

LANDING DATA

part 6

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LANDING DATA.

CROSSWIND LANDING.

(Figure A6-1)

Immediately after touchdown, directional control of the aircraft is primarily dependent upon the use of rudder since the nose-high attitude precludes the use of nose wheel steering or brakes. Consequently, the natural tendency of the aircraft to turn into a crosswind can best be overcome by touching down at a speed sufficient to provide an adequate flow of air over the tail surfaces. The aircraft should be rotated to a three point attitude as soon as possible after touchdown. The Crosswind Landing chart, figure A6-1, provides a convenient means of determining the minimum touchdown speed. Relative wind angle and velocity are represented by a series of arcs and radials emanating from the lower left corner of the chart. The heavy black line that slopes near vertically on the chart represents the aerodynamic rudder effectiveness at maximum deflection as a function of speed. By selecting a point on the chart at the intersection of a velocity arc and a direction radial, a known crosswind can be resolved into a headwind component and crosswind component on the scales at the left and bottom edges of the chart.

NOTE

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

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

Use Of The Chart.

The chart is used to determine the minimum touchdown speed in a given crosswind condition. This should then be compared with the recommended speeds for touchdown (V_{td}), which are tabulated on the Landing Distance charts. In all cases, the landing should be accomplished and the nose gear lowered as soon as possible. To read the chart, a point should be located which represents the

wind velocity (with gusts) and direction relative to the runway. This establishes a crosswind component of the wind which is the important factor in determining the minimum touchdown speed. If the located point is to the left of the heavy black line sloping across the chart, the minimum touchdown speed is determined by moving vertically downward from the point to the sloping line, then horizontally across to the speed scale at the right edge of the chart to read touchdown speed at which a crosswind landing is recommended. If the located point is to the right of the heavy black line and in the gray area, minimum touchdown speed is determined by moving vertically upward to the line, then horizontally across to the scale at the right edge of the chart to read touchdown speed at which a crosswind landing is recommended. The chart is also used to determine headwind component which is used when finding landing distances. When using the chart to read headwind component, a point is located which represents the wind velocity (without gusts) and the direction relative to the runway. Headwind component is then read by moving horizontally from the located point directly to the scale at the left.

Example.

GIVEN: runway heading 239° , wind direction 187° , wind velocity (with gusts) 16 knots, wind velocity (without gusts) 12 knots.

FIND: minimum touchdown speed and headwind component.

1. Select figure A6-1 for this problem and determine the relative wind angle by taking the difference between the runway heading and the wind direction:

$$239^{\circ} - 187^{\circ} = 52^{\circ}$$

2. Locate a point at the intersection of the 16-knot wind velocity arc and the 52° relative wind angle radial.

3. Move vertically upward from the point until the sloping line is intersected, then horizontally to the speed scale at the right and read 68 knots minimum touchdown speed.

4. Locate a point at the intersection of the 12-knot wind velocity arc and the 52° relative wind angle radial.

5. Moving horizontally to the left, from the located point, read headwind component of 7.5 knots.

LANDING DISTANCE.

(Figures A6-2 through A6-9)

Landing performance of the aircraft is expressed in terms of ground roll distance and the total distance required to approach over a 50-foot obstacle, touchdown and stop on

the runway. The data for normal landings are based on the use of a level, dry, hard-surface runway and must be corrected accordingly if the surface condition and gradient are otherwise. All landing performance is based on jet engines idling as a safety precaution should landing be aborted. For a brakes only landing, the idling jet power continues until the aircraft comes to a complete stop. When reverse thrust is employed to shorten the landing ground roll, the idling jet power exists only until the point when reverse thrust is applied when the nose gear makes ground contact. Should landing be accomplished with jets inoperative, landing data of this section is slightly conservative. Each chart is designed to illustrate the effect of variations in density altitude, gross weight, and wind upon the overall landing performance. Other factors affecting landing performance such as flaps setting, reverse thrust and landing technique (normal or assault) are covered by separate charts and are specified in the title. Six charts are supplied for normal landings with flaps set at the TAKEOFF, LAND, or UP (0°) position and with or without the use of reverse thrust. Assault landing charts, based on flap settings at LAND and the use of brakes and reverse thrust, are supplied. The essential differences between these charts and those for normal landing are the slower approach and touchdown speeds recommended.

NOTE

A slower approach speed is also recommended for assault landings, but has no direct effect on the landing distance. It is intended only to assist the pilot in passing the obstacle at the recommended speed.

The nose gear is lowered almost immediately after touchdown. Flaps remain unchanged throughout the landing roll. Each chart includes a table of stall, approach, obstacle clearance and touchdown speed at gross weights between 30,000 and 70,000 pounds. These speeds are based on a specified percentage of stall speed V_s which varies as a function of gross weight. For normal landings, the following percentages have been established:

V_s - zero thrust stall speed

V_{app} - approach speed $1.3V_s$ (flaps other than up)

- approach speed $1.25V_s$ (flaps up)

V_{50} - obstacle clearance speed; $1.2V_s$

V_{td} - touchdown speed; $1.1V_s$

For assault landings:

V_s - zero thrust stall speed

V_{app} - approach speed; $1.2V_s$

V_{50} - obstacle clearance speed; $1.2V_s$

V_{td} - touchdown speed; $1.05V_s$

NOTE

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

LANDING DISTANCE CORRECTIONS.**Effect Of Runway Condition Reading.**

(Figure A6-10)

Since the Landing Distance charts are based on the use of a dry, hard-surfaced runway, the ground roll portion of the landing distance may be expected to increase considerably when a slippery runway is encountered, due to less effective braking action. Figure A6-10, Variation Of Landing Ground Roll Distance With Runway Condition Reading, provides a means of correcting the landing ground roll to the existing runway braking conditions. Runway Condition Reading (RCR), as obtained from the weather forecast, may be applied directly to this chart. Should no RCR be available, the following typical readings may be used as a guide to determine an approximate runway condition reading.

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

Effect Of Runway Gradient.

(Figure A6-11)

When the landing runway is not level, the ground roll distance should be increased (downhill) or decreased (uphill) in accordance with the runway gradient (slope). This correction is applied graphically using A6-11, Effect Of Runway Gradient On Landing Ground Roll Distance. Since all of the other variables affecting landing performance are already included in the level ground run distance, the slope correction graph is valid for any landing configuration.

Effect Of Combined RCR And Runway Gradient.

(Figures A6-12, A6-13 and A6-14)

If the runway is either level or RCR is 23, the use of figures A6-10 or A6-11 is all that is required to account for gradient and RCR effects. However, if the runway is not level and RCR is other than 23, an additional correction factor is required. For Brakes Only landings this factor is contained on figure A6-12 for flaps land and figure A6-13 for flaps up or takeoff. Figure A6-14 presents the additional factor for Brakes and Reverse Thrust landings. No additional factor is required for uphill slopes, for Brakes and Reverse Thrust landings.

It should be noted that the order of application of correction factors for gradient and RCR, figures A6-10 and A6-11, to landing ground roll distances does not effect the accuracy of the results.

Use Of The Curves.

After the landing configuration has been decided upon and the possible necessity of performing an assault landing has been considered, the appropriate landing distance curve may be selected. From known or assumed temperature and

pressure altitude at the runway, a density altitude may be taken from the Density Altitude Curve, figure A1-3. Enter the Landing Distance curve at the required density altitude value along the left-hand edge, and proceed horizontally to the point of intersection with the landing gross weight line. The gross weight values are shown at 5,000-pound intervals; intermediate gross weights may be interpolated. By dropping vertically from the point of intersection, the level ground roll distance (no wind) may be read from the scale at the bottom of the curve. If a wind correction is required, continue reading downward, following the wind guide lines to the horizontal line representing the existing wind. Again a visual interpolation will probably be necessary. From this point, drop vertically downward and read level ground roll distance (with wind). If a 50-foot obstacle is to be cleared on approach, the total landing distance required, including the distance from the obstacle to the touchdown point must be known. This value is found by continuing to move vertically down to the appropriate wind line. Interpolation might be necessary. Horizontally to the left read the total landing distance over 50 feet.

If the runway is other than a dry, hard-surface runway, and a normal landing is planned, the level ground roll distance (with wind) must be corrected to the existing runway braking conditions. Refer to figure A6-10, and enter the chart with the appropriate RCR reading and proceed vertically upward to the plotted curve. Following from this point, horizontally to the scale at the left, read the landing distance factor. The corrected ground run distance is then determined by multiplying the factor by the level ground run distance (with wind).

In order to determine the ground roll required to stop the aircraft on a sloping runway, the level ground roll must be corrected by entering figure A6-11 at the left edge with level ground roll distance (with wind) corrected for RCR. Read horizontally across to the reference line in the center of the chart, then follow the guide lines establishing a tentative guide line. On the wing flap alignment grid below, establish the intersection of the runway gradient and wing flap setting and proceed vertically upward to the tentative guide line. The corrected ground roll distance is then determined by proceeding horizontally right to the distance scale. Total distance to land over a 50-foot obstacle on a sloping runway, exceeds the ground roll distance by the same amount as for a level runway. The entire procedure should be repeated using the "brakes only" curve to determine the landing distance which will be required should an engine failure occur enroute. For this case the landing ground roll, after accounting for RCR and runway gradient effects with figures A6-10 and A6-11, is multiplied by the additional correction factor from A6-12 or A6-13, depending on the flap setting. Note that when either RCR is 23 or runway gradient is 0%, the additional correction factor is 1.0.

Example.

GIVEN: gross weight 54,500 pounds, wet runway (ICAO Medium) (RCR = 12), 2% downhill slope, 10-knot headwind, brakes only for stopping, density altitude 1,400 feet, wing flaps LAND.

FIND: total landing distance, with and without headwind, stall speeds and recommended airspeeds for approach, obstacle clearance and touchdown. Landing is based on normal landing criteria.

1. Select figure A6-2 for this problem and enter the density altitude scale along the left edge of the chart with a density altitude of 1,400 feet.
2. Proceed horizontally right to the intersection with the 54,500-pound interpolated gross weight curve. Drop vertically to the level ground roll distance (no wind) scale and read 1,810 feet.
3. Move vertically down to the wind grid base line and proceed downward along or parallel to the headwind guide lines until the 10-knot line is intersected. Drop vertically from this point of intersection to the level ground roll distance scale (with wind) and read 1,450 feet.
4. At this point continue to drop vertically to the 10-knot headwind line, and horizontally left read a total distance over 50 feet of 2,220 feet.
5. The required speeds are found by interpolating those presented in the tabulation

Out of Ground Effect

$V_s = 84$ knots

$V_{app} = 108$ knots

$V_{50} = 100$ knots

In Ground Effect

$V_s = 77$ knots

$V_{td} = 85$ knots

6. Referring to figure A6-10, Variation Of Landing Ground Roll With Runway Condition Reading, and enter the chart at the bottom with an RCR of 12. Move vertically above to the brakes only curve, and horizontally left and read a landing distance correction factor for RCR of 1.48.

7. Multiply the ground roll distance of 1,450 (with wind) by the correction factor of 1.48 for RCR and determine the ground roll distance of 2,150 feet including the effect of the braking conditions.

8. Refer to figure A6-11, Effect Of Runway Gradient On Landing Ground Roll Distance and enter the distance scale at the left with the ground roll distance of 2,150 feet corrected for wind and RCR. Project horizontally across to the reference line at the center of the chart and follow the guide lines establishing a tentative guide line.

9. Locate the intersection of the wing flap setting and the runway gradient on the wing flap alignment grid on the

bottom of the chart and project vertically upward to intersect the tentative guide line.

10. Proceed horizontally right and read a landing ground roll distance corrected for wind, RCR and runway slope of 2,380 feet.

11. Referring to figure A6-12, additional Variation Of Landing Ground Roll Due To Combined RCR And Runway Gradient Effects, and enter the runway gradient scale at the left with a downhill gradient of 2%. Project horizontally across to an interpolated line for RCR 12. Proceeding vertically downward from this intersection read 1.044 as the Additional Landing Distance Factor.

12. The corrected ground roll distance then is the ground roll from step 10 multiplied by the factors from step 11, or $1.044 \times 2,380 = 2,490$ feet.

13. Determine the air distance by subtracting the ground roll distance (with wind) from the total distance over 50 feet (with wind):

$$\text{Air Distance} = 2,220 \text{ feet} - 1,450 \text{ feet} = 770 \text{ feet}$$

14. The air distance is then added to the ground roll distance corrected for wind, RCR and slope to determine the corrected total landing distance over 50 feet.

$$\text{Corrected Total Distance} = 2,490 \text{ feet} + 770 \text{ feet} = 3,260 \text{ feet.}$$

INCREMENTAL LANDING GROUND ROLL.
(Figure A6-13)

The Incremental Landing Ground Roll chart, figure A6-13, provides a means of determining the landing ground roll when the landing speed is greater than that tabulated on the appropriate landing distance chart. Such would be the case when the minimum touchdown speed from the Crosswind Landing chart exceeds the touchdown speed given in the Landing Distance chart. The chart provides the increase in ground roll resulting from increasing the touchdown speed. Adding this increment to the ground roll from the appropriate landing distance chart results in the correct total ground roll. The chart applies to landings with or without reverse thrust and as is true for all landings in this section, jets are set at idle. In addition to touchdown speed, the effects of gross weight, wind, altitude and flap deflection are included.

Use Of The Chart.

From the appropriate landing distance chart determine level ground roll distance based on recommended landing speed, as explained in the landing distance text. Next, enter the Incremental Landing Ground Roll chart with the predicted touchdown speed and accounting for flap setting, gross weight, wind and altitude effects, obtain the increase in ground roll. Adding this increase to the level ground roll distance from the landing distance chart results in the total

landing distance required for landing on a level runway with an RCR of 23, at the predicted touchdown speed. When required this ground roll distance is next corrected for gradient, RCR and their combined effects through the use of appropriate correction charts, as explained previously in the Landing Distance Corrections text.

Example.

GIVEN: predicted touchdown speed 107 KIAS, flap setting TAKEOFF, gross weight 55,000 pounds, 10-knot headwind, and 3,000 feet density altitude, wet runway (ICAO Medium) (RCR = 12), 1% downhill gradient and brakes only for stopping.

FIND: Ground Roll.

1. Since this is a brakes only landing with TAKEOFF flap setting, select figure A6-4 and read a ground roll of 2,050 feet and total distance over 50 feet of 3,300 feet.

2. Refer to figure A6-15 and enter with the predicted touchdown speed (107 KIAS) and proceed horizontally to the right to the TAKEOFF flap setting line.

3. Proceed vertically upward to an intersection with a horizontal line at 55,000 pounds gross weight and follow the guide lines from this intersection to the reference line.

4. Move vertically upward to an interpolated line for 55,000 pounds gross weight.

5. Proceed horizontally to the right to the reference line for winds and follow the solid guide line to 10 knots headwind.

6. Continue the horizontal movement to the right to the altitude block reference line and follow the guide lines to 3,000 feet density altitude.

7. Again moving horizontally to the right, intersect the TAKEOFF flap line and proceed vertically downward and read an incremental landing ground roll of 900 feet.

8. Adding the 900 feet to the step 1 ground roll of 2,050 feet results in a total ground roll of 2,950 feet.

9. Refer to figure A6-10 and obtain, for RCR = 12, a landing distance correction factor of 1.48.

10. Multiply 2,950 feet from step 8 by the factor of 1.48 for a total ground roll corrected for RCR of 4,370 feet.

11. Referring to figure A6-11, enter with 4,370 feet, and read a corrected landing ground roll of 4,670 feet for a 1% downhill gradient.

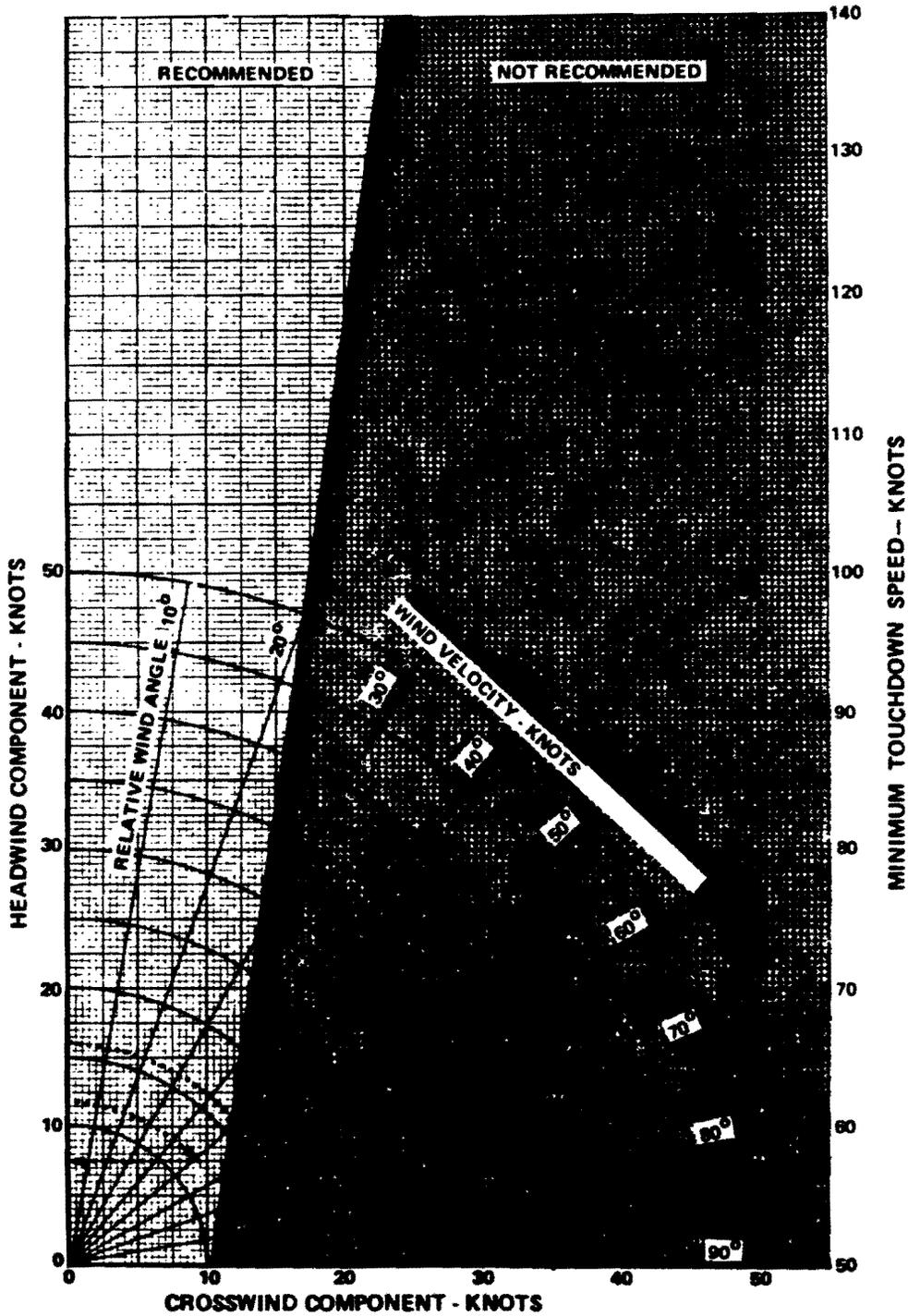
12. The final correction needed to account for gradient and RCR effects is the additional landing ground roll factor. Select figure A6-13 and read a factor of 1.03.

13. Multiply the ground roll from step 11 by the factor from step 12 for a totally corrected ground roll of 4,670 x 1.03 = 4,810 feet.

14. The total distance over 50 feet for this landing is determined by obtaining the air distance from step 1: Air distance = 3,300 feet - 2,050 feet = 1,250 feet. The air distance is then added to the corrected landing ground roll for a total distance over 50 feet = 4,810 feet + 1,250 feet = 6,060 feet.

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

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



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

Figure A6-1.

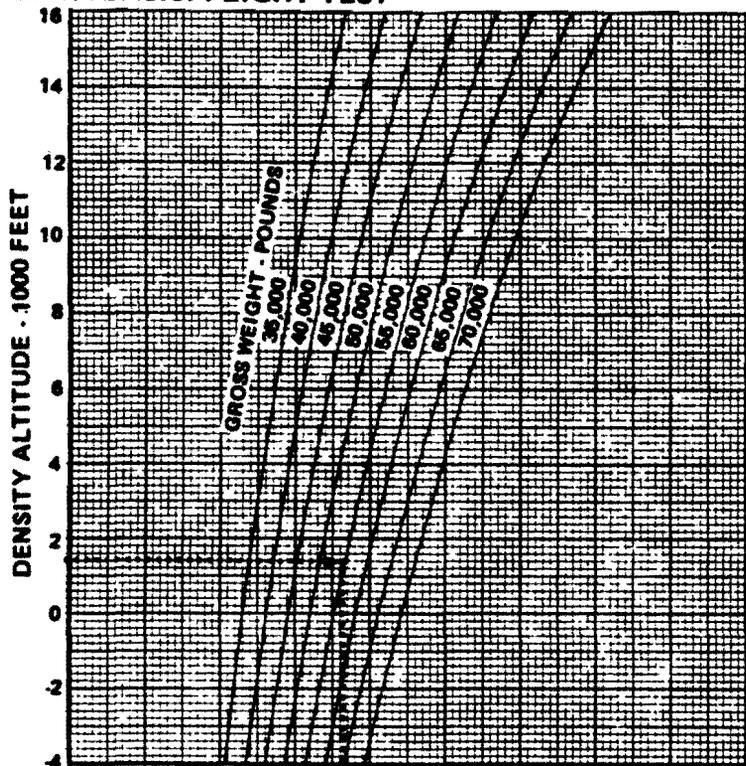
MODEL: C-123K, UC-123K
LANDING DISTANCE - WING FLAPS LAND
 BRAKES ONLY

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

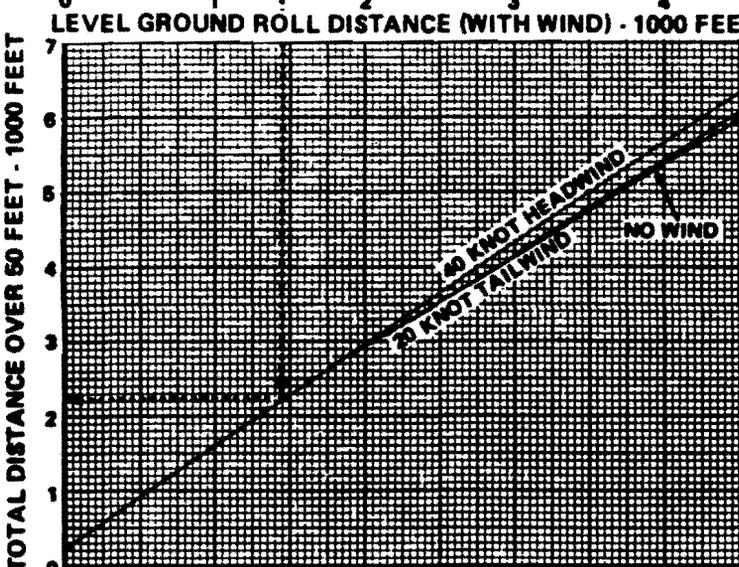
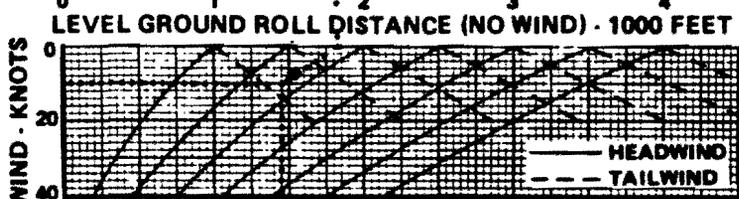
DATA AS OF: SEPTEMBER 15, 1973
 DATA BASIS: FLIGHT TEST

PROPELLERS: 43E60-607
 JET ENGINES IDLING

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



GROSS WEIGHT POUNDS	IAS KNOTS				
	IN GROUND EFFECT		OUT OF GROUND EFFECT		
	V _s	V _{td}	V _{app}	V ₅₀	V _s
30,000	56	61	81	75	65
35,000	60	67	87	81	69
40,000	65	72	92	86	73
45,000	69	77	98	91	77
50,000	73	81	103	95	80
55,000	77	85	108	100	84
60,000	81	89	113	104	87
65,000	84	93	117	108	91
70,000	87	97	121	112	94



CONDITIONS:

1. Level, dry, hard surface runway.
 μ rolling = 0.025, RCR = 23
2. V_s = zero thrust stall speed
 V_{app} = approach speed = 1.3 V_s
 V₅₀ = Obstacle clearance speed = 1.2 V_s
 V_{td} = touchdown speed = 1.1 V_s
3. Upon touchdown, rotate to a three point attitude as soon as possible.
4. J85-GE-17 engines - idling until V = 0

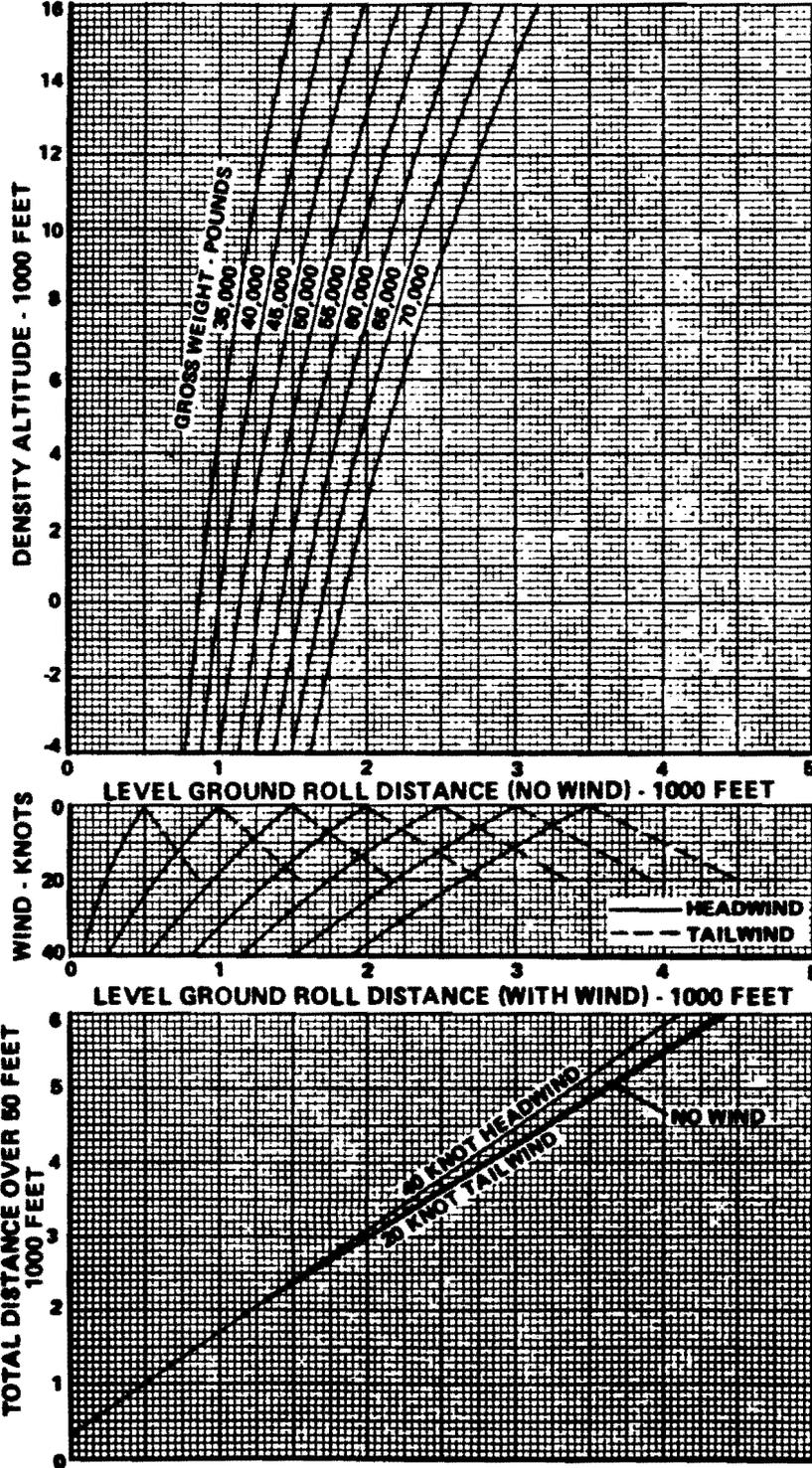
Figure A6-2.

MODEL: C-123K, UC-123K
LANDING DISTANCE - WING FLAPS LAND
 BRAKES AND REVERSE THRUST
 ENGINES: R2800-99W (2), J85-GE-17 (2)

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

PROPELLERS: 43E60-607
 JET ENGINES IDLING

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



GROSS WEIGHT POUNDS	IAS KNOTS				
	IN GROUND EFFECT		OUT OF GROUND EFFECT		
	V _s	V _{td}	V _{app}	V ₅₀	V _s
30,000	56	61	81	75	65
35,000	60	67	87	81	69
40,000	65	72	92	86	73
45,000	69	77	98	91	77
50,000	73	81	103	95	80
55,000	77	85	108	100	84
60,000	81	89	113	104	87
65,000	84	93	117	108	91
70,000	87	97	121	112	94

CONDITIONS:

1. Level, dry, hard surface runway, μ rolling = 0.025, RCR = 23
2. V_s = zero thrust stall speed
 V_{app} = approach speed = 1.3 V_s
 V₅₀ = Obstacle clearance speed = 1.2 V_s
 V_{td} = touchdown speed = 1.1 V_s
3. Upon touchdown, rotates to a three point attitude as soon as possible.
4. J85-GE-17 engines - idling until nose gear makes ground contact, then inoperative.
5. Full reverse thrust is applied when nose gear makes ground contact

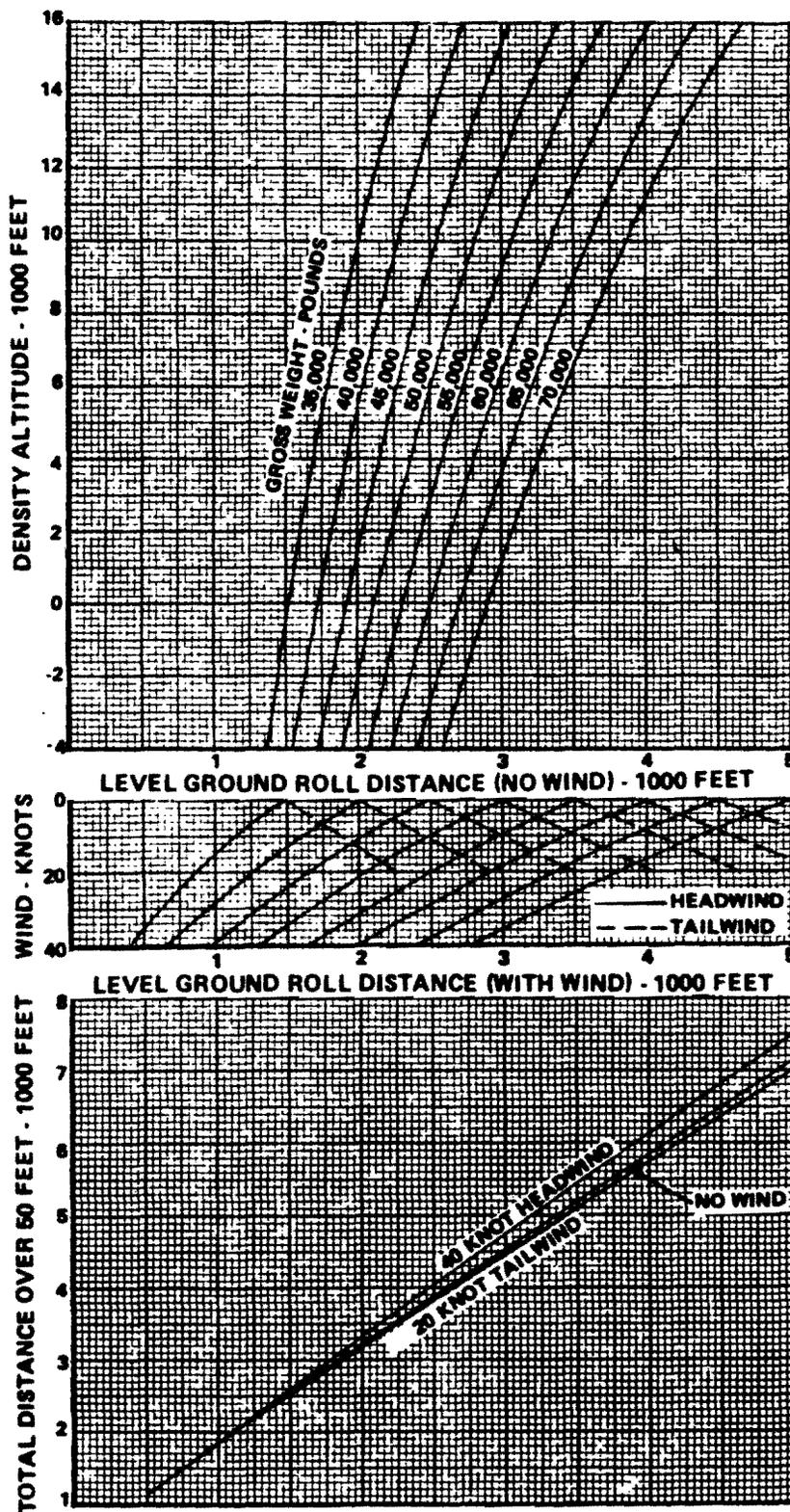
Figure A6-3.

MODEL: C-123K, UC-123K
LANDING DISTANCE - WING FLAPS TAKEOFF
 BRAKES ONLY

ENGINES: R2800-99W (2), J85-GE-17 (2)
 PROPELLERS: 43E60-607
 JET ENGINES IDLING

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

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



GROSS WEIGHT POUNDS	IAS KNOTS				
	IN GROUND EFFECT		OUT OF GROUND EFFECT		
	V _s	V _{td}	V _{app}	V ₅₀	V _s
30,000	60	67	85	79	67
35,000	65	73	92	85	72
40,000	70	78	98	91	76
45,000	75	83	104	96	81
50,000	79	88	110	101	85
55,000	83	92	115	106	89
60,000	87	96	120	111	93
65,000	91	101	125	116	96
70,000	95	105	130	120	100

CONDITIONS:

- Level, dry, hard surface runway.
 $\mu_{rolling} = 0.025$, RCR = 23
- V_s = zero thrust stall speed
 V_{app} = approach speed = 1.3 V_s
 V₅₀ = Obstacle clearance speed = 1.2 V_s
 V_{td} = touchdown speed = 1.1 V_s
- Upon touchdown, rotate to a three point attitude as soon as possible.
- J85-GE-17 engines - idling until V = 0

Figure A6-4.

MODEL: C-123K, UC-123K
LANDING DISTANCE - WING FLAPS TAKEOFF

BRAKES AND REVERSE THRUST

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

PROPELLERS: 43E60-607

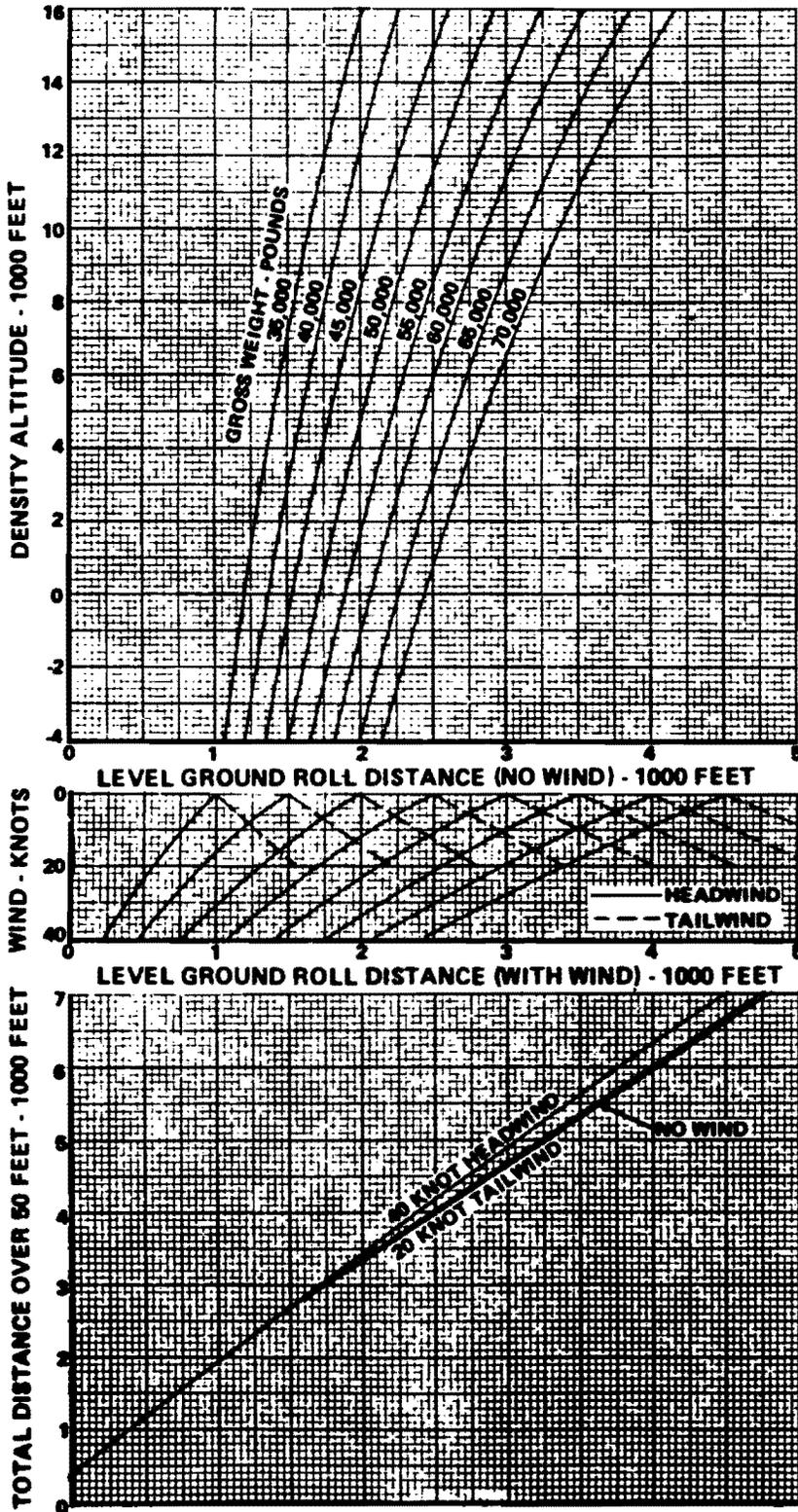
JET ENGINES IDLING

DATA AS OF: SEPTEMBER 15, 1973

DATA BASIS: FLIGHT TEST

FUEL GRADE: 100/130

FUEL DENSITY: 6 LB/GAL



GROSS WEIGHT POUNDS	IAS KNOTS				
	IN GROUND EFFECT		OUT OF GROUND EFFECT		
	V _s	V _{td}	V _{app}	V ₅₀	V _s
30,000	60	67	85	79	67
35,000	65	73	92	85	72
40,000	70	78	98	91	76
45,000	75	83	104	96	81
50,000	79	88	110	101	85
55,000	83	92	115	106	89
60,000	87	96	120	111	93
65,000	91	101	125	116	96
70,000	95	105	130	120	100

CONDITIONS:

- Level, dry, hard surface runway.
 μ rolling = 0.025, RCR = 23
- V_s = zero thrust stall speed
 V_{app} = approach speed = 1.3 V_s
 V₅₀ = obstacle clearance speed = 1.2 V_s
 V_{td} = touchdown speed = 1.1 V_s
- Upon touchdown, rotate to a three point attitude as soon as possible.
- J85-GE-17 engines - idling until nose gear makes ground contact, then inoperative.
- Full reverse thrust is applied when nose gear makes ground contact

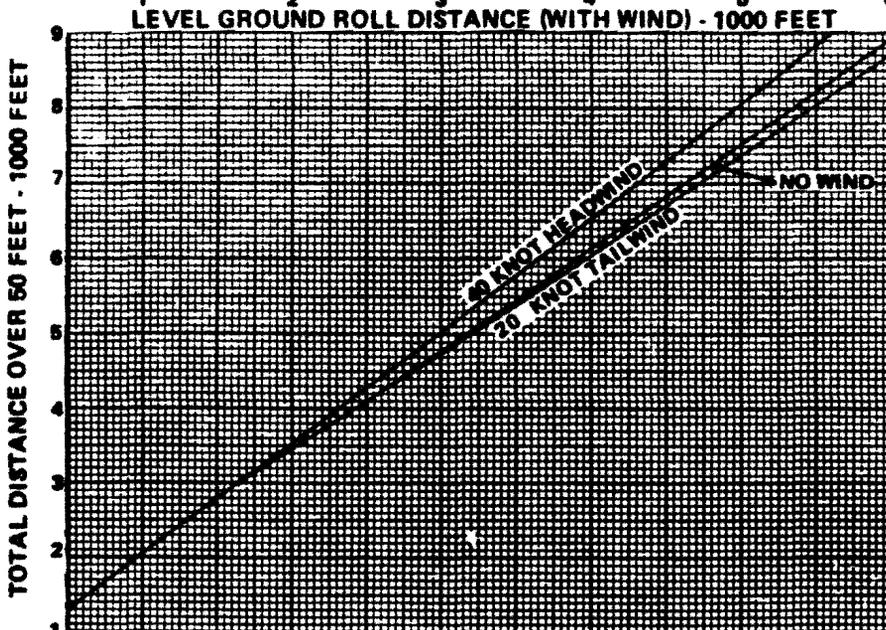
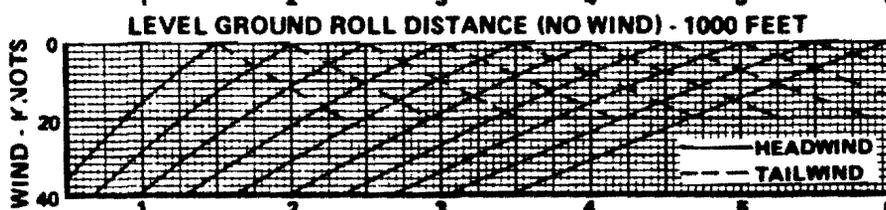
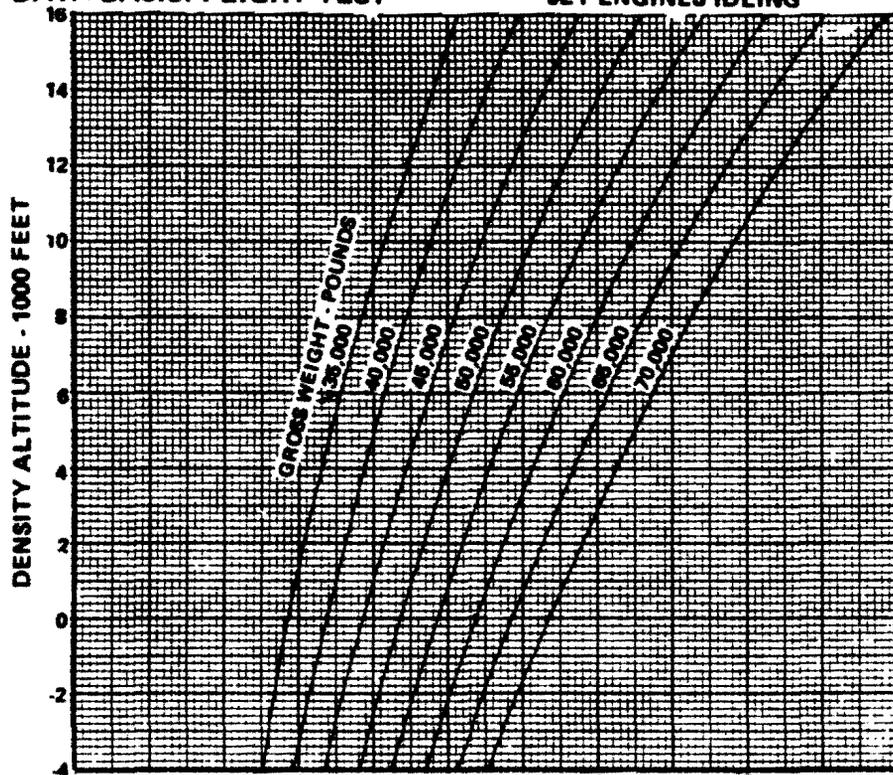
Figure A6-5.

MODEL: C-123K, UC-123K
LANDING DISTANCE - WING FLAPS UP
 BRAKES ONLY

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

ENGINES: R2800-99W (2), J85-GE-17 (2)
 PROPELLERS: 43E60-607
 JET ENGINES IDLING

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



GROSS WEIGHT POUNDS	IAS KNOTS				
	IN GROUND EFFECT		OUT OF GROUND EFFECT		
	V _s	V _{td}	V _{app}	V ₅₀	V _s
30,000	67	74	90	87	73
35,000	73	81	97	94	79
40,000	78	86	104	100	84
45,000	83	92	111	106	89
50,000	88	97	116	112	93
55,000	93	102	122	117	97
60,000	97	107	128	123	102
65,000	101	112	133	128	106
70,000	105	116	138	133	110

CONDITIONS:

- Level, dry, hard surface runway.
 μ rolling = 0.025, RCR = 23
- V_s = zero thrust stall speed
 V_{app} = approach speed = 1.25 V_s
 V₅₀ = obstacle clearance speed = 1.2 V_s
 V_{td} = touchdown speed = 1.1 V_s
- Upon touchdown, rotate to a three point attitude as soon as possible.
- J85-GE-17 engines - idling until V = 0

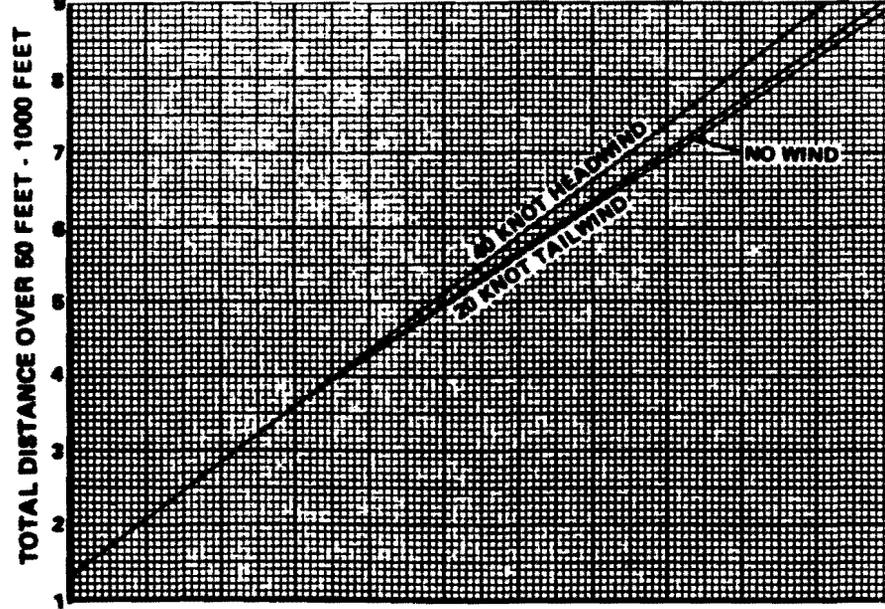
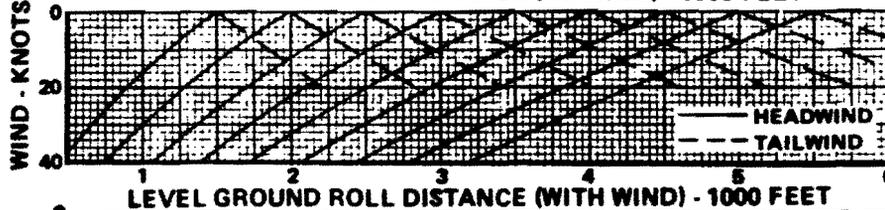
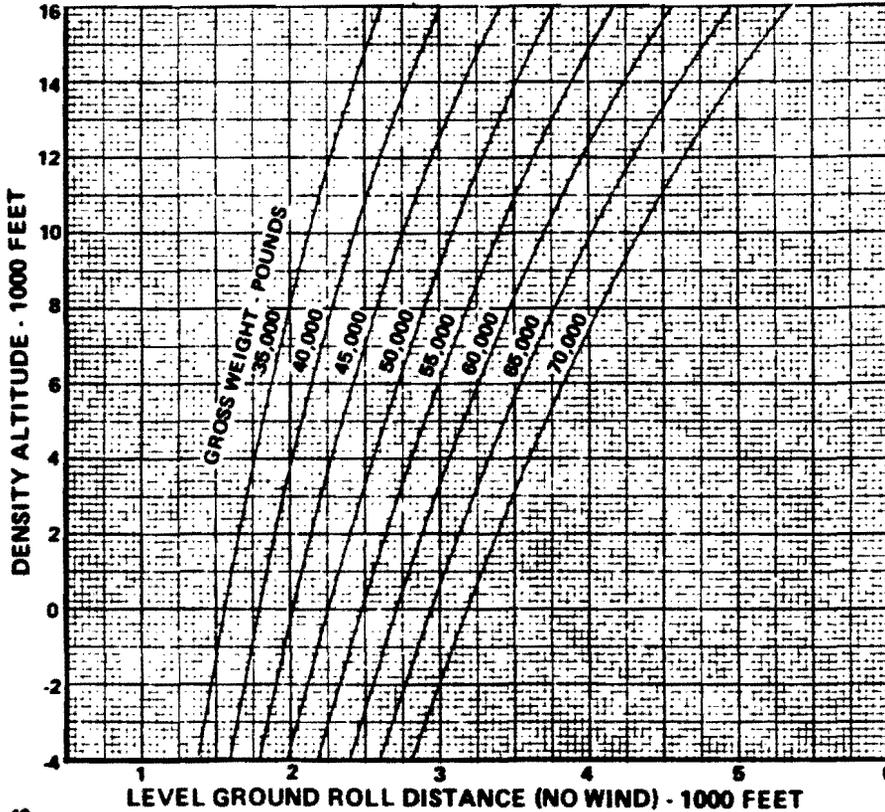
Figure A6-6

MODEL: C-123K, UC-123K
LANDING DISTANCE - WING FLAPS UP
 BRAKES AND REVERSE THRUST

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

ENGINES: R2800-99W (2), J85-GE-17 (2)
 PROPELLERS: 43E60-607
 JET ENGINES IDLING

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



GROSS WEIGHT POUNDS	IAS KNOTS				
	IN GROUND EFFECT		OUT OF GROUND EFFECT		
	V _s	V _{td}	V _{app}	V ₅₀	V _s
30,000	67	74	90	87	73
35,000	73	81	97	94	79
40,000	78	86	104	100	84
45,000	83	92	111	106	89
50,000	88	97	116	112	93
55,000	93	102	122	117	97
60,000	97	107	128	123	102
65,000	101	112	133	128	106
70,000	105	116	138	133	110

CONDITIONS:

- Level, dry, hard surface runway, μ rolling = 0.025, RCR = 23
- V_s = zero thrust stall speed
 V_{app} = approach speed = 1.25 V_s
 V₅₀ = obstacle clearance speed = 1.2 V_s
 V_{td} = touchdown speed = 1.1 V_s
- Upon touchdown, rotate to a three point attitude as soon as possible.
- J85-GE-17 engines - idling until nose gear makes ground contact, then inoperative.
- Full reverse thrust is applied when nose gear makes ground contact

Figure A6-7.

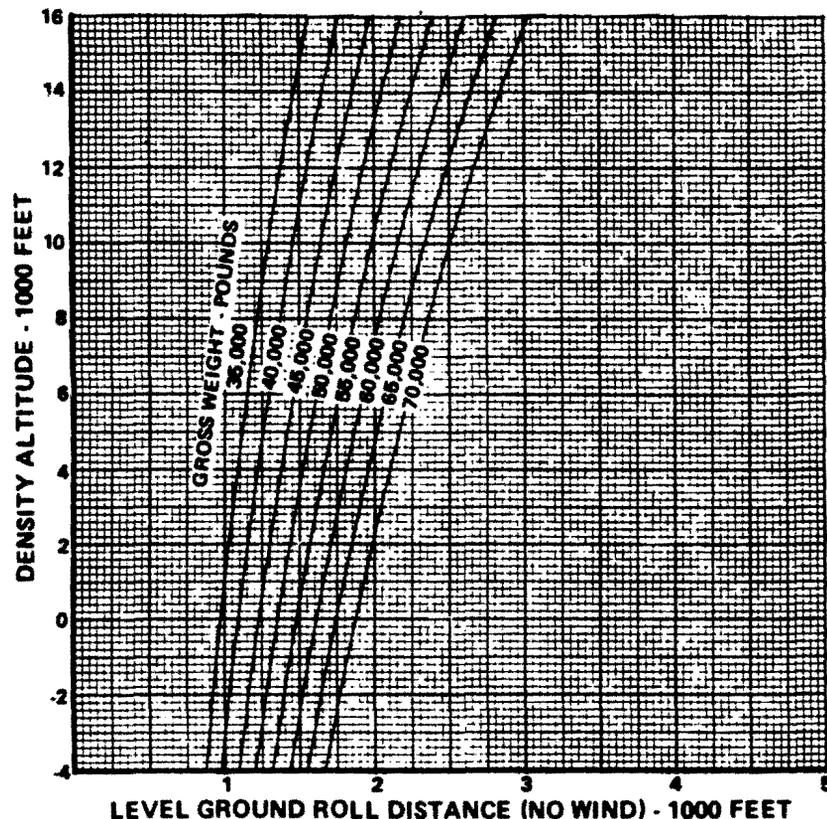
MODEL: C-123K, UC-123K
ASSAULT LANDING DISTANCE - WING FLAPS LAND

BRAKES ONLY

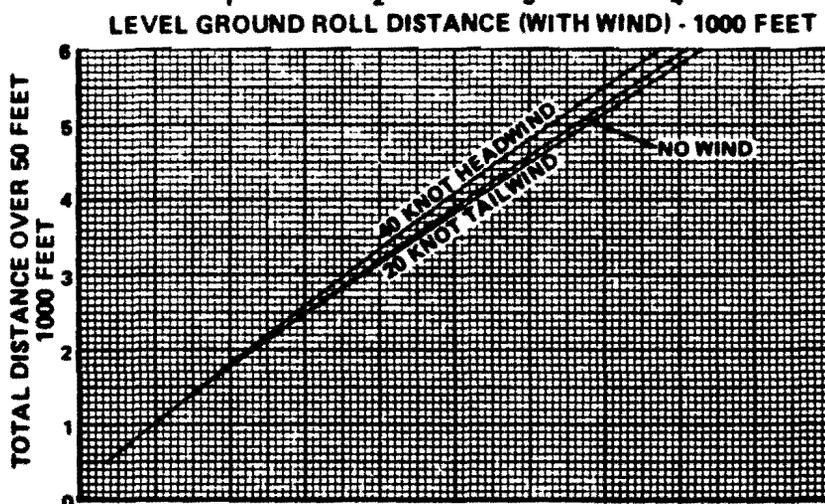
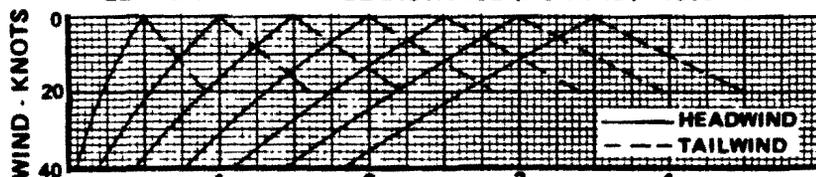
DATA AS OF: SEPTEMBER 15, 1973
 DATA BASIS: FLIGHT TEST

ENGINES: R2800-99W (2), J85-GE-17 (2)
 PROPELLERS: 43E60-607
 JET ENGINES IDLING

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



GROSS WEIGHT POUNDS	IAS KNOTS				
	IN GROUND EFFECT		OUT OF GROUND EFFECT		
	V _s	V _{td}	V _{app}	V ₅₀	V _s
30,000	55	58	75	75	64
35,000	60	63	80	80	68
40,000	64	68	85	85	72
45,000	68	72	90	90	76
50,000	72	76	94	94	80
55,000	76	80	99	99	84
60,000	80	84	103	103	87
65,000	83	88	107	107	90
70,000	87	91	111	111	93



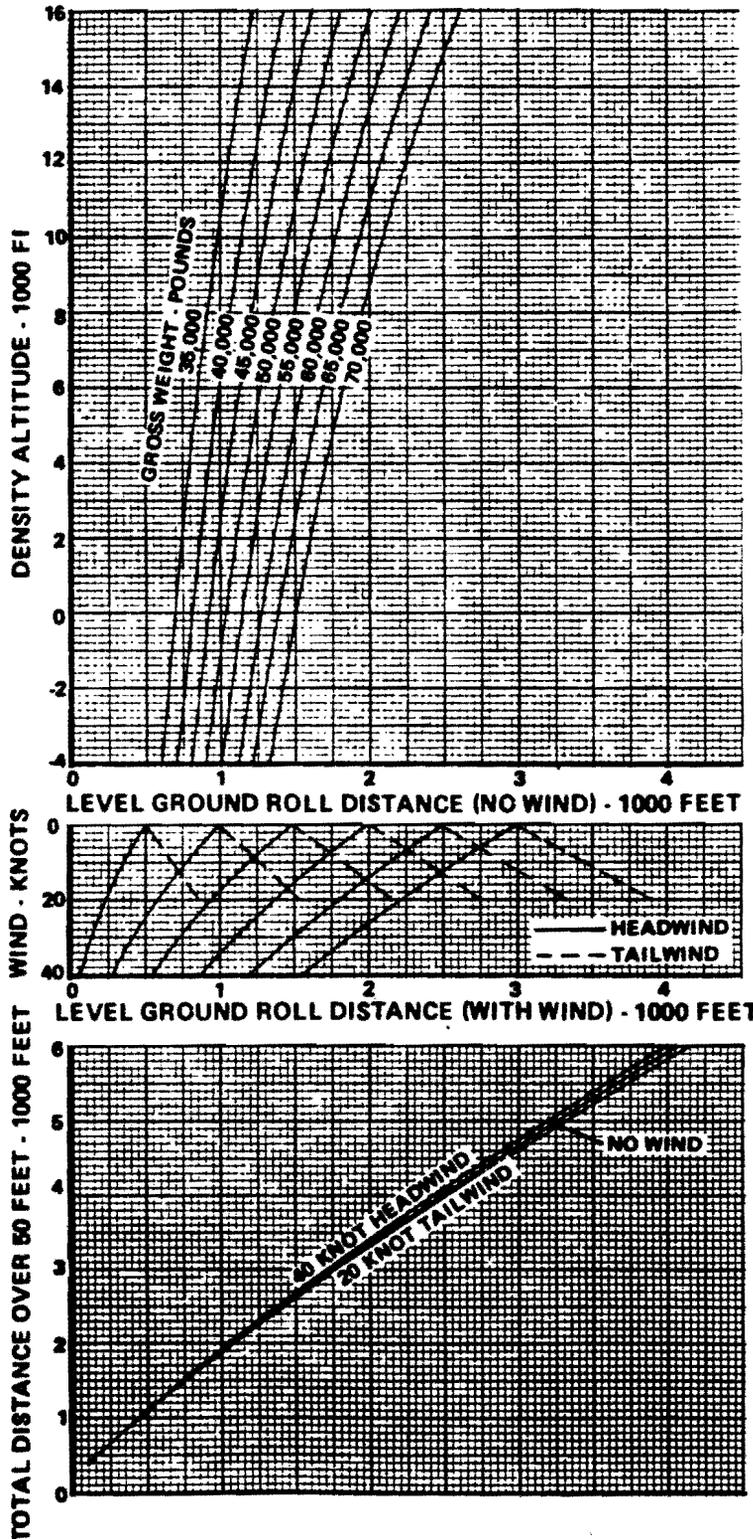
CONDITIONS:

- Level, dry, hard surface runway.
 μ rolling = 0.025, RCR = 23
- V_s = zero thrust stall speed
 V_{app} = approach speed = 1.2 V_s
 V₅₀ = obstacle clearance speed = 1.2 V_s
 V_{td} = touchdown speed = 1.05 V_s
- Upon touchdown, rotate to a three point attitude as soon as possible.
- J85-GE-17 engines - idling until V = 0

Figure A6-8.

MODEL: C-123K, UC-123K
ASSAULT LANDING DISTANCE - WING FLAPS LAND
BRAKES AND REVERSE THRUST

DATA AS OF: SEPTEMBER 15, 1973
 DATA BASIS: FLIGHT TEST
 ENGINES: R2800-99W (2), J85-GE-17 (2)
 PROPPELLERS: 43E60-607
 JET ENGINES IDLING
 FUEL GRADE: 100/130
 FUEL DENSITY: 6 LB/GAL



GROSS WEIGHT POUNDS	IAS KNOTS				
	IN GROUND EFFECT		OUT OF GROUND EFFECT		
	V _s	V _{td}	V _{app}	V ₅₀	V _s
30,000	55	58	75	75	64
35,000	60	63	80	80	68
40,000	64	68	85	85	72
45,000	68	72	90	90	76
50,000	72	76	94	94	80
55,000	76	80	99	99	84
60,000	80	84	103	103	87
65,000	83	88	107	107	90
70,000	87	91	111	111	93

CONDITIONS:

- Level, dry, hard surface runway.
 μ rolling = 0.025, RCR = 23
- V_s = zero thrust stall speed
 V_{app} = approach speed = 1.2 V_s
 V₅₀ = obstacle clearance speed = 1.2 V_s
 V_{td} = touchdown speed = 1.05 V_s
- Upon touchdown, rotate to a three point attitude as soon as possible.
- J85-GE-17 engines - idling until nose gear makes ground contact, then inoperative.
- Full reverse thrust is applied when nose gear makes ground contact.

Figure A6-9.

MODEL: C-123K, UC-123K
**VARIATION OF LANDING GROUND ROLL DISTANCE
 WITH RUNWAY CONDITION READING (RCR)**

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

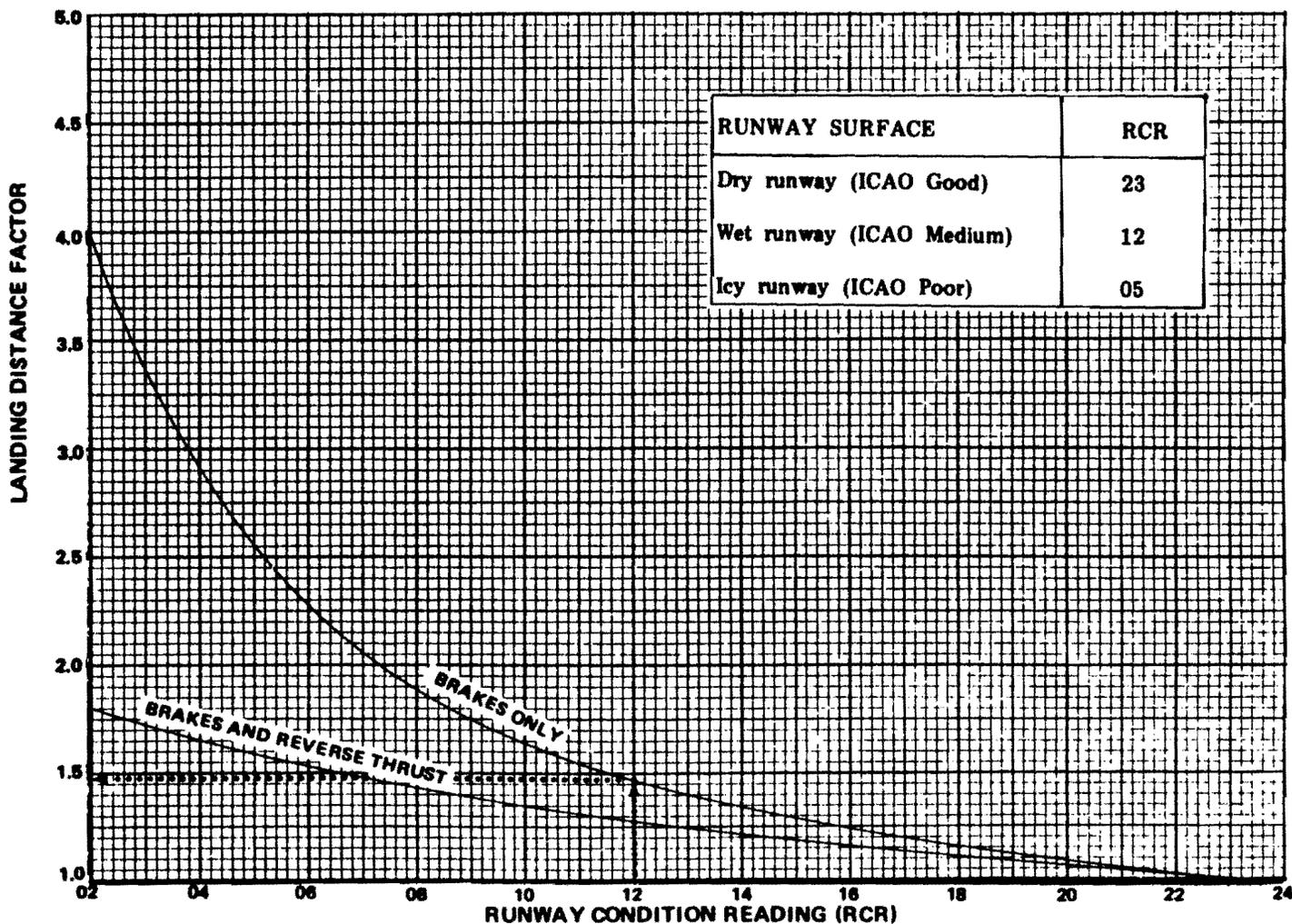


Figure A6-10.

Change 10

A6-15

MODEL: C-123K, UC-123K

EFFECT OF RUNWAY GRADIENT ON LANDING GROUND ROLL DISTANCE

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

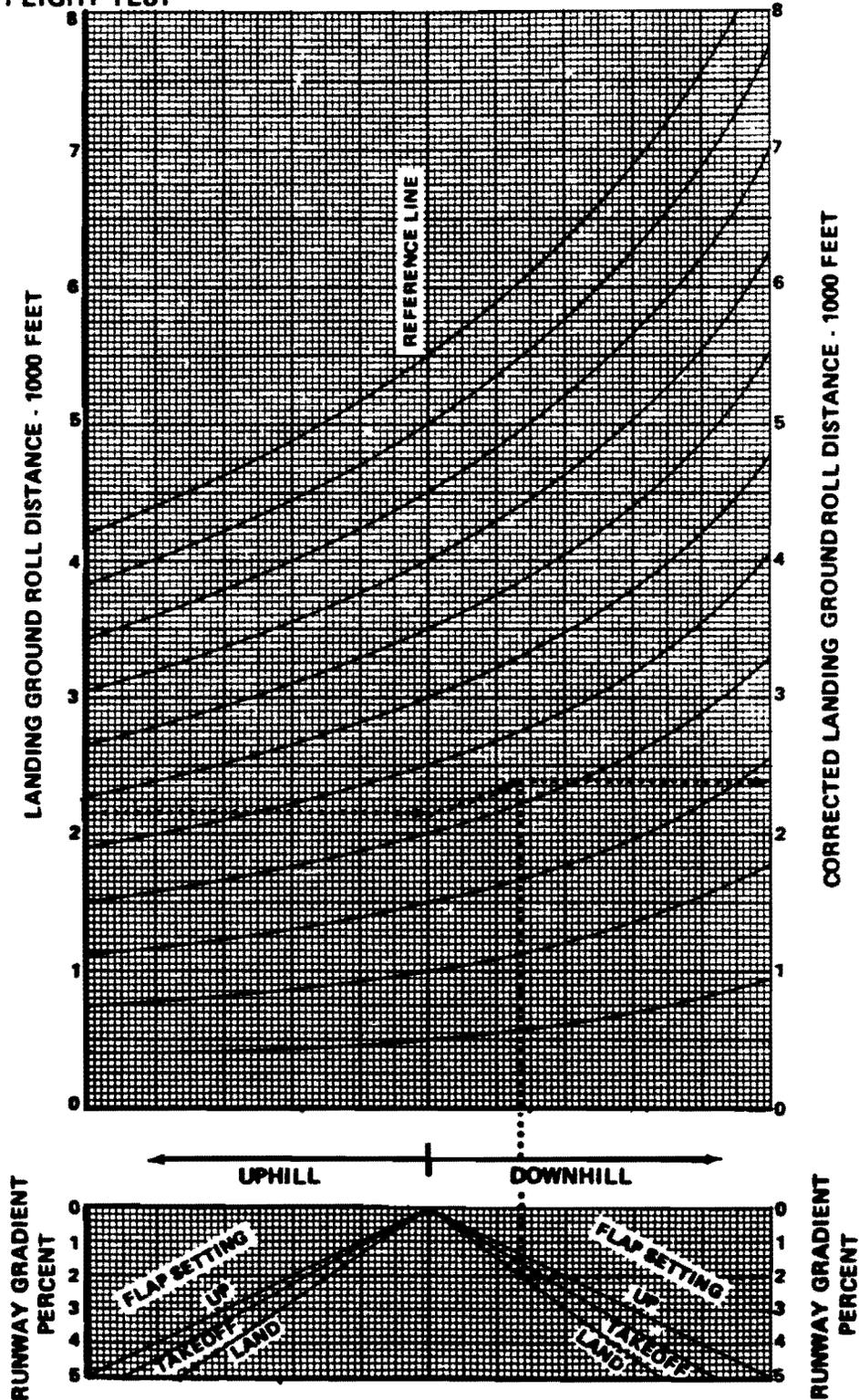


Figure A6-11.

MODEL: C-123K, UC-123K
ADDITIONAL VARIATION OF LANDING GROUND ROLL
DUE TO COMBINED RCR AND RUNWAY GRADIENT EFFECTS
FLAPS: LAND
BRAKES ONLY

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

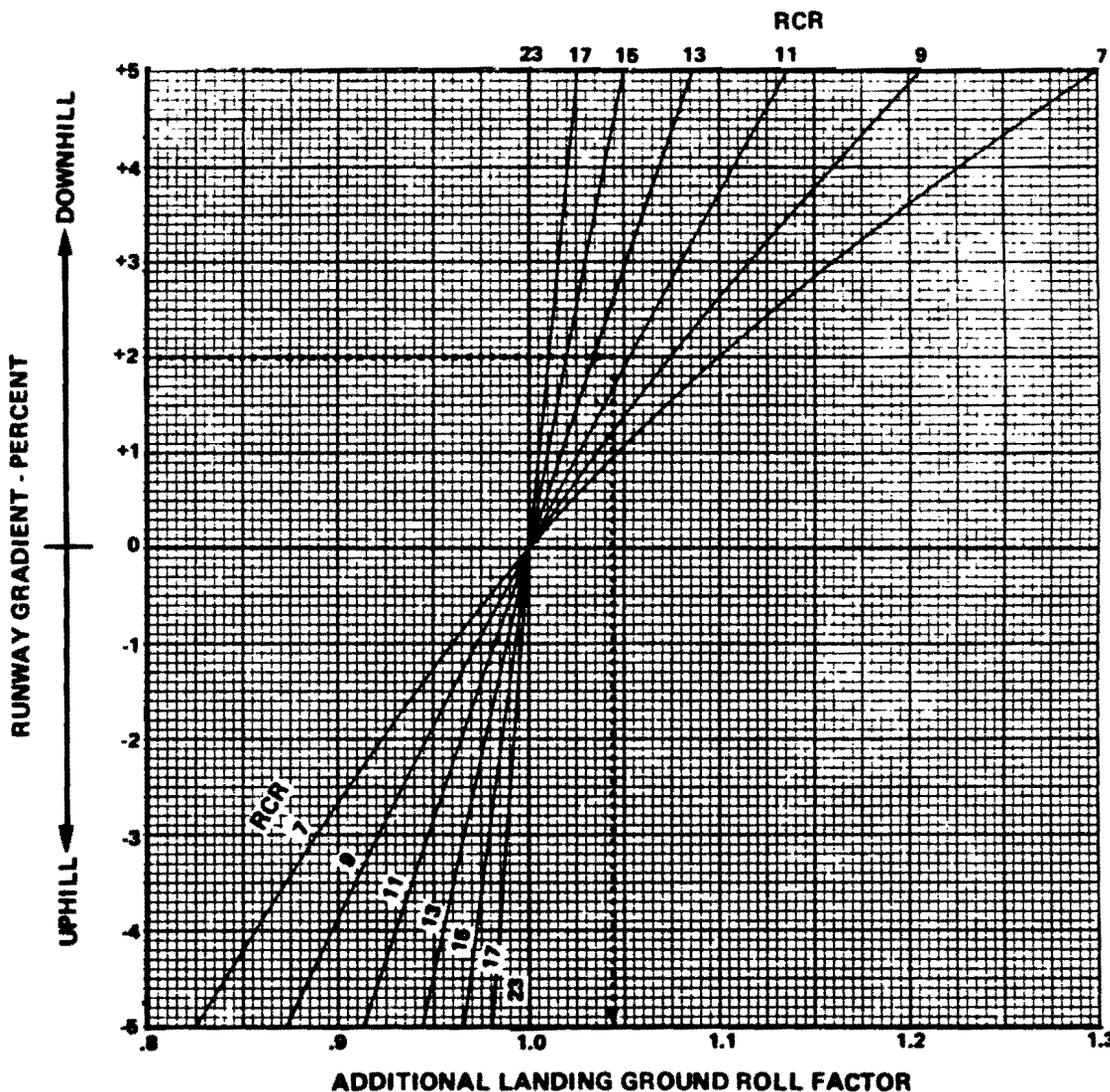


Figure A6-12

MODEL: C-123K, UC-123K
ADDITIONAL VARIATION OF LANDING GROUND ROLL
DUE TO COMBINED RCR AND RUNWAY GRADIENT EFFECTS
FLAPS: UP AND TAKEOFF
BRAKES ONLY

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

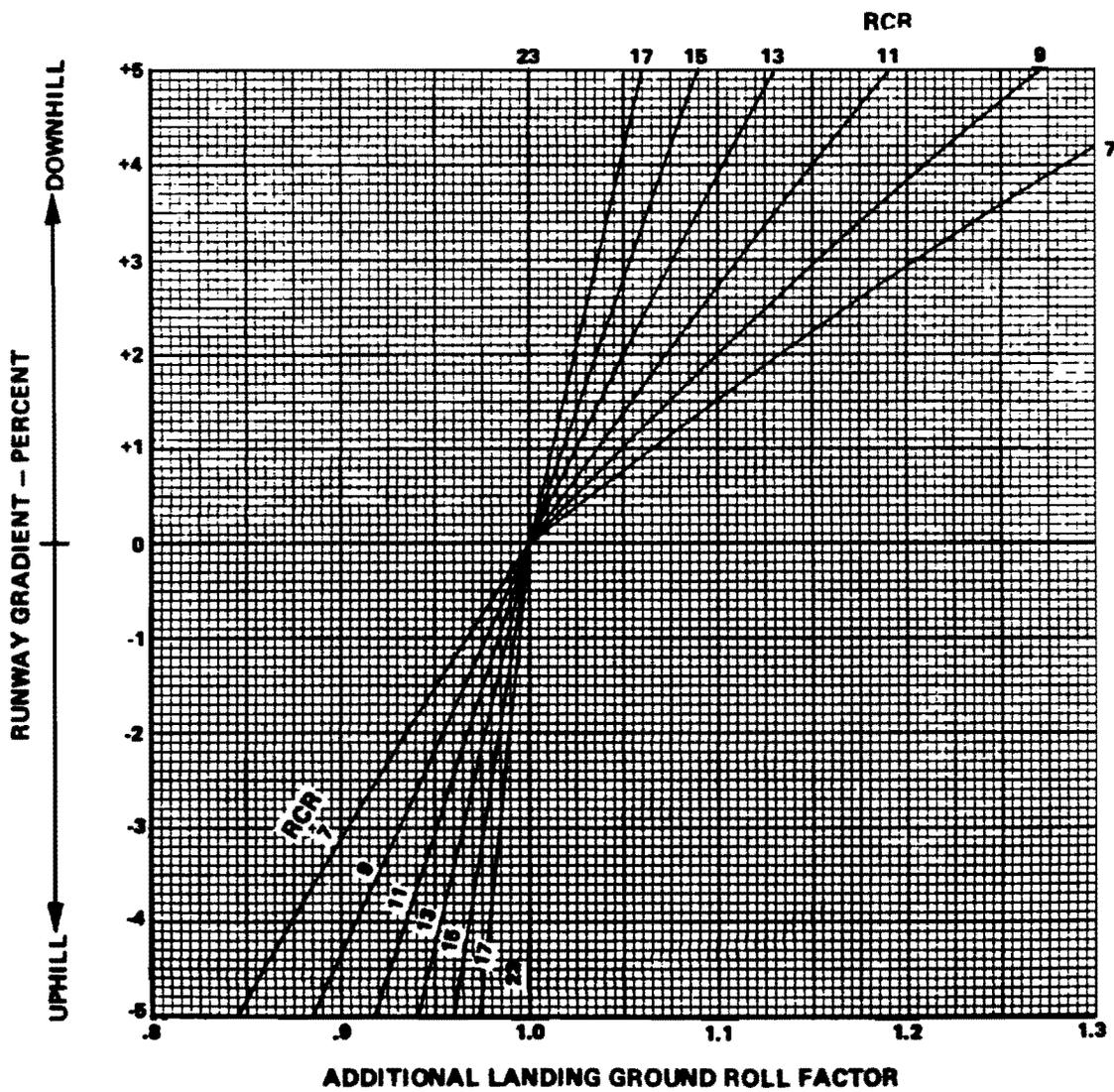


Figure A6-13.

MODEL: C-123K, UC-123K
 ADDITIONAL VARIATION OF LANDING GROUND ROLL
 DUE TO COMBINED RCR AND RUNWAY GRADIENT EFFECTS
 BRAKES AND REVERSE THRUST

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

NOTE:

No additional factor is required for uphill runway gradient

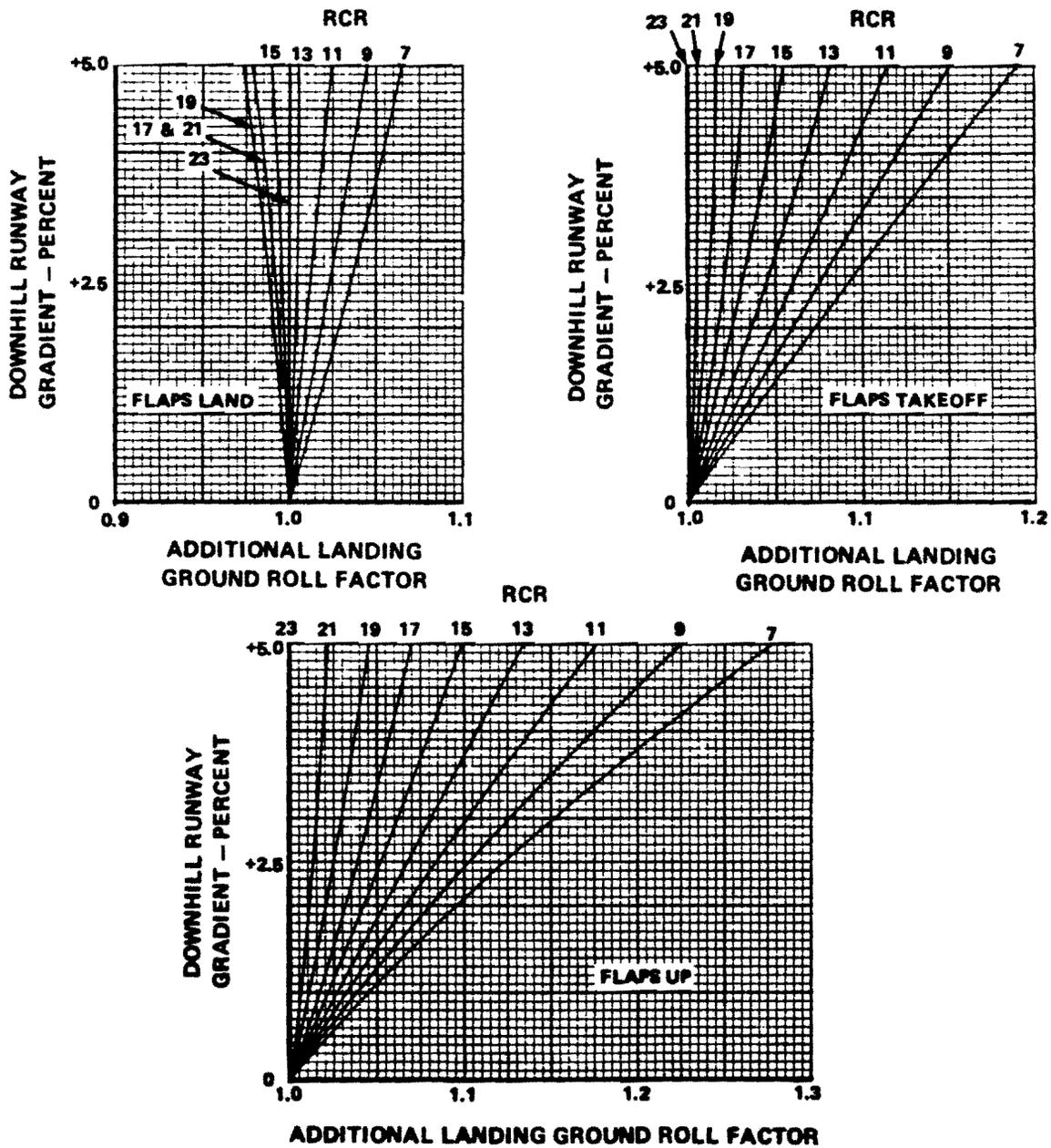


Figure A6-14.

MODEL: C-123K, UC-123K

INCREMENTAL LANDING GROUND ROLL

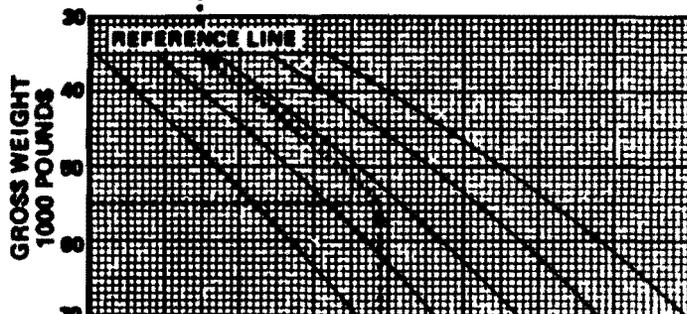
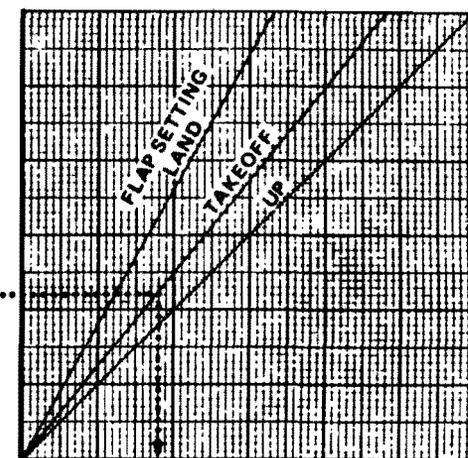
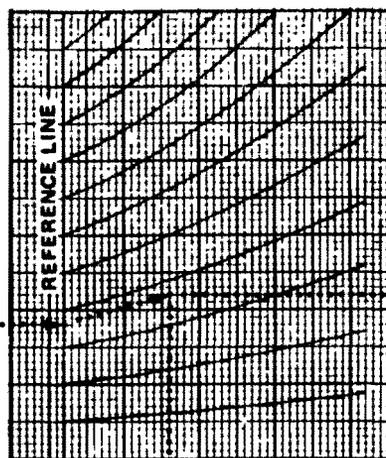
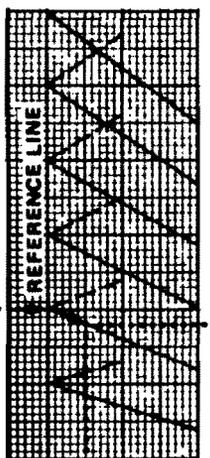
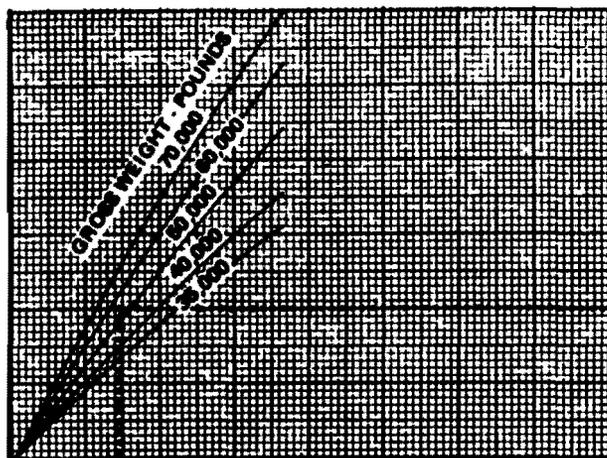
REQUIRED FOR LANDING AT GREATER THAN RECOMMENDED TOUCHDOWN SPEED

DATA AS OF: SEPTEMBER 15, 1973

DATA BASIS: FLIGHT TEST

FUEL GRADE: 100/130

FUEL DENSITY: 6 LB/GAL



WIND - KNOTS

DENSITY ALTITUDE - 1000 FEET

INCREMENTAL LANDING GROUND ROLL - 1000 FEET

— HEADWIND
 - - - TAILWIND

CONDITIONS:

1. Jets at idle
2. Valid for both brakes only and brakes and reverse thrust landings.

Figure A6-15.

MISSION PLANNING

part 7

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MISSION PLANNING.

GENERAL RADIUS MISSION.

The following sample problem is intended primarily to illustrate the use of the performance data charts rather than to serve as a recommended method of mission planning. Consequently, the fictitious situation is chosen to require the use of as many charts as possible and to acquaint the reader with the entire scope of information that may be extracted from the charts. It is recognized that varying tactical situations and operating circumstances will justify many different approaches to the requirement for mission planning. In many cases, only a few of the charts will be of interest and, quite often, the degree of accuracy illustrated will be superfluous.

NOTE

Although the Take-Off and Landing Data Card contains provisions for recording take-off data for both "wet" and "dry" power settings, the sample problem illustrates "wet" power settings only for the sake of brevity.

REQUIREMENT.

Three jeeps with drivers (8100 pounds) are to be landed at an airbase located 500 nautical miles from the home airfield.

DATA KNOWN.

1. Departure point is at sea level pressure altitude with a 3500-foot, dry, soft turf runway oriented 090° - 270° magnetic. Runway gradient is 2% uphill to the west.
2. Destination is at 1000 feet pressure altitude with a 4500-foot hard-surface runway oriented 170° - 350° magnetic. Runway gradient is 2% downhill to the south and a 50-foot obstacle exists at the north end of the strip. RCR assumed 20.
3. Intervening terrain contains mountains of 3000 feet pressure altitude.
4. Weather at base is VFR, FAT 70°F (23°C) sea level, 57°F (14°C) at 5000 feet, dew point 64°F (18°C), surface wind from 220° magnetic at 15 knots, winds aloft, 25-knot tailwind at 5000 feet, 10-knot tailwind at 10,000 feet.
5. Weather forecast at destination is IFR with rain, runway condition WR 13 (wet runway, runway condition reading of 13), FAT 61°F (16°C) at the surface, 34°F (1°C) at 10,000 feet, dew point 60°F (16°C). No wind data available.
6. Aircraft operating weight (less fuel and cargo) is 38,400 pounds.

NOTE

Since some of the performance data charts used throughout the sample problem involve the use of density altitude, the pressure altitudes given should be converted to density altitude. And since cruise data (Air Nautical Miles Per Pound of Fuel) is presented at given levels of density altitude, corresponding pressure altitudes should be determined. Refer to Figure A1-3, Density Altitude Curve.

	Pressure Altitude	FAT		Density Altitude
		°F	°C	
Departure	Sea Level	73	23	900 feet
Cruise Out	4200 feet	57	14	5000 feet
Destination	1000 feet	61	16	1400 feet
Cruise back	9400 feet	34	1	10,000 feet

GENERAL FLIGHT PLAN.

The general flight plan which will fulfill the various requirements of the mission is: take-off at sea level pressure altitude (900 feet density altitude) from a 3500-foot runway; climb to 4200 feet pressure altitude (5000 feet density altitude); cruise out 500 nautical miles; descend to 1000 feet (1400 feet density altitude) and land on a wet runway, possibly over a 50-foot obstacle, in less than 4500 feet, then after unloading the three jeeps and drivers, take-off in less than 4500 feet; climb to 9400 feet pressure altitude (10,000 feet density altitude) to take advantage of lower headwinds; cruise back 500 nautical miles; descend to sea level and land at the home airbase in less than 3500 feet.

Cruise Fuel.

Since the cruising fuel requirements form the major portion of the total fuel required, it is best to estimate this portion of the fuel load first in order to determine if the mission is within the capability of the aircraft under the existing circumstances. Following this, additional fuel requirements may be added in order to determine total fuel required. Basically, the line of thinking at this stage of the flight planning is to assume that the initial take-off is made with a high fuel load. This permits a first estimate of cruising fuel required for the total distance involved and provides a basis for estimating the reserve requirement. Finally, take-off and climb requirements can be checked in order to determine the total fuel required. Once the total fuel requirement is known, a detailed analysis of the flight plan can be made, taking into account such refinements as winds and off-loading of cargo at the mid-point. If this analysis reveals an excessive amount of reserve fuel at the completion of the mission, the take-off gross weight may then be reduced accordingly at the discretion of the pilot. To obtain the amount of fuel required for cruise, refer to

Figure A5-7, Long Range Prediction - Distance (Tanks ON). This chart normally illustrates the range capability of the aircraft as a function of gross weight change due to fuel consumption. By using the chart in the reverse manner, i. e., using a known range (1000 nautical miles), a corresponding change in gross weight may be read which represents fuel used and serves as a first estimate of the fuel required for cruise. Since the cruising range is only slightly less at 10,000 feet than at 5000 feet, the entire mission may be considered to be flown at one altitude when estimating cruising fuel. The 10,000-foot line is used in order to be conservative. Enter the chart at the 59,200 pound mark on the gross weight scale. This represents the basic operating weight plus a high fuel load and cargo:

38,400 basic operating weight
 8,100 cargo
 12,700 fuel load (assumed)

 59,200 take-off gross weight

Read vertically upward to the 10,000-foot line, then horizontally across to the distance scale at the left. From this point, count off 1000 nautical miles upward on the distance scale, then read back horizontally to the right until the 10,000-foot line is reached. Vertically below, read 51,850 pounds. From this it may be seen that 7350 pounds of fuel are required to cruise 1000 air nautical miles (59,200 - 51,850 = 7350). At first glance, then, it appears that the mission is feasible, since reserve and additional fuel requirements should easily be met with the 5350 pounds of fuel remaining:

12,700 assumed fuel
 -7350 cruising fuel

 5350 available for reserve and additional fuel requirements

Reserve Fuel.

Reserve fuel should equal 10% of the total fuel required to complete the flight. Furthermore, it should not be less than the amount required for 20-minute flight at normal cruising speed, and not more than a 2-hour supply. Since the total fuel required is not known as yet, a first estimate is made on the basis of cruising fuel:

10% x 7350 = 735 pounds reserve fuel

By referring to Figure A5-8, Long Range Prediction - Time (Tanks ON), it may be seen that for two hours of flight at 10,000 feet and a gross weight of 43,750 pounds (59,200 - 7350 - 8100 = 43,750), the fuel required is 1550 pounds. Therefore, the 735 pounds of reserve fuel is not excessive. A 20-minute supply would be about 1/6 of this amount or 123 pounds, so the minimum requirement is also met.

Additional Fuel Considerations.

Although the cruising fuel and the reserve fuel comprise the major portion of the total fuel requirement, some additional fuel must be included for the warm-up, take-off, and climb at the home airbase as well as at the destination. A convenient rule of thumb is that the fuel required for warm-up, taxi, and take-off is approximately equal to the fuel consumed in 10 minutes at METO Power for the reciprocating engines and 5 minutes at 100% RPM for the jet engines.

Reference to Figure A2-28, Fuel Flow vs Brake Horsepower for the reciprocating engine, shows that the fuel flow at 1900 BHP is 1686 pounds per hour, for each engine. Reference to Figure A2-29, Jet Engine Fuel Flow and Thrust Horsepower vs Airspeed for the jet engine, shows that the fuel flow at 100% RPM and at a true airspeed of 100 knots is 3000 pounds per hour, for each engine. To determine the fuel required for all engines for the previous warm-up, taxi, and take-off durations:

$$\text{reciprocating fuel required} = \frac{1686 \times 2 \times 10}{60} = 562 \text{ pounds}$$

$$\text{jet fuel required} = \frac{3000 \times 2 \times 5}{60} = 500 \text{ pounds}$$

$$\text{total warm-up, taxi, and take-off fuel required} = 1062 \text{ pounds}$$

Since this fuel allowance must be made for the return trip as well as the outbound trip, the total fuel required for warm-up, taxi, and take-off is 2124 pounds (1062 x 2 = 2124).

Fuel required to climb is taken from Figure A4-1. Climb at METO Power (Tanks ON). This chart shows that 400 pounds of fuel are required to climb to 4200 feet pressure altitude (5000 feet density altitude) at a gross weight of 58,138 pounds, which is the take-off gross weight reduced for the warm-up, taxi, and takeoff fuel requirement (59,200 - 1062 = 58,138). If the take-off gross weight for the return trip is assumed to be 44,901 pounds, which is the approximate gross weight when cargo and outbound fuel are deducted (58,138 - 8100 - 3675 - 1062 - 400 = 44,901), the fuel allowance for the climb on the return trip is 450 pounds.

Should expected temperatures indicate the use of aircraft heaters, a flow of approximately 48 pounds per hour to each operating heater unit should be considered. Consideration may also be given, if desired, to auxiliary power unit consumption of from five to seven pounds per hour.

Summary.

When all phases of the general flight plan have been completed, the total fuel requirement is determined by adding the individual requirements as follows, and reevaluating the reserve fuel allowance:

7350	cruising fuel
2124	warm-up, taxi, and take-off
400	outbound climb
450	return climb

10,324 total required to complete the flight.

A more accurate bases is now available for figuring the proper amount of reserve fuel:

$$10\% \times 10,324 = 1032 \text{ pounds}$$

When this is added to the amount required to complete the flight, the total fuel requirement becomes 11,356 pounds (10,324 + 1032 = 11,356). It is obvious that the initial assumed fuel weight exceeds the total fuel requirement by 1344 (12,700 - 11,356 = 1344). With the mission estimated fuel requirement being always conservative, the mission fuel could be cut by 1350 pounds to a value of 11,350 pounds reducing the gross weight for take-off to 57,850 pounds.

38,400	basic operating weight
8100	cargo
11,350	fuel

57,850 take-off gross weight

Furthermore, it should be remembered that the general flight plan did not take into account the following factors which tend to further reduce the total fuel requirement.

1. Cargo need not be carried on the return trip; consequently, lower power settings may be used.
2. Tailwind on the outbound leg is considerably stronger than the headwind expected on the return flight.
3. Distance covered during climbs has not been utilized when planning. Upon the completion of a more detailed analysis of the flight plan, a more accurate estimate of the required fuel load can be made.

Brake Horsepower Available.

Reference to the Brake Horsepower Available Chart (Maximum Wet Power - Normal Fuel), Figure A2-22 shows that the expected BHP = 2250 expected TOP = 127.5 psi, and the minimum performance TOP = 121.0 psi. The minimum performance torque pressure may now be used to determine the take-off gross weight limit and take-off distance.

NOTE

For this installation, and power setting, carburetor air temperature (CAT) should be considered to be 7°C higher than free air temperature (FAT) at 2800 RPM.

Take-off Gross Weight Limit.

Reference to Figure A3-2, Take-Off Gross Weight Limit, indicates that for the same atmospheric conditions and minimum performance torque pressure, the limit take-off gross weight with flaps UP (based on performance) is not a limiting factor with the jets operating at 100% RPM. The structural weight limit of 60,000 pounds based on landing gear strength for taxiing and ground handling could be used should the mission require additional fuel. Reference to A4-24 Emergency Service Ceiling, shows that for all mission altitudes, the aircraft has a service ceiling (100 foot per minute rate of climb) with jets at 100% RPM, far in excess of the requirements.

Take-off Distance (Outbound).

By using Figure A3-13, Take-Off Distance - Flaps UP, it may be seen that with a minimum performance torque pressure of 121.0 psi at a density altitude of 900 feet, and a gross weight of 57,850 pounds, a ground run of 2300 feet is required on a level, dry, hard-surface runway in a no-wind condition. A 10-knot headwind would reduce the ground run distance to 2000 feet. Since the runway at the departure point is dry, soft turf, and the existing wind will require taking off uphill on a 2% grade, the actual ground run required amounts to 2510 feet. (Refer to Figures A3-21 and A3-23).

NOTE

The take-off from the home base is planned with flaps up since the 3500-foot runway is more than adequate and less risk is involved in the event of an engine failure on take-off.

Take-off Speed.

The proper take-off speed (112 knots IAS) for the planned gross weight is interpolated from the table of airspeeds on the Take-Off Distance Chart, Figure A3-13. The minimum nosewheel lift-off speed is determined graphically from Figure A3-12 Crosswind Take-Off, using a 15-knot crosswind from 50° left. Since the recommended take-off speed is well above the minimum (61.3 knots), predicted take-off performance should be valid.

Critical Field Length.

The critical field length is checked to determine if the minimum safe condition exists. (Refer to GLOSSARY

OF TERMS AND ABBREVIATIONS, Part 1.) Figure A3-25 shows that on a dry, hard-surface runway, the critical field length is 2650 feet. However, since the runway is of soft, dry, turf, and sloped, the distance must be corrected, Figures A3-32, and A3-35 show a corrected field length of 3440 feet. This compares favorably with the 3500 feet of runway space available and indicates that the take-off can be made with sufficient space to abort or continue the take-off on one reciprocating engine in the event of engine failure.

Landing (Outbound).

The next consideration is the landing distance at the destination. To estimate the landing weight, start with the assumed take-off weight of 57,850 pounds; subtract 1062 pounds fuel allowance for warm-up; taxi, and take-off, 400 pounds for outbound climb; and 3675 pounds of cruising fuel (1/2 total cruising fuel). Thus, the estimated landing weight at the destination is 52,713 pounds (57,850 - 1062 - 400 - 3675 = 52,713). By entering Figure A6-2, Landing Distance - Flaps LAND (Brakes Only) the level ground run is found to be 1750 feet using a flap setting of 45° (LAND). This performance is based on the use of brakes only on a dry, hard-surface runway, and could be considerably improved by the use of reverse thrust. Since the wind is unknown until contact is established with the tower operator upon arrival, the landing distance is checked for the worst possible circumstances - landing to the south (downhill) over the 50-foot obstacle, in a no-wind condition. Figure A6-2 shows that the total distance to clear a 50-foot obstacle (no wind) is 2620 feet. Notice that this is 870 feet longer than the ground run. The effect of the wet surface condition (RCR of 13) is to lengthen the ground run to 2450 feet (Figure A6-10) and the 2% downhill slope further extends the ground run (Figure A6-11) to 2700 feet. When the additional distance required to approach over a 50-foot obstacle is added, the total distance required is 3570 feet (2700 + 870 = 3570). Thus the landing can be made at the destination even under adverse conditions, without benefit of reverse thrust.

Landing Speed.

The proper touchdown speed (83 knots IAS) for the anticipated landing gross weight is interpolated from the table of airspeeds included on the Landing Distance Chart, Figure A6-2. The minimum nosewheel touchdown speed cannot be checked until wind at the destination is determined.

Take-off Distance (Return).

The take-off for the return trip will be made at an approximate gross weight of 44,613 pounds (52,713 - 8100 - 44,613). Again referring to the Brake Horsepower Available Chart (Maximum Wet Power - Normal Fuel), Figure A2-23 it is found that with a dew point of 60°F (16°C) and a carburetor air temperature of 23°C (16°C FAT +

7°C = 23°C CAT), the engines may be expected to produce 2280 BHP, an expected torque pressure of 129 psi, and a minimum performance torque pressure of 122.5 psi. Further reference to Figure A3-13, Take-Off Distance - Flaps UP, shows that in order to clear the 50-foot obstacle at one end of the runway, with flaps UP and a no-wind condition, a ground run of 1200 feet would be required on a level, dry, hard-surface runway, with a total distance of 2000 feet. By applying the necessary corrections for the wet surface condition and the uphill slope, these distance figures become 1370 feet and 2170 feet, respectively.

NOTE

The total distance required to clear a 50-foot obstacle on a sloping runway exceeds the ground run distance by the same amount as for a level runway (in this case 700 feet).

Compared with the 4500 feet of runway space available, the return take-off can be made with a comfortable margin of safety. Take-off speed and critical field length for the return take-off should be checked just prior to departure when exact gross weight and wind are known.

Landing Distance (Return).

Landing performance need not be checked for the final landing at the home airbase since the gross weight of the aircraft will be considerably less than what it was at the destination airfield, no obstacles exist near the approaches to the runways, and the 3500-foot runway is considerably longer than the 2700 feet ground run required at the destination.

DETAILED FLIGHT PLAN.

The purpose of the detailed flight plan is to determine the specific power settings required throughout the flight and, by tabulating the airspeed, distance, and time between successive power changes, recheck the accuracy of the general flight plan. It should be noted that cruise power settings are reduced for every 2000-pound change in gross weight. This is predicted in the flight plan on a time basis, but during the actual flight, it is recommended that the fuel quantity gages be used. Some discrepancy should be expected between the fuel consumption in the detailed plan as compared with the general plan. This is due to the fact that winds were disregarded in the general plan, distance covered during the two climbs was not considered, and cargo was unloaded at the destination airfield.

OUTBOUND WARM-UP, TAXI, TAKE-OFF, AND CLIMB TO 5000 FEET.

Gross Weight (lb)	Fuel Weight (lb)	Pressure Altitude (ft)	Climb Power		Fuel Used (lb)	Ground Distance (n. mi.)	Time in Climb (min)
			Reciprocating Engines	Jet Engines			
57,850	11,350	Sea level to 4200	1900 BHP Rich 2600 RPM 115.5 psi TOP	100% RPM	1462	6	3

GROSS WEIGHT: 57,850 pounds as estimated in the general flight plan.

FUEL WEIGHT: 11,350 pounds as estimated in the general flight plan.

ALTITUDE: Choice of 4200 feet pressure altitude (5000 feet density altitude), permits direct reading of cruise data from Figure A5-2, Air Nautical Miles Per Pound of Fuel, takes advantage of best available tailwind, and clears en-route terrain.

CLIMB POWER: METO Power is used for the climb in order to obtain the climb performance specified in Figure A4-2, Climb at METO Power. This power setting represents the maximum power available for continuous operation. Jets are maintained at 100% RPM as considered in take-off.

NOTE

METO Power is held throughout the climb by advancing the throttles as necessary to hold limit torque or manifold pressure.

FUEL USED: The fuel used, 1462 pounds, consists of 1062 pounds for warm-up, taxi, and take-off, and 400 pounds required to climb from sea level to 4200 feet (pressure altitude). Climb fuel is read from Figure A4-1, Climb at METO Power (Tanks ON).

NOTE

The same fuel is required for climb in the detailed flight plan as predicted in the general plan.

GROUND DISTANCE: Ground distance, 6 nautical miles, is read from Figure A4-1, Climb at METO Power (Tanks ON).

CRUISE (1) OUTBOUND AT 5000 FEET (DENSITY ALTITUDE).

Gross Weight (lb)	Fuel Weight (lb)	Cruise Power	TAS (kts)	GS (kts)	Ground N. Mi/Lb	Fuel Used (lb)	Ground Distance (n. mi.)	Time (hrs)
56,388	9888	1085 BHP Man. Lean 1990 RPM 86 psi TOP	132	157	0.164	2000	328	2.1

GROSS WEIGHT: The gross weight at the start of the out-bound cruise leg is 56,388 pounds which is the take-off gross weight minus the fuel used for warm-up, taxi, take-off, and climb:

$$57,850 - 1462 = 56,388 \text{ pounds}$$

FUEL WEIGHT: The fuel weight at the start of the out-bound cruise leg is 9888 pounds which is the original fuel load minus the fuel used for warm-up, taxi, take-off, and climb:

$$11,350 - 1462 = 9888 \text{ pounds}$$

CRUISE POWER: The power setting for the outbound cruise leg is read from Figure A5-2, Air Nautical Miles Per Pound of Fuel (5000 Feet - Tanks ON). Since it is desired to fly the mission at 99% Best Economy, a "25-knot tailwind" line must be interpolated between the "no-wind" line and the "50-knot tailwind" line. Interpolation of the gross weight is also necessary since the 56,388 pound gross weight lies between the 55,000 and 60,000 pound gross weight lines. The intersection of these two interpolated lines establishes a point on the chart from which the power required may be read. The interpolated power is found to be 1085 BHP. Refer to Power Schedule tabulations of Part A2 for the RPM and TOP required.

TRUE AIRSPEED (TAS): The true airspeed of 132 knots is read from the airspeed scale along the bottom edge of the Air Nautical Miles Per Pound of Fuel Chart (5000 Feet), Figure A5-2.

CRUISE (2) OUTBOUND AT 5000 FEET (DENSITY ALTITUDE).

Gross Weight (lb)	Fuel Weight (lb)	Cruise Power	TAS (kts)	GS (kts)	Ground N. Mi/Lb	Fuel Used (lb)	Ground Distance (n. mi.)	Time (hrs)
54,388	7888	1025 BHP Man. Lean 1900 RPM 86 psi TOP	131.5	156.5	0.171	971	166	1.1

GROUND SPEED (GS): Ground speed is computed by adding the tailwind to the true airspeed.

$$132 + 25 = 157 \text{ knots}$$

GROUND NAUTICAL MILES PER POUND: The ground nautical miles per pound is computed by reading air nautical miles per pound from the scale at the left edge of Figure A5-2, and then substituting in the formula given under "CONDITIONS" on the chart:

$$\text{Ground N. Mi/Lb} = \text{Air N. Mi/Lb} \times \frac{\text{GS}}{\text{TAS}}$$

$$\text{Ground N. Mi/Lb} = 0.138 \times \frac{157}{132} = 0.164$$

FUEL USED: 2000-pound gross weight reduction is used for resetting power in order to achieve the performance specified in Long Range Prediction and Air Nautical Miles Per Pound of Fuel Charts.

GROUND DISTANCE: Ground distance is computed by multiplying ground n. mi/lb x fuel used:

$$\text{ground distance} = 0.164 \times 2000 = 328 \text{ miles}$$

TIME: The duration of the first cruise leg is computed by dividing the ground distance by the ground distance by the ground speed:

$$\text{time} = \frac{328}{157} = 2.1 \text{ hours}$$

GROSS WEIGHT: 56,388 - 2000 = 54,388 pounds.

$$\text{Ground N. Mi/Lb} = 0.144 \times \frac{156.5}{131.5} = 0.171$$

FUEL WEIGHT: 9888 - 2000 = 7888 pounds.

GROUND DISTANCE: Since the first 2000-pound reduction in fuel covered more than half of the outbound leg, the second segment of the outbound leg is terminated on the basis of distance remaining rather than a full 2000-pound reduction in fuel load. Distance remaining equals the total distance minus the distance covered in the initial climb and the first outbound segment:

CRUISE POWER: Power required for cruise at 54,388 pounds is taken from Figure A5-2, Air Nautical Miles Per Pound of Fuel (5000 Feet - Tanks ON). Power setting (RPM and TOP) are again read from the Power Schedule tabulations of Part A2.

$$500 - 6 - 328 = 166 \text{ miles}$$

TRUE AIRSPEED (TAS): The true airspeed of 131.5 knots is read from the Air Nautical Miles Per Pound of Fuel Chart, Figure A5-2.

FUEL USED: Fuel used is computed by dividing the ground distance by the ground nautical miles per pound:

GROUND SPEED (GS): Ground speed is computed by adding the tailwind to the true airspeed.

$$\text{fuel used} = \frac{166}{0.171} = 971 \text{ pounds}$$

$$131.5 + 25 = 156.5 \text{ knots}$$

TIME: Time is computed by dividing ground distance by ground speed:

GROUND NAUTICAL MILES PER POUND: Ground nautical miles per pound is determined by reading air nautical miles per pound and substituting in the formula:

$$\text{time} = \frac{166}{156.5} = 1.1 \text{ hour}$$

$$\text{Ground N. Mi/Lb} = \text{Air N. Mi/Lb} \times \frac{\text{GS}}{\text{TAS}}$$

RETURN WARM-UP, TAXI, TAKE-OFF AND CLIMB TO 10,000 FEET (DENSITY ALTITUDE).

Gross Weight (lb)	Fuel Weight (lb)	Pressure Altitude (ft)	Climb Power		Fuel Used (lb)	Ground Distance (n. mi.)	Time in Climb (min)
			Reciprocating Engines	Jet Engines			
45,317	6917	1000 to 9400	1900 BHP Rich 2600 RPM 115.5 psi TOP	100% RPM	1512	8	4

GROSS WEIGHT: The gross weight for the return take-off is the landing gross weight minus the cargo unloaded.

NOTE

$$\text{Gross weight} = 53,417 - 8100 = 45,317$$

METO Power is held throughout the climb by advancing the throttles as necessary to hold limit torque or manifold pressure. Above 7100 feet (on a Standard Day) full throttle is required until high blower is selected. Refer to SUPERCHARGER SHIFT DURING CLIMB, Section VII.

FUEL WEIGHT: 7888 - 971 = 6917 pounds

FUEL USED: The fuel used, 1512 pounds, consists of 1062 pounds for warm-up, taxi, and take-off, plus 450 pounds required to climb from 1000 feet to 9400 feet (pressure altitude). Climb fuel is read from Figure A4-2, Climb at METO Power.

ALTITUDE: A pressure altitude of 9400 feet (10,000 feet density altitude) is selected for the return trip to permit direct reading of cruise data from Figure A5-3 Air Nautical Miles Per Pound of Fuel (10,000 Feet) and to take advantage of a lower headwind.

CLIMB POWER: METO Power is used for the climb in order to obtain the climb performance specified in Figure A4-2, Climb at METO Power. This power setting represents the maximum power available for continuous operation. Jets are maintained at 100% RPM as considered in the return take-off.

GROUND DISTANCE: Ground distance, 8 nautical miles, is determined by reading 9 air nautical miles from Figure A4-2, Climb at METO Power, and subtracting 1 nautical mile due to a 10-knot headwind for 5 minutes.

TIME: Time consumed during the climb, 4 minutes, is read directly from Figure A4-2, Climb at METO Power.

CRUISE (3) BACK AT 10,000 FEET (DENSITY ALTITUDE).

Gross Weight (lb)	Fuel Weight (lb)	Cruise Power	TAS (kts)	GS (kts)	Ground N. Mi/Lb	Fuel Used (lb)	Ground Distance (n. mi.)	Time (hrs)
43,805	5405	940 BHP Man. Lean 1840 RPM 81 psi TOP	141.2	131.2	0.156	2000	312	2.4

GROSS WEIGHT: The gross weight at the start of the return cruise leg is 43,805 pounds, which is the take-off gross weight minus the fuel used for warm-up, taxi, take-off, and climb:

$$45,317 - 1512 = 43,805$$

FUEL WEIGHT: The fuel weight at the start of the return cruise leg is 5405 pounds, which is the fuel weight prior to take-off minus the fuel used for warmup, taxi, take-off, and climb:

$$6917 - 1512 = 5405 \text{ pounds}$$

CRUISE POWER: The power setting for the return cruise leg is read from Figure A5-3, Air Nautical Miles Per Pound of Fuel (10,000 Feet - Tanks ON). Since it is desired to fly the mission at 99% Best Economy, a "10-knot headwind" line must be interpolated between the "no wind" line and the "50-knot headwind" line. Interpolation of the gross weight is also necessary since the 43,805 pound gross weight lies between the 45,000 and 40,000-pound gross weight lines. The intersection of these two interpolated lines establishes a point on the chart from which the power setting may be read. The interpolated power setting is found to be 940 BHP.

TRUE AIRSPEED (TAS): The true airspeed of 141.2 knots is read from the airspeed scale along the bottom edge of the Air Nautical Miles Per Pound of Fuel Chart (10,000 feet), Figure A5-3.

GROUND SPEED (GS): Ground speed is computed by subtracting the 10-knot headwind from the true airspeed:

$$141.2 - 10 = 131.2 \text{ knots}$$

GROUND NAUTICAL MILES PER POUND: The ground nautical miles per pound is computed by reading air nautical miles per pound from the scale at the left edge of Figure A5-3, and then substituting in the formula given under "CONDITIONS" on the chart:

$$\text{Ground N. Mi/Lb} = \text{Air N. Mi/Lb} \times \frac{\text{GS}}{\text{TAS}}$$

$$\text{Ground N. Mi/Lb} = 0.168 \times \frac{131.2}{141.2} = 0.156$$

FUEL USED: 2000-pound gross weight reduction is used for resetting power in order to achieve the performance specified in Long Range Prediction and Air Nautical Miles Per Pound of Fuel Charts.

GROUND DISTANCE: Ground distance is computed by multiplying ground n. mi/lb x fuel used:

$$\text{ground distance} = 0.156 \times 2000 = 312 \text{ miles}$$

TIME: The duration of the third cruise leg is computed by dividing the ground distance by the ground speed.

$$\text{Time} = \frac{312}{131.2} = 2.4 \text{ hours}$$

CRUISE (4) BACK AT 10,000 FEET (DENSITY ALTITUDE).

Gross Weight (lb)	Fuel Weight (lb)	Cruise Power	TAS (kts)	GS (kts)	Ground N. Mi/Lb	Fuel Used (lb)	Ground Distance (n. mi.)	Time (hrs)
41,805	3405	920 BHP Man. Lean 1820 RPM 80 psi TOP	140.8	130.8	0.160	1125	180	1.4

GROSS WEIGHT: 43,805 - 2000 = 41,805 pounds.

FUEL WEIGHT: 5405 - 2000 = 3405 pounds.

CRUISE POWER: Power required for cruise at 41,805 pounds is taken from Figure A5-3, Air Nautical Miles Per Pound of Fuel (10,000 Feet - Tanks ON).

TRUE AIRSPEED (TAS): The true airspeed of 140.8 knots is read from the Air Nautical Miles Per Pound of Fuel Chart, Figure A5-3.

GROUND SPEED (GS): Ground speed is computed by subtracting the headwind from the true airspeed.

$$140.8 - 10 = 130.8$$

GROUND NAUTICAL MILES PER POUND: Ground nautical miles per pound is determined by reading air nautical miles per pound and substituting in the formula:

$$\text{Ground N. Mi/Lb} = \text{Air N. Mi/Lb} \times \frac{\text{GS}}{\text{TAS}}$$

$$\text{Ground N. Mi/Lb} = 0.172 \times \frac{130.8}{140.8} = 0.160$$

GROUND DISTANCE: Since the first segment of the return leg covered more than half of the distance, the remaining segment is terminated on the basis of distance remaining rather than a full 2000-pound reduction in fuel load. Distance remaining equals the total distance minus the distance covered in the climb and the first return segment:

$$500 - 8 - 312 = 180 \text{ miles}$$

FUEL USED: Fuel used is computed by dividing the ground distance by the ground nautical miles per pound:

$$\text{fuel used} = \frac{180}{0.160} = 1125 \text{ pounds}$$

TIME: Time is computed by dividing the ground distance by ground speed:

$$\text{time} = \frac{180}{130.8} = 1.4 \text{ hours}$$

Excess Fuel.

Excess fuel is the fuel remaining at the end of the flight (excluding reserve fuel) and is computed by subtracting the fuel used on the last cruise segment from the fuel weight at the beginning of the segment, then deducting the required reserve:

$$3405 - 1125 = 2280 \text{ pounds}$$

Since the total fuel required to complete the flight amounts to 9070 pounds (1462 + 2000 + 971 + 1512 + 2000 + 1125 = 9070), the 2280 pounds remaining are

considered in excess of the required reserve of 907 pounds (10% x 9070 = 907 pounds). Furthermore, reserve fuel should not exceed the amount required for two hours of flight at normal cruising speed - or 1550 pounds as determined in the general flight plan. Therefore, the original fuel load estimate of 11,350 pounds must be reduced by at least 730 pounds (2280 - 1550 = 730) and may be reduced by as much as 1373 pounds if desired (2280 - 907 = 1373).

ADDITIONAL CONSIDERATIONS.

Engine-out Operation.

Because of the drastic changes involved in airspeed and fuel consumption, engine failure represents one of the most important variations to the flight plan which might occur enroute. Accordingly, it is advisable that a preflight study of the engine-out performance of the aircraft be made, so that when the emergency occurs, the pilot is not suddenly faced with the decision to proceed on course or to turn back. Also of immediate concern in such an emergency is the ability to maintain altitude. Fuel consumption must of course be immediately considered since the high power settings required for engine-out flight cause considerable reduction in range. Also, the opposing jet, opposite the running reciprocating engine should be used at a fuel flow level to maintain 100 feet per minute rate of climb, minimum.

Equi-time Point.

The decision to proceed or turn back can be made beforehand by first computing the distance to the Equi-Time Point. This is the point at which the time required to return equals the time required to continue on to the destination. However, depending upon the fuel remaining and the engine-out fuel consumption, a safe return or continuation from the Equi-Time Point may or may not be possible. In order to determine this, it is necessary to consult the Air Nautical Miles Per Pound of Fuel Charts (Engine-Out Operation) and compare the fuel consumption (corrected to ground n. mi/lb) with the ground distance and fuel remaining.

NOTE

By definition of the Equi-Time Point, it is implied that if a safe return is possible with an engine-out, continuation is also possible and vice-versa.

Should this comparison show that a safe return or continuation is possible from the Equi-Time Point, the pilot is then assured that he can reach either his base or his destination, regardless of where an engine failure might occur. If the failure occurs prior to reaching the Equi-Time Point, he can safely continue. The distance to this point from the

departure point is computed by the following formula:

$$D = \frac{TD \times GSr}{GSr + GSc}$$

where TD = total ground distance to destination
 GSr = engine-out ground speed returning
 GSc = engine-out ground speed continuing

To investigate the possibility of returning on the engine from the Equi-Time Point, it is necessary first of all to approximate the gross weight at that point. Assume that the original fuel load were reduced by 1373 pounds in

order to carry the minimum required reserve. The actual gross weight at the start of the outbound leg would then be 56,477 pounds (57,850 - 1373 = 56,477). Based on first segment fuel consumption, the gross weight at the mid-point of the outbound leg would be 53,491 pounds:

$$\text{fuel used to mid-point} = \frac{250}{0.164} = 1524$$

$$\text{gross weight} = 56,477 - 1524 - 1462 = 53,491$$

Although the Equi-Time Point will fall somewhere short of the mid-point because of the 25-knot tailwind, mid-point gross weight may be used for planning purposes.

RETURN WITH ENGINE-OUT FROM EQUI-TIME POINT.

Mid-point Gross Weight (lb)	Power Setting		Speed (knots)			Ground N. Mi/ LB	Ground Distance (n. mi.)	Fuel Required (lb)	Fuel Weight (lb)
	Reciprocating Engines	Jet Engine	TAS	GSr	GSc				
53,491	1800 BHP Rich 2470 RPM 115.5 psi TOP	1250 lb/hr Fuel Flow	137	112	162	0.040	204	5100	7308

MID-POINT GROSS WEIGHT: Mid-point gross weight is determined by subtracting 1373 pounds of excess fuel and fuel required to reach the mid-point of the outbound leg, plus the fuel required for warm-up, taxi, take-off, and climb (1462):

$$57,850 - 1373 - 1524 - 1462 = 53,491$$

POWER SETTINGS: Power settings are taken from Figure A5-15, Air Nautical Miles Per Pound of Fuel, one jet engine at 1250 pounds fuel flow. Since the previous 25-knot tailwind must now be considered a headwind, a "25-knot headwind" line must be sketched in between the "no wind" line and the "50-knot headwind" line. Interpolation of the gross weight is necessary since the gross weight is between the 50,000 and the 55,000-pound gross weight lines.

SPEED: An operating point is established on Figure A5-15 at the intersection of the 53,491-pound gross weight line (sketched-in) and the 25-knot headwind line (sketched-in). True airspeed (137 knots) is then read vertically below on the airspeed scale at the bottom of the chart. Ground speed returning is determined by subtracting the headwind. Ground speed continuing is equal to the same TAS plus a 25-knot tailwind.

$$GSr = 137 - 25 = 112 \text{ knots}$$

$$GSc = 137 + 25 = 162 \text{ knots}$$

GROUND NAUTICAL MILES PER POUND: The ground nautical miles per pound is computed by reading air nautical miles per pound from the scale at the left edge of Figure A5-15 and then substituting in the formula given under "CONDITIONS" on the chart:

$$\text{Ground N. Mi/Lb} = \text{Air N. Mi/Lb} \times \frac{\text{GS}}{\text{TAS}}$$

$$\text{Ground N. Mi/Lb} = 0.049 \times \frac{112}{137} = 0.040$$

GROUND DISTANCE: The distance to the Equi-Time Point from the departure point is computed from the following formula:

$$D = \frac{\text{TD} \times \text{GSr}}{\text{GSr} + \text{GSa}}$$

$$D = \frac{500 \times 112}{112 + 162} = \frac{56,000}{274} = 204 \text{ nautical miles}$$

FUEL REQUIRED: Fuel required to return is computed by dividing the ground distance by the ground nautical miles per pound:

$$\text{Fuel required} = \frac{204}{0.040} = 5100 \text{ pounds}$$

FUEL WEIGHT: Fuel weight at the Equi-Time Point is computed by deducting excess fuel, and the fuel required to reach the Equi-Time Point (two-engine operation), from the fuel weight at the start of the outbound cruise leg:

fuel required to Equi-Time Point =

$$\frac{\text{distance}}{\text{n. mi/lb}} = \frac{204 - 6}{0.164} = \frac{198}{0.164} = 1207 \text{ pounds}$$

excess fuel = 1373 pounds

fuel weight = 9888 - 1207 - 1373 = 7308

By comparing the fuel required to return on one reciprocating engine and one jet engine at a fuel flow of 1250 pounds (5100 pounds) with the fuel weight at the Equi-Time Point (7308 pounds) it may be seen that with the fuel load as planned, it is possible to return to base or to continue on to the destination with 2208 pounds of fuel to spare (7308 - 5100 = 2208). In order to complete the engine-out planning, a similar analysis should be prepared for the return flight.

TAKE-OFF AND LANDING DATA (TOLD) CARD.

A take-off and landing data card is now published as part of the Pilot's cardboard check list, T. O. 1C-123K-1CL-1. A sample data card is shown on the last pages of Appendix 1 of the Flight Manual.

When the detailed analysis of the flight has been completed, the factors related to take-off performance should be entered on the card for ready reference. This information may then be used by the pilot in briefing the crew immediately prior to take-off. Upon arrival at the destination, the copilot should obtain the necessary data for determining the landing performance and prepare this section of the card for review by the pilot.

Take-off Conditions.

Free Air Temperature (FAT) - obtained from Base Operations or tower.

Carburetor Air Temperature (CAT) - same as Free Air Temperature except at Maximum Power when CAT = FAT + 7°C.

Dewpoint (DP) - obtained from Base Operations or tower.

Pressure Altitude (PA) - obtained from Base Operations or tower.

Density Altitude (DA) - obtained from Density Altitude Curve, Appendix, Part I.

Wind - Direction in degrees magnetic and speed obtained from Base Operations or tower.

Gross Weight - actual take-off gross weight obtained from Weight and Balance Clearance, Form "F."

Runway Length (Rwy. Lgth.) - obtained from Base Operations or AF Pilots Handbook.

Headwind Component (H. Wind Comp.) - obtained from Crosswind Take-Off Chart, Appendix, Part 3.

Crosswind Component (X Wind Comp.) - obtained from Crosswind Take-Off Chart, Appendix, Part 3.

Take-off Data.

NOTE

Record applicable data for both "wet" and "dry" power.

Manifold Pressure (MAP) - obtained from Appendix, Part 2. Power Schedule Charts.

Expected Torque (Exp. TOP) - obtained from Brake Horsepower Available charts, Appendix, Part 2.

Minimum Performance Torque (Min. Perf. TOP) - obtained from Brake Horsepower Available charts, Appendix, Part 2.

Take-off Gross Weight Limit (T. O. G. W. Limit) - obtain from Take-Off Gross Weight Limit chart, Appendix, Part 3 for flight limitation of Critical Field Length chart, Appendix, Part 3 for field limitation.

Take-Off Distance (T.O. Dist.) - obtained from the Take-Off Distance charts, Appendix, Part 3, and corrected for runway surface condition and runway gradient, using Figures A3-21 and A3-23.

Take-Off Speed (T.O. Speed) - obtained from Take-Off Distance charts, Appendix, Part 3, then checked against minimum nose wheel lift-off speed on Figure A3-12, Crosswind Take-Off.

Engine-Out Best Climb Speed - obtained from Engine-Out Rate of Climb charts, Appendix, Part 4.

Engine-Out Rate of Climb - obtained from Engine-Out Rate of Climb charts, Appendix, Part 4.

Engine-Out Service Ceiling (Maximum Dry) - obtained from Emergency Service Ceiling charts, Appendix, Part 4.

Landing Immediately after Take-off.

Final Approach Speed - obtained from Landing Distances charts, Appendix, Part 6.

Landing Distance (Brakes Only) - obtained from Landing Distance (Brakes Only) charts, Appendix, Part 6.

Landing Conditions.

Field Elevation (Fld. Elv.) - enter field elevation of intended destination.

Runway Length (Rwy. Lgth.) - enter runway length at intended destination.

Gross Weight - take-off gross weight minus the fuel used to complete the mission.

Free Air Temperature (FAT) - enter forecasted FAT at destination.

Pressure Altitude (PA) - enter pressure altitude at destination.

Density Altitude (DA) - obtain from Density Altitude curve, Appendix, Part 1.

Wind - enter forecasted wind direction and velocity.

Headwind Component - obtained from Crosswind Take-Off chart, Appendix, Part 3.

Crosswind Component - obtained from Crosswind Take-Off chart, Appendix, Part 3.

Landing Data.

Final Approach Speed - obtained from Landing Distance charts, Part 6.

Touchdown Speed (T/D) - obtained from Landing Distance charts, Appendix, Part 6, then checked against minimum nosewheel touchdown speed on Crosswind Landing chart, Figure A6-1.

Landing Distance (Brakes Only) - obtained from the Landing Distance charts, Appendix, Part 6, then corrected for runway surface condition and runway gradient, using Figures A6-10 thru A6-13.

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NOTE: * Denotes Illustrations.

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SECTION III
OPERATION

3.1 GENERAL

3.1.1 KFS 598

Rotate the VOL control knob clockwise from the OFF position. To override the automatic squelch pull the VOL knob out and rotate the VOL control for desired listening level on the noise being produced by the receiver. Push the VOL knob back in to activate the automatic squelch.

Select the desired operating frequency in the Standby display by rotating the increment/decrement knobs either clockwise or counterclockwise. A clockwise rotation will increment the frequency while a counterclockwise rotation will decrement the frequency. The larger knob will change the MHz portion of the standby display. At one band-edge (118 or 135MHz [expanded version 151.975]) the following 1MHz change will wrap around to the other band edge. The outside knob will change the KHz portion of the standby display. It will change in steps of 50KHz when the knob is pushed in and 25KHz when the knob is pulled out. The wrap around band edge is also utilized when incrementing or decrementing the KHz portion of the standby display.

To tune the radio to the desired operating frequency, the frequency must first be entered into the Standby display, and then the transfer button must be pushed. This will trade the contents of the Active and Standby display. The transceiver is always tuned to the frequency appearing in the Active display. It is therefore possible to have two different frequencies available, one in use and one stored in the Standby display.

During the transmit operation, a T will appear between the Active and the Standby displays, signifying that the transceiver is in the Transmit mode of operation.

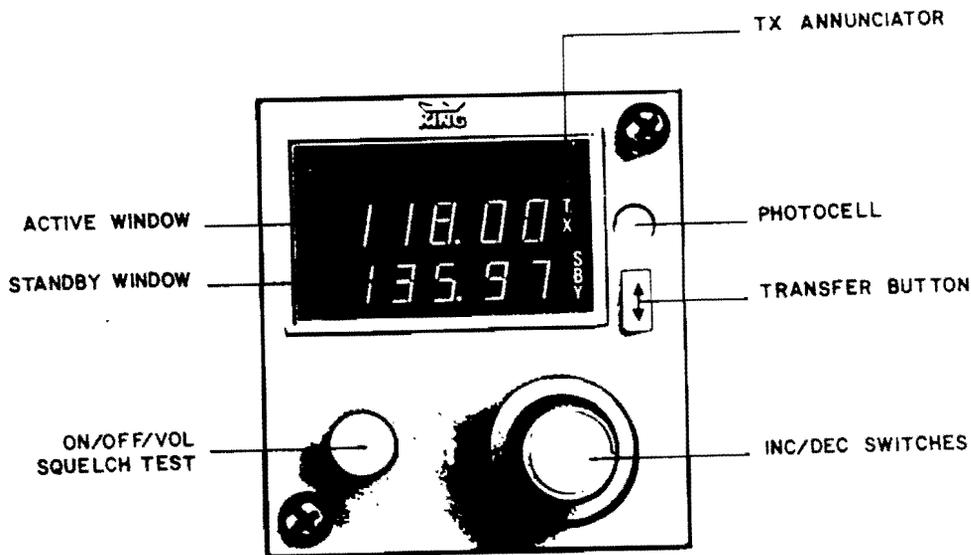


FIGURE 3-1 KFS 598 CONTROL FUNCTIONS

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3.1.2 KFS 598A OPERATING PROCEDURES

Rotate the VOL control knob clockwise from the OFF position. A momentary un-squelched state will occur. To override the automatic squelch state, push the PUSH TST knob. To return to the squelched state push the PUSH TST knob once again.

When the mic is keyed, the TX annunciator will light just right of the active display. If the mike key is held down for more than 1-1/2 minutes, the key line to the KTR 908 will be disabled. The total display will then flash as long as the mic key is depressed.

3.1.3 FREQUENCY MODE

3.1.3.1 Standby Entry

Frequency selection is accomplished in the Standby Entry mode by changing the frequency displayed in the Standby window of the display with the tuning knobs, and then transferring the selected frequency into the Active window by pressing the Transfer button. The larger tuning knob will increment or decrement the MHz portion of the display in 1 MHz steps with rollover at each band edge (118 MHz on the low end and either 135 or 151 MHz on the high end). The smaller tuning knob will increment or decrement the KHz portion of the display in 50 KHz steps with the knob pushed in or in 25 KHz steps with the knob pulled out. Rollover to the opposite band edge occurs at 000 and 975 KHz. While in the Standby Entry mode, the transceiver remains tuned to the frequency displayed in the Active window at all times.

3.1.3.2 Active Entry

The Active Entry mode is entered from Standby Entry Frequency mode or Channel mode by pushing the Transfer button for longer than 2 seconds. The tuning knobs operate as in Standby Entry, but will change the Active frequency, rather than the Standby frequency. The radio will be tuned to the Active frequency.

Momentarily pushing the Transfer button returns the control head to Standby Entry. The Standby frequency prior to Active Entry mode remains unchanged.

3.1.4 CIVIL OPERATION (J5982-P7 LEFT OPEN)

3.1.4.1 Channel Mode

- A. Momentarily pressing the CHAN button while in Frequency mode puts the unit in Channel mode. The unit remains tuned to the last active frequency displayed before entering Channel mode. The last used channel number is displayed unless no channels have been programmed, in which case the unit defaults to Channel 1 and dashes are displayed in the Standby window.

Turning either tuning knob changes the channel number and corresponding frequency. The channels will only increment and decrement to channels that have been programmed. If there has been no activity for five seconds the unit will return to Frequency mode and the channel frequency is placed in the Standby window. Pressing the CHAN button before the 5 second delay is completed will return the unit to Frequency mode and the status of Frequency mode prior to entering Channel mode remains the same.

- B. When in Channel mode, pressing the Transfer button will return the unit to Frequency mode. The channel frequency will become the new Active frequency and the last Active frequency will become the new Standby frequency. If the unit was in Active Entry mode prior to entering Channel mode, pressing the Transfer button or allowing the unit to time out will bring it back to Standby Entry.

3.1.4.2 Program Mode

- A. Program mode is selected by pressing and holding the CHAN button for longer than two seconds. The unit tunes the KTR 908 to last active frequency displayed before entering Program mode and the last used Channel number is displayed when Program mode is entered. The Channel number flashes and turning either tuning knob changes the Channel number. When the Channel number is flashing, pressing the Transfer button will cause the Channel number to stop flashing and cause the frequency to flash, unless the channel is Program Secured.

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The tuning knobs then work as in Frequency mode, except between rollover points 118.XX to 135.XX and 135.XX to 118.XX, or 118.XX to 151.XX and 151.XX to 118.XX for extended frequency range. dashes are displayed to unprogram the channel. When frequency is flashing, pressing the Transfer button will cause the frequency to stop flashing and the Channel number to flash.

- B. If no activity has occurred for 20 seconds the unit returns to Frequency mode. The unit can also be returned to Frequency mode from Program mode by pressing the CHAN button. Returning to Frequency mode will not change the Active or Standby frequencies from what they were prior to entering Program mode.

3.1.5 MILITARY OPERATION (J5982-P7 GROUNDED)

3.1.5.1 Channel Mode

- A. Pressing the CHAN button momentarily while in one of the Frequency modes puts the unit in Channel mode. The last channel used is the Channel number displayed. The unit tunes the KTR 908 to the frequency in the Standby window. If no channels are programmed, the unit will display CH 1 and dashes in the Standby window for five seconds, and will tune the KTR 908 to the last Active frequency. Either tuning knob will change the Channel number and corresponding channel frequency. The unit will only channel to channel numbers with frequency programmed.

Holding the Transfer button for two seconds selects the Active Entry mode.

NOTE

Channel mode does not time out as in civil operation.

- B. Pressing the CHAN button momentarily will return the unit to Frequency mode and the status remains what it was prior to entering Channel mode.

3.1.5.2 Program Mode

- A. Pressing and holding the CHAN button for longer than 2 seconds brings the unit into Program mode. The last used channel number is displayed and flashes. The transceiver tunes the frequency in the Standby window. When the channel number is flashing, the tuning knobs change the channel number. An unprogrammed channel displays dashes in the Standby window, in which case the transceiver tunes the last valid Active frequency.
- B. Pressing the Transfer button causes the channel number to stop flashing and the frequency to flash. The tuning knobs then operate as in the frequency mode. Pressing the Transfer button again causes the Channel number to flash and the frequency to stop flashing.
- C. In frequency rollover or rollunder, dashes will be displayed before rolling to the lowest or highest frequency respectively. Leaving dashes in the display unprograms the channel when leaving Program mode.
- D. The unit returns to Frequency mode by momentarily pressing the CHAN button or if no activity has occurred for 20 seconds. The Frequency mode status prior to Channel or Program mode is resumed. The transceiver will be tuned to the frequency in the Active display.

3.1.6 DEFAULT MODE

Turning the units on while holding the Transfer button down will bring the unit on in Active Entry and load 120.00MHz as the Active frequency.

3.1.7 REMOTE TRANSFER

Operates identically as front panel Transfer button with the exception that holding the Remote Transfer button for two seconds does not place unit in Active Entry.

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3.1.8 REMOTE CHANNEL

Pressing the Remote Channel button will cause the system to enter the Channel mode of operation and will increment the channel from the previous channel number used.

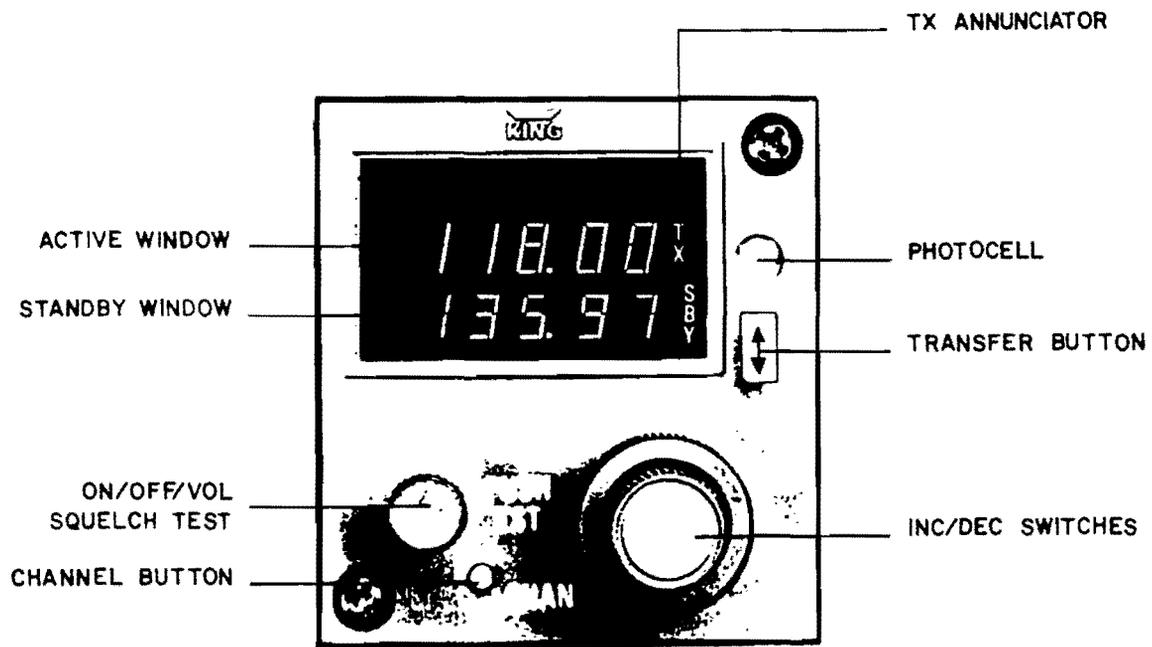


FIGURE 3-2 KFS 598A CONTROL FUNCTIONS