PERFORMANCE

QUICK
REFERENCE
HANDBOOK

WARNING

THE PERFORMANCE DATA IS BASED ON AN

AIRCRAFT THAT IS:

1.) WELL MAINTAINED

2.) OPERATING NORMALLY

3.) EXPERTLY FLOWN

THERE ARE NO ALLOWANCES FOR POOR AIRCRAFT PERFORMANCE OR IMPROPER PILOT TECHNIQUE.

INTRODUCTION

PURPOSE

To enhance safety by providing an L-29 pilot with an operational tool that facilitates acquiring performance data quickly in a user friendly format.

The performance data may be used for flight planning, determining fuel requirements specified in 14 CFR §§ 91.103(a), 91.151 or 91.167 and takeoff and landing performance information required by 14 CFR §91.103(b)(2).

ORGANIZATION

The performance data was converted from graph form to a table format for simplification and functionality. The tables are laid out in the order a normal flight would progress.

DATA SOURCE

The Nigerian Air force L-29 Flight Manual and the manufacturer's published data was the source for the performance data. No flight testing was performed to validate any of the performance data.

CORRECTIONS AND REVISIONS

Considerable effort was put into this handbook to ensure accuracy. However, as with many things, errors may occur. Please help make this and future handbooks as error free as possible by reporting suspected errors to:

corrections@L29support.com

The effective date and revision number are located on the footer of each page. When a revision is necessary the handbook will be revised in its entirety. Please consult the L29support.com web site to determine the current revision date and number.

The user of this handbook shall ensure that only the current version is used and, since this is not a controlled document, assumes all responsibility for the accuracy of the content contained herein.

PAGE NUMBERS

The first number reflects the section number which corresponds to *"Performance"*, in accordance with GAMA Specification No. 1, and the second number is the page number.

HANDBOOK RIGHTS

DISCLAIMER

No warranty or guarantee, expressed or implied, is made as to the accuracy, sufficiency or suitability of the materials contained herein or any revision, supplement or bulletin hereto. It is understood and agreed to by the user of this handbook that they shall release indemnity and hold L29 Support, Inc. harmless against any and all claims or actions of whatever nature which may arise or claim to arise from the use hereof.

CONTACT INFORMATION

If you have a comment, question or would like to acquire additional copies of this handbook please visit the web site L29support.com.

EXPLANATIONS

Performance data may be obtained quickly and in doing so will, in most cases, offer additional pad for operational safety. The explanations for using the quick method will be in bold print following the word **QUICK.**

Performance data may also be obtained by the interpolation method. This method is somewhat arduous but will yield performance data which will accurately reflect the capabilities of the aircraft for the current conditions and is typically used when the quick method does not provide sufficient performance or exact data is desired.

EXAMPLE

To help explain the use of the performance tables an example of a typical cross country flight is summarized and then explained in the following pages. Both the quick and interpolation methods are explained.

EXAMPLE CONDITIONS:

Pilots: 2 Distance: 275NM Fuel: 1300L

DEPARTURE FIELD:

Elevation: 900'MSL Altimeter setting: 29.82"
Temperature: 27°C Wind: 360° @ 10kts.
Runway: 30L Slope: 1% Downhill

CRUISE:

16,500' MSL Wind: Calm
Temp: Missing (if unknown use lapse rate of 2°C/1000')

DESTINATION FIELD:

Elevation: 5200'MSL Altimeter setting: 30.12"
Temperature: 32°C Wind: 350° @ 5kts.
Runway: 12 Slope: 2% Uphill

EXAMPLE SUMMARY:

SEGMENT	WEIGHT (LBS.)	TIME (MIN.)	DIST. (NM)	FUEL (L/LBS.)
Taxi	7799	6	-	48/ 85
Takeoff	7714	2	-	60/ 106
Climb	7608	16.9	63	255/ 451
Cruise	7157	40	183	283/ 501
Descent	6656	9	29	50/ 88
Approach	6568	5	-	40/ 71
Landing	6497	-	-	-
Totals		78.9	275	736/1302

(Flight time with no approach is 67.4 minutes)

QUICK, for a cross country flight at or above 15,000', no wind, use the following numbers for fuel flow and speed:

500 liters first 30 MINUTES.
500 liters per HOUR for the remainder.
250kt TAS average.

For the example, the time and fuel would be:
66 minutes.
800 liters.

FUEL QUANTITY AND WEIGHT

Assuming the aircraft ZFW is 5500lbs. with two pilots enter the table at the current fuel load proceeding across to find aircraft weight.

The example plans a fuel load of 1300L. Entering the table at 1300L and proceeding right to find the aircraft weight of 7799.4lbs.

Additionally, this table may be used to convert liters into gallons or pounds.

TAXI FUEL

Use 8 liters per minute for taxi fuel burn. The burn is less at idle however eight liters per minute is an average taking into consideration higher power settings needed for taxi and engine run-up. If an extended engine run-up is performed add 20 liters per minute for the time above 80% to the taxi fuel burn.

STALL SPEEDS

Enter the table at the actual aircraft weight or interpolate between the weights closest to the actual weight.

The example plans a take off weight of 7714lbs. Interpolate between 7497lbs. and 7938lbs. to arrive at the stall speeds for 7714lbs.

91/Clean
86/Takeoff
82/Landing

QUICK, enter the table and use the data for the actual or next higher weight.
For the example use the data for 7938lbs.
92/Clean
88/Takeoff
83/Landing

WIND COMPONENT CHART

Enter the table at "0" proceeding outward on the angle difference between wind direction and the runway heading to the wind velocity arc. Proceed straight left to determine the headwind/tailwind component or proceed straight down to determine the crosswind component.

The example plans a takeoff from runway 30L with the wind 60° to the right of runway heading at 10kts. Enter the table at 0 and proceed outward on the 60° angle to the 10kt. wind velocity arc. Proceed left to find a 5kt. headwind component or straight down to find an 8kt. crosswind component.

DENSITY ALTITUDE

Enter the table at the pressure altitude and proceed down to the density altitude adjacent to the current temperature. Linear interpolations may be necessary to determine exact density altitude.

The example plans a takeoff from an airport at 900'MSL with the altimeter setting of 29.82"HG. Knowing that 1"HG = 1000' of altitude it is determined that there is 100' difference between the MSL and pressure altitude. Being that the altimeter setting is less than the standard of 29.92" add the difference to the MSL altitude to find a pressure altitude of 1000'. If the altimeter setting had been higher than standard, the difference would be subtracted.

Enter the table at 1000' pressure altitude and proceed down adjacent to the current temperature of 27°C to find the density altitude of 2600'.

Additionally, this table may be used to convert temperatures between Fahrenheit and Celsius.

QUICK, enter the table at or the next higher pressure altitude and proceed down adjacent to the current or next higher temperature to find the density altitude.

TAKEOFF

Fuel:

For planning use 30 liters per minute for the time takeoff power is applied to when it is reduced to 97% for climb, normally 1000'AGL.

Performance data:

1.) Enter the table at the actual weight and density altitude or interpolate as necessary between the weights and density altitudes closest to the actual conditions to find the takeoff data for the actual weight and density altitude.

2.) Make a correction, if needed, for headwind or tailwind as directed at the bottom of the respective table. (There is intentionally a slight difference between the corrections for the two takeoff tables.)

3.) Make a correction, if needed, for runway slope as indicated at the bottom of the table.

The example plans a takeoff from an elevation of 900'MSL (2,600' D.A.) at a weight of 7714lbs. with a five knot headwind and 1% downhill runway slope.

Step 1, Interpolate between the weights of 7497lbs. and 7938lbs. at 2K and 4K to find the data for 7714lbs. Then interpolate between the 2K and 4K interpolated data to find the data for 2.6K.

7497/2K	7938/2K	7497/4K	7938/4K
2725/ 93	3122/ 96	3104/ 93	3537/ 96
4692/ 93	5125/ 96	5161/ 93	5866/ 96
3891/102	4367/105	4331/102	4837/105

7714/2K	7714/4K
2920/ 94	3316/ 94
4785/ 94	5506/ 94
4124/103	4579/103

7714/2.6K
3052/ 94
5025/ 94
4276/103

Step 2, Subtract 10% for the five knot headwind.

7714/2.6K-10%/HW
2747/94
4523/94
3849/103

Step 3, Subtract 2% for the 1% downhill slope from ground roll and distance to clear 50’ obstacle. Do not make a correction to the accelerate stop distance.

7714/2.6K-10%/HW-2%/Slope
2692/94
4523/94
3772/103

The data displayed in each data block is as follows:

Ground Roll Distance/Liftoff Speed
Accelerate Stop Distance/Abort Speed
Distance to Clear a 50’ Obstacle/Speed at Obstacle

This information is not only provided for quick reference but is also provided *to illustrate the additional distance that is required to stop, if an abort is initiated at takeoff speed, and to clear a 50’ obstacle. Consider this information carefully in your go/no go decision.*

QUICK, enter the table and use the data for the actual weight and density altitude or, if necessary, the next higher weight and or density altitude.

For the example use the takeoff data for 7938lbs. at 4000’ D.A.,

7938/4K
3537/96
5866/66
4837/105

Corrections for wind and slope only need to be applied if they decrease aircraft performance or if the additional performance is required.

Corrections that decrease performance shall be rounded up and added to the distances.

For this example no corrections were made as they increased aircraft performance.

CLIMB

1.) Enter the table at the actual weight at *start* of climb and density altitude at the *top* of climb or interpolate as necessary between the weights and density altitudes closest to the actual conditions to find the climb data for the actual weight and density altitude.

2.) Subtract the altitude to climb from the density altitude at *top* of climb to find the *start* of climb density altitude.

3.) Enter the table at the actual weight and density altitude at the *start* of climb or interpolate as necessary between the weights and density altitudes closest to the actual conditions to find the climb data for the actual weight and density altitude.

4.) Subtract the data found in step 3 from the data found in step 1 to find the climb data.

The example plans a climb from 1900' to 16,500'MSL a difference of 14,600' (time & fuel used for a climb up to 1000'AGL is included in the takeoff segment).

Step 1, the density altitude at the top of climb is 18,200'. Interpolate between the weights 7497 and 7938 at 15K and 20K to find the climb data for 7608lbs. Then interpolate between 15K and 20K interpolated data to find the climb data for 7608lbs at 18,200'D.A..

7497/15K	7938/15K	7497/20K	7938/20K
15.1	17.4	21.8	25.4
52.7	60.6	79.4	92.6
247	285	338	394

7608/15K	7608/20K
15.7	22.7
54.7	82.7
257	352

7608/18.2K
20.2min.
72.6nm
318L of Fuel.

Step 2, Subtract 14,600’ (altitude to climb) from the top of climb of 18,200’ density altitude to find the start of climb density altitude of 3,600’.

Step 3, Interpolate between the weights 7497lbs. and 7938lbs. at 5K to find the climb data for 7608lbs. Then interpolate between the interpolated data for 5K and sea level to find the climb data for 7608lbs. at 3,600’.

<u>7497/5K</u>	<u>7608/5K</u>	<u>7938/5K</u>
4.4	4.6	5
13.3	13.7	15
85	88	96

<u>7608/3.6K</u>
3.3min.
9.9nm
63L fuel

Step 4, Subtract the data found in step 3 from the data found in step 1 to find the climb data for 7608lbs. from 3,600’ to 18,200’ density altitude.

<u>7608/3.6K – 18.2K (16,500MSL)</u>
16.9min.
62.7nm
255L Fuel.

QUICK, enter the table and use the data for the next higher weight closest to the density altitude at top of climb then subtract the data for the density altitude closest to the start of start climb.

For the example start with the data at 7938lbs. at 20,000’ D.A. and subtract the data for 7938lbs. at 5,000’ D.A. (15,000’ difference) to find the climb data of:

20.4min.
77.6nm.
298L of fuel

CRUISE

1.) Enter the table at the actual weight and density altitude planned for cruise or interpolate as necessary between the weights and density altitudes closest to the actual conditions to find the cruise data for the actual weight and density altitude in the desired profile.

The example plans to cruise at an altitude of 16,500’ MSL (18,200’ D.A.) at best speed.

Step 1, Interpolate between the weights of 7056lbs. and 7938lbs. at 15K and 20K in the speed profile to find the data for the actual weight of 7157lbs. Then interpolate between 15K and 20K interpolated data to find the cruise data at 7157lbs. at 18,200’D.A.

7056/15K	7938/15K	7056/20K	7938K/20K
94	94	94	94
470	470	400	400
221/.44	217/.43	204/.45	199/.44
276/.59	271/.58	276/.69	269/.67

7157/15K	7157/20K
94	94
470	400
221/.44	204/.45
276/.59	276/.69

7157/18.2K
94%
425LPH
210/.45 (CAS/MACH)
276/.65 (TAS/nm per liter of fuel)

Note: For preflight planning purposes it may be advantageous to determine the top of descent point, utilizing the descent table, prior to performing cruise calculations.

QUICK, enter the table and use the data for the closest weight for the next lowest density altitude for the proposed cruise density altitude in the desired profile.

For the example use the cruise data for 15K at 7056lbs. in the speed profile.

<u>7056/15K</u>
94% N_1
470LPH
221/.44 (CAS/MACH)
276/.59 (TAS/nm per liter of fuel)

DESCENT

1.) Enter the table at the density altitude at the top of descent or interpolate between the closest density altitudes to find the data for a descent to sea level.

2.) Subtract the altitude to descend from the density altitude at top of descent to find the density altitude at bottom of descent.

3.) Enter the table at that density altitude at bottom of descent or interpolate between the closest density altitudes to find the data for a decent to sea level.

4.) Subtract the data found in step 3 from the data found in step 1 to find the descent data from top of descent to the bottom of descent.

The example plans a descent from 16,500MSL to 6,700MSL (pattern altitude) a difference of 9,800'.

Step 1, Interpolate between the data for 15K and 20K to find the descent data for 19.3K (19,300' D.A. using the destination conditions and the std. lapse rate of 2°C/1000').

15K	19.3K	20K
17	20	21
50	62	64
114	130	133

Step 2, Subtract 9,800’ (altitude to descend) from the top of descent density altitude of 19,300’ to find 9,500’ (density altitude at the bottom of descent).

Step 3, Interpolate between 5K and 10K to find the descent data for 9.5K.

5K	9.5K	10K
7	11	11
19	33	34
24	80	86

Step 4, Subtract the data found in step 3 from the data in step 1 to find the descent data from 16,500MSL to 6,700’MSL.

16,500’MSL – 6,700’MSL
9min.
29nm.
50L. of fuel

QUICK, enter the table and use the data for the amount of altitude closest to the amount to descend.

For the example a descent of 9,800’ is planned so use the data for 10K.

10K
11min.
34nm.
86L. of fuel

APPROACH/HOLDING FUEL

Use 8 liters per minute fuel burn* for flight time for:

Holding
IFR approach
VFR traffic pattern

*Burn based on 135kts IAS, clean, and not configuring for landing until reaching a point where a normal descent to a landing can be made.

LANDING

1.) Enter the table at the actual weight and density altitude or interpolate as necessary between the weights and density altitudes closest to the actual conditions to find the landing data for the actual weight and density altitude.

2.) Make a correction, if needed, for headwind or tailwind as directed at the bottom of the table.

3.) Make a correction, if needed, for runway slope as indicated at the bottom of the table.

The example plans a landing at an elevation of 5200'MSL (8,000' D.A.) at a weight of 6497lbs. with a four knot tailwind and 2% uphill runway slope.

Step 1, Interpolate between the weights of 6174lbs. and 6615lbs. at 8K to find the data for 6497lbs.

<u>6174/8K</u>
95/81
2346
2888

<u>6615/8K</u>
98/83
2472
2995

<u>6497/8K</u>
97/82
2441
2967

Step 2, Add 8% for a four knot tailwind.

<u>6497/8K+8%/TW</u>
97/82
2636
3204

Step 3, Subtract 1% for the 2% uphill slope from ground roll and distance to clear 50' obstacle.

<u>6497/8K+8%/TW-2%/Slope</u>
97/82 approach/touchdown speeds
2583 landing distance
3140 distance to clear a 50’ obstacle

Please keep in mind the landing tables are based on maximum braking.

QUICK, enter the table and use the data for the actual weight and density altitude or, if necessary, the next higher weight and or density altitude.

Corrections that decrease performance shall be rounded up and added to the distances.

Corrections for wind and slope only need to be applied if they decrease aircraft performance or if the additional performance is required.

For the example use the landing data for 6615lbs. at 8000’ D.A.,

<u>6615/8K</u>
98/83
2472
2995

For the tailwind round up from 8% to 10% then round that figure up and add it to the distances (i.e. 250’ and 300’ respectively).

<u>6615/8K + 10%/TW</u>
98/83
2722
3295

For this example only the correction for the tailwind was applied. The uphill slope would increase performance or shorten the distances.

FUEL QUANTITY AND WEIGHT

LITERS	= GALLONS	= POUNDS*	+ A/C WEIGHT**
100	26.4	176.9	5676.9
200	52.8	353.8	5853.8
300	79.2	530.6	6030.6
400	105.6	707.5	6207.5
500	132.0	884.4	6384.4
600	158.4	1061.3	6561.3
700	184.8	1238.2	6738.2
800	211.2	1415.0	6915.0
900	237.6	1591.9	7091.9
1000	264.0	1768.8	7268.8
1100	290.4	1945.7	7445.7
1200	316.8	2122.6	7622.6
1300	343.2	2299.4	7799.4

*BASED ON FUEL DENSITY OF 6.7LBS. PER GALLON.
** BASED ON ZERO FUEL WEIGHT OF 5500LBS.

STALL SPEEDS
AT 1G

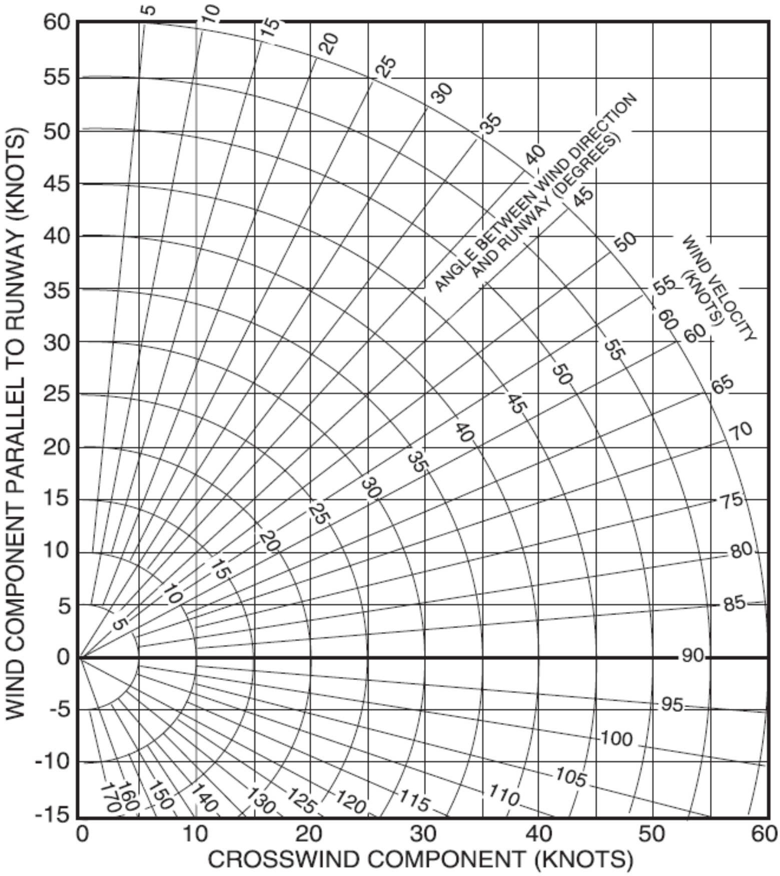
5733LBS.	6174LBS.	6615LBS.
78	81	84
74	77	80
70	73	76

7056LBS.	7497LBS.	7938LBS.
87	90	92
83	85	88
78	81	83

CLEAN / FLAPS & GEAR UP
TAKEOFF / FLAPS 15º & GEAR DOWN
LANDING / FLAPS 30º GEAR DOWN

LINEAR INTERPOLATIONS ARE PERMISSIBLE.

WIND COMPONENT CHART



DENSITY ALTITUDE X 1000’

TEMP. ºF/ºC	PRESSURE ALTITUDE X 1000’ 12	13	14	15	16	17
80/27	15.9	17.1	18.3	19.5	20.7	21.9
60/16	14.8	16.0	17.2	18.4	19.6	20.8
40/4	13.5	14.7	15.9	17.1	18.3	19.6
20/-7	12.2	13.4	14.7	15.9	17.1	18.3
0/-18	10.9	12.1	13.4	14.6	15.8	17.1
-20/-29	9.5	10.7	12.0	13.2	14.5	15.7
-40/-40	8.0	9.3	10.5	11.8	13.1	14.3

TEMP. ºF/ºC	PRESSURE ALTITUDE X 1000’ 18	19	20	21	22	23
60/16	22.0	23.2	24.4	25.6	26.8	28.0
40/4	20.8	22.0	23.2	24.4	25.6	26.8
20/-7	19.6	20.8	22.0	23.2	24.4	25.6
0/-18	18.3	19.5	20.8	22.0	23.2	24.4
-20/-29	17.0	18.2	19.5	20.7	22.0	23.2
-40/-40	15.6	16.9	18.1	19.4	20.6	21.9

Note: 1”HG equals 1,000’ altitude. If pressure is higher than standard subtract from MSL altitude for pressure altitude, if lower than standard add.

LINEAR INTERPOLATIONS ARE PERMISSIBLE.

TAKEOFF PERFORMANCE

FLAPS 15º, N_1 100% AT BRAKES RELEASE
PAVED, LEVEL, DRY SURFACE RUNWAY

D. A.	5733LBS.	6174LBS.	6615LBS.
S. L.	REMOVED FOR SAMPLE	1570/85 3104/85 2563/92	REMOVED FOR SAMPLE
2000	REMOVED FOR SAMPLE	1733/85 3392/85 2779/92	REMOVED FOR SAMPLE
4000	REMOVED FOR SAMPLE	1986/85 3717/85 3032/92	REMOVED FOR SAMPLE
6000	REMOVED FOR SAMPLE	2256/85 4060/85 3339/92	REMOVED FOR SAMPLE
8000	REMOVED FOR SAMPLE	2563/85 4475/85 3699/92	REMOVED FOR SAMPLE

GROUND ROLL DISTANCE / LIFTOFF SPEED
ACCELERATE STOP DISTANCE / ABORT SPEED
DISTANCE TO CLEAR A 50' OBSTACLE / SPEED AT OBSTACLE
(DISTANCE IN FEET / SPEED IN KNOTS)
LINEAR INTERPOLATIONS ARE PERMISSIBLE.

CORRECTIONS TO BE MADE IN THE FOLLOWING ORDER:

1) SUBTRACT 3% FOR EACH KNOT OF HEADWIND.
2) ADD 4% FOR EACH KNOT OF TAILWIND.
3) SUBTRACT 2%FOR EACH 1% DOWNHILL SLOPE.
4) ADD 6% FOR EACH 1% UPHILL SLOPE.

(CORRECTIONS FOR SLOPE ON ACC. STOP DIST. N/A.)

CLIMB PERFORMANCE

FROM SEA LEVEL

N_1 97% 189KTS/.35M

D. A.	7056LBS.	7497LBS.	7938LBS.
5K	REMOVED FOR SAMPLE	4.4 13.3 85	REMOVED FOR SAMPLE
10K	REMOVED FOR SAMPLE	9.4 29.8 165	REMOVED FOR SAMPLE
15K	REMOVED FOR SAMPLE	15.1 52.7 247	REMOVED FOR SAMPLE
20K	REMOVED FOR SAMPLE	21.8 79.4 338	REMOVED FOR SAMPLE
25K	REMOVED FOR SAMPLE	29.8 111.4 440	REMOVED FOR SAMPLE

TIME IN MINUTES.
DISTANCE IN NM.
FUEL IN LITERS.

* N_1 must be reduced to 94% after 30 minutes.

LINEAR INTERPOLATIONS ARE PERMISSIBLE.

DOES NOT INCLUDE TAXI & TAKEOFF FUEL.

CRUISE PERFORMANCE 10,000' DENSITY ALTITUDE

	6174LBS.	7056LBS.	7938LBS.
RANGE	REMOVED FOR SAMPLE	87 390 180/.33 209/.53	REMOVED FOR SAMPLE
MID	REMOVED FOR SAMPLE	90 440 206/.37 238/.54	REMOVED FOR SAMPLE
SPEED	REMOVED FOR SAMPLE	94 530 233/.42 269/.51	REMOVED FOR SAMPLE

PERCENT N_1
FUEL FLOW IN LITERS PER HOUR
CAS / PERCENT OF MACH
TAS / NAUTICAL MILES PER LITER OF FUEL

FOR FLIGHTS WITHOUT EXTERNAL FUEL TANKS OR PYLONS INSTALLED, INCREASE SPEED AND NAUTICAL MILES PER LITER OF FUEL BY 4%.

LINEAR INTERPOLATIONS ARE PERMISSIBLE.

SHADED VALUES ARE FOR INFORMATION ONLY AND ARE NOT RECOMMENDED FOR LONG RANGE CRUISE.

DESCENT PERFORMANCE

N_1 65% 162KTS IAS TO SEA LEVEL
SPEED BRAKES RETRACTED

D. A.	ALL WEIGHTS
25K	24 78 148
20K	21 64 133
15K	17 50 114
10K	11 34 86
5K	7 19 44

TIME IN MINUTES.
DISTANCE IN NM.
FUEL IN LITERS.

LINEAR INTERPOLATIONS ARE PERMISSIBLE.

DOES NOT INCLUDE APPROACH FUEL.

LANDING PERFORMANCE

FLAPS 30º SPEED BRAKES EXTENDED
IDLE THRUST MAXIMUM BRAKING
PAVED, LEVEL, DRY SURFACE RUNWAY

D.A.	5292LBS.	5733LBS.	6174LBS.
S.L.	REMOVED FOR SAMPLE	92/77 1840 2346	REMOVED FOR SAMPLE
2000	REMOVED FOR SAMPLE	92/77 1931 2437	REMOVED FOR SAMPLE
4000	REMOVED FOR SAMPLE	92/77 2021 2563	REMOVED FOR SAMPLE
6000	REMOVED FOR SAMPLE	92/77 2130 2635	REMOVED FOR SAMPLE
8000	REMOVED FOR SAMPLE	92/77 2237 2779	REMOVED FOR SAMPLE

APPROACH SPEED / TOUCHDOWN SPEED
LANDING DISTANCE
LANDING DISTANCE TO CLEAR A 50' OBSTACLE
(DISTANCE IN FEET / SPEED IN KNOTS)
LINEAR INTERPOLATIONS ARE PERMISSIBLE.

CORRECTIONS TO BE MADE IN THE FOLLOWING ORDER:

1) SUBTRACT 1% FOR EACH KNOT OF HEADWIND.
2) ADD 2% FOR EACH KNOT OF TAILWIND.
3) SUBTRACT 1%FOR EACH 2% UPHILL SLOPE.
4) ADD 1% FOR EACH 1% DOWNHILL SLOPE.