Flight Test Performance Calculation Package – Diamond DA42

You must prepare a full set of planning documents for your flight test and can use this package for that purpose.

These flight planning documents must include:

- weight and balance
- flight plan
- performance predictions
  - Accelerate-Stop Distance Required
  - Take-Off Distance Required
  - Single Engine Service Ceiling
  - Etc.

Performance predictions should cover all phases of flight for which charts are available in the POH. We suggest that you prepare these in a package in advance of your flight test using an estimate of the examiner's weight, the forecast weather conditions applicable to the time of your flight test and of course the actual aerodrome data.

The charts and performance information provided in this package are based on a 2004 model Diamond DA42 with the Centurion 1.7 engines. You should check to confirm that the information given in this package is applicable for the year or model aircraft that you will use on your flight test. If the information differs then you should use the charts provided by your flight school or the actual POH information when preparing for your flight test, or any other flight.

Often the examiner will give you a questionnaire ahead of time so that you can have this information determined before the examiner arrives. You should of course be capable of explaining how you determined it during the pre-flight oral briefing.

Your documentation should be put together in a package or binder so that it is neat, clear and professional. This will make a good impression with the examiner and will set you up for success.

Using information for your specific aircraft, airfield and the latest weather information, fill in the information below for use in the weight & balance and performance calculations:

Aeroplane and loading information:

- **Aeroplane empty weight:** _____ lbs
- **Aeroplane empty moment:** _____ in-lbs
- **Pilot weight:** _____ lbs
- **Examiner weight:** _____ lbs
- **Baggage weight:** _____ lbs
  (Mostly flight bags, jackets and documentation, normally located in the aft baggage area)
- **Fuel quantity:** _____ USG, and **Fuel weight:** _____ lbs
  (Sufficient fuel for at least a two hour flight test plus day VFR reserves)

Aerodrome and Weather information:

- **Aerodrome elevation:** _____ feet
- **Altimeter setting:** _____" Hg
- **Runway in use:** _____, length of runway: _____ feet
- **OAT:** _____°C
- **Wind:** ____/___ by ATIS
- **Flight test altitude:** _____' (sufficient to allow recovery at least 2,000' AGL)
- **Temperature at flight-test altitude:** ___°C from FD

Most aeroplane charts require one to input the pressure altitude and the aeroplane weight so the first steps are to calculate these.

Use the information for the airfield where you will be conducting your flight test and the latest weather information information

Pressure Altitude at take-off = (airfield elevation) + ((altimeter setting) – 29.92) x 1,000'
= _____ ft

Select an altitude for the flight test that will allow at recovery at least 2,000' AGL.

Pressure Altitude at test altitude = (test altitude) + ((altimeter setting) – 29.92) x 1,000'
=_____ ft

The second step in pre-flight planning is to estimate the aeroplane weight at take-off. To do this we must estimate the weight of fuel that will be carried.

For a typical flight test, sufficient fuel must be carried for about 2 hours of flying plus VFR reserves which correspond to 30 minutes of fuel at normal cruise power. Of course there will have to be fuel for taxi, take-off, climb, descent and landing so we can estimate the fuel using a total flight time of 3 hours at normal cruise power. We can verify that this will be sufficient and then make any adjustments necessary at the end.

Refer to the "Fuel Flow (per engine)" chart you can find that the fuel flow is ___ GPH per engine or ___ GPH total

Estimated fuel required is 3 hours x ____ GPH = ____ USG = _____ lbs

Actual fuel on board = ____ USG = _____ lbs

Using this information, we can now calculate the weight and balance for the flight test

Use the weight and balance chart to determine your take-off and landing weights and center of gravity positions

Take-off weight: _____ lbs, **Center of Gravity:** Within Limits / Outside Limits

Landing weight: _____ lbs, **Center of Gravity:** Within Limits / Outside Limits

Take-off Distance Required (TODR)

The total take-off distance needed to clear a 50 ft tall obstacle. Where there are existing obstacles at your departure airport you should determine the distance required to clear these obstacles.

Refer to the “Take-off Distance Over 50 ft Obstacle” chart and the local aerodrome data

Take-off Distance Required: _____ ft

Take-off Distance Available: _____ ft

Climb Performance – Take-off Climb

This is the climb rate from a take-off climb, used to achieve the best rate of climb shortly after take-off for obstacle clearance

Refer to the “Climb Performance – Take-Off Climb” chart

Rate of Climb (Take-Off Climb): _____ fpm

Climb Performance – Cruise Climb

This is the climb rate from a cruise climb, used to achieve the best combination of climb rate and forward speed. Note that the cruise climb chart uses a fairly low airspeed (85 KIAS). Typical cruise climb speed will be higher than this (perhaps 100 KIAS) to provide a lower pitch attitude for better visibility and improved passenger comfort and to reduce overall trip time by climbing at a faster speed. Bear in mind that if you choose a cruise climb speed faster than what is shown on the chart, you will not achieve the climb rate shown.

Refer to the "Climb Performance – Cruise Climb" chart

Rate of Climb (Cruise Climb): _____ fpm

Time, Fuel and Distance to Climb

The Diamond DA42 Aircraft Flight Manual doesn't provide a "Time, Fuel and Distance to Climb" chart, so you will have to use a rule of thumb to come up with this information.

Rule-Of-Thumb #1: Average climb rate is approximately the climb rate at 2/3 your desired altitude

Rule-Of-Thumb #2: Average TAS during climb is approximately the same as your TAS when at 2/3 your desired altitude

Rule-Of-Thumb #3: Average fuel flow will be the fuel flow at 100 % load

Example: Climbing from Sea Level to 10,000 ft so check climb rate and TAS at 7,000 ft. These values will be close to the average climb rate and average TAS for the climb.

Since you now have the altitude to climb, average climb rate, average TAS and fuel flow you can now calculate the time, fuel and distance needed for the climb

Time: _____ minutes

Fuel: _____ USG

Distance: _____ nm

Single Engine Climb Rate

The single engine rate of climb is usually determined for two situations – firstly following an engine failure after take-off and secondly at your cruising altitude.

Refer to the “One Engine Inoperative – Climb / Descent” chart

After liftoff

Single engine rate of climb: _____ fpm (_____% gradient)

At flight test altitude

Single engine rate of climb: _____ fpm (_____% gradient)

Single Engine Cruise Performance

If you are above your single engine absolute ceiling when an engine fails then you will be unable to maintain altitude. You will gradually descend down to the single engine absolute ceiling even if you are at full power on the operating engine and are maintaining the best single engine rate of climb speed (blue line, V_{YSE}). You need to check that you still will be able to maintain an altitude above terrain. This is particularly important during instrument conditions when you can’t see the terrain, so you should always check that your single engine absolute ceiling is above the Minimum Obstacle Clearance Altitude (MOCA) if you are flying IFR.

Refer to the “One Engine Inoperative – Climb / Descent” chart

Single Engine Service Ceiling: _____ ft

Time, Fuel and Distance to Descend

The Diamond DA42 Aircraft Flight Manual doesn't provide a "Time, Fuel and Distance to Descend" chart, so you will have to pick an airspeed and descent rate for the descent, and use a rule of thumb to come up with this information.

Descent Airspeed: A good airspeed to use for descent is the IAS used for cruise

Rate of Descent: Since the DA42 is not pressurized a descent rate of 500 fpm will allow you to descend relatively quickly without being uncomfortable for your passengers

Rule-Of-Thumb #1: Average TAS during descent is approximately the same as your TAS when at 2/3 of your cruising altitude

Rule-Of-Thumb #2: Average fuel flow will be approximately the fuel flow at 50 % load

Example: Descending from 10,000 ft to Sea Level so check TAS at 7,000 ft. This value will be close to the average TAS for the descent.

Since you now have the altitude to descend, average descent rate, average TAS and fuel flow you can now calculate the time, fuel and distance needed for the descent

Time: _____ minutes

Fuel: _____ USG

Distance: _____ nm

Landing Distance Required

The total landing distance needed to clear a 50 ft tall obstacle situated at the threshold. Where there are existing obstacles at your arrival airport you should determine the distance required to clear these obstacles and land.

The landing distance chart requires the pressure altitude and temperature (to take into account the effects of density altitude) and the wind component to calculate landing distance but do not usually take into account the effect of weight on landing distance.

Refer to the "Landing Distance Over 50 ft Obstacle" chart and the local aerodrome information

Landing Distance Required: _____ ft

Landing Distance Available: _____ ft

PERFORMANCE CALCULATIONS SUMMARY

WEIGHT AND BALANCE

Estimated fuel required: ____ USG = _____ lbs

Actual fuel on board: ____ USG = _____ lbs

Take-off weight: _____ lbs, **Center of Gravity:** Within Limits / Outside Limits

Landing weight: _____ lbs, **Center of Gravity:** Within Limits / Outside Limits

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TAKE OFF

Pressure Altitude: _____ ft **Take-off Decision Speed:** _____ KIAS

Take-off Distance Required: _____ ft, **Distance Available:** _____ ft

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CLIMB

NORMAL

Airspeed: _____ KIAS

Time: _____ minutes

Fuel: _____ USG

Distance: _____ nm

ONE ENGINE INOPERATIVE

Airspeed: _____ KIAS

After Liftoff:
Single Engine Rate of Climb: _____ fpm
(_____% gradient)

At Flight Test Altitude:
Single Engine Rate of Climb: _____ fpm
(_____% gradient)

CRUISE

Pressure Altitude: _____ ft **Single Engine Service Ceiling:** _____ ft

Power Setting: _____ in. Hg, _____ RPM

Performance: _____ KIAS, _____ KTAS, _____ GPH per Engine

DESCENT

Airspeed: _____ KIAS **Time:** _____ minutes

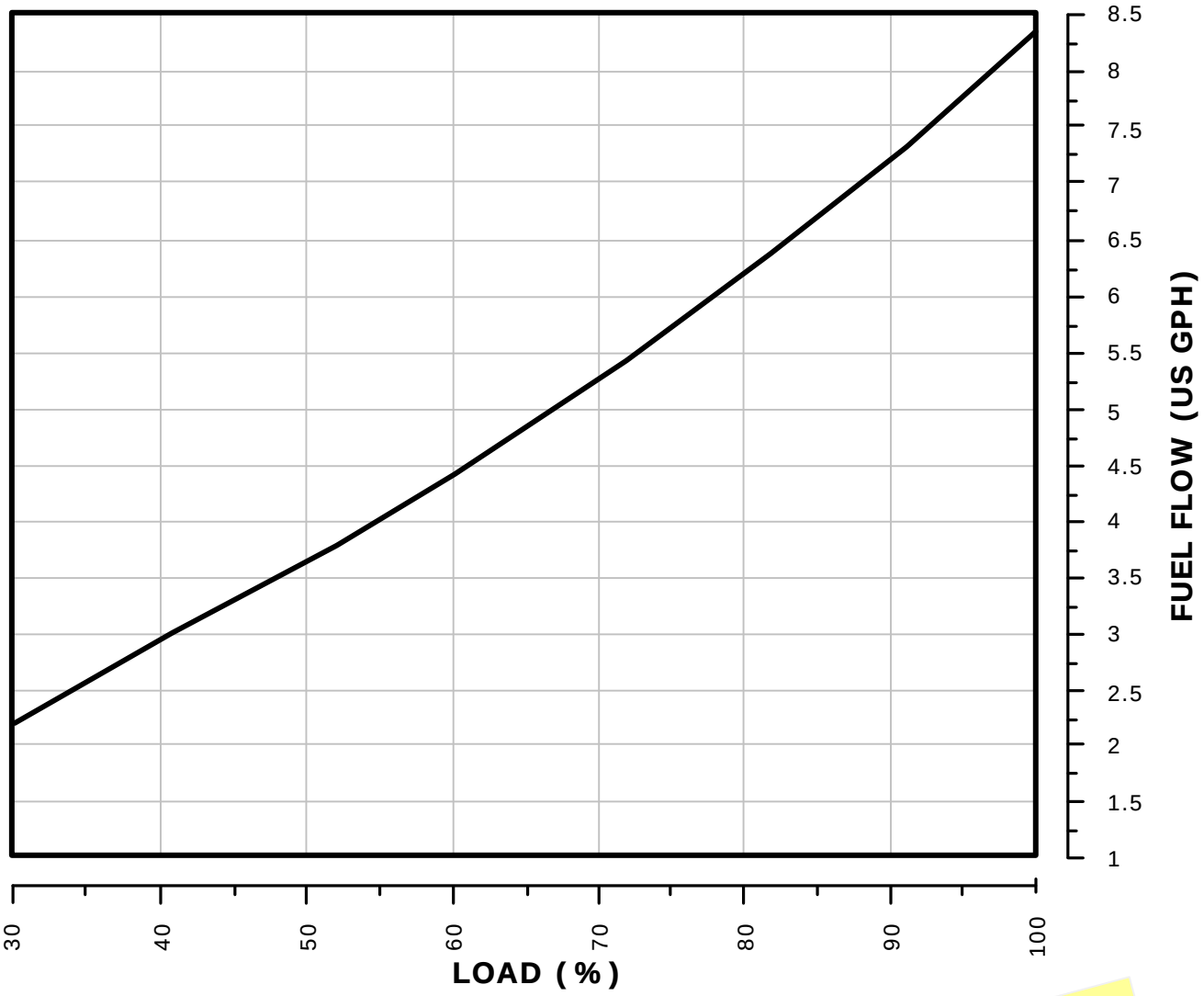
Fuel: _____ USG **Distance:** _____ nm

LANDING

Approach Airspeed: _____ KIAS

Landing Distance Required: _____ ft, **Distance Available:** _____ ft

FUEL FLOW (per engine)
(Chart Extract)

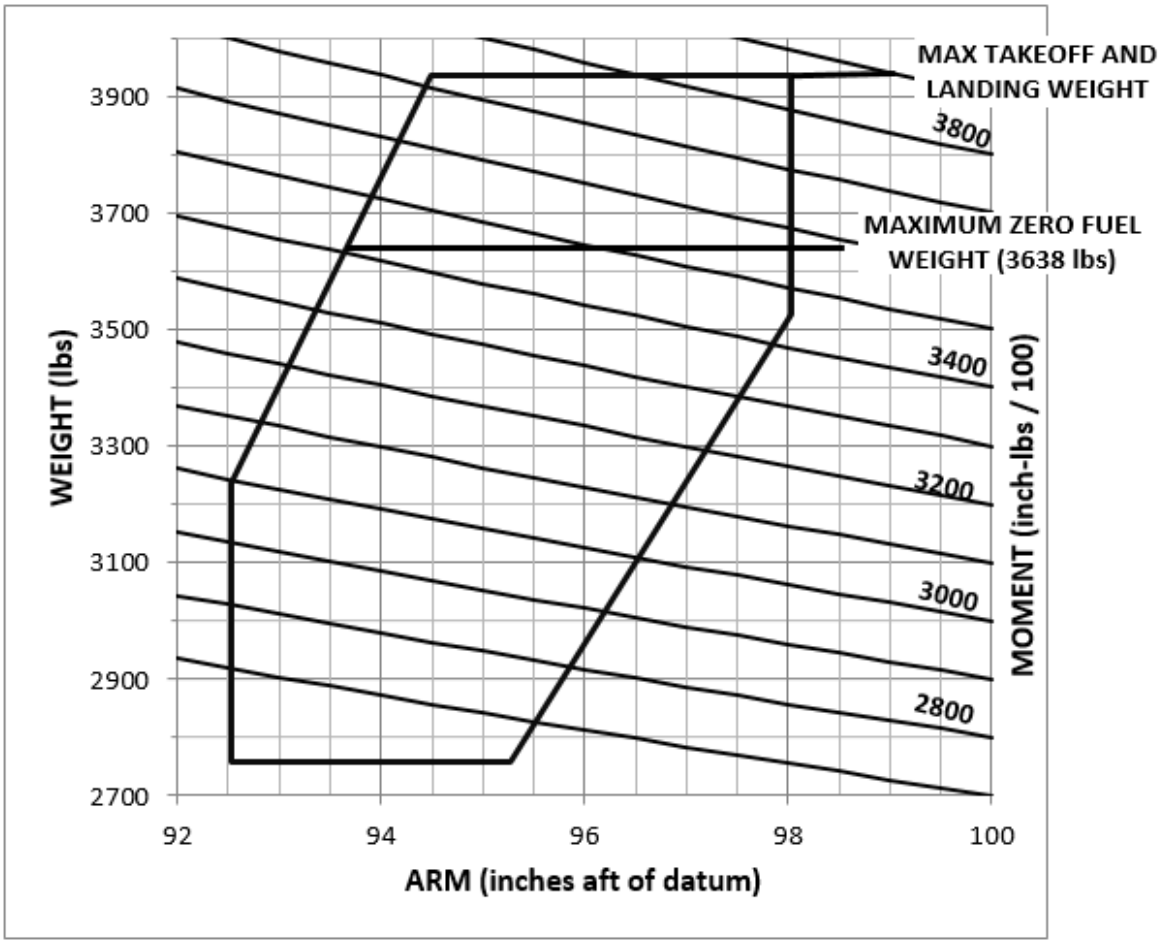


NOTE:

Mark up these charts in red so that it is easy for the examiner to see how you came up with your performance figures

	Weight (lbs)	Arm (inches)	Moment (inch-lbs / 100)
Basic Empty Weight			
Pilot & Co-Pilot		90.6	
Rear Passengers		128.0	
Nose Baggage		23.6	
Cockpit Baggage		153.1	
Baggage Extension		178.7	
De-icing Fluid (9.2 lb/USG)		39.4	
Zero Fuel Total (Max 3638lb)			
Useable Fuel, Main Tanks (7.01lb/USG)		103.5	
Useable Fuel, Aux Tanks (7.01lb/USG)		126.0	
Ramp Weight (Max 3953lb)			
Start & Taxi Fuel	18	103.5	1863
Take-Off Weight (Max 3935lb)			
Trip Fuel, Main Tanks (7.01lb / USG)		103.5	
Trip Fuel, Aux Tanks (7.01lb / USG)		126.0	
Landing Weight (Max 3748lb)			

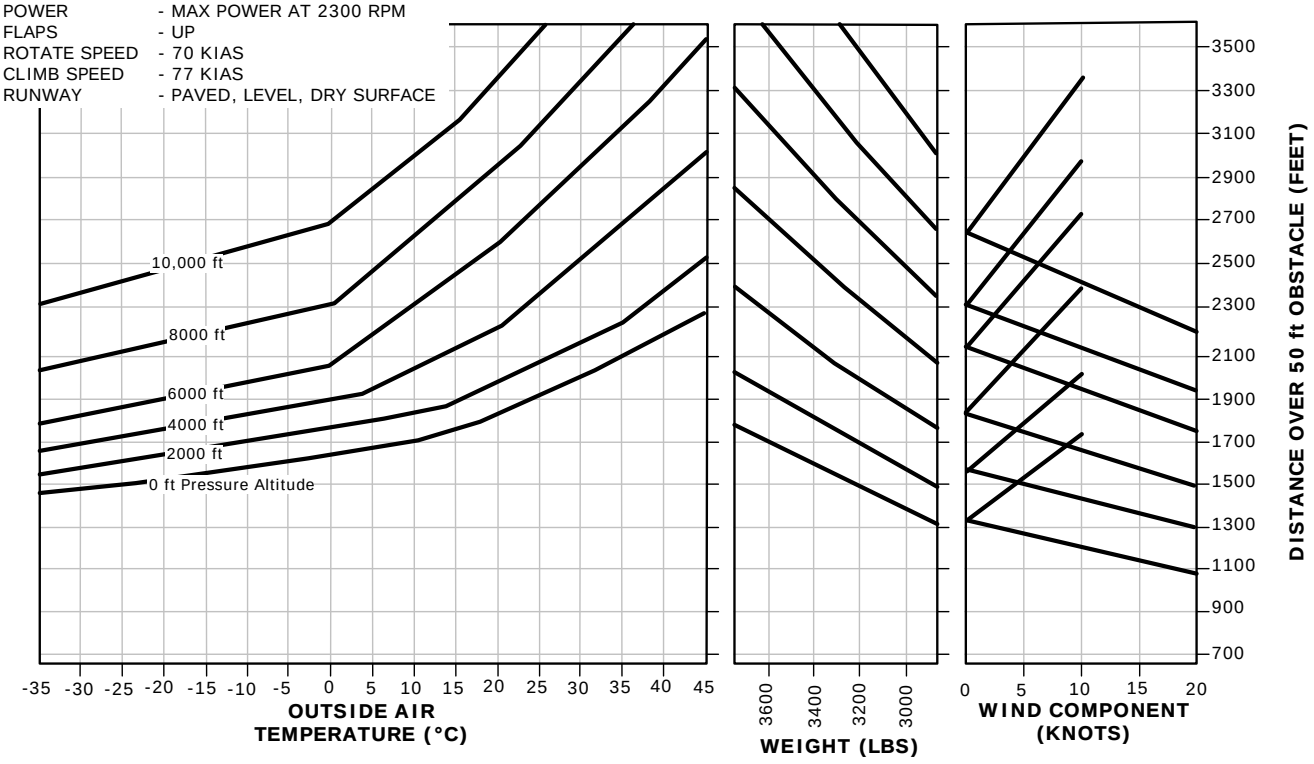
NOTE:
Weight and CG location must be within limitations at all times during the flight. It is not sufficient to simply calculate the weight and balance at take-off



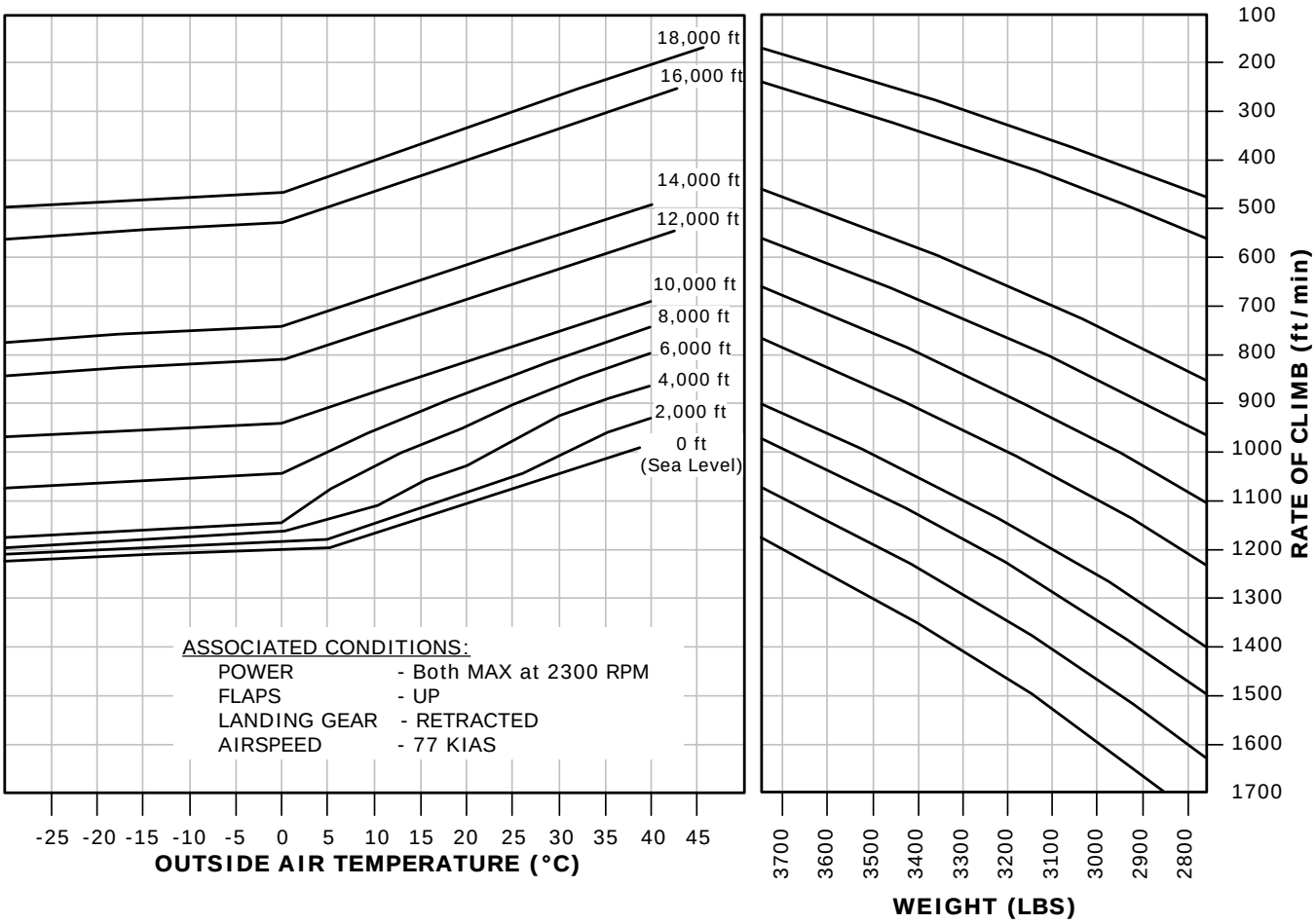
TAKE-OFF DISTANCE
Over 50 ft Obstacle

ASSOCIATED CONDITIONS:

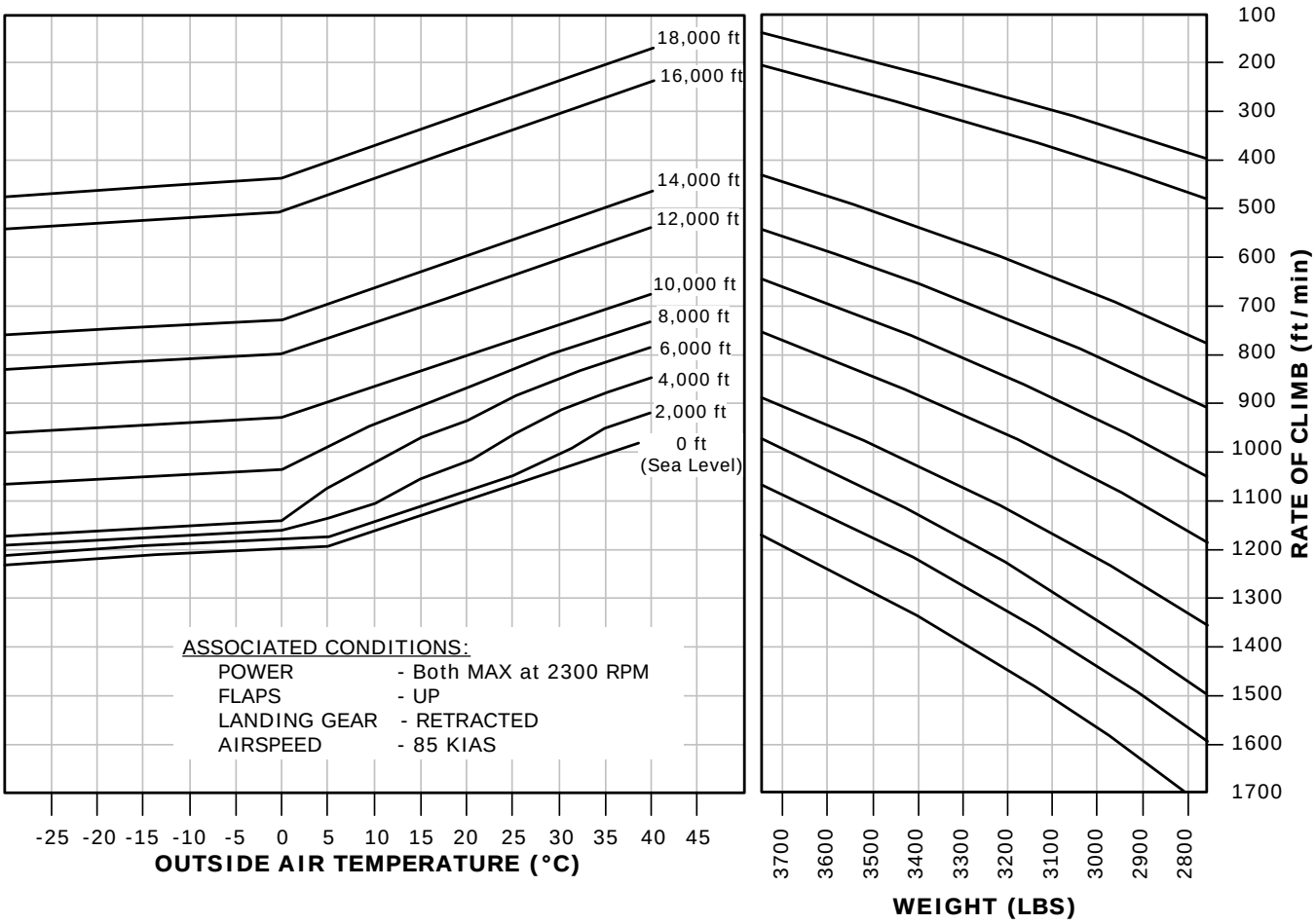
POWER	- MAX POWER AT 2300 RPM
FLAPS	- UP
ROTATE SPEED	- 70 KIAS
CLIMB SPEED	- 77 KIAS
RUNWAY	- PAVED, LEVEL, DRY SURFACE



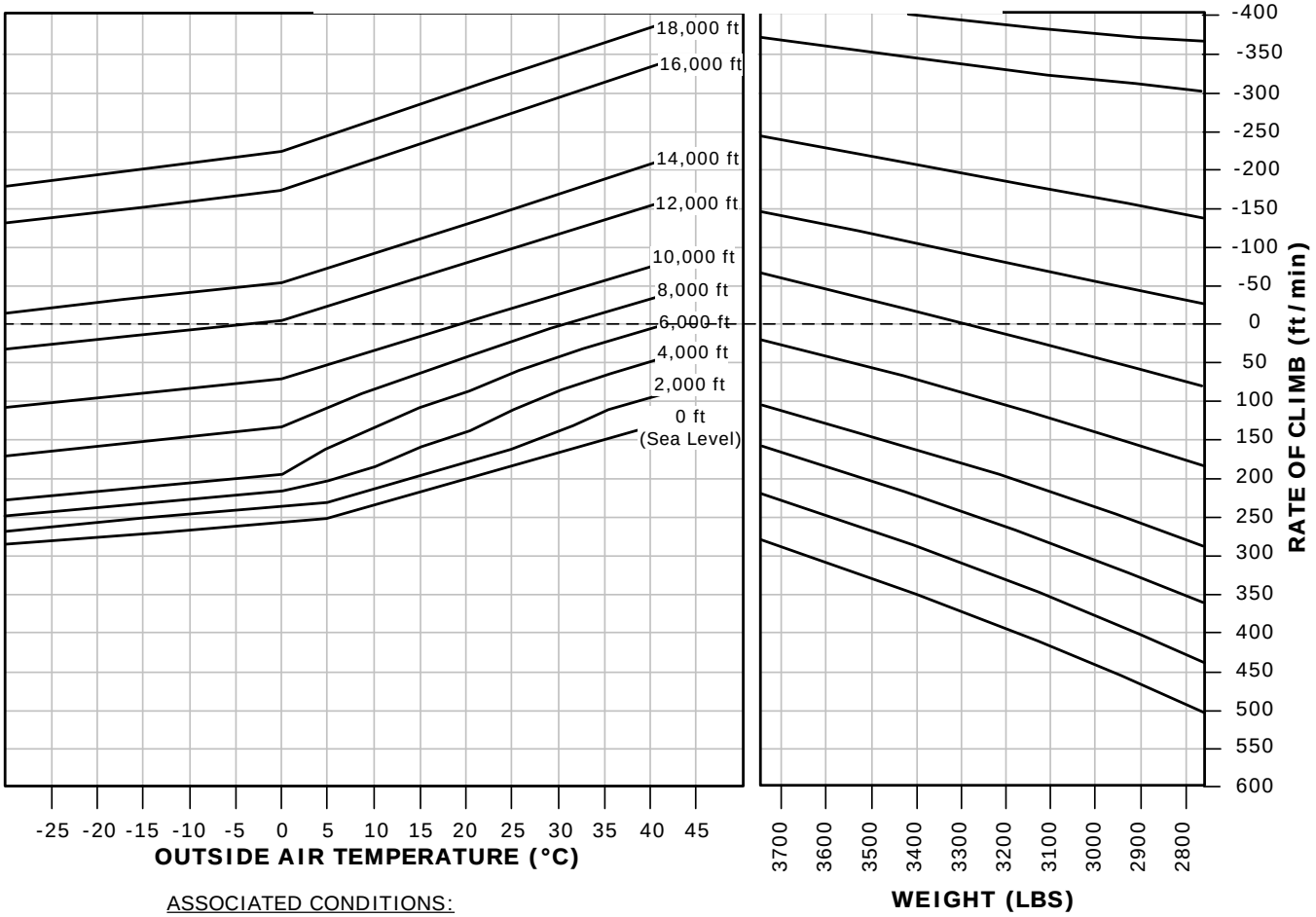
CLIMB PERFORMANCE – TAKE-OFF CLIMB



CLIMB PERFORMANCE – CRUISE CLIMB



ONE ENGINE INOPERATIVE – CLIMB / DESCENT



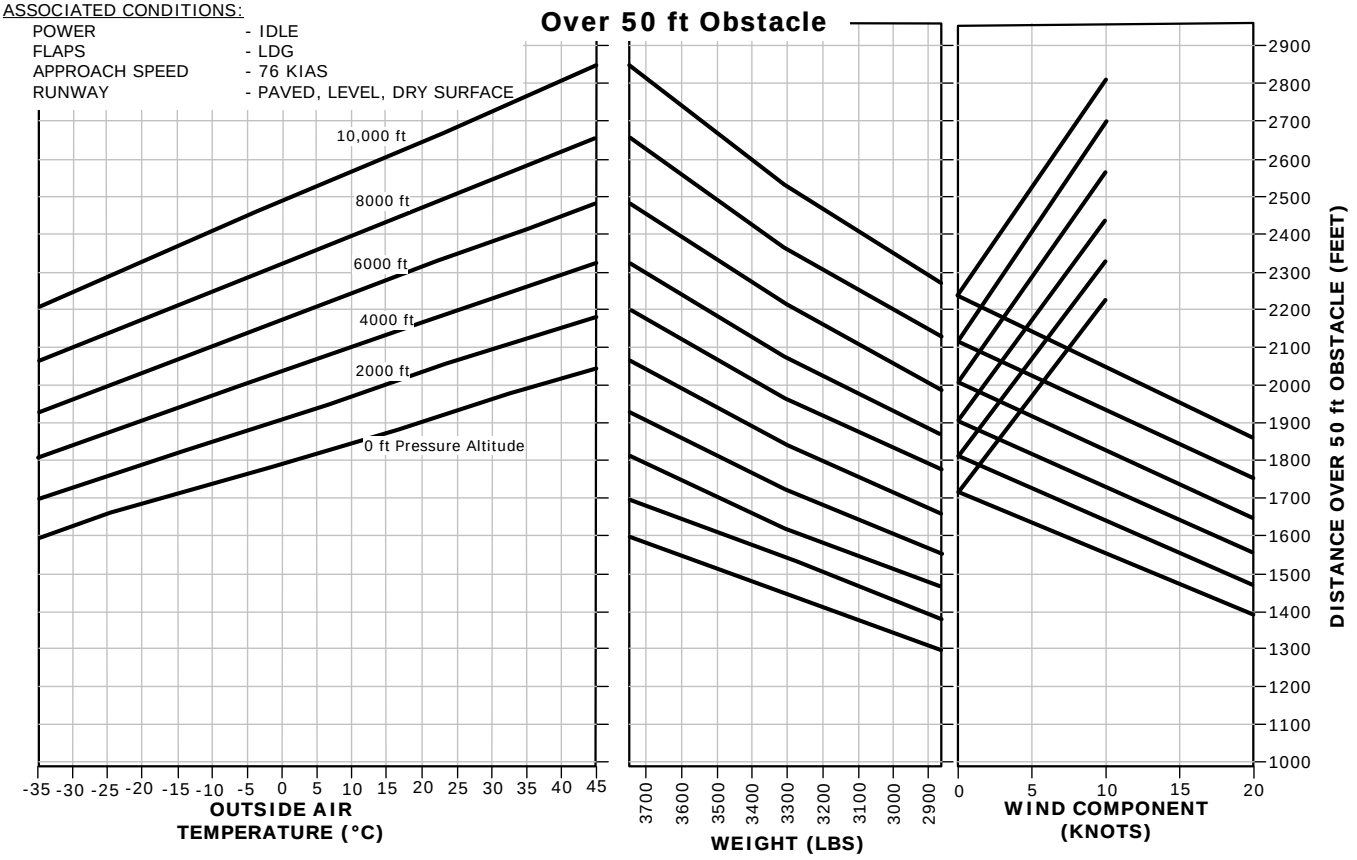
ASSOCIATED CONDITIONS:

OPERATING ENGINE	- MAX at 2300 RPM
FAILED ENGINE	- FEATHERED and SECURED
FLAPS	- UP
LANDING GEAR	- RETRACTED
AIRSPEED	- 82 KIAS
ZERO SIDESLIP	- ESTABLISHED

LANDING DISTANCE
Over 50 ft Obstacle

ASSOCIATED CONDITIONS:

POWER	- IDLE
FLAPS	- LDG
APPROACH SPEED	- 76 KIAS
RUNWAY	- PAVED, LEVEL, DRY SURFACE



NAV CANADA

CANADIAN FLIGHT PLAN AND FLIGHT ITINERARY
PLAN DE VOL ET ITINÉRAIRE DE VOL CANADIEN

ICAO FLIGHT PLAN
PLAN DE VOL OACI

PRIORITY / PRIORITÉ

<< ≡ **FF** →

ADDRESSEE(S) / DESTINATAIRE(S)

<< ≡

FILING TIME / HEURE DE DÉPÔT

→

ORIGINATOR / EXPÉDITEUR

<< ≡

SPECIFIC IDENTIFICATION OF ADDRESSEE(S) AND/OR ORIGINATOR / IDENTIFICATION PRÉCISE DU(DES) DESTINATAIRE(S) ET/OU DE L'EXPÉDITEUR

3 MESSAGE TYPE / TYPE DE MESSAGE

<< ≡ **(FPL**

7 AIRCRAFT IDENTIFICATION / IDENTIFICATION DE L'AÉRONEF

–

8 FLIGHT RULES / RÈGLES DE VOL

–

TYPE OF FLIGHT / TYPE DE VOL

<<

9 NUMBER / NOMBRE

–

TYPE OF AIRCRAFT / TYPE D'AÉRONEF

WAKE TURBULENCE CAT. / CAT. DE TURBULENCE DE SILLAGE

/

10 EQUIPMENT / ÉQUIPEMENT

– << ≡

13 DEPARTURE AERODROME / AÉRODROME DE DÉPART

–

TIME / HEURE

<< ≡

15 CRUISING SPEED / VITESSE DE CROISIÈRE

–

ALTITUDE / LEVEL / NIVEAU

0 0 0 0 0

ROUTE / ROUTE

→

<< ≡

16 DESTINATION AERODROME / AÉRODROME DE DESTINATION

–

TOTAL EET / DURÉE TOTALE ESTIMÉE

DAYS/JOURS HRS MINS

SAR

HRS MINS

ALTN AERODROME / AÉRODROME DE DÉGAGEMENT

→

2ND ALTN AERODROME / 2e AÉRODROME DE DÉGAGEMENT

→

<< ≡

18 **OTHER INFORMATION / RENSEIGNEMENTS DIVERS**

–

)<< ≡

19

ENDURANCE / AUTONOMIE

HRS MINS

– **E /**

PERSONS ON BOARD / PERSONNES À BORD

→ **P /**

EMERGENCY RADIO / RADIO DE SECOURS

UHF VHF ELT

→ **R /** U V E

ELT TYPE / TYPE D'ELT

SURVIVAL EQUIPMENT / ÉQUIPEMENT DE SURVIE

POLAR POLAIRE DESERT DÉSERT MARITIME MARITIME JUNGLE JUNGLE

→ **S** / **P** **D** **M** **J**

JACKETS / GILETS DE SAUVETAGE

LIGHT LAMPES FLUORES FLUORES UHF VHF

→ **J** / **L** **F** **U** **V**

DINGHIES / CANOTS

NUMBER NOMBRE CAPACITY CAPACITÉ COVER COUVERTURE COLOUR COULEUR

→ **D** / → → **C** →

<< ≡

AIRCRAFT COLOUR AND MARKINGS / COULEUR ET MARQUES DE L'AÉRONEF

WHEELS ROUES SEAPLANE HYDRAVION SKIS AMPHIBIAN AMPHIBIE

A /

REMARKS / REMARQUES

→ **N** /

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AN ARRIVAL REPORT WILL BE FILED WITH / UN COMPTE RENDU D'ARRIVÉE SERA NOTIFIÉ À :

NAME AND PHONE NUMBER OR ADDRESS OF PERSONS(S) OR COMPANY TO BE NOTIFIED IF SEARCH AND RESCUE ACTION INITIATED / NOM ET NUMÉRO DE TÉLÉPHONE OU ADRESSE DE LA (DES) PERSONNE(S) OU COMPAGNIE À AVISER SI DES RECHERCHES SONT ENTREPRISES

PILOT-IN-COMMAND / PILOTE COMMANDANT DE BORD

PILOT'S LICENCE NO. / N° DE LICENCE DU PILOTE

C /

)<< ≡

FILED BY / DÉPOSÉ PAR

SPACE RESERVED FOR ADDITIONAL REQUIREMENTS / ESPACE RÉSERVÉ À DES FINS SUPPLÉMENTAIRES

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