SECTION 1 - OPERATING LIMITATIONS

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GENERAL

The aircraft has certain operative limitations that have to be considered concerning both performances and systems.

This section is divided in two:

- ***General Limitations:*** concerning Weights, Centring, Speeds and Load Factors.
- ***System Limitations:*** concerning each aircraft system.

Depending on the type of operation the applicable regulation is different. So, the limitations for military role are different than those for civil operation. For each limitation, the military or civil nature is specified in the heading. If the limitation is applicable for both military or civil, no mention is made in the heading.

GENERAL LIMITATIONS

KINDS OF OPERATION

The aircraft is Transport Category certified and may be used for the following types of operation when fitted with appropriate, approved and operative instruments and equipment as required by airworthiness and/or operating regulations:

– Instrument Flight Rules (IFR).

– Night Operation.

– Flight under Icing Conditions

WARNING

Ambient conditions may result in severe icing beyond flight conditions for which the aircraft was certified.

– Passenger Transport

– Cargo transport.

The aircraft ability to perform the following types of operation has been proven:

– RNP-5 in according to FAA 90-96 (FAA) Advisory Circular (AC) 90-96 - U.S. Operators and Aircraft Approval to Operate Under Instrument Flight Rules (IFR) in European Airspace designated for Basic Area Navigation (BRNAV/RNP 5).

NIGHT VISION GOGGLES (NVG) OPERATION

– The aircraft is certified to be compatible for NVG/NVIS operations with Generation III, Type I, Class B NVG/NVIS"s in accordance with the military specification U.S. DOD MIL-STB-3009, "Lighting, Aircraft, Night Vision Imaging System (NVIS) Compatible".

NOTE

Compliance with the above mentioned standard does not involve operational approval.

AIRCRAFT ROLES (MILITARY)

In terms of operational limitations, the types of mission the aircraft is certified to perform, and the associated load factor limits authorized for each, are shown below:

Mission Type	Load Factor Limit Margin
Assault Transport	from 3.0 g to -1.0 g
Normal Transport	from 2.5 g to -1.0 g
Logistical Transport	from 2.25 g to -0.85 g

Table 1-1 Aircraft Roles (Military) - Load Factor Limit Margin

FLIGHT CREW

MINIMUM FLIGHT CREW

Minimum crew required is two: pilot and copilot.

A third crewmember acting as a jumpmaster/loadmaster is required when conducting aerial delivery and combat offloading operations.

NOTE

It is recommended that an assistant jumpmaster/loadmaster be added.

In addition, a third crewmember acting as a dropmaster is required when conducting sea rescue operations.

EMERGENCY CREW (MILITARY)

EMERGENCY FLIGHT CREW

In case of a non-evacuated aircraft likely to be lost, the absolute minimum crew required to takeoff, fly and land the aircraft safely is one pilot.

MAXIMUM OCCUPANCY

Maximum people to be transported excluding both minimum flight crew and observer´s seat occupant, must not exceed the lesser of the following values:

– 71

or

– passenger/cargo cabin seat arrangement assigned occupants as approved for takeoff and landing.

WEIGHT LIMITATIONS (CIVIL)

The structural weight limitations, as specified in this section, may be reduced by aircraft performances own limitations. Please refer to Performance Data Manual of this Operations Manual.

GROSS WEIGHT LIMITATIONS

Total aircraft weight limitations for the indicated conditions are given below.

CONDITION	GROSS WEIGHT (KG)	GROSS WEIGHT (Lb)
Maximum Ramp/Taxi Weight	21050	46410
Maximum Take-off Weight	21000	46300
Maximum Landing Weight	20700	45630
Maximum Zero Fuel Weight	18500	40780
Minimum Flight Weight	10800	23810

Table 1-2 Gross Weight Limitations (Civil)

Weights in lbs have been rounded to the nearest 10lb.

MAXIMUM LANDING WEIGHT

The maximum landing weight is the one that allows a 2.5% climb gradient if a go-around has to be done with only one engine operative.

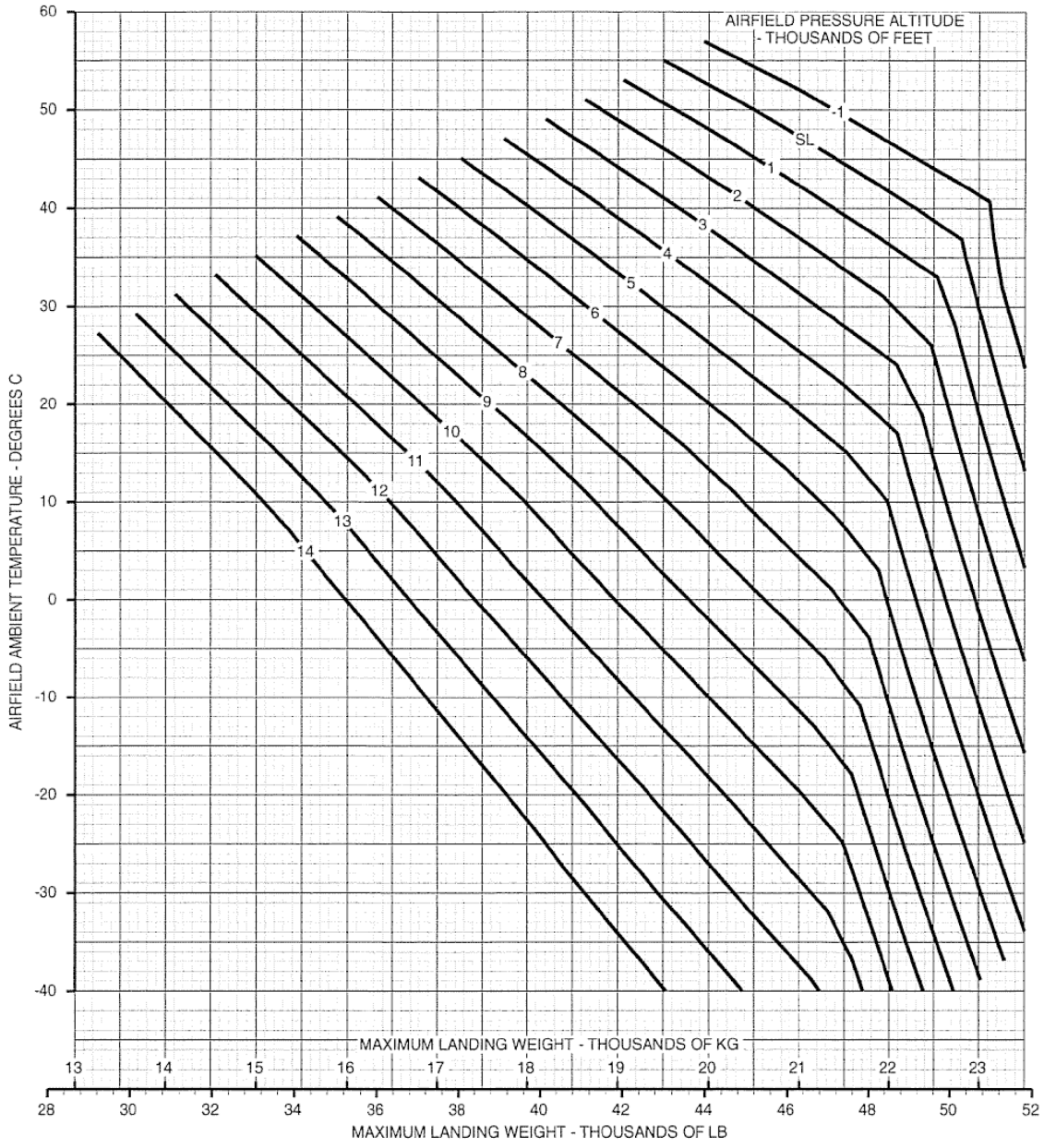


Figure 1-1 Maximum Landing Weight (Civil)

NOTE

Reduce the graph-derived weight value by 8 percent when ice accretion is suspected.

WEIGHT LIMITATIONS (MILITARY)

The structural weight limitations, as specified in this section, may be reduced by aircraft performances own limitations. Please refer to Performance Data Manual of this Operations Manual.

Two types of weight limitations are applicable to the aircraft when used for military transport: One set of limitations applicable to aircraft total weight and another set applicable to combined fuel/cargo weight transported. The first set of limitations is shown below and the second one is shown in the Figure Weight Limitations (Military).

GROSS WEIGHT LIMITATIONS

Total aircraft weight limitations for the indicated conditions are given below.

		Weight Limit	Weight Limit without Fuel	Operational Limitations
Normal Transport Operation	Taxiing	21050 kg (46410 lb)	18500 kg (40780 lb)	---
	Takeoff	21000 kg (46300 lb)		Maximum Load Factor 2.5 g
	Landing	20700 kg (45630 lb)		Sink Rate 600 fpm
Logistical Transport Operation	Taxiing	23250 kg (51270 lb)	20700 kg (45630 lb)	---
	Takeoff	23200 kg (51160 lb)		Maximum Load Factor 2.25 g
	Landing	23200 kg (51160 lb)		Sink Rate 540 fpm
Assault Transport Operation		17700 kg (39030 lb)	16500 kg (36380 lb)	Maximum Load Factor 3.0 g

Table 1-3 Gross Weight Limitations (Military)

Weights in lbs have been rounded to the nearest 10lb.

WEIGHT LIMITATIONS CHART

Figure Weight Limitations (Military) shows fuel/cargo combination zones admitted for associated load factors. This graph must be used in conjunction with graph Maximum Flight Speeds (Military), which shows the associated speed limits applicable to each particular fuel/cargo combination zone.

Zone A: Recommended (green shaded)

This zone shows the fuel/cargo combinations admitting Normal Transport operations at manoeuvre load factors up to 2.5 g within the corresponding altitude/airspeed envelope shown on graph Maximum Flight Speeds (Military), considering structural landing weight limitation of 20700 kg.

The graph also shows 3.0 g line. Below this area, aircraft can be used in Assault or Transport Missions with load factors of up to 3 g (dashed zone).

Zone B: Caution (yellow shaded)

This zone shows the fuel/cargo combinations admitting Logistical Operations at manoeuvre load factors up to 2.25 g within the corresponding altitude/airspeed envelope shown on graph Maximum Flight Speeds (Military). Exceeding either load factor limit or the airspeed limit may cause structural damage to the aircraft.

Zone C: Not recommended (red shaded)

This zone shows the fuel/cargo combinations presenting structural damage high risk. It is not recommended to operate the aircraft in this zone. It must therefore be avoided. Under extreme emergency conditions, when the risk of aircraft damage is a secondary concern, the pilot must decide whether risk level justifies operating in this zone.

While flying under turbulence (even moderate) condition, this zone is prohibited.

Landing must be performed at minimum descending airspeeds. Operating in this zone involves wing structure damage high risk while ground operating.

Excessive fuel weight (graph right zone) involves wing structure damage high risk ground operating.

Excessive cargo weight (graph upper zone) involves wing structure damage high risk while airborne operating.

An aircraft structural inspection must be carried-out after flying in this zone.

Landing weight limitations

The aircraft may be landed with any weight between minimum and maximum flight weights, considering ratios between aircraft weight and maximum vertical descending speed at landing. Limitations are shown on the Weight Limitations graph for each type of operation.

For fuel/cargo combinations above the 20700 kg line, maximum vertical descending speed is 540 fpm.

Use of Weight Limitations (Military) figure.

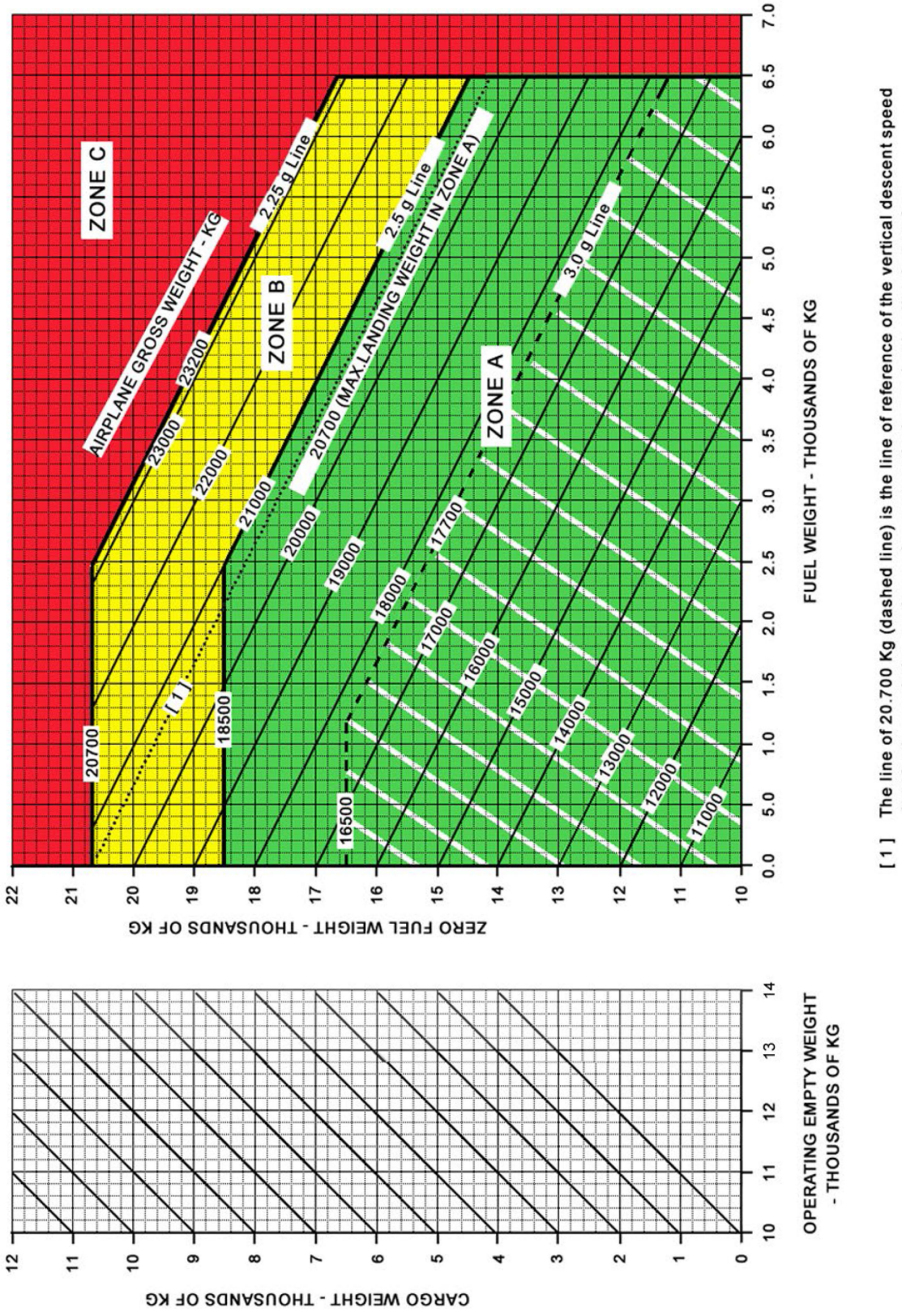


Figure 1-2 Weight Limitations (Military)

Weight Limitations chart can be used for any of the following purposes:

1. ***Determining both load factor and maximum admitted speeds for a given cargo, fuel and empty operating weight.***

   In this case, cargo quantity shall be located on the left vertical scale and trace across parallel to the guidelines as far as the aircraft empty operating weight of the aircraft on the lower scale.

   From this point, trace a horizontal line to the right. Locate the fuel quantity required on the lower right scale and trace vertically to intercept the horizontal line traced earlier. Maximum admitted load factor will be limited to the value given by the zone in which the intersection point locates.

   NOTE

   Load conditions shall also be checked prior to determine their destination status.

2. ***Calculating maximum load admitted for both given aircraft weight, required fuel quantity and empty operating weight.***

   In this case it is necessary to locate the required fuel quantity and trace vertically upwards to the curve corresponding to the aircraft weight. From this point, trace a horizontal line to the left. Locate the aircraft empty operating weight at the left of the graph and trace vertically to intercept the horizontal line traced earlier. From this point, move leftwards parallel to the guidelines. Read maximum cargo weight compatible with selected condition from the vertical scale.

AIRSPEED LIMITATIONS (CIVIL)

MAXIMUM AIRSPEEDS

Maximum Flight Airspeeds (Civil) figure shows (as a flight altitude function) maximum operating airspeed V_{MO}.

The maximum operating limit speed must not be deliberately exceeded during any regime of flight (climb, cruise or descent) unless a higher airspeed is authorized for flight test or pilot training.

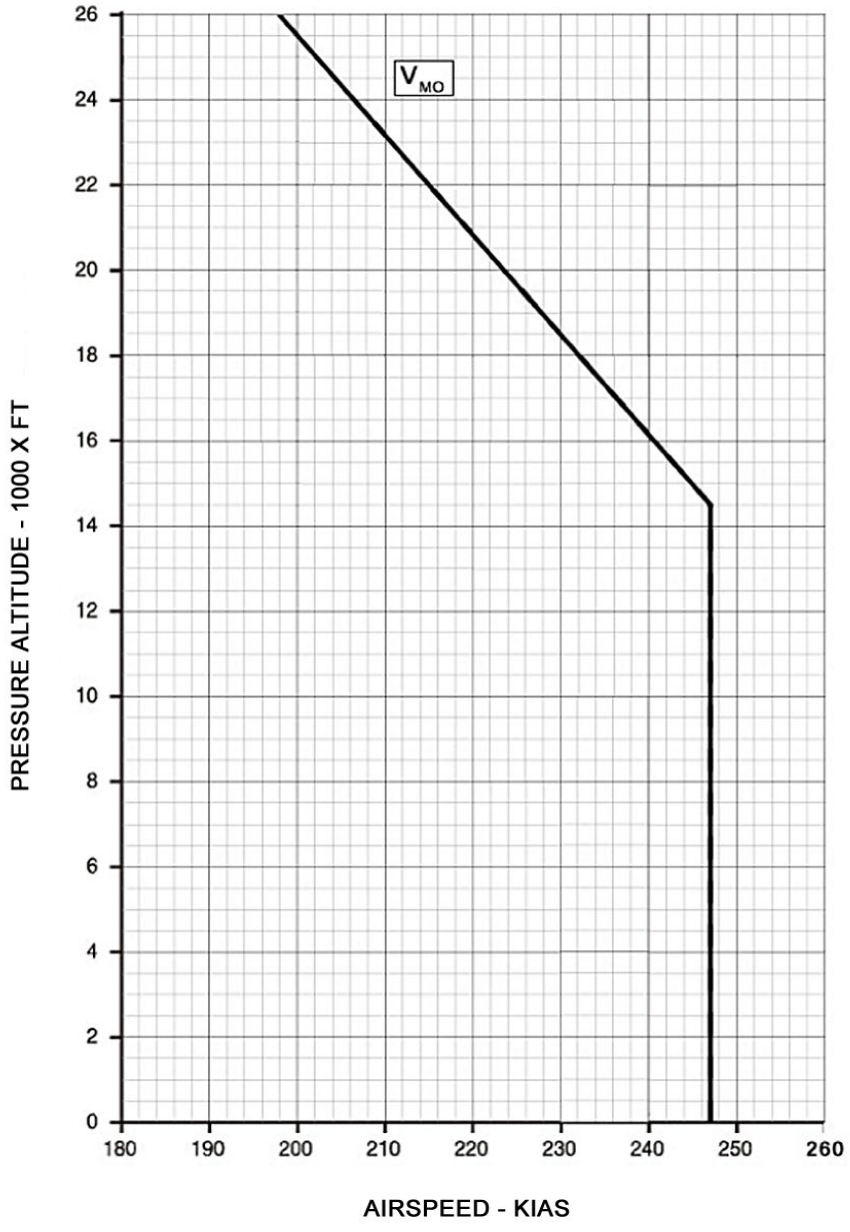


Figure 1-3 Maximum Flight Airspeeds (Civil)

MANOEUVRE SPEED

Manoeuvre speed V_A is 190 KIAS from sea level to 25000 ft.

Full application of rudder and aileron controls, as well as manoeuvres that involve angles of attack near the stall, should be confined to speeds below V_A.

Rapid and large alternating rudder control inputs, or certain combinations of sideslip angle and opposite rudder deflection can result in potentially dangerous loads on the vertical stabilizer, even at speeds below the design manoeuvring speed V_A.

NOTE

Pilots should not become reluctant to command full rudder when required and when appropriate, such as during and engine failure shortly after takeoff or during strong or gusty crosswind takeoffs and landings.

SPEED WITH FLAPS EXTENDED

Maximum speeds at which flaps may be extended and at which the aircraft may fly with flaps extended, V_{FE}, are:

Position	V_{FE} (KIAS)
T/OFF (10º)	185
APPR (15º)	180
LNDG (23º)	175

Table 1-4 Speed with flaps extended (Civil)

Flaps extension above 19000 feet is prohibited.

LANDING GEAR OPERATION SPEED

Maximum speed at which it is safe to extend or retract the landing gear (V_{LO}), and maximum speed at which the aircraft can fly safely with landing gear extended and locked (V_{LE}), are the same.

$V_{LO}=V_{LE}=175$ KIAS

However, maximum speed at which it is safe to extend the landing gear when the emergency lowering system is used, is 150 KIAS.

Landing gear extension above 18000 feet is prohibited.

MAXIMUM DOOR OPERATION SPEED

In flight operation of any rear side cabin door or rear door is feasible only under the appropriate authorization.

Maximum speed at which any paratroops door may be opened or closed or at which the aircraft may be flown with doors open is 160 KIAS.

Maximum speed at which the aircraft may be flown with both ramp and cargo door and one paratroops door open simultaneously is 130 KIAS.

The maximum permissible airspeed for opening or closing both ramp and cargo door in flight or for operation with the ramp and cargo door open in flight is 240 KIAS.

OPENABLE COCKPIT WINDOW OPERATING SPEED

Maximum proven speed at which any openable cockpit window can be opened during unpressurized flight- without negative impact on cabin atmosphere, is 200 KIAS.

FULL REVERSE POWER OPERATING SPEED

Maximum permissible airspeed for full reverse power operation on ground is 120 KIAS.

AIRSPEED LIMITATIONS (MILITARY)

MAXIMUM AIRSPEEDS

Figure Maximum Flight Airspeeds (Military) shows (as a flight altitude function) maximum recommended airspeed (V_{MO}), as well as maximum speed (V_D), applicable to each fuel/cargo combinations zone defined in the Figure Weight Limitations (Military).

WARNING

Airspeed limitations shall never be exceeded

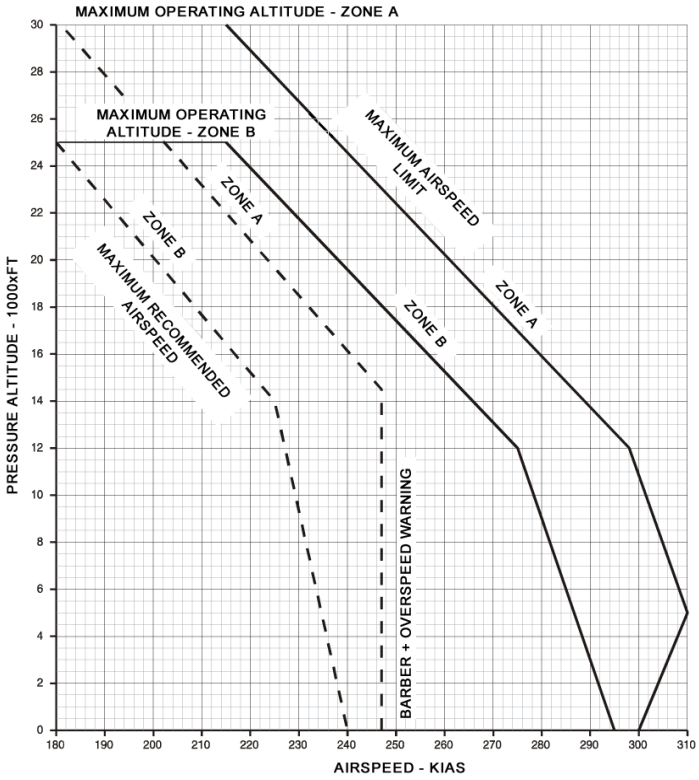


Figure 1-4 Maximum Flight Airspeeds (Military)

Operation between maximum recommended speed and maximum speed for zone A (Normal and Assault Operation) is admitted in slight to moderate turbulence. It is strictly prohibited when flying under severe turbulence conditions.

Operation between maximum recommended speed and maximum speed for zone B (Logistical Operation) is admitted only under slight turbulence conditions. It is strictly prohibited when flying under moderate turbulence conditions.

TURBULENCE PENETRATION AIRSPEED

Any cruise speed up to the maximum recommended speed (V_{MO}), can be used up to and including moderate turbulence conditions.

The aircraft should not be used under severe turbulence conditions. If these cannot be avoided, recommended penetration airspeed for severe turbulence is shown in the graph below for the two applicable zones (A and B).

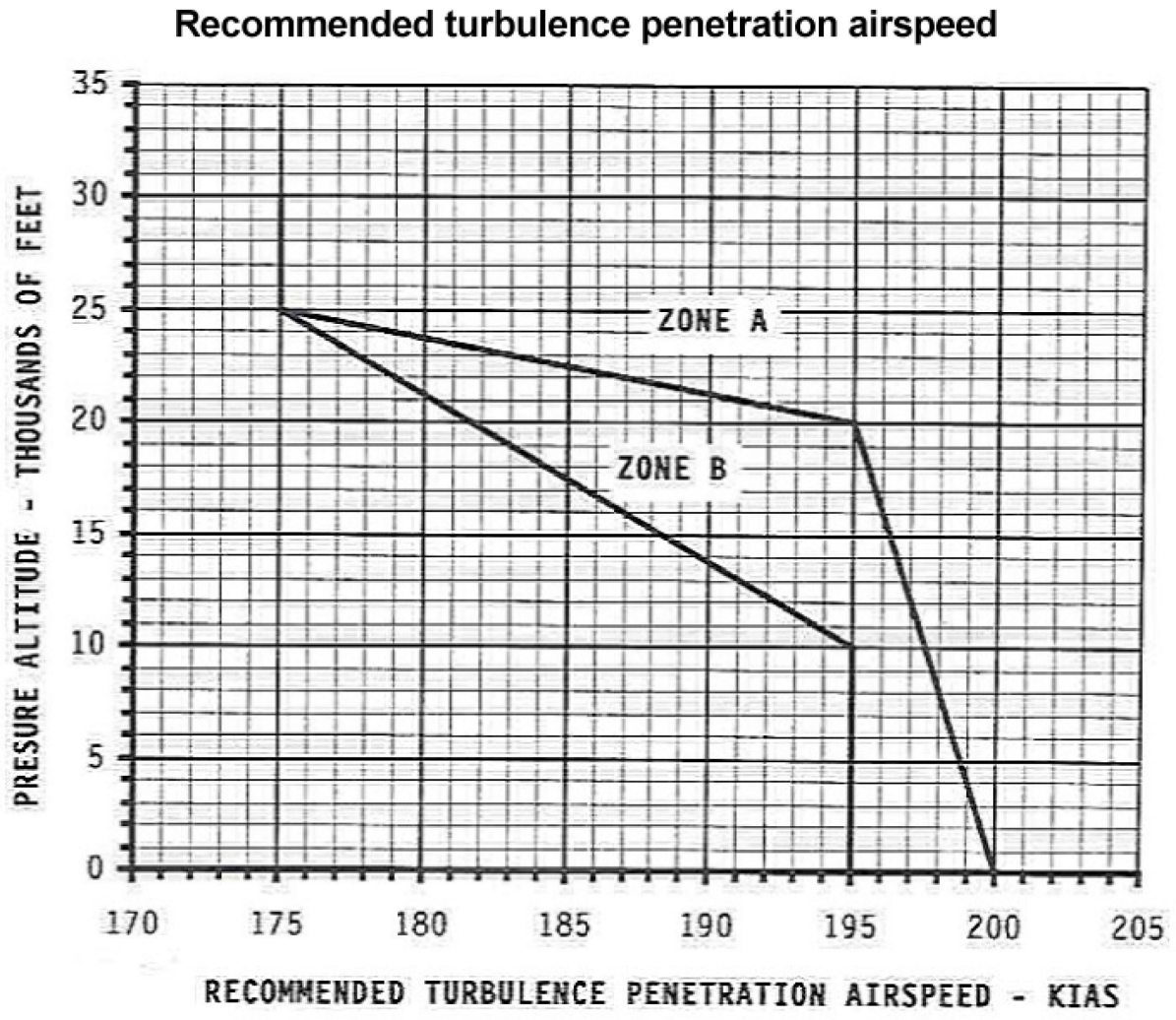


Figure 1-5 Recommended Turbulence Penetration Airspeed (Military)

MANOEUVRE SPEED

Manoeuvre speed V_A is defined for diverse operation zones in the following graph. Full actuations over rudder or ailerons controls, and manoeuvres involving angles of attack close to stall, must be performed at speeds below V_A.

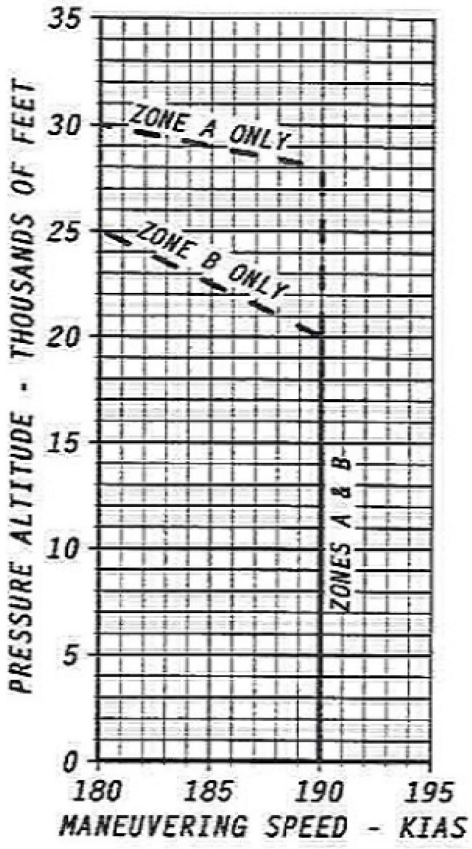


Figure 1-6 Manoeuvre Speed (Military)

SPEED WITH FLAPS EXTENDED

Maximum speeds at which flaps may be extended and at which the aircraft may fly with flaps extended, V_{FE} are:

Position	V_{FE}=(KIAS)	
	From SL to 19000 ft	To 25000 ft
T/OFF (10º)	190	160
APPR (15º)	185	160
LNDG (23º)	180	160

Table 1-5 Speed with flaps extended (Military)

Linear variation must be used between 19000 ft and 25000 ft.

Flaps extension above 25000 feet is prohibited.

LANDING GEAR OPERATION SPEED

Maximum speed at which it is safe to extend or retract the landing gear (V_{LO}), and maximum speed at which the aircraft can fly safely with landing gear down and locked (V_{LE}), are the same.

V_{LO} (KIAS) = V_{LE} (KIAS)	
From SL up to 19000 ft	At 25000 ft
180	160

Table 1-6 Landing Gear Operation Speed (Military)

Linear variation must be used between 19000 ft and 25000 ft.

However, maximum speed at which it is safe to extend the landing gear when the emergency lowering system is used, is 150 KIAS.

Landing gear extension above 25000 feet is prohibited.

MAXIMUM DOOR OPERATION SPEED

In flight operation of any rear side cabin door or rear door is feasible only under the appropriate authorization.

Maximum speed at which any paratroops door may be opened or closed or at which the aircraft may be flown with doors open is 160 KIAS.

Maximum speed, at which both rear door and ramp may be opened or closed or at which the aircraft may be flown with both rear door and ramp open, is 240 KIAS.

Maximum speed at which the aircraft may be flown with both rear door and ramp and one paratroops door open simultaneously is 130 KIAS.

OPENABLE COCKPIT WINDOW OPERATING SPEED

Maximum proven speed at which any openable cockpit window can be opened during unpressurized flight- without negative impact on cabin atmosphere, is 200 KIAS.

FULL REVERSE POWER OPERATING SPEED

Maximum permissible airspeed for full reverse power operation on ground is 120 KIAS.

CENTRE OF GRAVITY LIMITATIONS (CIVIL)

Aircraft centre of gravity location for any weight configuration and type of operation must always be within the limits as shown in the following graph. The limits apply with the landing gear retracted. The effect of extending the landing gear is nose-up moment of 1.6 m.kg (139 in.-lb).

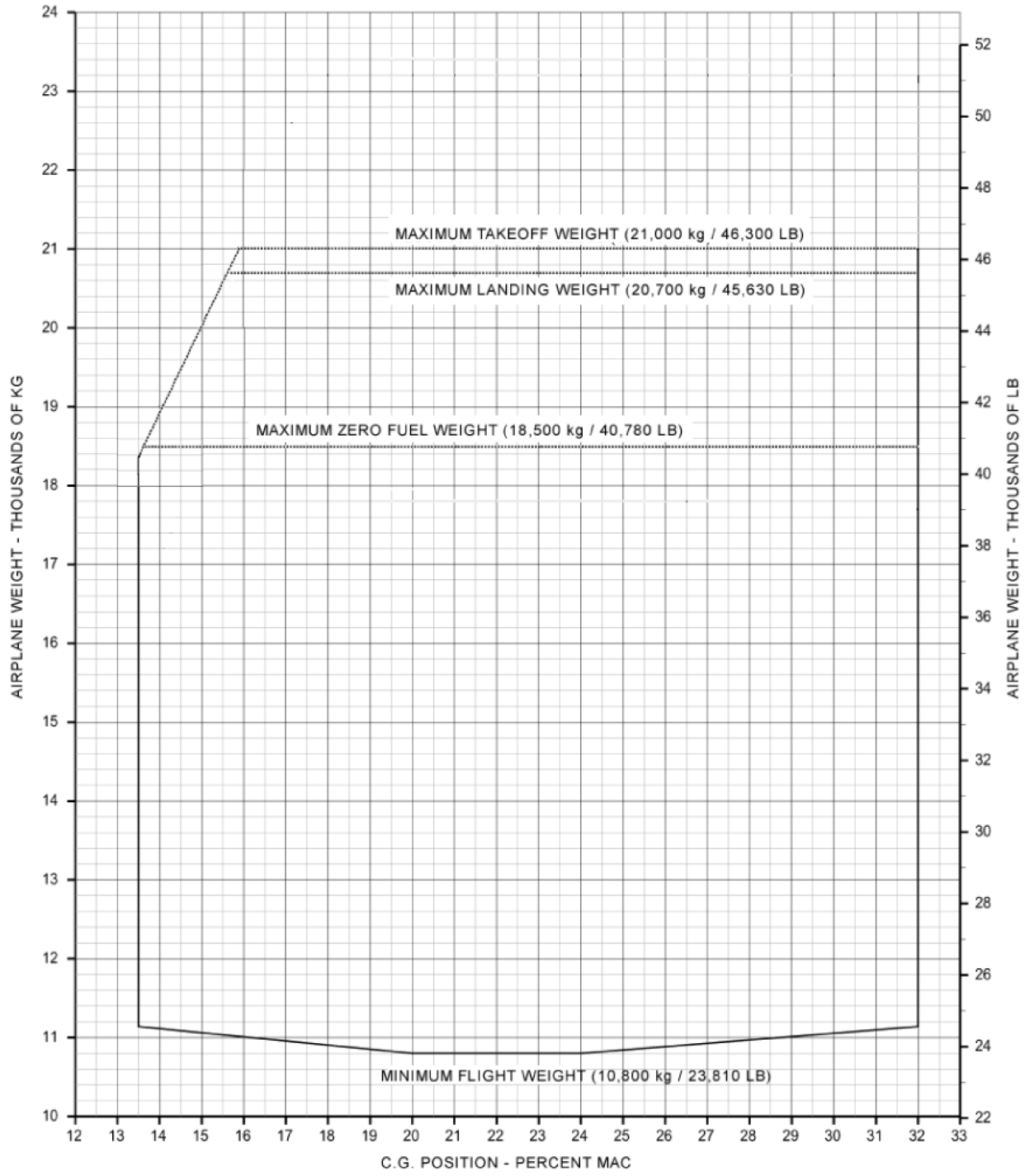


Figure 1-7 Centre of Gravity Limitations (Civil)

CENTRE OF GRAVITY LIMITATIONS (MILITARY)

Aircraft centre of gravity location for any weight configuration and type of operation must always be within the limits as shown in the following graph. The limits apply with the landing gear retracted. The effect of extending the landing gear is nose-up moment of 1.6 m.kg (139 in.-lb).

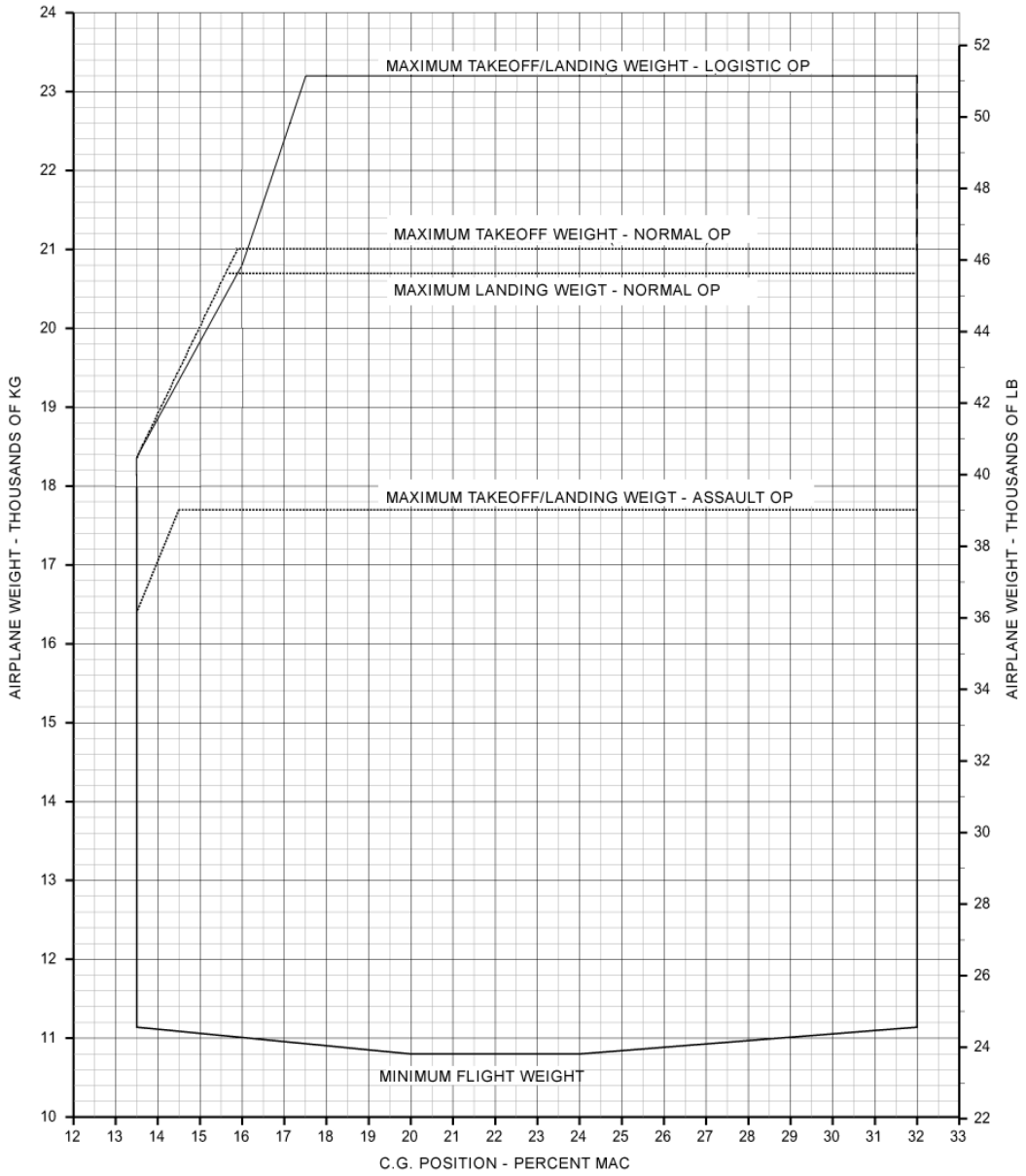


Figure 1-8 Centre of Gravity Limitations (Military)

LIMITATIONS DUE TO LATERAL C.G. DISPLACEMENT, IMPOSED BY GROUND LOADS

The Airplane Weight, Vertical Landing Speed and turning conditions are affected by loads lateral asymmetry, imposed by ground loads. The tires inflation pressure on MLG will be only 89 psi.

Given a set of loads (m_i(Kg)) with different lateral displacements (e_i(m)) with respect to the airplane plane of symmetry, the rolling moment generated by a lateral C.G. displacement is the sum of load rolling moments ($m_i x e_i$) of each payload. The Airplane Weight, Vertical Landing Speed and turning conditions limits are shown in the following figure as a function of the rolling moment due to lateral C.G. displacement:

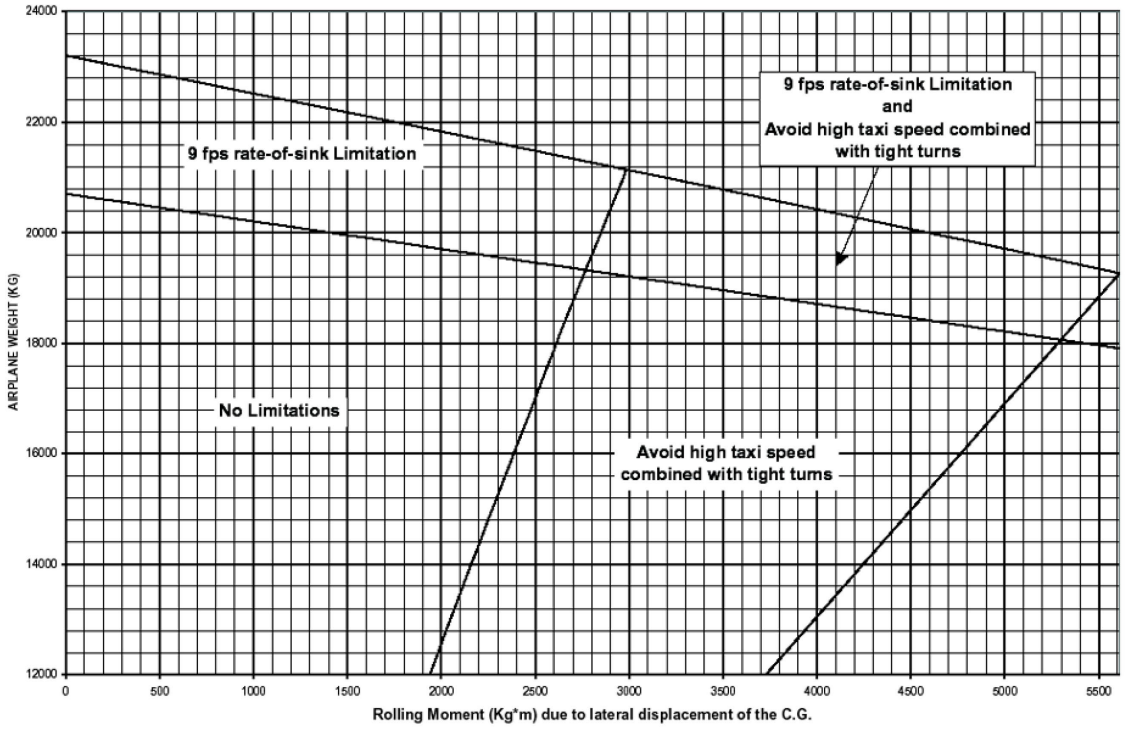


Figure 1-9 Limitations For Lateral C.G. Displacement Imposed By Ground Loads

The next operations will be prohibited:

- Pivoting
- Rolling over bump with step height above 30 mm

FLIGHT ENVELOPE (CIVIL)

Both altitude and ambient temperature envelope for airborne, takeoff and landing operations are shown in the following figure.

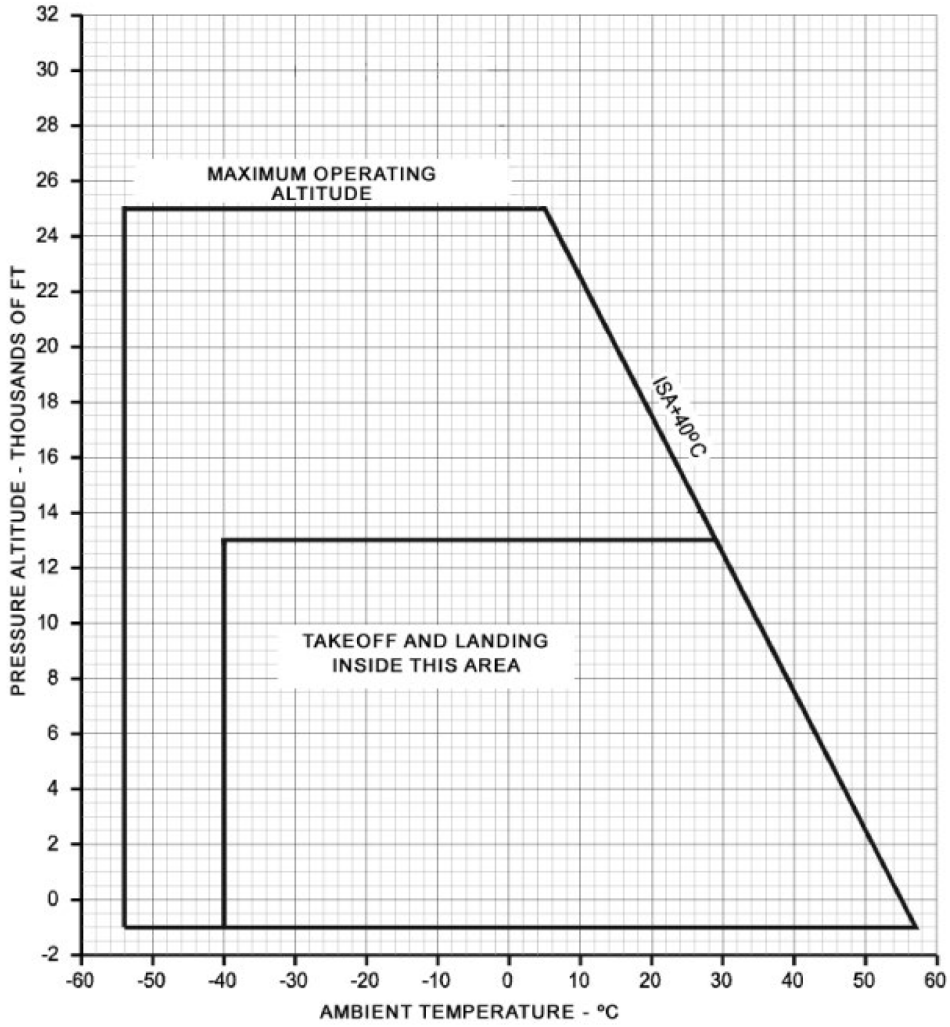


Figure 1-10 Flight Envelope (Civil)

In addition, for take-off and landing operations the following limitations are also applicable:

Maximum Tailwind Component	10 knots
Runway Slope	±2 percent
Runway Surface Type	Smooth, hard-surfaced

Table 1-7 Flight Envelope (Civil) - Take-off and landing limitations

A take-off shall not be attempted in a depth of more than 19 mm (3/4 in.) of water or the equivalent depth of snow or slush.

FLIGHT ENVELOPE (MILITARY)

Both altitude and ambient temperature envelope for airborne, takeoff and landing operations are shown in the following figure.

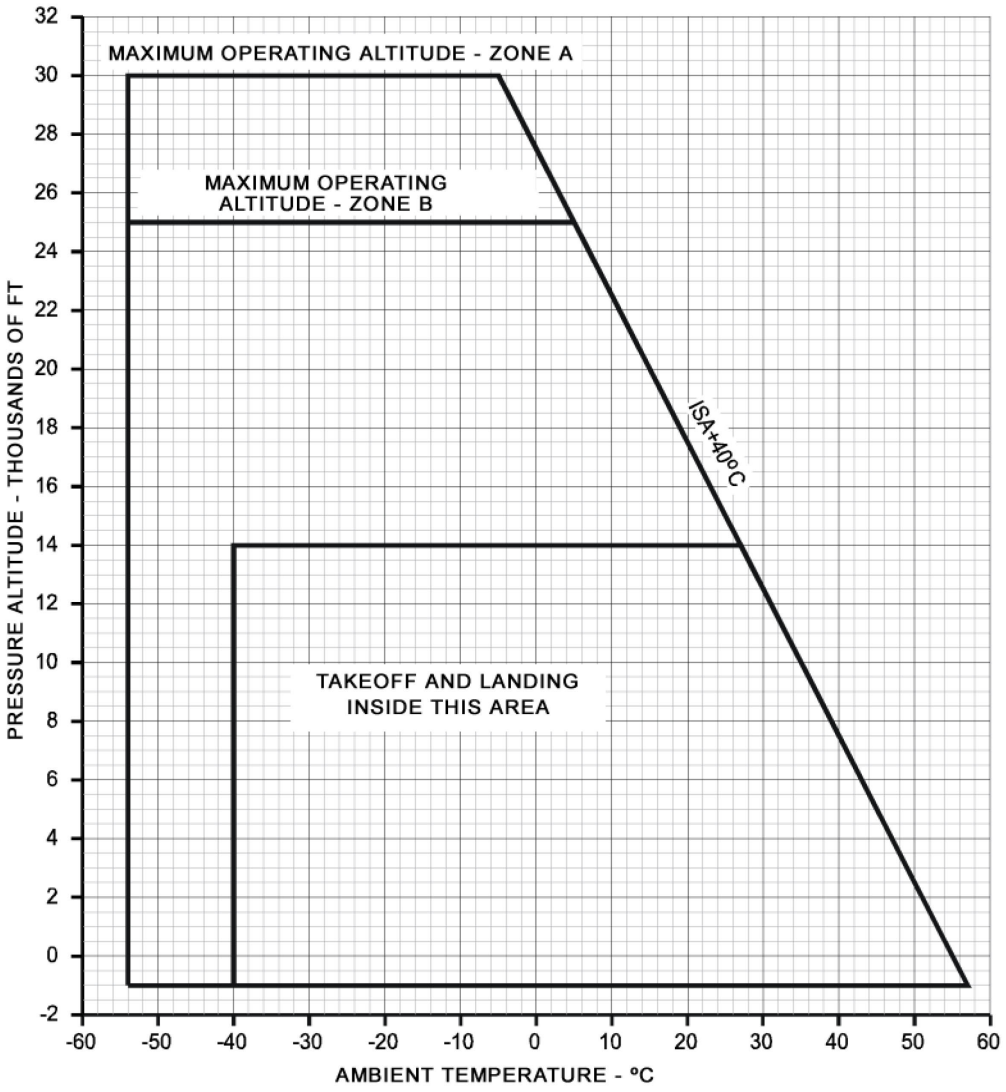


Figure 1-11 Flight Envelope (Military)

In addition, for take-off and landing operations the following limitations are also applicable:

Maximum Tailwind Component	10 knots
Runway Slope	±2 percent

Table 1-8 Flight Envelope (Military) - Take-off and landing limitations

A take-off shall not be attempted in a depth of more than 19 mm (3/4 in.) of water or the equivalent depth of snow or slush.

IN-FLIGHT MANOEUVRE LIMITATIONS

Aerobatic manoeuvres, intentional spins, nose up above 20º stalling, extreme dives or any other manoeuvre involving excessive acceleration, is strictly prohibited.

MANOEUVRING LOAD FACTOR LIMITATIONS (CIVIL)

The in-flight manoeuvring Load Factor Limits for which the airplane structure is approved are the following:

– Flaps Retracted: 2.5 g to -1.0 g

– Flaps Extended: 2.0 g to 0.0 g

These accelerations limit the angle of bank in turns and the severity of pull-up manoeuvres.

Intentional manoeuvring shall be confined to those with load factors below the values listed above. Aerobatic manoeuvres and intentional spins are not authorized.

ACCELERATION LIMITATIONS (MILITARY)

Structurally safe load factors for the corresponding flight conditions shown in the Figure Weight Limitations (Military) must never be exceeded.

Load factor margin admitted with flaps and/or landing gear extended is 0g to 2.0g, up to appropriate flaps or landing gear extended speed limit, as applicable.

When flying under slight turbulence, do not intentionally exceed the following margins during manoeuvres:

– Zone A 0 to 2.0g

– Zone B 0.5 to 1.5g

When flying under moderate turbulence do not intentionally exceed the following margins during manoeuvres:

– Zone A 0.25 to 1.75g

– Zone B 0.75 to 1.25g

NOTE

This precaution minimizes the possibility of excessive strain on the aircraft as a result of manoeuvre loads and gusts combined.

For asymmetric manoeuvres which involve ailerons deflection, acceleration while banking and/or speed banking, admitted load factors are:

– Zone A 0.25 to 1.5g

– Zone B 0.5 to 1.25g

The aircraft has an accelerometer indicating g-force to which it is being forced. Given that g-force feeling is often deceptive particularly when pilots attention is elsewhere, sudden or unnecessary manoeuvres should be avoided.

TAKEOFF AND LANDING CROSS WIND LIMITATIONS

Maximum admissible crosswind components at takeoff and landing are shown (as an operating conditions function) in the corresponding sections of "Performance Data Manual".

BRAKE POWER LIMITATIONS (MILITARY)

Maximum admitted brake power is shown in the following figures. From these figures it is possible to determine minimum time required to wait for brakes to cool after landing before starting a new takeoff. Minimum wait time is to ensure sufficient braking capacity to absorb required energy if takeoff has to be rejected.

Graphs usage is illustrated by an example using broken lines with arrows.

Brake power Limitations - Brake power at Landing (Military) figure allows calculating kinetic energy absorbed by the brakes during landing to be calculated, taking into account operating conditions at landing.

Brake power Limitations - Brake power at Acceleration-Stop (Military) figure allows calculating kinetic energy that should be absorbed by the brakes in case rejected takeoff (RTO) occurs at the next takeoff.

Brake power Limitations - Minimum waiting times for brake cooling (Military) figure allows minimum wait time between landing and next takeoff to ensure brakes have sufficient power absorption capacity to be calculated based on both two power values as previously determined. Zones defined in this figure indicate actions to be taken in each case.

This wait time is always less than, or equal to, that required by brake temperature indicating system (BTIS).

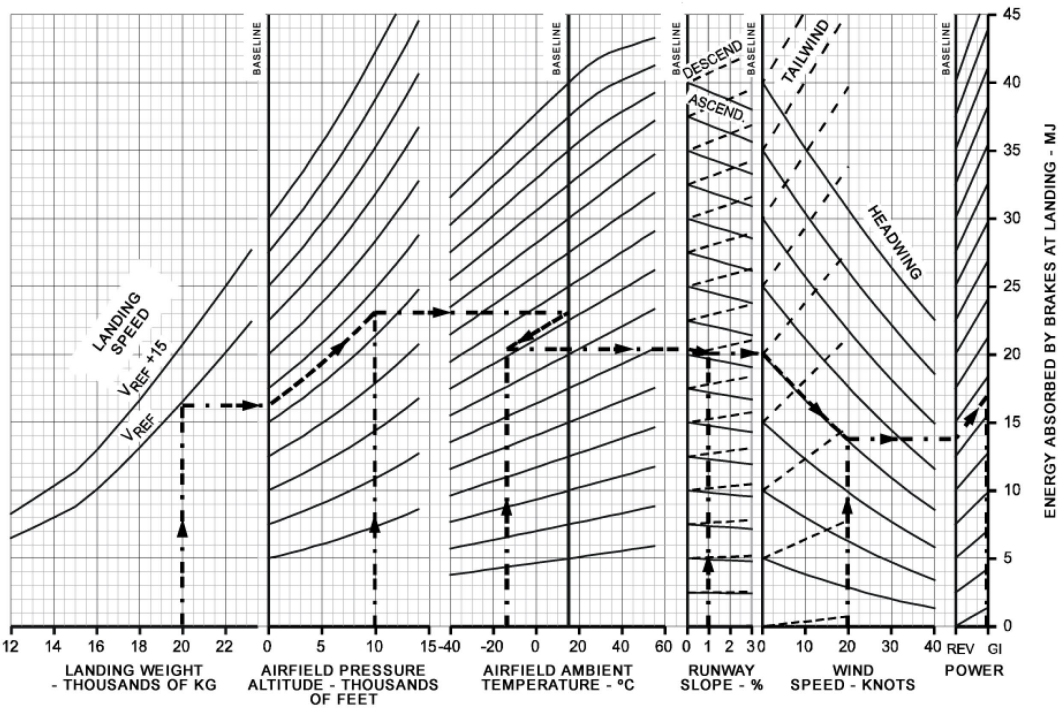


Figure 1-12 Brake power Limitations - Brake power at Landing (Military)

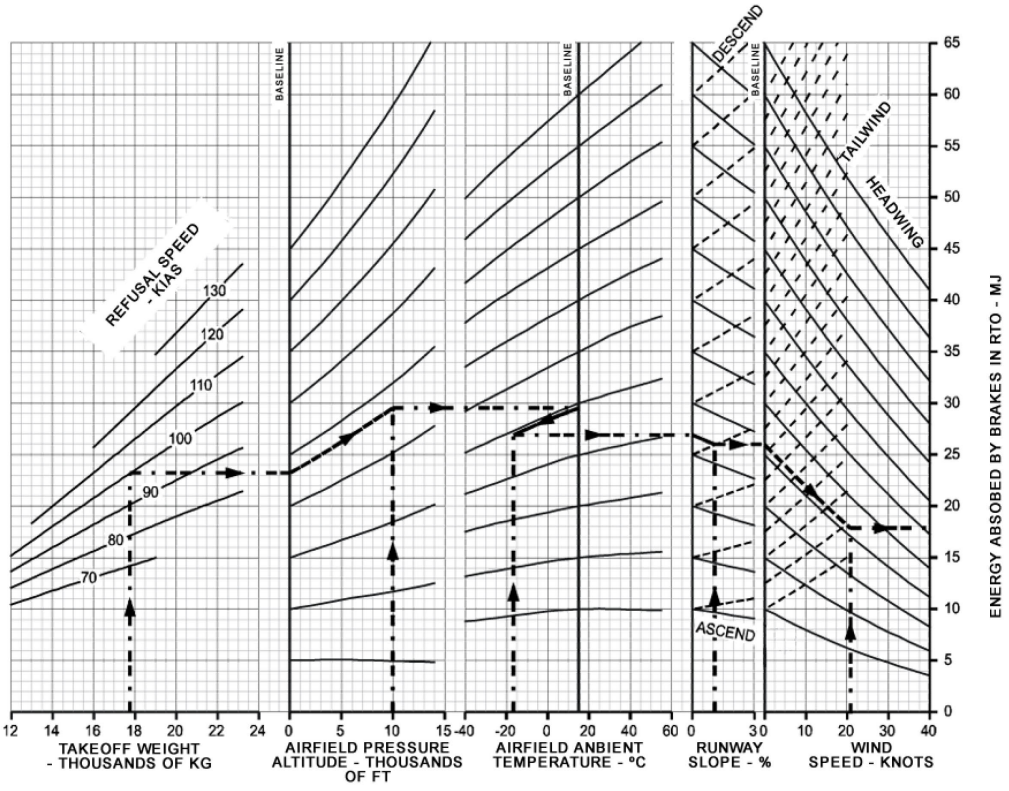


Figure 1-13 Brake power Limitations - Brake power at Acceleration-Stop (Military)

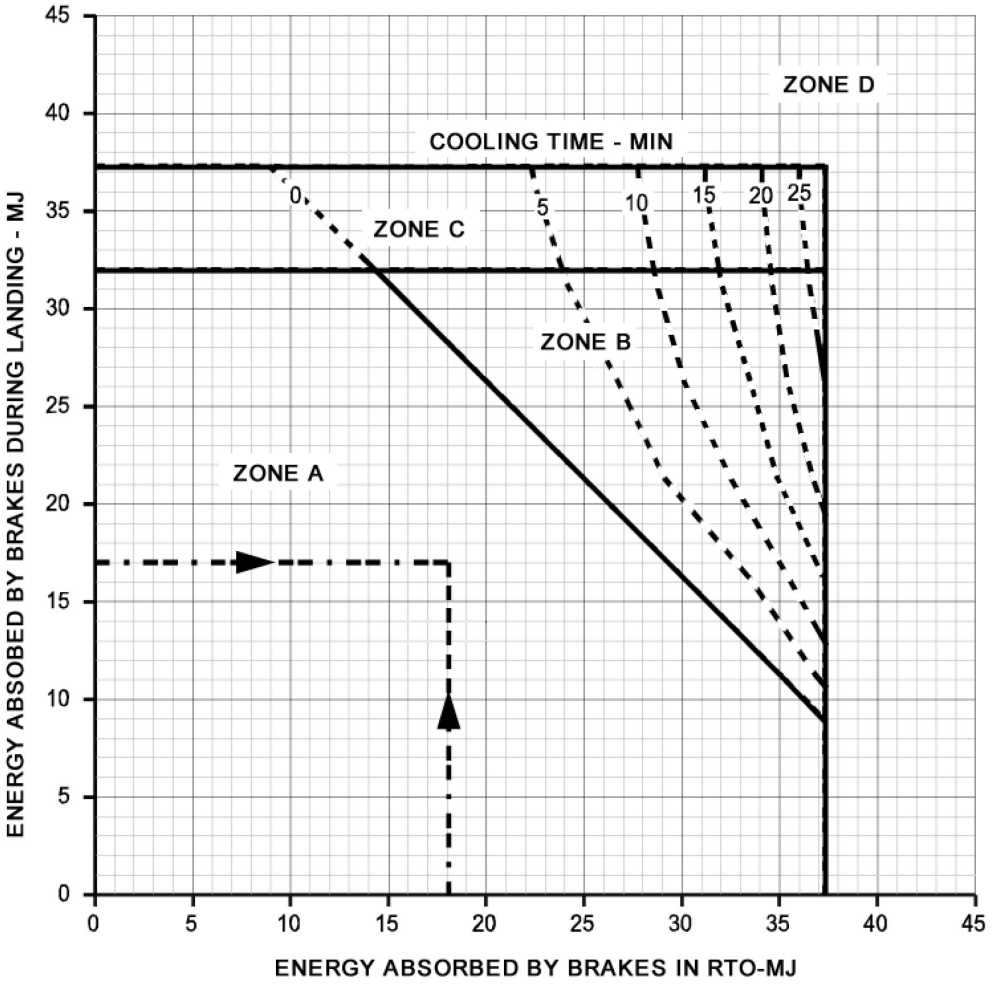


Figure 1-14 Brake power Limitations - Minimum waiting times for brake cooling (Military)

Zone A: Normal

The aircraft can take-off immediately after landing without waiting.

Zone B: Normal

It is necessary to wait for the time indicated by the curves (in minutes) before starting the next takeoff.

Zone C: Caution

A note must be entered in the aircraft log book. A maximum of 15 minutes must be waited in case main landing gear fuses blow. If this happens, aircraft maintenance team must be notified. If this does not happen, the total time indicated by the curves must be waited before attempting a new takeoff.

Zone D: Not recommended

A note must be entered in the aircraft log book and maintenance team must be notified.

RUNWAY ROUGHNESS REQUIREMENTS (MILITARY)

PAVED RUNWAYS

ACN values calculated using the international ICAO ACN/PCN standard method and appropriate to each zone of figure Weights Limitations (Military) are shown below. These values are used when minimum strength requirements of soft paved runways are being established.

Zone in Weight Restrictions Graph	Pavement Subgrade Classification			
	A (High)	B (Medium)	C (Low)	C (Ultra Low)
A	8	9	9	10
B	9	10	11	12

Table 1-9 ACN values - Rigid Pavements

Zone in Weight Restrictions Graph	Pavement Subgrade Classification			
	A (High)	B (Medium)	C (Low)	C (Ultra Low)
A	6	8	9	10
B	8	9	10	11

Table 1-10 ACN values - Flexible Pavements

UNPAVED RUNWAYS

Runway types

The aircraft can operate at earth surfaces (such as laterite or moraine).

Each time the aircraft operates at unpaved runways an entry must be made in the aircraft log book.

Surface conditions

There should not be a significant amount of standing water on the surface. The surface must be smooth and compacted, such that any stones and gravel above 1 inch in diameter have been rolled into the ground. There must be no loose-stones or solid objects of more than 2 inches in diameter on the firm surface Loose soil in excess than 2 inches high or which extends over a length of more than 60 feet is not admitted. There must be no ruts more than two inches deep (measured from surrounding surface level and not from rut edges).

Field surfaces such as stubble, grass (soft mown grass, dense grass or rolled on average subsoil) are admitted. However, no vegetation more than two inches high is admitted.

Roughness conditions and classification

Runway surface material must be at least 12 inches thick and well compacted. When soil mechanical characteristics can be classified by the "in-place" method it may be classified as follows:

"Hard" unpaved runways

Unpaved runways with surface material with CBR (California Bearing Ratio) soil bearing strength of at least 7, and modulus of soil reaction (k) of at least 180 pci.

"Soft" unpaved runways

Unpaved runways with surface material with CBR (California Bearing Ratio) soil bearing strength as low as 2, and modulus of soil reaction (k) of at least 50 pci.

Surface roughness limitations

Runway surface roughness profile must not have bumps raising H above those shown in “Hard” Unpaved Runways (Military) and “Soft” Unpaved Runways (Military) figures.

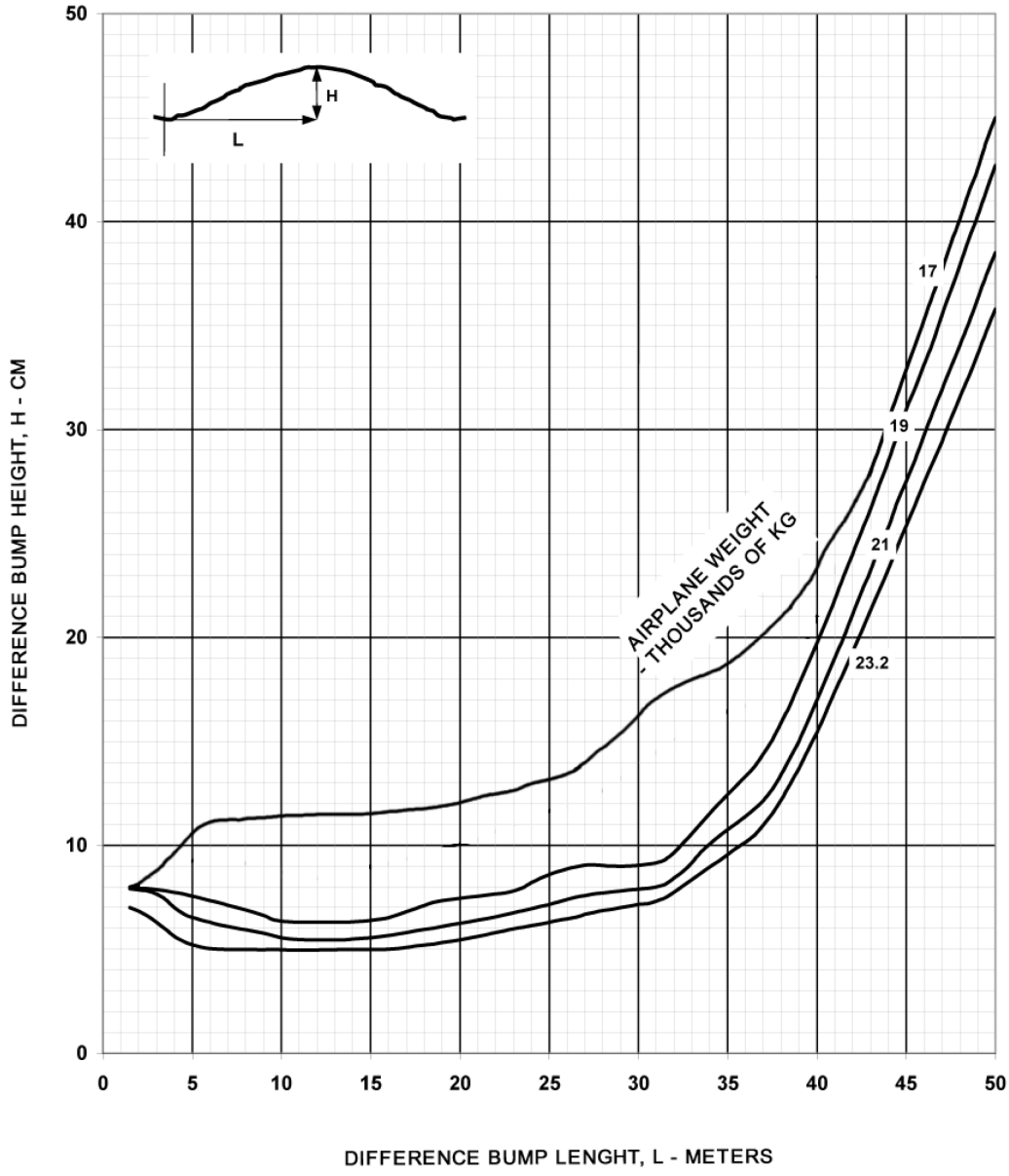


Figure 1-15 Surface Roughness Limitations - "Hard" Unpaved Runways (Military)

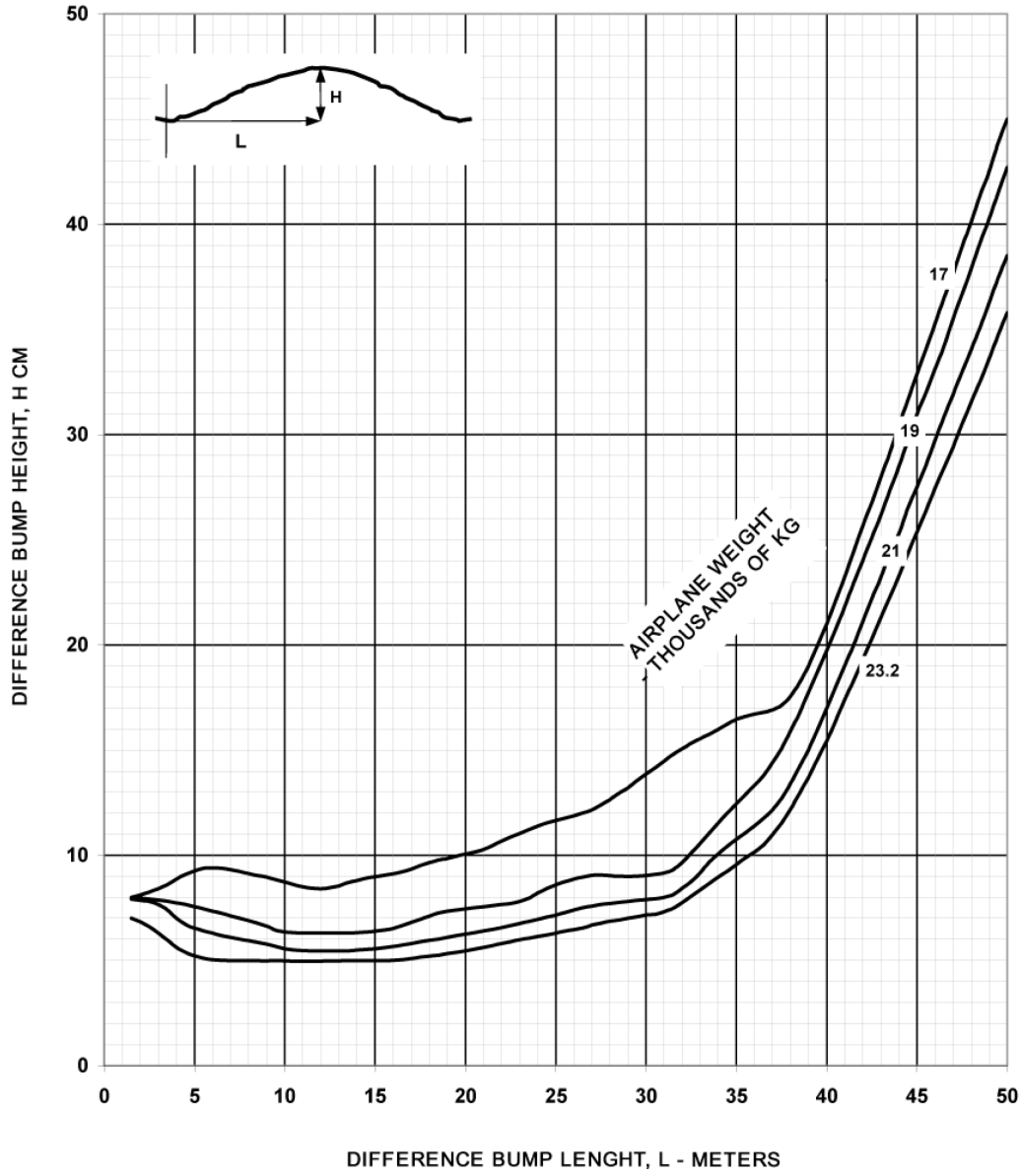


Figure 1-16 Surface Roughness Limitations - "Soft" Unpaved Runways (Military)

SYSTEM LIMITATIONS

POWER PLANT SYSTEM

ENGINES

Number of engines: 2
Manufacturer: Pratt & Whitney Canada Inc.
Type: Turboprop
Model: PW127G

The following engine speed conversion values are applied:

100% TQ = 11576 lb·ft
100% NP = 20000 rpm power turbine speed = 1200 rpm propeller speed.
100% NH = 33300 rpm high-pressure compressor speed.
100% NL = 27700 rpm low pressure compressor speed.

ENGINE OIL PRESSURE LIMITS

Minimum oil pressure for operation with propeller: feathered (40 PSIg), unfeathered (55 PSIg).

Maximum oil pressure: continuous operation (65 PSIg), 20 second limit (100 PSIg).

ENGINE OIL TEMPERATURE LIMITS

Minimum oil temperature for starting: -54°C.

Minimum oil temperature for unfeathering: -40°C.

Minimum oil temperature for takeoff: 0°C (45°C under icing conditions).

Maximum steady oil temperature: 125°C.

Maximum oil temperature in hotel mode: 125°C.

Maximum oil temperature for up to 20 seconds: 140°C.

ENGINE STARTING LIMITS

Engine starting: 15 minutes minimum cooling-off time after three consecutive starts.

Starting operation:

- 30 seconds on - 1 minute off.
- 30 seconds on - 1 minute off.
- 30 seconds on - 15 minutes off.

Maximum admitted starting transient (five seconds maximum) ITT is 950ºC.

Oil pressure during engine start, at oil temperature below 10ºC and until it reaches 21ºC:

- Maximum oil pressure during start: 100 PSI.
- Minimum oil pressure during starting: 40 PSI.

PROPELLERS

Number of propellers: 2
Manufacturer: Hamilton Standard
Model: HSD 568F-5
Number of blades: 6
Diameter (propeller feathered): 3932 mm (12.9 feet)

PROPELLER BRAKE

The engine must not be propeller-braked operated in case of tail wind.

Unattended propeller brake operation with the engine running is prohibited. It is required a qualified crew-member in the seat on the same side as the propeller brake. Walk around a braked propeller area is prohibited.

Do not exceed 715ºC ITT during propeller-brake engine operation (this limitation is not applicable during propeller-braked engine start-up).

Minimum admitted time between successive propeller engagements is 10 minutes.

AUTOFEATHER/APR

The AF/APR system must be checked daily before first flight. The system must be armed for takeoff as well as for approach and landing.

The operative cycle of the Auxiliary Feathering Pump operated with the Feathering MAN selector is:

30 sec. connected, 10 min. disconnected.

After four cycles of 30 seconds, let the unit cool for a minimum of 1 hour.

TAKEOFF POWER LIMITS

The following takeoff power limits apply:

Operating Conditions	**Operating Limits**				
	Time Limit	Max. Torque percent	Max. ITT (ºC)	Max. % NH	Max % NP
Normal Takeoff (Two-engine Operation)	5 minutes	101	765 [1]	102.3	101
Maximum Takeoff (One engine inoperative)		112	800	103.7	
Transition	20 seconds	125	840	104.3	120 [2]

Table 1-11 Takeoff Power Limits

[1] . The value shown is the absolute maximum. The steady-state ITT limit for the existing ambient conditions to be observed in normal takeoff (two-engine operation), must be obtained from the graph below.

[2] . The corresponding transient limit is further restricted to just five seconds.

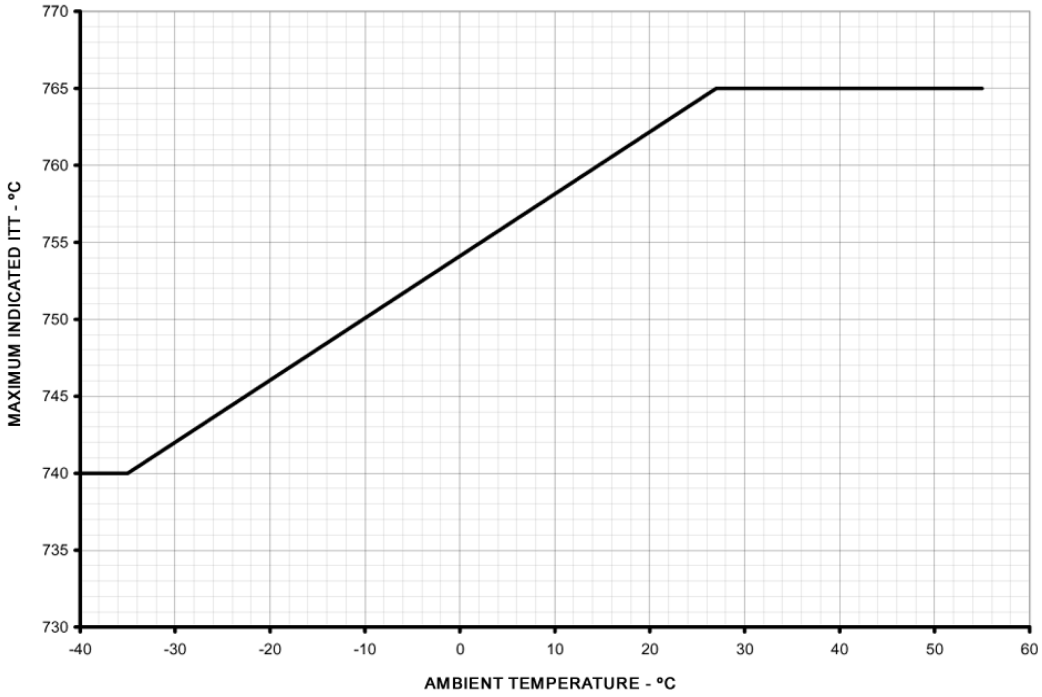


Figure 1-17 ITT limits for Normal Takeoff Power

MAXIMUM CONTINUOUS POWER LIMITS

The following maximum continuous power limits apply:

Operating Conditions	Operating Limits				
	Time Limit	Max. Torque Percent	Max. ITT (ºC)	Max. %NH	Max. %NP
Max. Continuous	Unrestricted [1]	112	800	103.7	101
Transient	20 seconds	125	840	104.3	120 [2]

Table 1-12 Maximum Continuous Power Limits

[1] . Maximum continuous power, although authorized for unlimited periods during flight, is intended for abnormal use (e.g., single-engine operation, heavy airframe ice accretion, compliance with ATC requirements or when obstructions dictate the use of an steep angle) at pilots discretion.

[2] . The corresponding transient limit is further restricted to just five seconds.

MAINTENANCE MESSAGES

Do not flight dispatch the aircraft if a power plant maintenance message is lighted.

POWER PLANT CONTROL COMPUTER

Power plant will be operated in automatic control mode (EEC and EPC on) during normal flight.

POWER LEVERS

While flying with BLS system de-activated, any BLS OVRD pushbutton lighted normally-indicated condition is prohibited.

It is also prohibited to position power levers below flight idle stop while in-flight. This position may lead to aircraft control loss or to engine/propeller overspeed.

Reverse Power operation is authorized for ground operation only.

OIL

Approved Lubricating Oils

Lubricating oils approved for aircraft use are shown below.

Specification	Oil Type	Approved Brand Names
PWA 521	Type II (5 Cs) Oils	AeroShell Turbine Oil 500 Royco Turbine Oil 500 Mobil Jet Oil II Castrol 5000 Exxon Turbo Oil 2380
----	4 Cs Oils	Castrol 4000
PWA 521	Type II (5 Cs) Oils 'Third Generation'	AeroShell Turbine Oil 560 Royco Turbine Oil 560 Mobil Jet Oil 254 254

Table 1-13 Approved Lubricating Oils

Only first-row above listed approved oils may be mixed.

Oil Capacity Data

Following data are applicable to each power plant.

Usable oil: 10.99 litres (2.90 U.S) gal.)
Total oil: 23.02 litres (6.08 U.S. gal.)

The "MIN" mark on the level sight gage on each engine indicates 19.5 litres (5.16 U.S. gal.) remains at the system. Additional 3.5 litres (0.92 U.S. gal.) are required to indicate "TOP-UP" oil level on the gauge.

Engines left overnight may have misleading oil level indications. If engine oil level was not checked after last flight, an engine run must be carried-out to circulate oil before an oil level test can be completed.

Oil Consumption Limitations

Maximum oil consumption admitted for each engine, as gauged through the last 10 hours of engine operation, must not exceed 0.227 kg/hour (0.500 lb/hour).

ENGINE STARTING SYSTEM

	Voltage Limits		
	Internal Battery	External Battery	GPU
Minimum	22	22	24
Maximum	--	30	30

Table 1-14 Engine Starting System Limits

Maximum indicated battery load for initiating generator-assisted engine starting: 100 A on each indicator.

INTEGRATED ENGINE DISPLAY SYSTEM

The primary engine parameters display (%TQ, ITT, %NP and %NH) must always be displayed on the upper IEDS screen during normal flight. Composite mode in normal flight usage is prohibited.

FUEL SYSTEM

REFUELLING

Before ground pressure-refuelling, a refuelling test must be done with the REFUEL-DEFUEL Control Panel.

The aircraft must not be refuelled while one propeller-braked engine is running.

Maximum refuelling pressure is 55 PSI. Wing inboard tanks must be filled before outboard ones.

Fuel quantity indicating system test must be completed before flight.

FUEL MANAGEMENT

During normal flight, use tank-to-engine fuel feed with its lateral auxiliary wing tank boost pump in standby condition and crossfeed valve closed.

While airborne, use gravity fuel transfer system only in case of pressure transfer system failure.

Fuel crossfeed valve may be opened to correct, or prevent from, fuel unbalance.

FUEL UNBALANCE

Following fuel unbalance values shall not be exceeded while airborne:

Aircraft weight	Maximum admitted fuel asymmetry	
	Main Tanks	Auxiliary Tanks
Up to 18000 kg (39690 lb)	270 kg (600 lb)	60 kg (135 lb) when main tanks are balanced, decreasing linearly to zero by 23 kg (50 lb) for each 100 kg (240 lb) in unbalanced main tanks.
Over 18000 kg (39690 lb)	90 kg (200 lb)	20 kg (40 lb) when main tanks are balanced; negligible otherwise.

Table 1-15 Fuel Unbalance Values

FUEL

Usable Fuel

Fuel quantity that may be used is shown below:

Fuel Tank		Usable Fuel		
		Litres	U.S. gal.	Imp. gal.
Right Wing	Main Tank	1695	448	373
	Auxiliary Tank	2055	542	452
Left Wing	Main Tank	1695	448	373
	Auxiliary Tank	2055	542	452
Total		7500	1980	1650

Table 1-16 Usable Fuel

Above indicated quantities are maximum values and may be obtained either during gravity refuelling or simultaneous pressure-refuelling of all tanks with the aircraft levelled. Values for each main tank reduce to:

- 1540 litres/407 U.S. gal/339 Imp. gal. when each main tank is pressure-refuelled separately from its corresponding auxiliary wing tank
- 1590 litres/420 U.S. gal/350 Imp. gal. when each main tank is gravity-refuelled.

Fuel loading varies with the specific gravity. Without any fuel weight limitation.

Remaining fuel quantity at each fuel tank is not safely usable at every flight condition when fuel quantity indicator shows "zero".

Approved Fuels

Fuel types listed in below comply with P&WC CPW 204 and later revisions current specification, and are approved for aircraft use. Please refer to the Maintenance Manual for PW 127G (P/N 3044822) Engine. Unless otherwise specified, fuel specifications latest issue shall be applied. Either a single approved fuel or any mixture of approved fuels may be used.

Specification Type	**Civil**			**Military**			
NATO Code	---			F-35	F-34 [1]	F-40	F-43/F-44
Fuel Type	Jet A	Jet B	Jet A-1	--- [2]	JP-8	JP-4	JP-5
U.S.A.	ASTM D 1655 [3]			MIL-T-83133		MIL-T-5624	
U.K.	---			DEF STAN 91-91 [4]	DERD 2453	DERD 2454	DERD 2498/2452 [5]
France				AIR 3405		AIR 3404	
Freezing Point, °C (max.)	-40	-50	-47	-47		-58	-46

Table 1-17 Approved Fuels

[1] . F-34 is the same as F-35 after adding the appropriate anti-icing additive and corrosion inhibitor.

[2] . Kerosene type almost identical (without additives) to ASTM D 1655 Jet A-1 fuel.

[3] . Freezing point values below the corresponding ones as listed above may be agreed between supplier and purchaser.

[4] . DERD 2494 fuel specification is also admitted for use.

[5] . F-43 and F-44 are procured in the U.K. according respectively to DERD 2498 and 2452, specifications. F-43 becomes F-44 by adding the appropriate anti-icing additive to the first NATO code.

Tank Fuel Temperature Limits

Maximum tank fuel temperatures admitted for the indicated fuels are:

- 50ºC (JP-8/Jet A/Jet A-1/JP-5)
- 35ºC (JP-4/Jet B)

In-flight tank fuel temperature must be kept at least 5ºC above used fuel actual freezing point. See the table of approved fuels above to determine used fuel actual freezing point maximum value. When a fuel mixture is being used, highest actual freezing point value must be considered.

Approved Fuel Additives

The additives listed below can be mixed (either separately or in combination) with any of the approved fuels or fuel mixtures as indicated.

NOTE

1 bbl. = 159 litres (42 U.S. gal.)

1. Anti-Static Additives

Trade Name/Specification	Maximum Admitted Concentration - Parts per Million by Weight
Shell ASA-3	1.0
Dupont Stadis 450	3.0

Table 1-18 Anti-Static Fuel Additives

2. Anti-Icing Additives

Any anti-icing additive which is directly equivalent to those in the following table is approved for use in homogenous fuel mixtures.

Manufacturer/Specification	Maximum Admitted Concentration - Percentage by Volume
Phillips PFA 55MB	0.15
MIL-I-27686D	0.15
MIL-I-27686E (EGME)	0.15
MIL-I-85470A (DIEGME)	0.15

Table 1-19 Anti-Icing Fuel Additives

NATO codes for EGME and DIEGME are S-748 and S-1745, respectively.

3. Anti-corrosion/Lubricant Additives

The following anti-corrosion and lubricant additives are described primarily as corrosion inhibitors and secondarily as lubricant additives.

Trade Name	Maximum Admitted Concentration	
	lbs/1000 bbls.	Grams/10000 litres
Apollo PRI-19	4	114
Cooper Hitec E-580	8	228
Dupont DCI-4A	8	228
Mobilad F-800	8	228

Table 1-20 Anti-corrosion/Lubricant Fuel Additives

It is recommend a lubricant improver to be fuel-added during extensive engine operation with low-lubrication fuels.

4. Anti-Microbiological Additives

The following additives can be used on a limited basis, being defined as intermittent or non-continuous use in a single application to sterilize the aircraft if suspected or confirmed contaminated by microbial organisms such as fungi, bacteria and yeasts. For those operators for whom the need to use a microbicide is indicated (LP blocked filters), a monthly action is recommended as a dosage guideline.

Additives can also be used continuously when the aircraft is used less than 1200 hours per year.

Trade Name	Maximum Admitted Concentration - Parts per Million by Weight
Biobor JF	270

Table 1-21 Anti-Microbiological Fuel Additives

5. Corrosion Inhibitors

Trade Name	Maximum Admitted Concentration	
	lbs/1000 bbls.	Grams/10000 litres
Dupont AFA-1	16	456
Lubrizol 451	20	570
Nalco 5400-A	8	228
Nalco 5403	8	228
Petrolite TOLAD 245	20	570

Table 1-22 Corrosion Inhibitors

6. Oxidation Inhibitors

One or a combination of the following oxidation inhibitors may be added to the basic fuel in total concentration below 25 milligrams per litre (0.025 grams per litre) to prevent from gum accretion.

– 2,4-Dimethyl-6 Tertiary Butyl Phenol

– 2,6-Ditertiary-Butyl-4 Methyl Phenol

– 2,6-Ditertiary Butyl Phenol

– 75% 2,6-Ditertiary-Butyl Phenol 10-15% 2,4 4,6-Tritertiary Butyl Phenol 10-15% Orthotertiary Butyl Phenol

– 72% Min. 2,4-Dimethyl-6 Tertiary-Butyl Phenol 28% Max. Monomethyl and Dimethyl Tertiary Butyl Phenol

– 60% Min. 2,4-Ditertiary-Butyl Phenol 40% Max. Mixed Tertiary Butyl Phenol.

7. Thermal Stability Additive

The following stability additive is approved for use in engine fuel (at the manufactures discretion).

Trade Name	Maximum Admitted Concentration	
	lbs/1000 bbls.	Grams/10000 litres
Dupont JFA-5	30	855

Table 1-23 Thermal Stability Fuel Additive

8. Metal Deactivator

Trade Name	Maximum Admitted Concentration	
	lbs/1000 bbls.	Grams/10000 litres
N, N1 - Disalicylidene - 1,2 Propane Diamine	1	57

Table 1-24 Metal Deactivator

AIR-CONDITIONING AND PRESSURIZATION

If only one engine is operative the air-conditioning pack must be turned-off while takeoff or go-around engine power is selected.

Maximum differential pressure for normal operation: 5.58 PSI.

Maximum differential pressure limit: 5.77 PSI.

Takeoff and landing should be carried-out with cabin unpressurized when manual pressurization control is used.

AUTOMATIC PILOT

- The automatic pilot and/or yaw damper must not be engaged for takeoff.
- The yaw damper must be disconnected prior to touchdown.
- Minimum speed for automatic pilot operation is 1.23 V_{SR}.
- Maximum altitude for AP/FD civil operation is 25000 feet.
- Maximum altitude for AP/FD military operation is 30000 feet.
- Automatic pilot must be disengaged in severe turbulence.
- The automatic pilot Minimum Engage Height (MEH) after takeoff is 1000 ft AGL.
- The automatic pilot Minimum Use Height (MUH) during cruise is 1000 ft AGL.
- The autopilot Minimum Use Height (MUH) for VOR non-precision approach is 600 ft AGL.

During CAT I approaches:

- The automatic pilot must be disengaged at or above a minimum altitude of 200 ft AGL.

- If the automatic pilot disengages or is disengaged below 500 feet, it must remain disengaged for that approach.
- An approach with automatic pilot engaged must not be commenced or continued with an inoperative engine.
- The automatic pilot may remain engaged down to Minimum Use Height (MUH) 600 feet for non precision approaches.

The flight director shall not be used for approach unless the decision height is not less than 200 feet above the runway threshold elevation.

ELECTRICAL SYSTEM

Continuous admitted load on each generator is 400 Amps. Generators may not be operated with loads above 400 Amps for periods lasting more than 5 minutes.

After engine start-up checks must be completed before takeoff.

	GPU (AC)
Min.	110 V
Max.	118 V

Table 1-25 GPU Voltage Limits (AC)

GPU Minimum Power (AC) is 10 KVA.

NOTE

If the engine start is to be performed with external power source, the GPU (DC) must be capable of producing 28 VDC at loads up to 2000 Amps with negligible voltage drop.

The maximum load in 115 V AC circuit is 1000 VA (8.69 A), and it can be distributed through all the 115 V AC sockets or just in one of them.

The maximum load in 28 V DC circuit is 560 W (20 A), and it can be distributed through all the 28 V DC sockets or just in one of them.

HYDRAULIC SYSTEM

Unless performance data allows in contrary, both No. 1 and No. 2 hydraulic pumps must be turned-on for takeoff, go-around and landing, when operating in manual mode.

Approved hydraulic fluids are MIL-H-5606 (red) and MIL-H-83282 (red). However, when MIL-H-83282 fluid is used, lowest ambient temperature allowed is -40ºC.

Both fluid types may be mixed. However, lowest temperature limit for mixed fluid operation is -40ºC.

Each time hydraulic system comes into service an entry must be made at the log book thus indicating both quantity and type of fluid serviced.

LANDING GEAR

Tire Limit Speed:

Maximum admitted tire ground speed is 178 KTAS (Ground Speed).

FLIGHT CONTROLS

Automatic Rudder Travel Control System (ARTCS) must always be tested and considered operative before flight. ARTCS automatic mode must be selected for normal flight.

Rudder Booster System (RBS) must always be tested and considered operative before flight. For normal flight, RBS shall be operative and its primary RBS heater selected.

Flaps System must always be tested and considered operative before flight.

DOORS

Since every rear-side cabin door or ramp and cargo door is operable, its operation shall always be previously authorized according to the appropriate supplement(s) to the Aircraft Flight Manual terms and conditions.

Boarding at, or disembarking by, any lateral access door on the side where a propeller-braked engine is located, is only admitted with such engine shut-down

Every external door must be checked before flight and before takeoff.

The maximum permissible altitude for flight with the ramp and cargo door open is 25000 ft.

Unless specified otherwise in the corresponding emergency procedure, cockpit entry door must remain open during takeoff and landing.

Opening or closing any rear side cabin door in flight with the ramp and cargo door open, is not authorized.

NOTE

Nevertheless opening or closing the ramp and cargo door in flight with one rear side cabin door open, is authorized.

SEATS

Both crew seats must be locked in position during takeoff and landing. When fitted and in use, forward observer seat must be locked in position. When not in use, it should be folded to the stowed position.

ICE AND RAIN PROTECTION

Refer to SECTION V - ALL WEATHER OPERATIONS.

COMMUNICATIONS

If the aircraft is fitted with HF communications unit, it shall not be used while the aircraft is being refuelled.

NAVIGATION

If GPS is used for BCP calculation in IFR and BRNAV operations, position accuracy must be crosschecked every 15 minutes against another available navigation sensor approved for this flight operation.

If Hybrid IRS/GPS is used in IFR and BRNAV operations, position accuracy must be crosschecked every 15 minutes against another available navigation sensor approved for this flight operation.

LIGHTS

If the aircraft is fitted with emergency lighting system, it must be armed for all flight operations.

OXYGEN (CIVIL)

The minimum permissible flight crew supplement oxygen pressure for take-off is 500 psi; however, when the airplane is in the approved all-cargo transport configuration, refer to applicable operational regulations for any additional supplemental oxygen enroute dispatch requirements by occupants to account for a possible prolonged enroute flight at 25000 feet following the occurrence of smoke in the cargo cabin.

OXYGEN (MILITARY)

The minimum permissible flight crew supplement oxygen pressure for take-off is 500 psi; however, when the airplane is in the approved all-cargo transport configuration, refer to applicable operational regulations for any additional supplemental oxygen enroute dispatch requirements by occupants to account for a possible prolonged enroute flight at 25000 feet following the occurrence of smoke in the cargo cabin.

When flying above 25000 ft each crew-member oxygen mask must be connected to its oxygen socket, and masks must be immediately available.

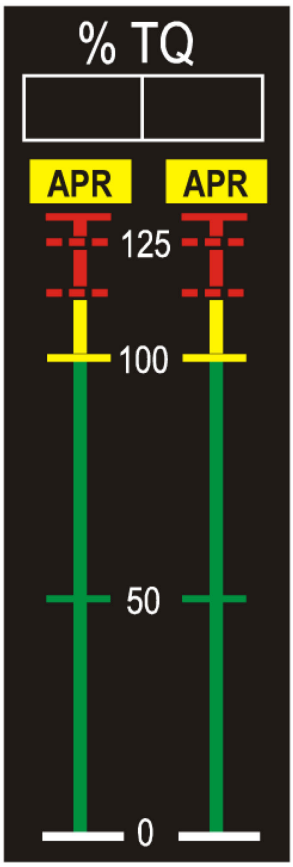
AERIAL DELIVERY

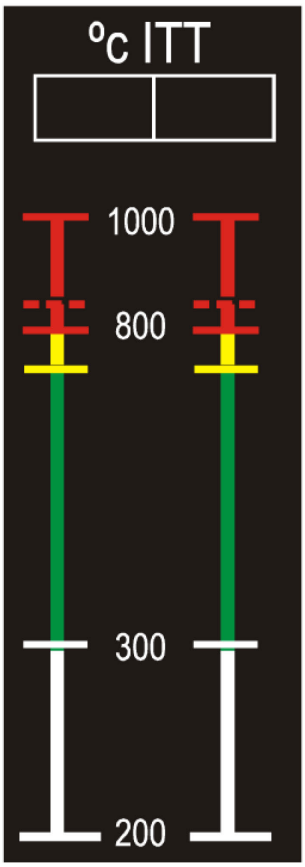
STATIC LINE

Maximum paratrooper weight for conducting a 'hung up' paratrooper recovery through the ramp is 130 kg (286.6 lb).

INSTRUMENT MARKINGS

Both flight and engine instrument markings are depicted in the following figures. Instrument markings should be considered as they represent limitations which are not necessarily text-repeated. However, further explanations may be given of some markings concerning certain instruments in the relevant text section.





Torque Indicator (TQ)

Green scale: from 0% to <101.5%

Amber scale: from 101.6% to <112.0%

Red scale: from >112.0% to 130% (end of scale)

White mark: 110.4%

Dashed red mark: 112.1%, 124.8%

ITT Indicator

White scale: from 200°C to ≤ 300°C

Green scale: from 301°C to ≤ 765°C

Amber scale: from 766°C to ≤ 800°C

Red scale: from 801°C to ≤ 1000°C

Amber triangle: 715°C (only APU mode)

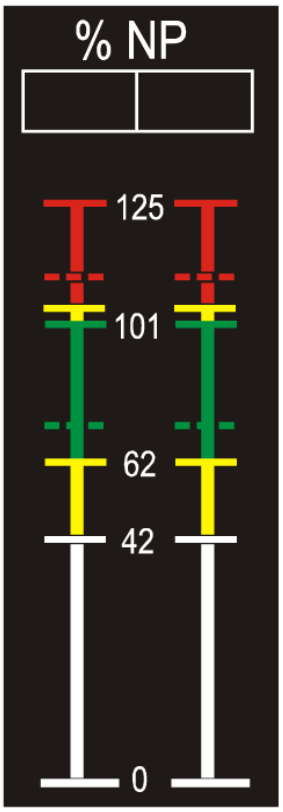
Dashed red mark: 840°C (in start mode 950°C in)

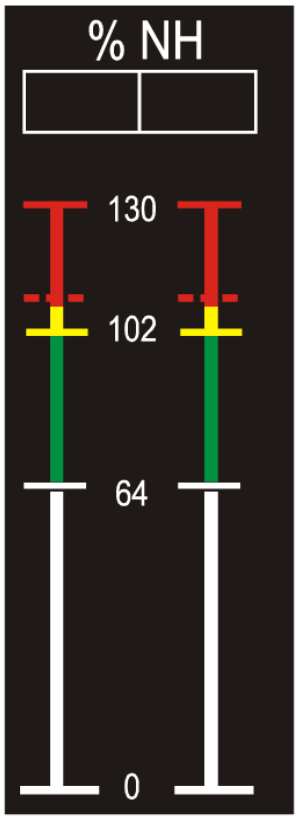
Mode APU

Vertical yellow scale: from 716°C to ≤ 800°C

Vertical green scale: from 301°C to ≤ 715°C

Figure 1-18 Instrument markings (Sheet 1 of 7)





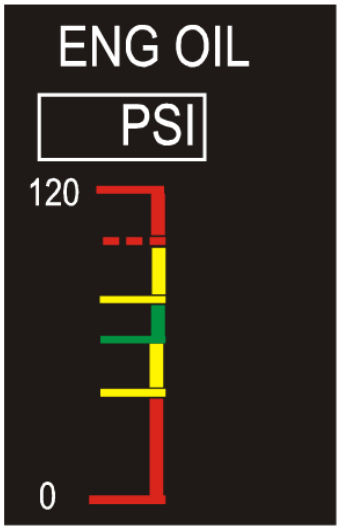
Propeller Speed (NP)

White scale: from 0% to ≤ 42.1%
Amber scale: from 42.2% to ≤ 62.5%
Green scale: from 62.5% to ≤101%
Amber scale: from 101.1% to ≤103.5%
Red scale: from 103.5% to 125%
Amber triangle: 40%
Dashed green mark: 70.8%
Dashed red mark: 109.6%

High Compressor Speed (NH)

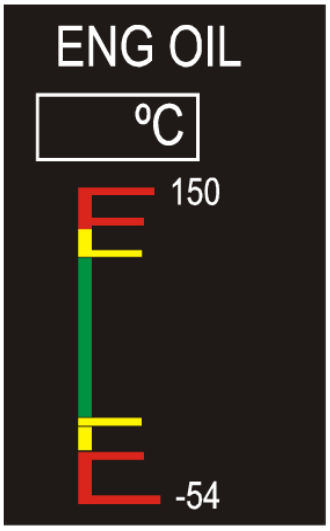
White scale: from 0% to < 64%
Green scale: from 64% to ≤102.3%
Amber scale: from 102.4% to ≤103.7%
Red scale: from 103.8% to 130%
Dashed red mark: 104.3%

Figure 1-18 Instrument markings (Sheet 2 of 7)



Engine Oil Pressure

Red scale: from 0 to < 40 psi
Amber scale: from 40 psi to < 55 psi
Green scale: from 55 psi to ≤ 65 psi
Amber scale: from 66 psi to ≤ 100 psi
Red scale: from 101 psi to 120 psi
Dashed red mark: 100 psi



Engine Oil Temperature

Red scale: from -54°C to < -40°C
Amber scale: from -40°C to < 0°C
Green scale: from 0°C to ≤ 125°C
Amber scale: from 126°C to ≤ 140°C
Red scale: from 141°C to 150°C
White triangle: 45°C

Differential Pressure in Cabin

Green arc: from 0 psi to 5.5 psi
Amber arc: from 5.5 psi to 5.7 psi
Red arc: from 5.7 psi to 8 psi

Cabin Altitude

Green arc: from 0 to 8000 ft
Amber arc: from 8000 to 10000 ft
Red radial: 10000 ft

Figure 1-18 Instrument markings (Sheet 3 of 7)

TRIM Indicator

ELEVATOR
Right and Left

Green zone: from 2.5 to 4.5 ANU

Red radials: 0 and 12 ANU

AILERON
Normal and Standby

Red radials: 8 and -8

RUDDER

Green arc: from 1R to 0R

Red radials: 5R and 5L

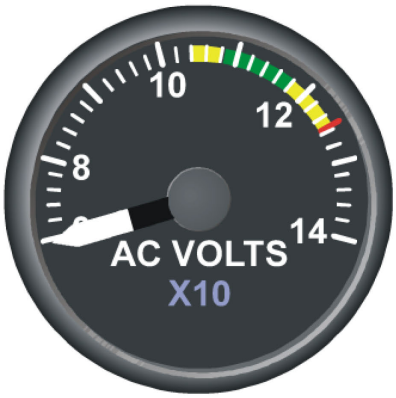
Angle of Attack Indicator

Green arc: from 0 to 0.8

Amber arc: from 0.8 to 0.9

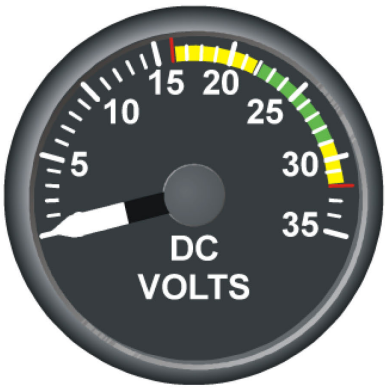
Red arc: from 0.9 to 1.0

Figure 1-18 Instrument markings (Sheet 4 of 7)



(AC) Voltmeter
Generator and Inverter

Green arc: from 108 to 118 V
Amber arc: from 118 to 125 V from 104 to 108 V
Red radial: 125 V



(DC) Voltmeter

Green arc: from 22 to 29 V
Amber arc: from 16 to 22, from 29 to 32 V
Red radials: 16 and 32 V

Generator Ammeter

Green arc: from 0 to 400 A
Amber arc: from 400 to 500 A
Red radial: 500 A

Figure 1-18 Instrument markings (Sheet 5 of 7)

Hydraulic Pressure

Green arc: from 2900 psi to 3100 psi
Amber arc: from 3100 psi to 3750 psi
Red radial: 3750 psi

Hydraulic Fluid Quantity

Green arc: from 63% to 77%
Blue radials: 63% and 77%

Hydraulic Brake Pressure

Green arc: from 2900 psi to 3100 psi
Amber arc: from 3100 psi to 3750 psi
Red radial: 3750 psi

Hydraulic Brake Pressure Emergency System

Green arc: from 2900 psi to 3100 psi
Amber arc: from 3100 psi to 3750 psi
Red radial: 3750 psi

Brake Temperature

Green arc: from 50°C to 220°C
Amber arc: from 220°C to 450°C
Red arc: from 450°C to 700°C

Figure 1-18 Instrument markings (Sheet 6 of 7)

Airspeed Indicator

The indicator needle of the indicated airspeed changes of colour depending of the airspeed in that moment, in such a way that it adopts the following colours:

- White when the indicated airspeed is less than VMO-2Kt.
- Amber when the indicated airspeed is between VMO-2Kt and VMO+3Kt (it becomes white again below VMO-4Kt).
- Red when the indicated airspeed is more than VMO+3Kt (it becomes amber again below VMO+1Kt).

The VMO indication (stripped needle) follow the valves represented in Zone A and Zone B (according to the Gross Weight selected in the FMS) of the Maximum Flight Airspeeds Graphic (Figure 1-2) in this section. Prepare for a strong oscillation of the VMO Indication when there is a change between Zone A and Zone B. Whenever there is an important change of weight (due to thowing, in-flight refuelling), on update on the weight must be made in the FMS.

NOTE: The VMO aural warning obeys only to Airspeed limitations in Zone A.

Figure 1-18 Instrument markings (Sheet 7 of 7)

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