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1 – GENERALITIES

Aircraft and system limitations in this section include the limitations required by the regulations and contained in the FLIGHT MANUAL.

IMPORTANT

ALL THE LIMITATIONS OF THE DGAC APPROVED FLIGHT MANUAL ARE REPRODUCED HERE IN BOXES.

– THE ADDITIONAL LIMITATIONS ARE INDICATED AS A GUIDE IN ORDER TO HAVE AN OPTIMIZED UTILIZATION OF THE AIRCRAFT.

– ALL REFERENCES TO AIRSPEED OR MACH RELATE TO INDICATED AIRSPEED OR INDICATED MACH UNLESS OTHERWISE NOTED.

– ALL REFERENCES TO ALTITUDE RELATE TO PRESSURE ALTITUDE UNLESS OTHERWISE NOTED.

2 – KINDS OF OPERATIONS

This airplane is certificated in the transport category for the following kinds of operation when the appropriate instruments and equipments required by the airworthiness and/or operating regulations are approved, installed and in operable condition.

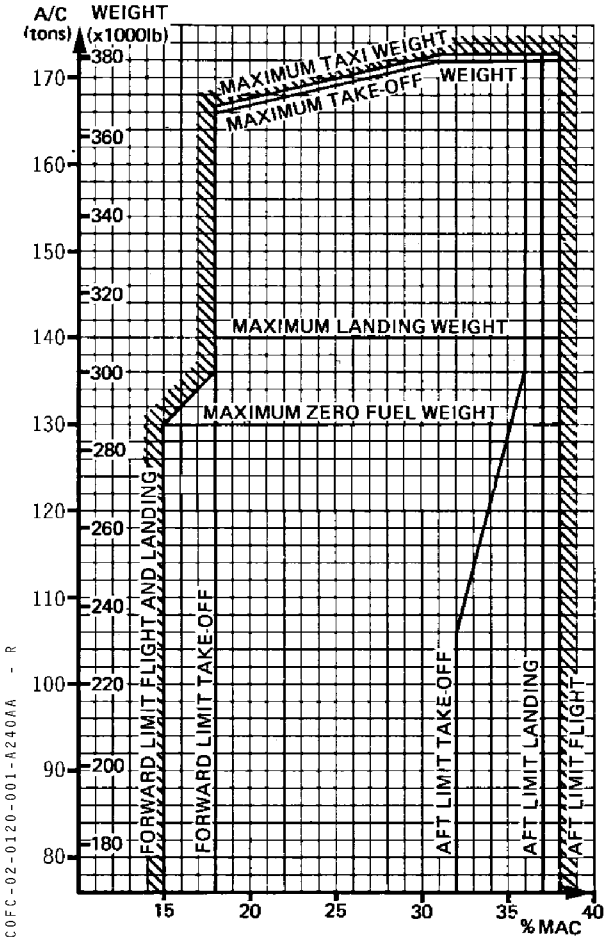
– Carriage of passengers (maximum number of passengers seats : 345)
– Carriage of cargo
– Icing conditions
– Extended over water flight and ditching
– Day and night VFR
– IFR
– For operation with AFS, limitations are given in the Auto flight system section.

Note : The airworthiness regulations do not allow CAT II and CAT III operations unless the operator has received the agreement from his national appropriate authorities.

1 – WEIGHTS/CENTER OF GRAVITY

A – CENTER OF GRAVITY LIMITS

The limits of the center of gravity are given in percentage of the mean aerodynamic chord, landing gear extended. The MAC is 6.608 meters long (260.15 inches). Station 0 is located 6.3825 meters (251.28 inches) forward of fuselage nose.



Note : Aircraft Center of gravity must always be within presented limits regardless of fuel load.

Manoeuver on ground :

- When the weight is higher than 164 tons (361 620 lb), do not exceed ± 65° on nose wheel travel during towing.
- When the weight is higher than 163.5 tons (360 520 lb), do not exceed a maximum taxiing speed of 15 kt during a turn.

B – WEIGHT LIMITATIONS

	KG	POUNDS
MAXIMUM TAXI WEIGHT	172 600	380 510
MAXIMUM TAKE-OFF WEIGHT (BRAKES RELEASE)	171 700	378 530
MAXIMUM LANDING WEIGHT	140 000	308 690
MAXIMUM ZERO FUEL WEIGHT	130 000	286 650
MINIMUM WEIGHT	90 000	198 410

Under exceptional conditions following a take off at any weight within max take off weight and max landing weight an immediate landing is permitted provided overweight landing procedure is adhered to.

Exceptional conditions are :

- emergencies
- abnormalities wherein continuance of flight to destination is not possible.

Code : 0008

GE Eng. : 80C2A5/A5F

ALL

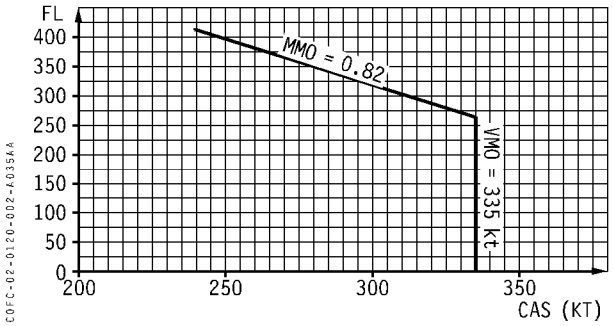
2 – SPEEDS

A – VMCA – VMCG

	kt CAS	kt IAS
VMCG	109.5	114 in 15/0 and 15/15 113 in 15/20
VMCA	117.0	120.6 in 15/0 and 15/15 120 in 15/20

B – MAXIMUM OPERATING SPEEDS (VMO)

The maximum operating limit speed VMO may not be deliberately exceeded in any regime of flight (climb, cruise or descent).



C – MAXIMUM SLATS/FLAPS SPEEDS (VFE)

(1) Maximum slats/flaps extended speeds or operating speeds for takeoff, approach and landing :
Maximum operating altitude : 20000 ft

	SLATS	FLAPS	SPEED (IAS)
TAKEOFF	15	0	250 KT
TAKEOFF AND APPROACH	15 15	15 20	215 KT 205 KT
LANDING	15 30	20 40	205 KT 175 KT

(2) Maximum slats extended speed for holding and en route :

HOLDING AND « EN ROUTE »	15	0	250 KT/M 0.55

D – GEAR OPERATING SPEEDS

Maximum speeds at which the landing gear may be extended or retracted :
VLO extension: 270 KT/M 0.59
VLO retraction: 240 KT/M 0.53

Maximum speed with landing gear locked down :
VLE = 270 KT or M 0.65

E – KRUGER

If Kruger cannot be retracted :
do not exceed . . . . . 300 KT/M 0.65

F – MANUAL PITCH TRIM

When operating with manual pitch trim only :
do not exceed . . . . . 285 KT/M 0.78

GE Eng. : 80C2A5-80C2A5F

ALL

3 – MISCELLANEOUS

A – MINIMUM FLIGHT CREW

The minimum flight crew consists of 2 pilots.

B – DISPATCHIBILITY

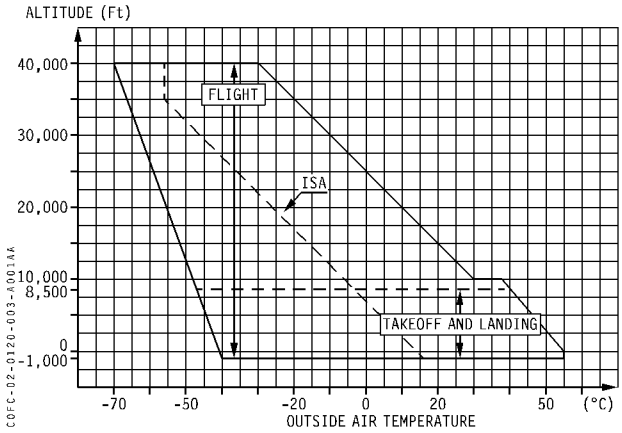
For dispatch in the event of equipment failure or missing parts, refer to MEL/CDL.

C – FLIGHT MANEUVERING LOAD ACCELERATION LIMITS

Clean configuration : + 2.5 g to – 1 g
Slats extended configuration : + 2 g to 0 g

D – OPERATING PERFORMANCE LIMITATIONS

(1) Environmental envelope



(2) Airport Operation limitations

Runway slope (mean) . . . . . ± 2 %
Runway altitude . . . . . 8,500 ft

Wind :
. Tail wind component (takeoff and landing) . . . . . 10 kt
. Cross wind (takeoff and landing) : Maximum calculated and demonstrated on dry and wet runway . . . . . 32 kt
. Max wind for passenger and cargo doors operation . . . . . 60 kt

E – TIRES

MAXIMUM TIRE SPEED
. . . . . GROUND SPEED = 195.5 kt

F – WINDSHIELD WIPERS IN USE

Maximum operating speed . . . . . 230 kt

G – COCKPIT WINDOWS OPEN

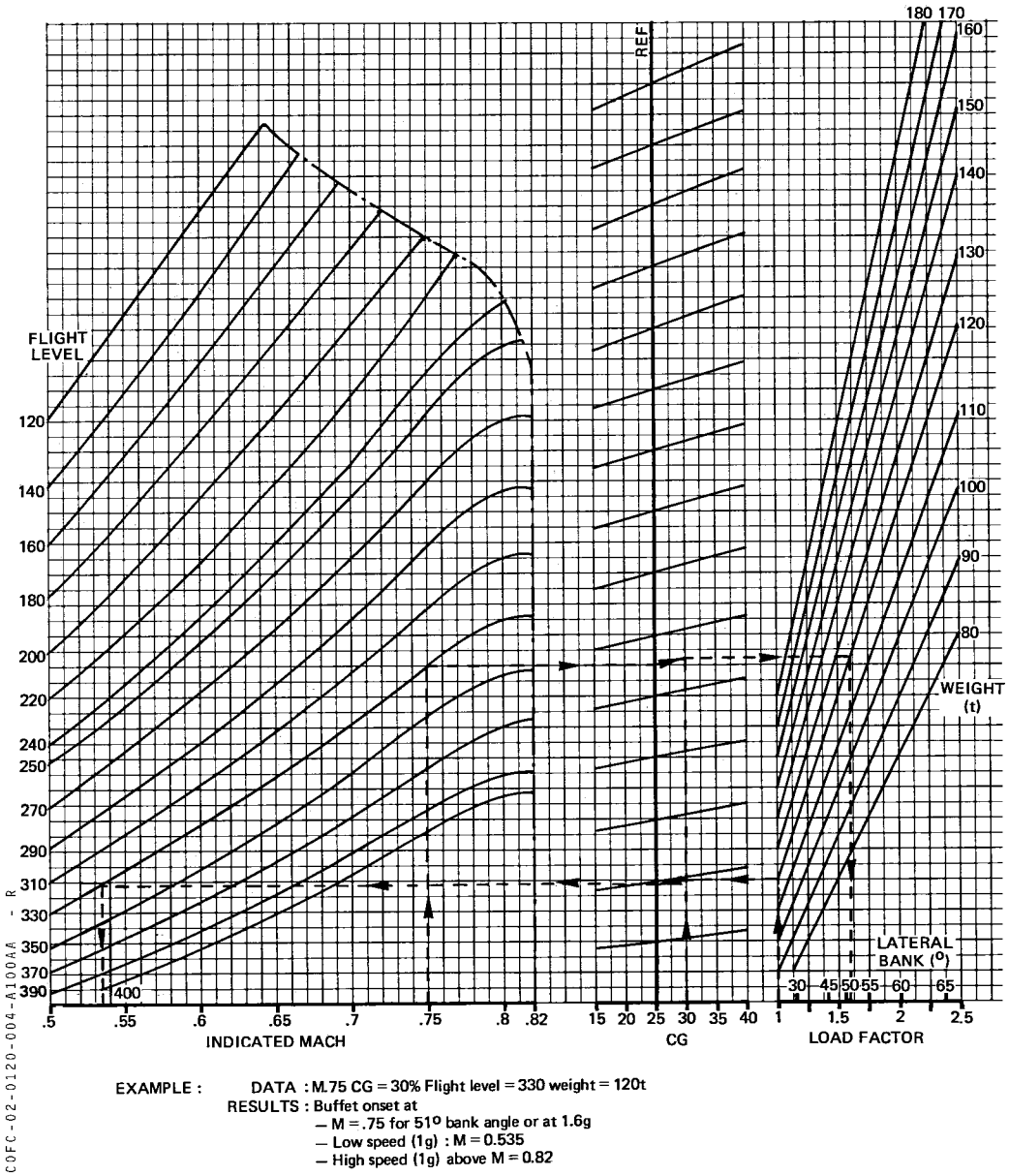
Maximum speed . . . . . 225 kt

Std or Mod : 11392

ALL

4. BUFFET ONSET

BUFFET ONSET
clean configuration

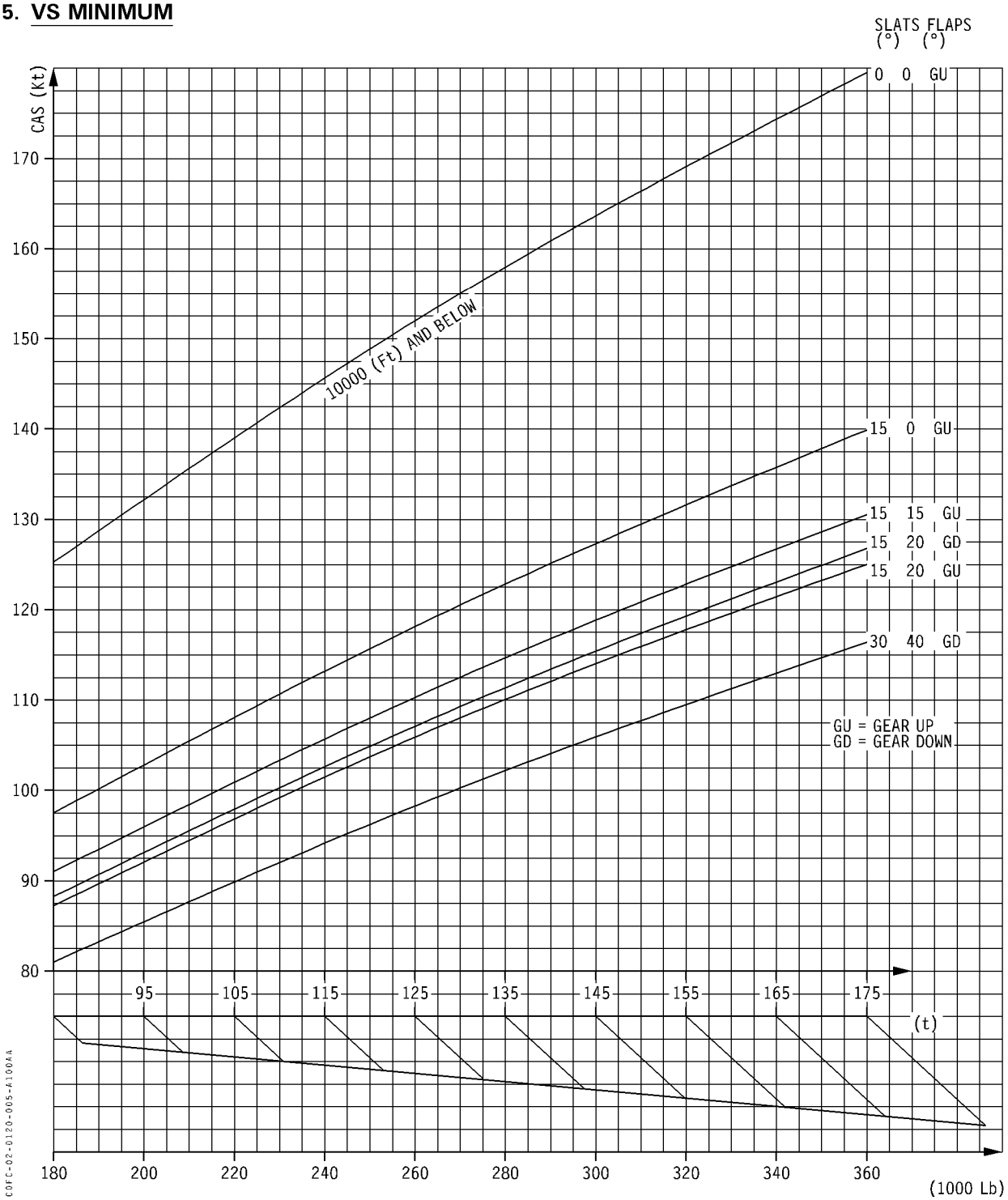


EXAMPLE : DATA : M.75 CG = 30% Flight level = 330 weight = 120t
RESULTS : Buffet onset at
— M = .75 for 51° bank angle or at 1.6g
— Low speed (1g) : M = 0.535
— High speed (1g) above M = 0.82

Mod : 5527

ALL

5. VS MINIMUM



Note : In clean configuration, the stall speed at a given weight is increased by 1.2 kt/1000 ft above 10,000 ft.

Mod : 5527

ALL

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AUTOPILOT :

R – Minimum altitude for use of the autopilot in a cruise configuration : 1000 ft.
R – Minimum altitude for use of VERTICAL SPEED mode in approach : 160 ft.

AUTOTHROTTLE

R TAKE OFF :
R In case ENGINE TRIM is inoperative, use ATS with no mode engaged.

Note : the take off must follow this procedure :
1 – ATS is armed to keep the benefit of the THR L mode (α-floor).
2 – Action on GO LEVERS engages A/THR in THR mode.
3 – Disconnect immediately the A/THR by pressing either instinctive disconnect pushbutton switch.
4 – Check that MAN THR illuminates amber on PFDs.

AUTOLAND

R AIRPLANE CONFIGURATION
R Center of gravity limitation :
R FWD 18%, AFT 36% if landing weight greater than 130 T.
R FWD 15%, AFT 36% if landing weight lower than 130 T.
R Certified configuration : slats 30°/flaps 40°.

The approach speed (Vapp) is Vref + 5 kt + CDU WIND CORR.

ALTITUDE EFFECT :

The altitude effect on Autoland above 2 500 ft has not been evaluated.
Therefore, for autoland operation above 2 500 ft elevation, it is recommended that each operator assesses the autoland capability in good visibility conditions for each runway prior to performing CAT 2 or CAT III operation.
This should be done in the frame of each operator operational approval and does not preclude complying with other applicable local operational regulations.

AUTOLAND ON A CAT 1 ILS BEAM :

Automatic landing system performance has been demonstrated on CAT 2 and CAT 3 ILS runways. However automatic landing in CAT 1 or better weather conditions is possible on CAT 1 ground installations or when ILS critical areas are not protected provided the following precautions are taken :

– the airline has checked that the ILS beam quality and the effect of the terrain profile before the runway has no adverse effect on A.P. guidance. In particular the effect of terrain discontinuities within 300 m before runway threshold must be assessed.
– the crew is aware that LOC or GS beams fluctuations independent of the aircraft system may occur and the PF is prepared to immediately disconnect the AP and to take the appropriate action, should unsatisfactory guidance occur.
– at least CAT 2 capability is displayed on FMA and CAT 2/3 procedures are used.
– visual references are obtained at a DA/DH appropriate for the CAT 1 approach being flown or a go-around is performed.

CATEGORY II APPROACH AND AUTOMATIC LANDING

Minimum decision height : 100 ft. R
1 AP in CMD at least. R
Certified capability : CAT 2, CAT 3. R

CATEGORY III APPROACH AND AUTOMATIC LANDING WITH DECISION HEIGHT

Minimum decision height : 15 ft. R
2 AP in CMD and 1 autothrottle at least. R
Certified capability : CAT 3. R

CATEGORY III APPROACH AND AUTOMATIC LANDING WITH NO DECISION HEIGHT

2 AP in CMD and 1 autothrottle at least. R
Certified capability : CAT 3. R
Minimum runway visual range : 75 m (250 ft). R
Minimum height demonstrated for approach interruption : R
15 ft. R

Mod : 5686 = (5143 + 5686)

ALL

MAXIMUM WIND CONDITIONS FOR AUTOMATIC LANDING AND ROLL OUT

R – DEMONSTRATED WIND CONDITIONS :
R Head wind . . . . . 30 kt
R Cross wind . . . . . 20 kt
R Tail wind . . . . . 10 kt
R – Performance of ROLL OUT mode has been
R demonstrated on dry and wet runway.
R – Performance of ROLL OUT mode on snow
R covered or icy runway has not been demonstrated.

FMS

The FMS can be used in the RADIO mode for advisory purpose only.

NAV + PROF modes may be used for non precision approaches only. PROF mode use in approach below 1000 ft AGL is not allowed. Respect of obstacle clearance and constraints remain normal crew responsability.

An approach procedure cannot be conducted if the associated navaids are unserviceable.

Mod : 5686 = (5686/US) = (5686/PW4000/US)

ALL

1 – AIR CONDITIONING AND PRESSURIZATION

A – AIR CONDITIONING WITH LP GROUND UNIT

When aircraft is supplied by external LP air, air conditioning supply from the packs should not be used simultaneously.

B – RAM AIR INLET

OPEN ONLY IF DIFFERENTIAL PRESSURE IS LOWER THAN 1 PSI.

C – MAXIMUM CABIN DIFFERENTIAL PRESSURE

– Positive differential pressure limitation . 8.40 PSI

– MAXIMUM NEGATIVE DIFFERENTIAL PRESSURE . . . . . MINUS 1 PSI
– SAFETY RELIEF MAXIMUM DIFFERENTIAL PRESSURE . . . . . 8.85 PSI

– Maximum cabin differential pressure for landing . . . . . 1 PSI
– Cabin signs « ON » . . . . . 11,300 ± 500 ft
– Passengers oxygen mask drop . . . . . 14,000 { + 0 ft / – 500 ft

D – WARNINGS

– Maximum cabin altitude (CAB ALT) . . . . . 9,550 ± 350 ft

2 – APU

A – STARTING

- In flight APU starting is allowed up to :
  – 40,000 ft within the whole flight envelope when electric supply is by engine generator(s).
  – 20,000 ft when electric supply is by batteries only.
- Minimum oil quantity indication before start . . . . . above 1/4
- Minimum oil quantity indication when APU operates at 100 % N (stabilized condition) . . . . . MIN
- Minimum cooling intervals between start cycles . 1 min

Note : 1 – These minimum oil indication requirements allow a normal APU operation for a further 60 hours.

2 – On ground :
After 3 start attempts separated by 1 min cool down a 60 min cooling period must be allowed for.

3 – In flight :
Within any one hour period
– 3 start attempts are permitted below 37,000 ft
– 5 start attempts are permitted above 37,000 ft
Best starting capability is ensured up to 37,000 ft.

4 – Use of JET B may impair APU capability to perform high altitude air start.

B – OPERATIONS

R

– AIR BLEED EXTRACTION :

Allowed for either :
– 2 air cond packs up to 20,000 ft.
– 1 air cond pack + wing anti ice up to 15 000 ft.
– engine start up to 20,000 ft.

– ELEC POWER EXTRACTION :

- At or below 35,000 ft . . . . . 1 (90 kVA)
- Above 35,000 ft up to 40,000 ft :
  ISA and below . . . . . 1 (90 kVA)
  ISA + 20 . . . . . 0.83 (75 kVA)
  ISA + 35 . . . . . 0.44 (40 kVA)

C – ROTOR SPEED

Maximum N . . . . . 109 %

D – EGT

Maximum EGT . . . . . 585° C

3 – COMMUNICATIONS

No limitations.

4 – ELECTRICAL

A – AC POWER

NOMINAL LOAD PER GENERATOR :
(CONTINUOUS) . . . . . 1 (90 KVA)

B – DC POWER

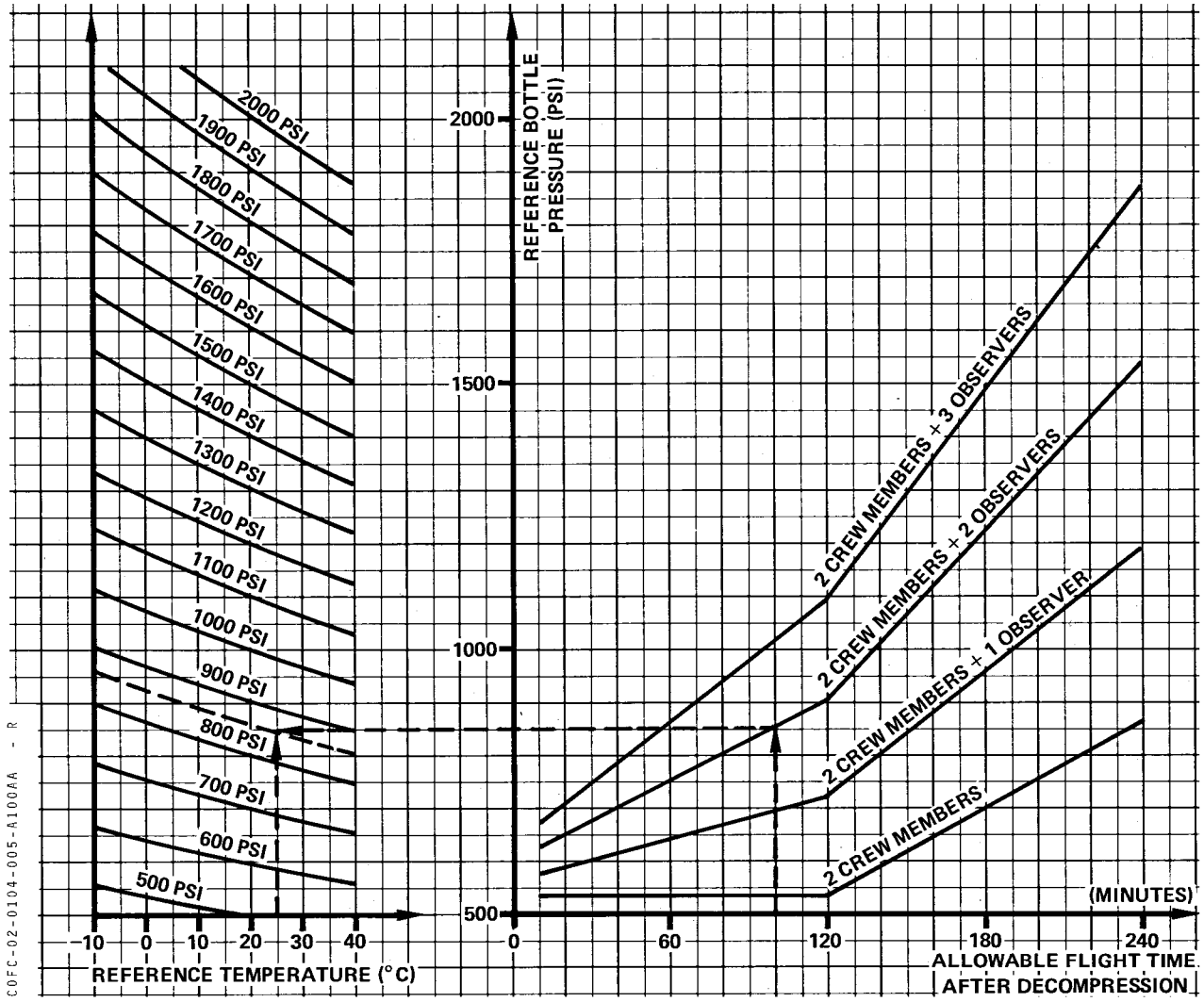
NOMINAL LOAD PER T.R.
(CONTINUOUS) . . . . . 150 AMP

Code : 0148

ALL

5 – EMERGENCY EQUIPMENTS

MINIMUM FLIGHT CREW OXYGEN PRESSURE.



Reference temperature (°C) :

= $\frac{\text{OAT + Cabin temp}}{2}$ (on ground)

= Cabin temp – 10°C (in flight)

Minimum bottle pressure required to provide :

. Crew protection after loss of cabin pressure (100 % 0_2 during emergency descent + diluted 0_2 during cruise at FL between 100 and 150)

Provision is made to cover :

. unusable quantity
. normal system leakage
. reference temp. errors
. pre-flight checks
. usage of 0_2 when only 1 pilot is in cockpit.

Mod : 2965

Minimum required oxygen for dispatch depends on the local Airworthiness Authorities.

For example, JAR OPS requires that there must be enough oxygen do supply each cockpit crew member for :

– the entire flight time when the cabin altitude exceeds 13,000 ft

and

– the flight time less the first 30 minutes when cabin altitude is between 10,000 ft and 30,000 ft

and

– not less than 2 hours

ALL

6 – FUEL

A – FUEL AND FUEL ADDITIVES (ENGINES AND APU)

Refer to : – GE specification D50TF2
– Flight Manual chapter 2.04

B – USABLE FUEL TANK CAPACITY

TANK	LITER	US GAL
OUTER TKS	9,260	2,450
INNER TKS	35,140	9,280
CTR TK	17,600	4,650
TRIM TK	6,150	1,625
Total	68,150	18,005

C – FUEL QUANTITY INDICATIONS

Tank fuel remaining when the respective quantity indicator reads zero, cannot be safely used in flight.

D – FUEL LOADING

Maximum refueling pressure . . . 50 psi (3.5 bar)
Maximum defueling pressure . . 11 psi (0.75 bar)

Maximum allowed unbalance fuel :

. 2000 kg (4410 lb) in "inner" at takeoff
. 4000 kg (8820 lb) in "inner" at landing
. 900 kg (1980 lb) in "outer" at landing

Dispatch with fuel in CTR TK and wing tanks not full is allowed provided the sum of ZFW plus fuel in CTR TK does not exceed MAX ZFW (fuel in CTR TK usable).

E – FUEL TEMPERATURE IN TANKS

- Do not take-off if the SAT is lower than the actual fuel freezing point + 3°C or – 46°C, whichever is the higher.
- Do not fly with a TAT lower than the :
  – Actual fuel freezing point + 2°C or - 47°C, whichever is the higher when fuel is fed from INR or CTR tanks.
  – Actual fuel freezing point + 5°C or - 44°C, whichever is the higher when fuel is fed from OUTR tanks.

- If the actual fuel freezing point of the fuel being used for the flight is unknown the minimum fuel specification values provided hereafter must be used :

JET A	JP 5	JET A1	JP 8	JET B	RT	JP 4	TS-1
– 40°C	– 46°C	– 47°C	– 47°C	– 50°C	– 55°C	– 58°C	– 60°C

F – FUEL MANAGEMENT

– Operations with outer tank empty are not allowed.

G – TAKE-OFF RESTRICTIONS

1 – Take off on center tank is prohibited.
2 – Take off with inner tanks and center tank empty is prohibited when the fuel quantity in each outer tank is below 900 Kg (1984 lb).

H – LANDING RESTRICTIONS

– Except under abnormal conditions, landing with more than 2 000 kg (4 400 lb) in trim tank is not allowed.

Mod : 4801

GE Eng. : All

ALL

7 – HYDRAULICS

A – APPROVED FLUIDS

Approved hydraulic fluids are according to specification NSA 307110 :

TYPE IV
HYJET IV and IV-A
SKYDROL 500 B4
SKYDROL LD4

Note : The intermixing of these fluids is permitted.

B – PWR TRANSF operation in flight

PWR TRANSF operation is possible if green system is powered by 2 engine driven pumps or by 1 engine driven pump and the electric pumps.

C – SYSTEM PRESSURE

Normal pressure range : 2800 to 3300 psi

Note : When PTU is in use, 3500 psi may be reached.

R **D – RAT**

R RAT maximum operating speed : 320 kt

8 – ICE AND RAIN PROTECTION

A – ANTI-ICE

It is recommended that prolonged flight in icing conditions with slats extended should be avoided.

B – RAIN REPELLENT

Approved rain repellent is Type 3 repellent RAIN BOE. Rain repellent must be applied only on wet windshields.

Note : Windshield wipers must not be used if rain repellent has been applied to a dry windshied.

Mod : 5670

9 – LANDING GEAR

A – LANDING GEAR

Towbarless operations on nose landing gear (towing and pushback) are allowed using towbarless towing vehicles that are specifically accepted for Airbus aircraft and are listed in Airbus SIL 09-002.

B – BRAKES

Maximum brake temperature allowed for takeoff (with brake fans off - if installed) . . . . . 300°C.

10 – NAVIGATION

Operation above latitudes of 72° 30′ N and beyond 60° S is not permitted.

11 – POWER PLANT

A – THRUST SETTING/EGT LIMITS

CONDITION	TIME LIMITATION	EGT (° C) LIMITATION	NOTE
MAX TAKE OFF and MAX GO-AROUND	5 min	960	
	10 min	960	Only in case of engine failure
MAX CONTINUOUS	Unlimited	925	
MAX CLIMB	Unlimited	890	
MAX CRUISE*	Unlimited	835	
STARTING	40 seconds	750-820	Must be recorded. Repetitive starts are cause for maintenance actions.
		820-870	Must be recorded. Maintenance action is required before the next start. (Intended flight may be completed).
STARTING	Unlimited	750	

* Operating restriction, not a certified limit.

B – RPM

- MAXIMUM N1 . . . . . 117.5 %
- MAXIMUM N2 . . . . . 112.5 %

C – OIL TYPE

Refer to GE specification D50TF2

CAUTION

The intermixing of different types or brands of lubricating oil or preservative oils must be avoided. In the event of inadvertend mixing of these oils occurs, the entire engine oil system must be drained, flushed and reserviced with the correct oil without delay in accordance with the Maintenance Manual.

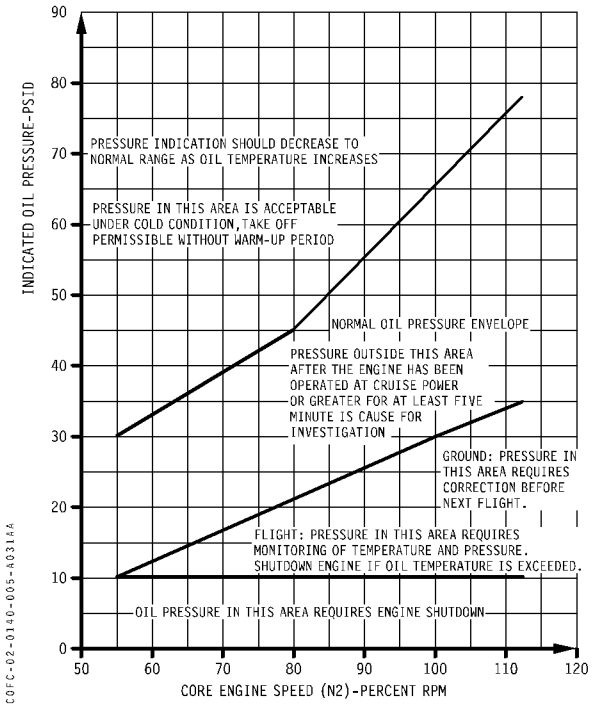
Note : For possible use other brands of oils, refer to :

GE SERVICE BULLETIN 79.1 AS REVISED

D – OIL TEMPERATURE

- MAXIMUM TRANSIENT (15 min) . . . 175° C
- MAXIMUM CONTINUOUS . . . . . 160° C

E – OIL PRESSURE



F – STARTER

- Starter duty cycle :
  - Max continuous . . . . . 5 min
  - Cool starter for 30 s per min of operation.
  - Cool starter for 10 min after two consecutive 5 min cycles and prior to each additional 5 min cycle.
- Starter reengagement :
  - Maximum N2 . . . . . 30 %

G – REVERSE THRUST

THE SELECTION OF THE THRUST REVERSERS IN FLIGHT OR THEIR PRESELECTION BEFORE TOUCHDOWN IS PROHIBITED.

BACKING THE AIRCRAFT WITH USE OF REVERSE THRUST IS NOT PERMITTED.

- Max reverse thrust should not be used below 80 kt.
  - If reverse unlocked or reverse stowed is selected do not reselect the opposite position before light indication shows end of transit.

GE Eng. : 80C2

ALL