Limitations

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Observance of the limitations contained within the Limitations section of the Airplane Flight Manual is mandatory.

Structural Weight Limitation

S/Ns 5001 to 5134 without SB 601-0280 or 601-0360

Maximum Taxi and Ramp . . . . . 43,250 LBS (19,618 KG)

Maximum Takeoff (MTOW) . . . . . 43,100 LBS (19,550 KG)

Maximum Landing (MLW) . . . . . 36,000 LBS (16,329 KG)

Maximum Zero Fuel (ZFW) . . . . . 29,500 LBS (13,381 KG)

Minimum Flight . . . . . 25,000 LBS (11,340 KG)

S/Ns 5001 to 5134 with SB 601-0280

Maximum Taxi and Ramp . . . . . 44,750 LBS (20,229 KG)

Maximum Takeoff (MTOW) . . . . . 44,600 LBS (20,230 KG)

Maximum Landing (MLW) . . . . . 36,000 LBS (14,061 KG)

Maximum Zero Fuel (ZFW) . . . . . 31,000 LBS (14,061 KG)

Minimum Flight . . . . . 25,000 LBS (11,340 KG)

NOTE: SB 601-0280 modifies Challengers pre-S/N 5135 to increase MOTOW to 44,600 lbs (as well as ramp weight 44,750 lbs).

S/N 5135 and subsequent; S/Ns 5001 to 5134 with SB 601-0360

Maximum Taxi and Ramp . . . . . 45,250 LBS (20,525 KG)

Maximum Takeoff (MTOW) . . . . . 45,100 LBS (20,457 KG)

Maximum Landing (MLW) . . . . . 36,000 LBS (14,061 KG)

Maximum Zero Fuel (ZFW) . . . . . 31,000 LBS (14,061 KG)

Minimum Flight . . . . . 25,000 LBS (11,340 KG)

NOTE: SB 601-0360 modifies Challengers pre-S/N 5135 to increase MOTOW to 45,100 lbs (as well as ramp weight 45,250 lbs).

NOTE: The maximum takeoff weight (MTOW) and/or maximum landing weight (MLW) may be further limited due to:

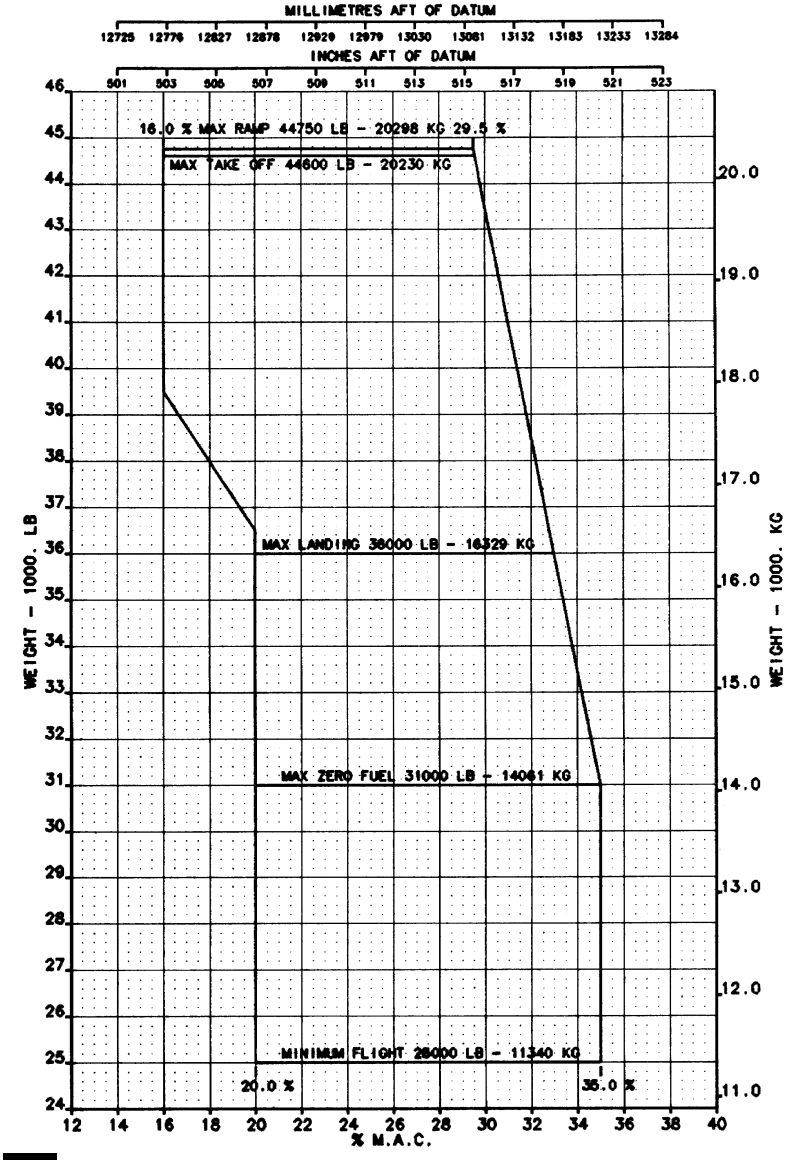
- reduced tire pressure (AFM Supplement 11)
- brake kinetic energy
- tire limit speeds (AFM Supplement 11) and/or
- performance considerations (runway and/or climb obstacle)

Center of Gravity Limits

- The maximum permissible center of gravity (CG) range with landing gear extended is shown in **Figures 3-1 through 3-4** on the following pages. The effect of landing gear retraction on CG position is negligible.
- **Figures 3-2 and 3-4** are for **aircraft incorporating SB 601-360, Modification – Increased MTOW to 45,100 TOGW**.
- **Figures 3-3 and 3-4** apply to aircraft operations with fuel IN the tail cone tank and are taken from AFM Supplement 12, pertaining to **aircraft S/Ns 5135 and subsequent; and prior A/C with SB 601-0262** – Tail Tank Installation.
- The aircraft must be loaded IAW the loading instructions associated with the Weight and Balance Report as identified with specific A/C serial number (RAW-601A-####) and the Weight and Balance Manual.

Center of Gravity Limits

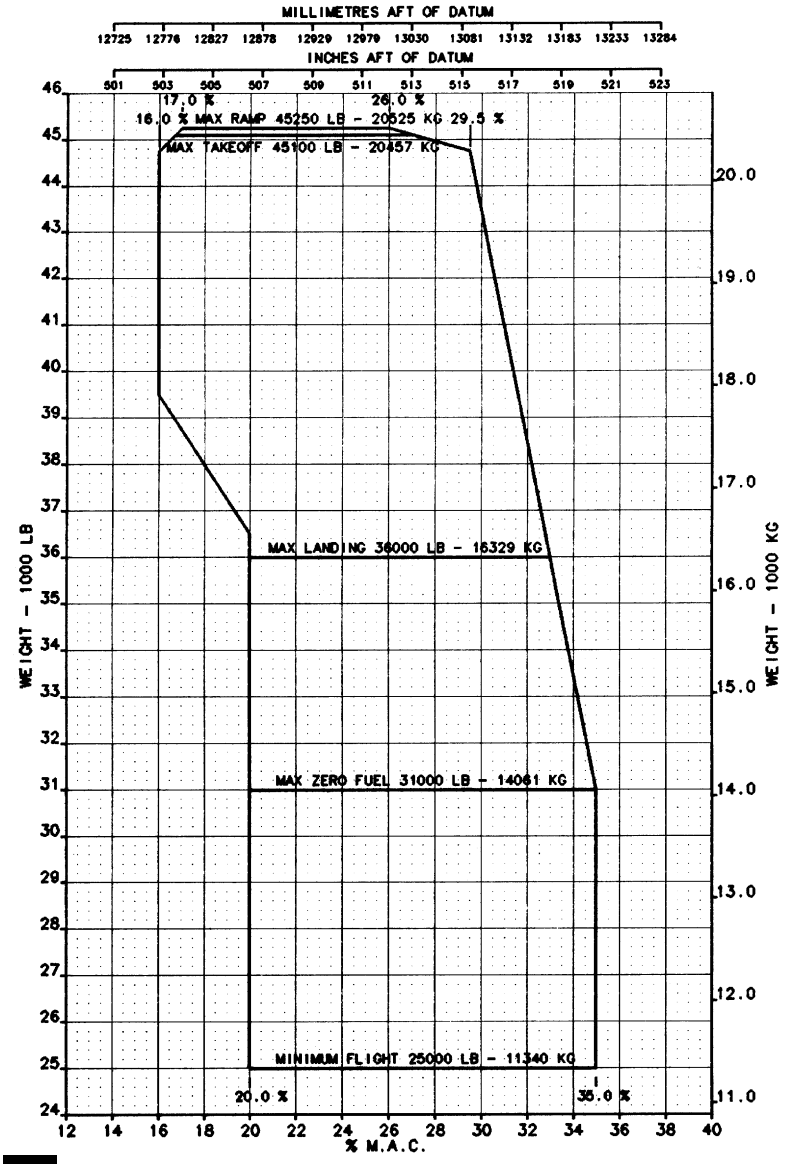
CL-601-1A/3A – 44,600 lbs MTOW
(A/C with SB601-0280 – Gross Weight Increase)



3-1

Center of Gravity Limits

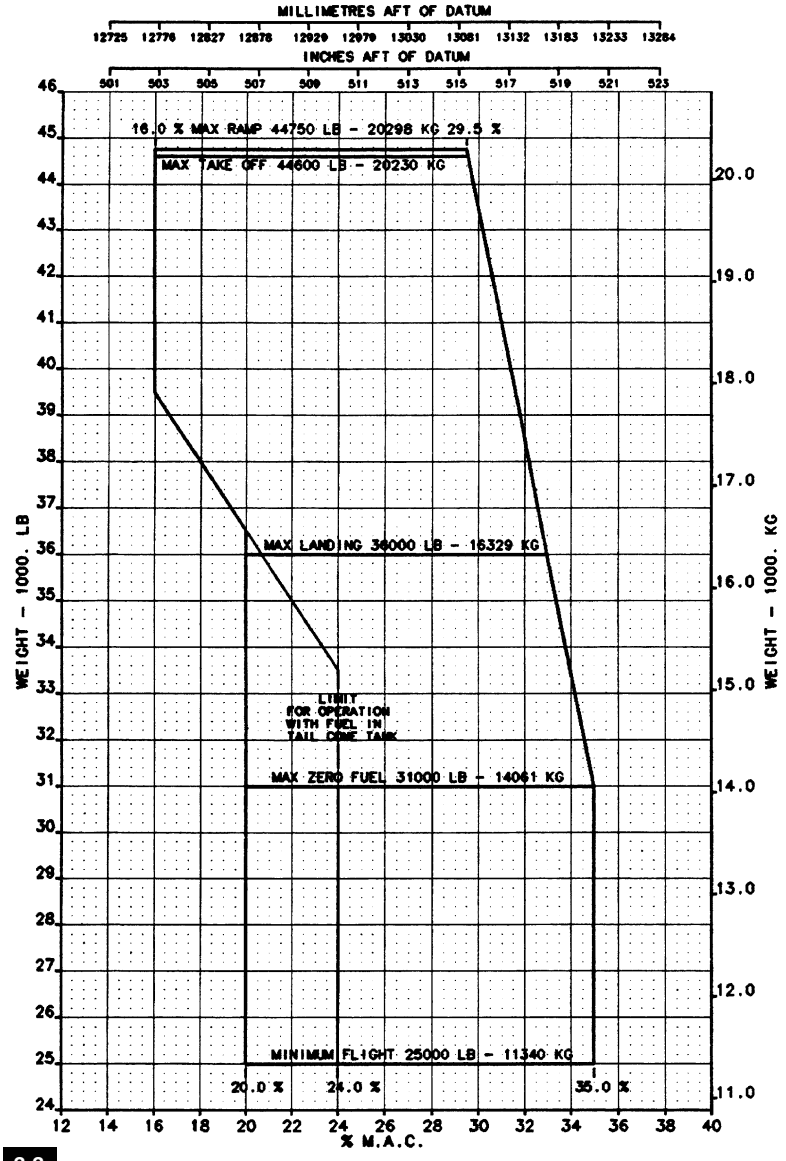
CL-601-1A/-3A – 45,100 lbs MTOW
(A/C with SB601-0360 – Gross Weight Increase)



3-2

Center of Gravity Limits

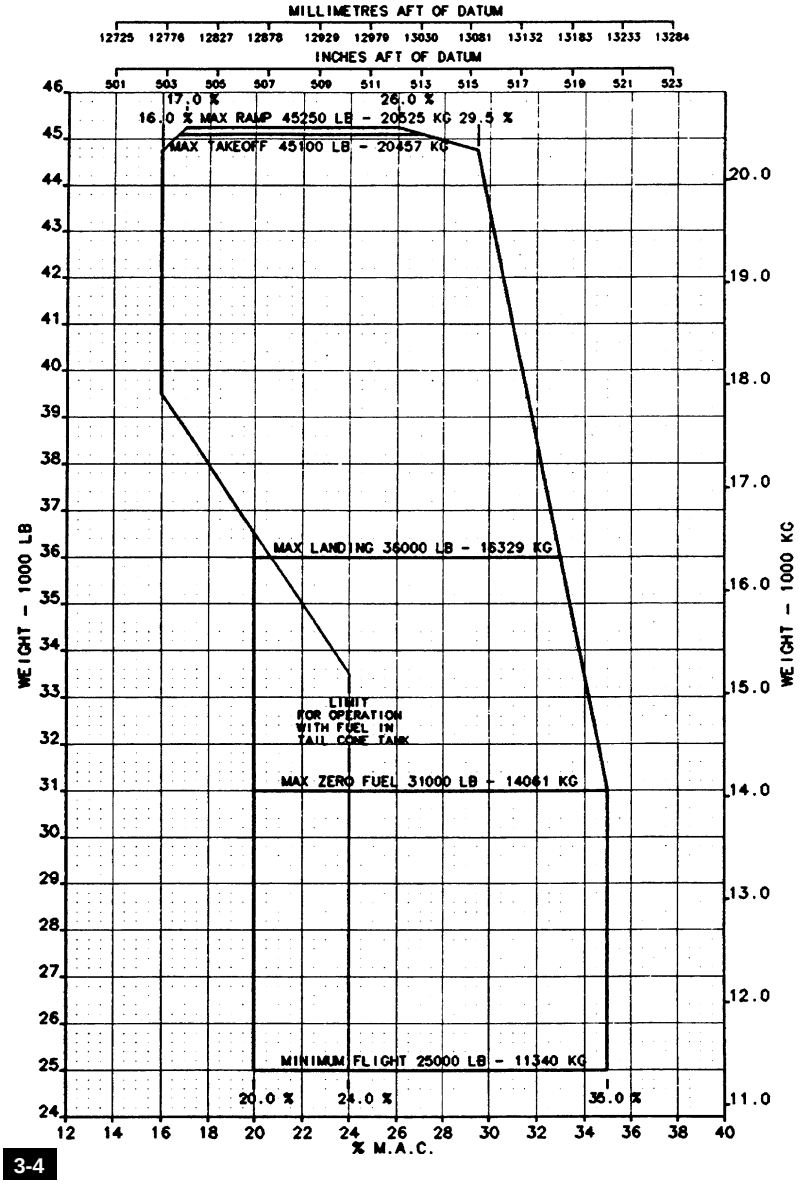
Tail Tank – 44,600 lbs MTOW
(A/C prior to SN 5135 with SB601-0262 – Tail Tank Addition)



3-3

Center of Gravity Limits

Tail Tank – 45,100 lbs MTOW
(S/N 5135 and subsequent and A/C with SB601-0360 – Gross Weight Increase; and A/C prior to SN 5135 with SB601-0262 – Tail Tank Addition)



3-4

Operating Limitations

Types of Operation

This airplane is certificated in the transport category and is eligible for the following kinds of operations when the appropriate instruments and equipment required by the airworthiness and/or operating certificate are installed and approved and are in operable condition.

- Day and night, VFR, IFR, and Icing Conditions.
- Reduced Vertical separation Minimums (RVSM), Basic RNAV, RNP-5 and RNP-10 — Minimum Navigation Performance Specifications (MNPS).
  - On A/C incorporating SB 601-0491 — Reduced Vertical Separation Minimum (RVSM) — 1,000 ft. Aircraft Qualification Requirements:

    This A/C is certified capable of RVSM operations IAW FAA “Interim guidance material on the approval of operations/aircraft for RVSM operations”, 91-RVSM, dated March 14, 1994.

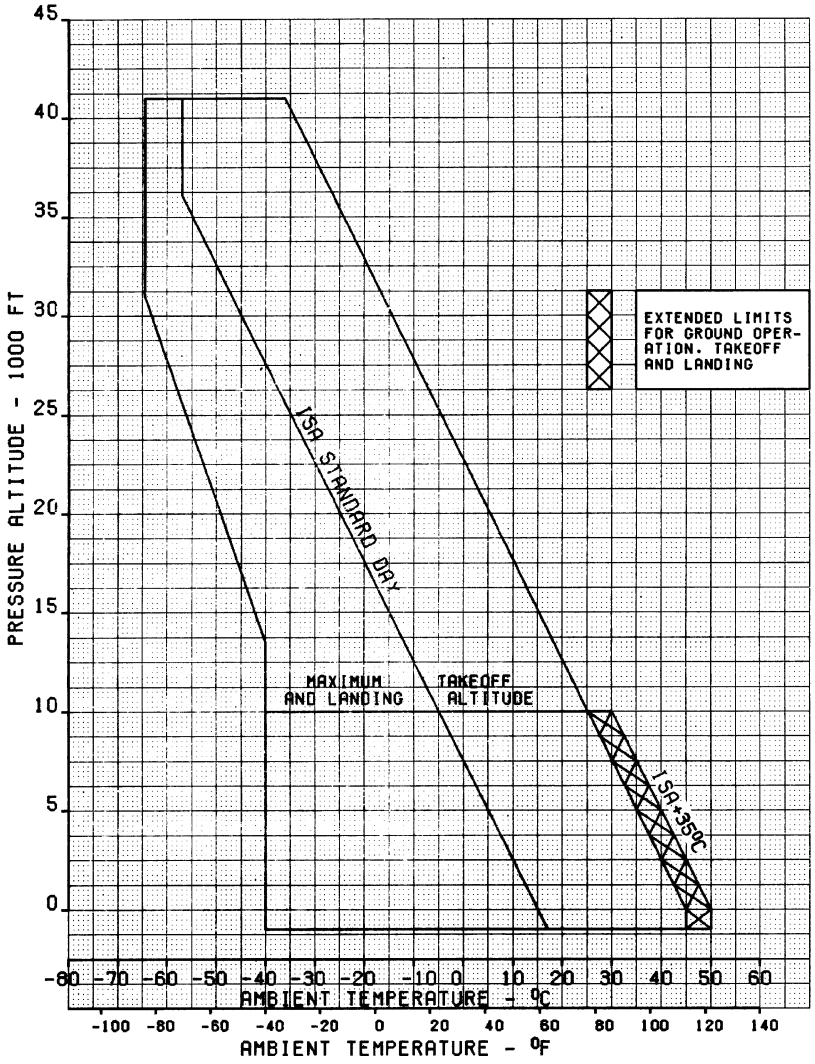
NOTE: Compliance with the standard noted above does not constitute RVSM operational approval.

On A/C SN 5120 and subsequent and airplanes with SB 601-0397, Modification – Navigation Computers – Introduction of NZ-9102/NZ9112 Software:

- The FMS installation meets the requirements of RNP-5 operations in accordance with JAA Temporary Guidance Leaflet No. 2 dated May 14, 1997: AMJ 20x2, JAA Guidance Material on Airworthiness Approval and Operational Criteria for Use of Navigation Systems in European Airspace Designated for Basic RNAV Operations.

NOTE: Demonstration of performance in accordance with provisions of AMJ 20X2 does not constitute approval to conduct RNP-5 operations.

Altitude and Temperature Operating Limits



3-5

- The FMS installation with the IRS has met the requirements of RNP-10 operations in accordance with FAA Order 8400.12A “Required Navigation Performance 10 (RNP-10) Operational Approval” Rev. A dated JAN 2, 1998; based on compliance with MNPS requirements and FAR 121 appendix G, IRS systems.

NOTE: Demonstration of performance in accordance with provisions of FAA order 8400.12A does not constitute approval to conduct RNP-10 operations.

Altitude and Temperature Operating Limits

- Maximum airport pressure altitude for takeoff and landing is 10,000 ft. Maximum operating altitude is 41,000 ft.
- Maximum air temperature approved for takeoff and landing is ISA +35°C.
- Minimum air temperature approved for takeoff is -40°C (-40°F).
- When the ambient temperature is less than -30°C (-22°F) or below, the engines must be motored for 60 seconds and the fan must rotate before engine start is initiated (**Figure 3-5**).
  - See additional limitations for Air Data and AFCS systems later in this chapter:

NOTE: OAT -30°C or below, see limits for Starter-Duty Cycle later in this chapter.

Runway Surface

- Both igniters on both engines must be on continuously for takeoff and landing on runway surfaces covered with standing water, slush, or snow or in icing conditions.

NOTE: CAE SimuFlite recommends In Flight Start switchlights (both) be selected on. (A “Relight” switch is available on early serial numbers).

Runway Slopes

- The maximum runway slopes approved for takeoff and landing are +2% (uphill) and -2% (downhill).

Tailwind Conditions

- The maximum tailwind component approved for takeoff and landing is 10 kts.

Minimum Flight Crew

- The minimum flight crew is one pilot and one copilot.

Maximum Occupants

- The total number of occupants, including no more than 19 passengers, must not exceed the lesser of the following:
  - 22 or,
  - The number for which seating accommodation approved for takeoff and landing is provided.

Operating in Icing Conditions

During cold weather operations, the flight crew must ensure that the airplane fuselage, wings and tail surfaces are free from ice, snow or frost.

COWL Anti-Ice System GROUND operations

The engine COWL A/I system must be on when the OAT is 10°C (50°F) or below and visible moisture in any form is present (such as fog with visibility of one mile or less, rain, snow, sleet and ice crystals).

The engine COWL A/I system must also be on when the OAT is 10°C (50°F) or below when operating on runways, ramps, or taxiways where surface snow, ice, standing water or slush is present.

WING Anti-ice system GROUND operations

The weather and surface conditions requiring WING A/I on the ground are the same as for COWL except that the OAT is 5°C (41°F) or below.

When Type II or IV anti-icing fluids have been applied, the WING A/I system must only be selected on, if required, as power is advanced for takeoff.

The definition of icing in flight is the same as noted.

NOTE: In flight, both COWL & WING A/I systems have the same criteria requiring use. However, on the ground, WING A/I is not required on unless OAT is 5°C or below.

FLIGHT operations:

The engine COWL and the WING anti-ice must be on at or above 22,000 feet when:

- ice is indicated by the ice detection system; or
- in icing conditions, if an ice detector has failed.

Below 22,000 feet when:

- ice is indicated by the ice detection system; or
- in icing conditions

NOTE: Icing conditions exist in flight at a TAT of 10°C (50°F) or below and visible moisture in any form is encountered (such as clouds, rain, snow, sleet or ice crystals), except when the SAT is -40°C (-40°F) or below.

Super-cooled Large Droplet Icing

Continued operation in areas where super-cooled large droplet (SLD) icing conditions exist is prohibited.

SLD icing conditions are indicated by ice accretion on the flight compartment side windows.

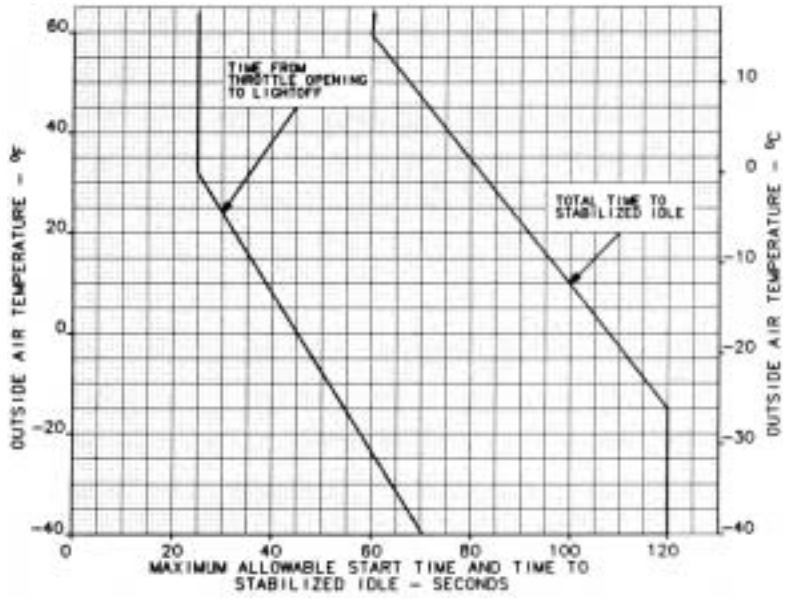
- The wing and cowl anti-icing systems must be ON in SLD icing conditions.
- Leave icing conditions when side window icing occurs.

Powerplant Limitations

Engines

- Two General Electric CF34-3A
- Two General Electric CF34-3A1 (S/Ns 5135 and subsequent)
- Two General Electric CF34-3A2
  - Mixing of CF34-3A and 3A2 engines is permitted.

Start Time vs Ambient Temperature



Engine Operating Limits

Condition	N_1% RPM	N_2% RPM	ITT°C -3A/-3A2	ITT°C -3A1	Time Limit for ITT
Max Takeoff (APR Operating)	98.6[1]	99.4[1]	871 900	899 928	5 Min 2 Min
Normal Takeoff	96.2[1]	98.3[1]	856 878	884 900	5 Min 2 Min
Max Continuous	98.6[1]	99.2[1]	860	860	—
Start/Relight	—	—	930 903	930 903	16 Sec 50 Sec
Minimum Idle Icing Conditions (Cowl Anti-Ice Only)	—	64.0	—	—	—

Table 3-A; Engine Operating Limits

[1] The N_1 and N_2 and ITT takeoff and maximum continuous limits are engine limits and are not presented for purposes of setting power. The pilot must observe the takeoff and maximum continuous power settings for the appropriate pressure altitude, ambient temperature, and bleed air extraction as presented in the AFM Performance section.

CAUTION: **On airplanes with CF34-3A or 3A2 engines:** During APR operation, a transient increase of ITT above 871°C may be observed resulting in a red ITT indication and a red OVER TEMP light on the operating engine. These indications are acceptable for a 2 minute period provided the 2 minute APR operating transient limit of 900°C is not exceeded. (AFM Abnormal Proce. page 5)

NOTE: Above 40,000 ft, one ACU or cowl anti-ice must be selected for each engine.

Automatic Performance Reserve (APR)

- If takeoff performance is predicated upon the use of APR, takeoff with the APR system armed must not be attempted until satisfactory static and dynamic APR system tests have been achieved.
- The APR system must be selected OFF for takeoff if:
  - preflight static or dynamic tests fail
  - ambient temperature is below -20°C (-4°F).
- If the APR is not required for takeoff, the system may be armed but the dynamic test need not be carried out. In this case, the appropriate APR OFF performance data MUST BE utilized:

Oil Temperature

Minimum for starting . . . . . -40°C

Maximum permissible . . . . . 163°C (15 MINUTES MAX)

Maximum for single engine climb . . . . . 155°C (60 MINUTES MAX)

Maximum continuous . . . . . 150°C

Oil Pressure

Transient cold start (**3A1**) . . . . . 115 PSI (10 MINUTES

Minimum at steady-state idle (**3A1**) . . . . . 25 PSI

Minimum at takeoff (power) (**3A1**) . . . . . 45 PSI

Maximum continuous (**3A1**) . . . . . 110 PSI

Transient cold start (**3A/3A2**) . . 100 PSI (6 MINUTES MAX)

Minimum at steady-state idle (**3A/3A2**) . . . . . 25 PSI

Minimum at takeoff (power) (**3A/3A2**) . . . . . 40 PSI

Maximum continuous (**3A/3A2**) . . . . . 95 PSI

NOTE: For transient cold starts, engine must remain at idle until oil pressure returns to normal range. The actual gauge indications are limited by the oil system pressure transmitter.

Air Turbine Starter

- The starter must not be used if indicated N_2 RPM exceeds 55%.

Starter Duty Cycle

- **Normal engine start**: 3 consecutive engine start cycles with 5 minutes cooling between additional start cycles.
- **Motoring and engine start at -30°C (-22°F) and below**: motor engines for 60 seconds and ensure fan rotation, then 2 consecutive engine start cycles with 5 minutes cooling between additional cycles.
- **Motoring with engine fuel and ignition OFF:** 90 seconds with 5 minutes cooling between additional cycles of 30 seconds.

Associated Conditions

- Air turbine starts in flight at initiation of thrust lever movement:
  - ITT must be less than 90°C.
  - N_2 must be 28% or greater.
- Air turbine starts on the ground at initiation of thrust lever movement:
  - ITT must be 120°C or less
  - N_2 must be 20% or greater.

CAUTION: During airstarts, the starter must not be used if N_2 exceeds 55%.

- Windmill starts at initiation of thrust lever movement:
  - ITT must be 120°C or less
  - Above 10,000 ft, N_2 must be 13% and stable or increasing
  - **3A1 engines**: At or below 10,000 ft, N_2 must be 10% or greater.
  - **3A/3A2 engines**: At or below 10,000 ft, N_2 must be 12% or greater.

NOTE: Windmill airstart airspeed limits:

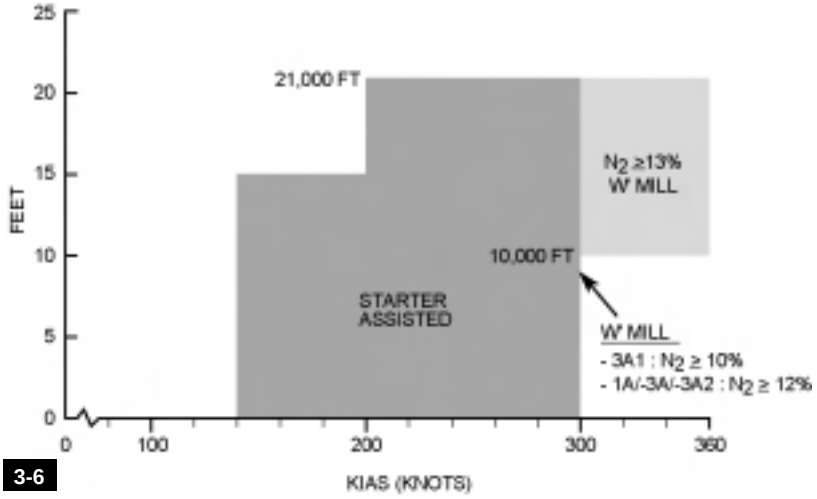
- 300 KIAS below 10,000 ft
- 300 KIAS to V_{MO} at 10,000 to 21,000 ft.

Engine Airstart

- Engine starting in flight is permitted only within the envelope defined in **Figure 3-6**.

CF34 Starting Envelope

All Engines



3-6

Fuel Temperatures

Takeoff with engine fuel temperature indications below 5°C (41°F) is prohibited. Takeoff with a bulk fuel temperature below the following limits is prohibited.

Fuel	Bulk Fuel Takeoff Limit	Bulk Fuel Freezing Point
ASTM D1655 JET A	-30°C*	-40°C
ASTM D1655 JET A-1	-37°C*	-47°C
ASTM D1655 JET B	-40°C*	-50°C
MIL-T-5624 JP-4	-48°C*	-58°C
MIL-T-5624 JP-5	-36°C*	-46°C
MIL-T-83133A JP-8	-40°C*	-50°C

* When OAT is within 5°C of takeoff limit or colder, determine bulk fuel temperature using a fuel sample from a water drain.

Table 3-B; Fuel Temperature Takeoff Limits

Fuel Grades

Fuels conforming to any of the following specifications (**Table 3-C**) are approved for use. Mixing of fuels is permitted.

Type	Canadian	American	British
Jet A	CAN2-3.23-M81	ASTM D1655	D. Eng RD2494
Jet A-1	CAN2-3.23-M81	ASTM D1655	D. Eng RD2494
JP-5	—	MIL-T-5624	D. Eng RD2452
JP-8	—	MIL-T-83133A	D. Eng RD2453
Jet B	CAN2-3.22-M80	ASTM D1655	D. Eng RD2486
JP-4	CAN2-3.22-M80	MIL-T-5624	D. Eng RD2486

Table 3-C; Approved Fuels

Fuel Additives

The following additives, used individually or in combination, are approved:

- Anti-icing additives to the latest revision of specification MIL-I-27686E or any direct equivalent at a concentration of 0.10 to 0.15% by volume.
- Anti-icing Methyl Cellosolve at concentrations of 0.10 to 0.15% by volume.
- SOHIO Biobor JF biocide additive at a concentration not in excess of 270 parts per million (20 parts per million elemental boron) to prevent the growth of micro-organisms.
- Shell ASA-3 anti-static additive at a concentration that will provide not in excess of 300 conductivity units, which is approximately equivalent to one part per million.

Oil Grades

- Refer to appropriate maintenance or servicing manual for approved oil grades.

Oil Replenishment System

- The oil replenishment system must not be operated before 15 minutes have elapsed after engine shutdown. The Challenger Time Limits/Maintenance Checks manual (PSP601A-5) states that oil replenishment should be accomplished up to 30 minutes following engine shutdown.

Auxiliary Power Unit (APU)

- Garrett GTCP-36-100E

  Maximum RPM 110%

  Maximum EGT . . . . . 732°C

- The APU must not be operated if APU generator oil leakage is evident.
- Unless it has been established that any main (engine-driven) generator with a part number 720845, 720845A, or 720845B has more than 150 operating hours, the auxiliary power unit (APU) and APU generator systems must be serviceable for dispatch.
- Minimum ambient temperature for starting a cold soaked APU on the ground is -40°C.
- The following start cycles are permitted:

  a. Aircraft batteries on the ground or for normal in flight start: three start attempts, each of 30 seconds continuous cranking, followed by a 20-minute off-time, followed by two further attempts each of 30 seconds continuous cranking.

  b. Ground power: two start attempts, each of 15 seconds continuous cranking, followed by a 20-minute off-time, followed by two further attempts, each of 15 seconds continuous cranking.

- If a successful start is not obtained in either case (a or b), a further start must not be attempted for a period of at least 35 minutes.

NOTE: Before applying bleed air load on the APU, allow APU RPM to stabilize at 100% for 2 minutes.

- The APU RDY light must be on within 60 seconds of actuating the APU start switch.

- Starting:

  Maximum EGT:

  - 974°C not to be exceeded under any operating conditions.

  Hung start:

  - Below 60% RPM – maximum 20 seconds.
  - Between 60 and 95% RPM – maximum 10 seconds.

NOTE: The AFM states that in-flight starting of the APU is guaranteed at altitudes below 15,000 feet and has been demonstrated at altitudes up to 20,000 feet.

- APU starting and operation is permitted within the following operating envelope:

  Airspeed:

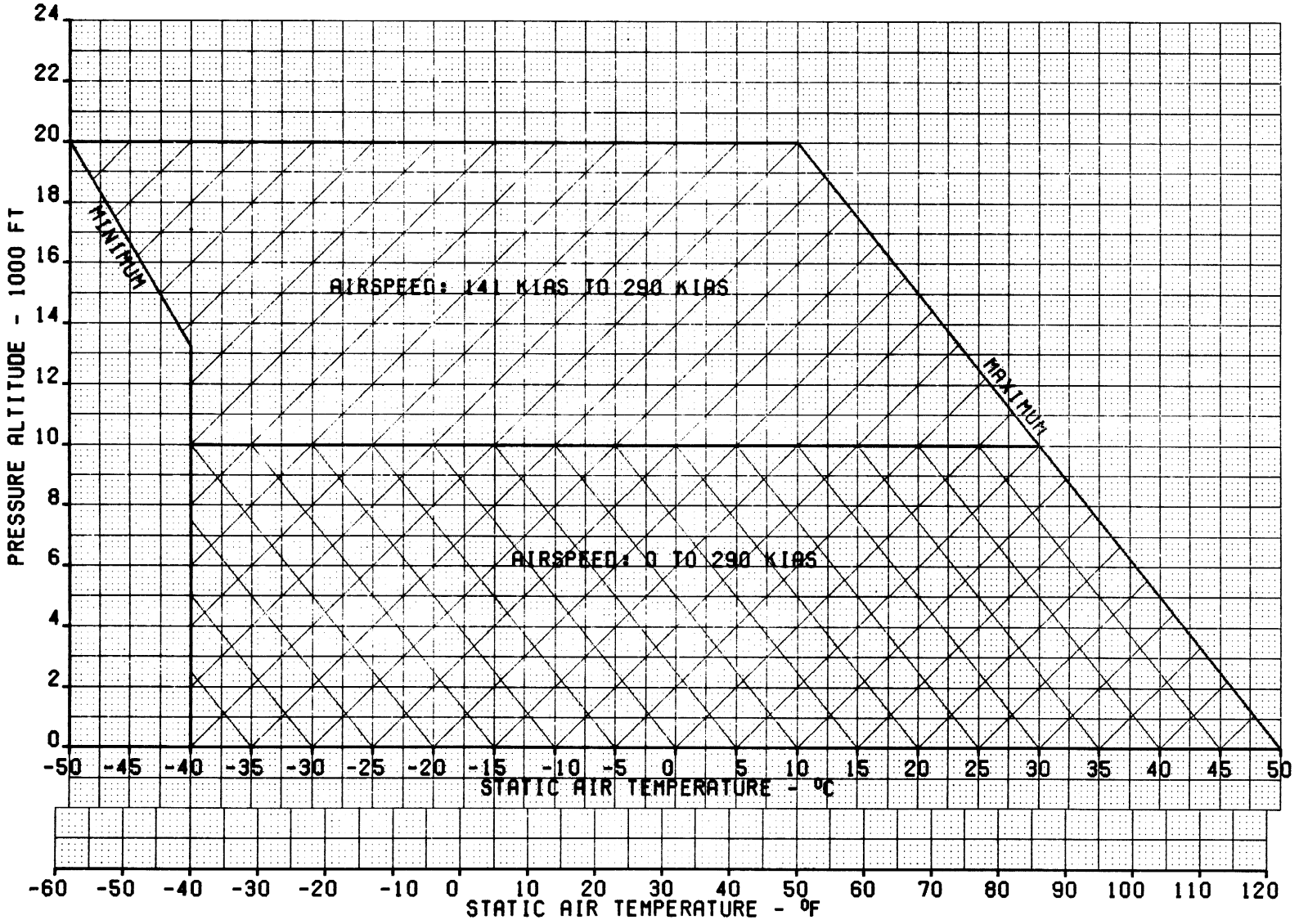
  Sea level to 10,000 ft . . . . . 0 TO 290 KIAS

  10,000 to 20,000 ft . . . . . 141 TO 290 KIAS

Refer to **Figure 3-7** (following page) for altitude and temperature limitations.

- APU bleed air extraction is not permitted above 14,500 ft pressure altitude.
- With APU supplying bleed air during takeoff and landing, the APU generator must be selected OFF.
- APU bleed air extraction is not permitted in flight whenever standby electrical power is required from the APU.
- Do not operate the APU in flight if a main engine fails and engine rotor burst damage is suspected.
- The inflight use of the APU generator is intended only if both main generators have failed. Use of the APU generator is not permitted unless both main generators are off-line.
- The maximum permissible load on the APU generator in flight is 30 kVA.

APU Operating Envelope



3-7

Operating Limit Speeds

Maximum Operating Limit Speed

- Maximum operating limit speeds must not be deliberately exceeded in any regime of flight (climb, cruise, or descent) unless a higher speed is specifically authorized for flight test or training operations (**Table 3-D**).

Altitude	Max Operating Limit Speed	
Pilot's and Copilot's Altimeter	V_{MO} (KIAS)	M_{MO} (M_I)
0 to 10,000	301	—
10,000 to 21,330	360	—
21,330 to 25,640	—	0.79
25,640 to 28,720	330	—
28,720 and Above	—	0.835

Table 3-D; Maximum Operating Speed (V_{MO}) and Mach Number (M_{MO})

Design Maneuvering Speed (V_A)

LBS KG	24,525 11,124	31,000 14,061	36,000 16,329	38,000 17,237	43,100 19,550	44,600 20,230	45,100[1] 20,457
Altitude	**Design Maneuvering Speed V_A (KIAS)**						
SL	172	193	211	217	236	241	243
10,000	174	201	224	232	256	263	265
15,000	179	209	234	243	267	275	278
20,000	186	219	245	254	278	286	290
25,000	194	229	255	265	289	297	299
30,000	203	238	264	274	294	304	304
35,000	211	245	268	276	—	—	—
40,000	218	248	—	—	—	—	—
45,000	225	—	—	—	—	—	—

Table 3-E; Design Maneuvering Speed (V_A)

[1] Maximum weight of 45,100 lbs requires **SB 601-0360**.

- Full application of rudder and aileron controls as well as maneuvers that involve angles-of-attack near stall must be confined to speeds below V_A. Values of V_A are given in **Table 3-E** for varying altitudes and heights.

CAUTION: Avoid rapid and large alternating control inputs, especially in combination with large changes in pitch, roll, or yaw (e.g. large slip angles), as they may cause structural failure at any speed, including below V_A.

RVSM Maximum Operating Speed

- Maximum cruise mach number during flight in RVSM airspace is 0.82 on airplanes incorporating Canadair Service Bulletin 601-0491, Reduced Vertical Separation Minimum (RVSM) – 1000 feet Aircraft Qualification requirements.

V_{FE} (Flaps Extended)

Flaps 20° . . . . . 232 KIAS

Flaps 30° . . . . . 198 KIAS

Flaps 45° . . . . . 190 KIAS

V_{LO} (Landing Gear Operating)

V_{LO} . . . . . .197 KIAS/0.7 M_I

V_{LE} (Landing Gear Extended)

V_{LE} . . . . . 250 KIAS/0.7 M_I

Tire Limit Speed

- 183 kts ground speed.

NOTE: Operations IAW AFM Supplement 11 – Tire Pressures less than 145 PSI will further restrict speed, operational weights, and airport operational considerations.

Maximum Airspeed for ADG Operation

- 250 KIAS is the maximum airspeed for continuous operation of the air driven generator (ADG) following automatic or manual deployment. When operationally necessary, speeds up to 330 KIAS are permitted for a period of 12 minutes reducing to a period of four minutes at V_{MO} with linear interpolation. For flight test and training deployment, the maximum airspeed is 215 KIAS.

Turbulence Penetration Speed

- 280 KIAS or 0.75 M_I, whichever is lower.

Minimum Operating Limit Speed

- Intentional speed reduction below the onset of stall warning, as defined by stick shaker operation, is prohibited unless a lower speed is specifically authorized for flight test or training operations.

Maneuvering Limit Load Factors

- These load factors limit the permissable angles of bank in turns and the severity of pull-up maneuvers.

  Flaps Up . . . . . -1.0 to +2.56 Gs

  Flaps Down . . . . . 0.0 TO +2.0 Gs

Systems Limitations

Air Conditioning and Pressurization (Structural)

- The maximum relief differential pressure is 9.20 PSI.
- During taxi, takeoff, and landing, the pressure differential must not exceed 1.0 PSI.

Air Data System

- Both air data computers must be operational for takeoff.
- The pilot and copilot must not select ALTERNATE static source simultaneously.

RVSM – Air Data Systems Required

- On airplanes incorporating Canadair Service Bulletin SB 601-0491, Reduced Vertical Separation Minimum (RVSM) – 1000 feet Aircraft Qualification Requirements:
  - The ADC source coupled to the active autopilot must be the same as that coupled to the ATC transponder during flight in RVSM airspace.
  - If alternate static source is selected, airplane must not be operated in RVSM airspace.

Automatic Flight Control System (AFCS)

- Operation of the autopilot is prohibited at altitudes below 200 ft AGL.
- On **S/Ns 5001 and 5008 and subsequent and aircraft with SB 601-0233**, Modification – Flight Guidance Computer – Elimination of Monitor Trips:
  - The autopilot is not approved for continued approach following engine failure on final approach.
  - Maximum flap angle for single engine autopilot coupled approach is 20° with V_{REF} + 10 KIAS.

- On **S/Ns 5001 and 5026 and subsequent and aircraft with SB 601-0276**, Modification – Flight Guidance Computer – Introduction of -715 Unit:
  - VOR approaches are not permitted with flaps set to 0.
- On **S/Ns 5067 and 5085 and subsequent**:
  - Use of LNAV mode is not permitted when Lasertrak is selected.

The next two bulleted items are not applicable to CAE SimuFlite Challenger simulator.

- On **S/Ns 5002 to 5007 without SB 601-0233**, Modification – Flight Guidance Computer – Elimination of Monitor Trips:
  - Coupled ILS approaches are not permitted.
- **On S/Ns 5002 to 5025 without SB 601-0276**, Modification – Flight Guidance Computer – Introduction of -715 Unit:
  - With the autopilot engaged in heading mode and VOR mode armed, overstation course changes are limited to a maximum of 60 degrees
  - during enroute VOR mode operation, pilot monitoring is required to ensure satisfactory capture and tracking
  - VOR approaches are not permitted without a valid co-located DME.

Bleed Air Systems

- The bleed air 10th stage valves must be closed for takeoff and landing with cowl and/or anti-ice systems on.

Configuration Deviation List (CDL)

- AFM (Appendix 1) is the CDL .If the aircraft is to be operated with certain secondary airframe and/or nacelle parts missing, operation must be IAW the limitations specified in the basic AFM, and as amended by the CDL

NOTE: AFM Supplement 14 – Operation with Airplane Systems Inoperative is a document similar to but separate from the CDL. Additional information is presented in this chapter under the AFM Supplements heading.

Electrical Systems

- Unless it has been established that any AC generator with a part number 720845, 720845A, or 720845B has more than 150 operating hours:
  - Prior to every flight a visual inspection of the engine cowls and drains for evidence of AC generator oil leakage must be conducted. If generator oil leakage is evident, generator must be replaced.
- Unless it has been established that the APU generator with a part number 720845, 720845A, or 720845B has more than 150 operating hours:
  - Prior to every flight a visual inspection of the APU drains for evidence of generator oil leakage must be conducted. If oil leakage is evident, APU generator must be replaced unless it has been established that AC Generators with part numbers 720845, 720845A, or 720845B are not installed, or if installed, both have more than 150 operating hours.

Permissible Loads on AC Systems

Individual AC generator loading, as indicated by the loadmeters, must not exceed the following values (**Table 3-F**):

NOTE: While not listed in the AFM LIMITATIONS section, the maximum power rating for the ADG is 15 kVA at or above 160 knots.

Altitude (ft)	Load Limitation (kVA)	
	Main Generator	APU Generator
0 - 11,000	30	30
11,000 - 20,000	30	30
20,000 - 35,000	30	—
35,000 and Above	25	—

Table 3-F; Permissible Loads on Each Generator

Permissible Loads on DC Systems

In Flight:

- Maximum permissible continuous load on TRU 1 or TRU 2 is 100A.
- Maximum permissible continuous load on ESSENTIAL (ESS) TRU 1 and ESS TRU 2 combined is 60A.
- **On aircraft incorporating S/B 601-0437**, Mod – Left Bleed Air, ACU and Temperature Control System – Transfer to DC Essential Bus:.
  - Maximum permissable continuous load on ESS TRU 1 and ESS TRU 2 combined is 75A:

NOTE: S/B 601-0437 changed the electric bus source for the L 10th BLEED AIR, ACU, and Temperature Control System to the DC ESS bus.

Ground Operation:

- Total combined loads on TRU 1 and TRU 2 must not exceed limits shown in **Figure 3-8**.
- Individual loads on TRU 1 and TRU 2 must not exceed 100A. If TRUs are inadvertently operated at limiting loads for periods longer than those shown, the nose bay doors must be opened for 10 minutes minimum prior to taxi for takeoff.

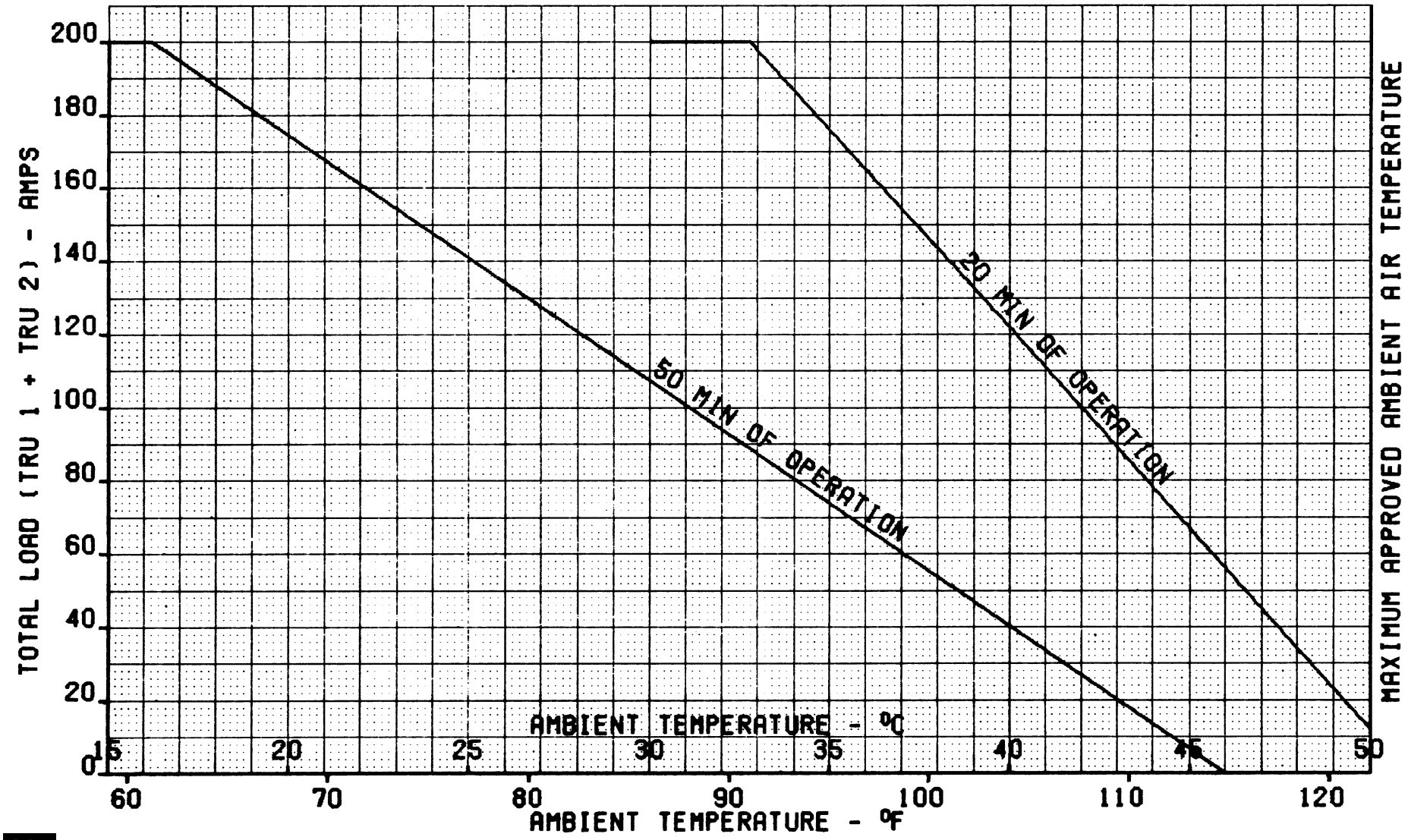
Permissible Operating Time

During ground operation at ambient temperatures above 45°C (113°F), operation of electrical/avionics equipment must be limited to 30 minutes unless at least one environmental control system is operating and cabin doors closed.

NOTE: Closing the cabin curtain does not alleviate the need to close the cabin doors.

Maximum Permissible Loads on DC Electrical System – Ground Operation

S/Ns 5001 and Subsequent, also S/Ns 3040 to 3066, and Prior A/C With SB 601-0107



3-8

Electronic Flight Instruments System (EFIS)

- The pilot and copilot EFIS CRT fans must be operational for takeoff (i.e., both COOL AIR FAN annunciators off).
- The standby attitude indicator and compass must be operational for takeoff.
- The EADI, EHSI, and symbol generators for both pilot and copilot must be operational for takeoff.
- The composite mode may be used during IFR operation only after a failure of an EADI or EHSI.
- The data contained in the AFM takes precedence over the data contained in the checklist display.

Flight Controls – Lift/Drag Devices

Flaps

- Enroute use of flaps is prohibited.
- Flight at altitudes above 15,500 ft with flaps extended is prohibited.

Flight Spoilers

- **S/Ns 5001 and subsequent:**
  - Flight below an altitude of 300 ft AGL with flight spoilers extended is prohibited.
  - To ensure adequate maneuver margins, flight spoilers must not be extended in flight at airspeeds below the recommended approach speed plus 10 KIAS (refer to AFM Performance Section – Landings).

Lasertrak System

- **S/Ns 5067, 5087 and subsequent**:
  - The Lasertrak system must be operated in accordance with the AFM and the Honeywell Lasertrak Navigation Display Unit Pilots Manual, 95-8440-1, (Rev 1, DEC 89, or later applicable revision).

Flight Management System

- The CAE SimuFlite Challenger simulator is equipped with dual GPS sensors and NZ 5.2 software.

CAUTION: The following information is applicable to most **3A/3Rs** and to the **CAE Challenger simulator**. There are many possible variations throughout the Challenger fleet not addressed below. In all cases the AFM and all appropriate supplements should be complied with. Based on the version of software and the "age" of the flight management systems in use there are more applicable restrictions that exceed the scope of this Cockpit Reference Handbook.

- The current version of the Honeywell FMZ Series Flight Management System PILOT'S OPERATING MANUAL, 28-1146-043, must be immediately available to the flight crew whenever the equipment is in use.
- Database information must be kept current by 28-day cycle updates as distributed.
- Each operational FMS CDU must be initialized with the present position prior to use.

NOTE: Initial positions are never transfered from FMS to FMS. As each FMS initial position is loaded, that position is also sent to each IRS.

- The aircraft must not be moved during IRS alignment.
- When using previously stored flight plans and waypoints, each waypoint shall be verified for accuracy prior to use.
- Fuel display parameters are advisory only.

- Flight plan transfers during holding patterns are not permitted.

NOTE: The prohibition against transferring flight plans "during holding patterns" refers to what the FMS computers and the CDUs indicate they are doing (providing guidance for). Changing FD modes and/or flying out of a holding pattern area IS NOT sufficient. The FMS computers must be NAVIGATING out of the holding pattern prior to a flight plan transfer.

- During RNAV operation of the FMS, additional navigation equipment required for the specific type of operation must be operable.
- RNAV approaches are permitted only when the systems are programmed with data from current published instrument RNAV approach procedures.
- When VNAV modes are used in conjunction with a holding pattern, the altitude selector must be preset to the holding altitude. Once established in a hold, normal use of the altitude selector is available.
- For VNAV predictions during flight, all data must be entered in the PERF INIT pages and CONFIRM INIT selected. For each subsequent flight, performance data must again be updated and confirmed.
- Operating on IRS inputs only, FMS position must be checked for accuracy (reasonableness) prior to use as a means of domestic RNAV navigation and under the following conditions:
  - Prior to each compulsory reporting point during IFR operation when not under radar surveillance or control;
  - At or prior to arrival at each enroute waypoint during IFR RNAV operation;
  - Prior to requesting off-airway routing and at hourly intervals thereafter during operation off approved RNAV routes;
  - When DGRAD annunciator on the CDU is illuminated.

- Following a period of FMS dead reckoning (DR annunciator on CDU illuminated), the aircraft position should be verified by visually sighting ground reference points and/or by using other navigation equipment such as VOR, DME, IRS, NDB, or radar fix.
  - On S/Ns 5085 and subsequent and aircraft with SB 601-0358, Modification – Flight Management System – Navigation Computer Software Update:
  - The IRS alignment limits are ±78.25°.
  - The pilot and copilot altimeters must be the primary altitude reference for all VNAV operations.
  - The minimum altitude for VNAV operation is 400 ft AGL.
- The HONEYWELL FMZ 2000 FMS using NZ4.1 or better software is specifically addressed in an AFM Supplement. A partial list of operating parameters and limitations are listed below. Pilots must be familiar with the AFM, supplements and completed service bulletins (SB) applicable to their own aircraft.
  - Pilot must verify the currency of the nav data base or verify each selected waypoint for accuracy referencing current approved data prior to IFR enroute and terminal navigation.
  - Operation above N 72° 30.0' latitude and below S 59° 30.0' latitude is prohibited due to unreliable magnetic heading, unless the IRS is installed and operating.
  - An FMS DEGRADE annunciator requires FMS position to be verified by other appropriate means. Conducting an IAP during degrade is prohibited.
  - ILS, LOC, LOC-BC, LDA, SDF & MLS approaches using FMS guidance are prohibited
  - When using FMS guidance for conducting IAPs that do not include “or GPS” in the title of the published procedure, the flight crew must verify the procedure specified navaid and associated avionics are operational.

- The FMS APPRoach annunciator on the instrument panel must be illuminated by the FAF in order to continue an instrument approach retrieved from the FMS navigation data base.

NOTE: The FMS APPR legend on the pilot/copilot instrument panel(s) should normally illuminate passing 2 NM prior to the FAF.

- The Flight Director (FD) must be coupled to the NAV mode (autopilot coupled or not coupled), to accomplish GPS non-overlay approaches.
- Using FMS guidance for conducting an IAP, the procedure navaid must be tuned and valid, and the raw data displayed in the cockpit, under the following conditions:
  - VOR approaches, (specified as VOR Only; navaid has no co-located DME capability), and NDB approaches without GPS (GPS failed or RAIM OUT OF LIMITS OR UNAVAILABLE).
  - For any IAP (other than a GPS stand alone approach), outside the U.S. National Airspace System, with GPS as the navigation sensor.
- Minimum altitude for autopilot-coupled VNAV operation is 50 feet below the published MDA when conducting a non-precision IAP.
- Conducting missed approach procedures, the autopilot-coupled operation is prohibited until the flight crew has established a rate of climb that ensures all altitude requirements of the procedure will be met.

- Aircraft with Navigation Computers capable of operating NZ-9102/NZ-9112 Software or newer:
  - Meet the requirements of RNP-5.
  - The FMS installation with the IRS has been demonstrated to meet RNP -10 as a primary means of navigation for flight up to 6.2 hours in duration without updating. The determination of flight duration starts when the system is placed in the NAVIGATION mode.

NOTE: IRSs also provide required attitude and heading reference.

- If the coupled FMS is receiving usable navigation information from at least two inertial reference systems (IRSs), it is approved for:
  - VFR/IFR operations within the conterminous United States and Alaska IAW the enroute criteria of AC 90-45A and AC 20-101B.
  - Flight into the NAT MNPS airspace in accordance with AC 120-33 or AC 91-49, provided both FMS installations are operating and include a minimum of two operable approved sensor systems.

Fuel System

- The maximum permissible fuel imbalance between the contents of the main fuel tanks is 800 lbs (363 kg).
- Takeoff with up to 500 lbs (230 kg) of fuel in the auxiliary tank is permitted, provided that there is at least 1500 lbs (690 kg) of fuel in each wing tank and no fuel in the tail tank (if installed).
- Takeoff with more than 500 lbs (230 kg) of fuel in the auxiliary tank is permitted, provided that both wing tanks are full.
- Fuel remaining in a tank when the appropriate fuel quantity indicator reads zero is not usable.
- The maximum usable fuel quantities shown below are achieved by pressure fueling and based on maximum achievable capacity with wings level, aircraft $^1/_2$° nose-down, and a standard day conversion factor of 6.8 lbs/U.S. gallon.
- To determine approximate maximum usable fuel quantities by gravity fueling, reduce selected weight by 7%.
- **On aircraft equipped with forward and aft fuselage tanks**, maximum usable fuel quantity is:

  Left Main Tank . . . . . 4,909 LBS (2,227 KG)

  Right Main Tank . . . . . 4,909 LBS (2,227 KG)

  Fuselage Tanks . . . . . 6,868 LBS (3,115 KG)

  Total . . . . . 16,686 LBS (7,569 KG)

- **On aircraft equipped with aft fuselage fuel tank only**, maximum usable fuel quantity is:

  Left Main Tank . . . . . 4,909 LBS (2,227 KG)

  Right Main Tank . . . . . 4,909 LBS (2,227 KG)

  Fuselage Tanks . . . . . 5,736 LBS (2,601 KG)

  Total . . . . . 15,554 LBS (7,055 KG)

Tail Cone Tank

S/Ns 5001 to 5134 (3As) with SB 601-0262; S/N 5135 and subsequent (3Rs)

AFM Supplement 12 adds the following limitations for aircraft operation with a Tail Cone Tank. The Limitations section of the AFM are applicable in addition to the following:

- The maximum permissible center of gravity (CG) range with landing gear extended is shown in **Figures 3-1** or **3-2** (pages 3-8 and 3-9).
- Fuel jettison must only be carried out with flaps set to 0.
- Jettisoning of fuel in known lightning conditions is prohibited.
- Fuel jettison must not be initiated when tail tank fuel quantity is below 30 lbs.
- The maximum usable fuel quantity is increased by 1,276 lb (579 kg).

NOTE: In emergency situations, if it is not possible to complete fuel jettisoning, a landing may be made with fuel in the tail cone tank.

Stall Protection System

- Both stall protection systems must be fully operative for take-off and remain on for all phases of flight.
- The stall protection test indicator must only be used for S.P.S. functional test purposes.

Taxi Lights

- Taxi lights must be switched OFF whenever the aircraft is stationary in excess of 10 minutes.

NOTE: While there is no published time limit for ground operation of the “Landing Lights”, the procedures in the AFM only allow the landing lights to be on during takeoffs and landings.

Tire Pressures

- When operating with 25.75 x 6.75 – 14 PR main wheel tires at unloaded inflation pressures between 145 and 198 PSI, the maximum takeoff weight (MTOW) is limited (refer to **Figure 3-9**, opposite).
- The maximum nosewheel tire pressure is 151 PSI (1041 kPa) +5/-0% on the ground.
- Tire pressures must be verified daily and a placard installed on the pilot's instrument panel under "Special Operating Condition" in accordance with SB 601-0205 – Modification – Flight Compartment Tire Pressure Caution Placard – Special Operating Conditions Only.

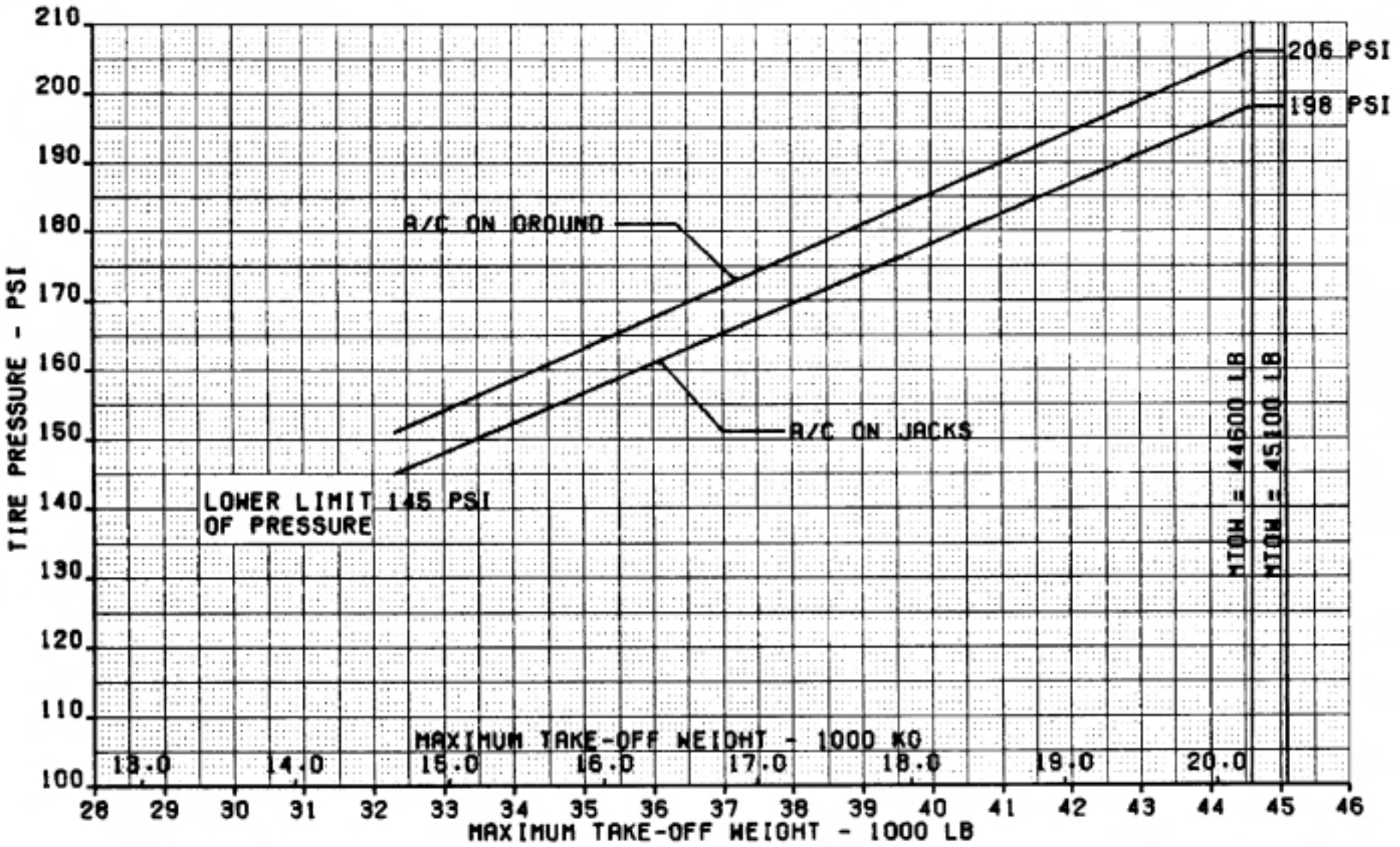
NOTE: Operations IAW AFM Supplement 11 – Tire Pressures less than 145 PSI will further restrict speed, operational weights, and airport operational considerations.

NOTE: The 45,100 lb MTOW, shown on figure 3-9, applies to **S/Ns 5135 and subsequent and prior A/C with SB 601-0360**.

NOTE: When tire inflation is less than 206 PSI (WOW), the maximum takeoff gross weight must be limited IAW **Figure 3-9**.

Tire Pressures vs. Maximum Takeoff Weight

CL-601-1A/3A/3R – 44,600 lbs and 45,100 lbs MTOW



3-9

Thrust Reversers

- Thrust reversers are approved for ground use only.
- The thrust reverser preflight checks (AFM Normal Procedures) must be successfully accomplished and the proper indications obtained on each operative thrust reverser prior to each takeoff.
- Thrust reversers are intended for use during full stop landings. Do not attempt a go-around maneuver after deployment of thrust reversers.
- Application of reverse thrust above 60% N_1 is not permitted at airspeeds below 60 KIAS.
- The maximum demonstrated crosswind component approved for use of reverse thrust is 24 kts (at 33 ft [10 meters] tower height). This value was demonstrated on a dry runway and is considered limiting.

NOTE: AFM, NORMAL PROCEDURES, TAXIING – TRs may be used to supplement wheel brakes in tailwinds up to 10 knots.

Wheel Brake Cooling Limitations

- Brake cooling times (established in accordance with the procedures in the AFM Normal Procedures – Landing Gear Wheels and Brakes) must be observed between a landing or low-energy rejected takeoff (RTO) and a subsequent takeoff to ensure that sufficient brake energy is available to bring the aircraft to a complete stop if that subsequent takeoff is rejected.
- If a fusible plug releases, all four wheels, brakes, tires, and the anti-skid wheel speed sensors must be inspected in accordance with the procedures in the Time Limits/ Maintenance Checks, PSP 601A-5 or PSP 601-5 Any damage must be rectified before the next takeoff.

NOTE: The AFM, Operating Manual, and QRH have the same “spaghetti graph” presentation of the Brake Cooling chart in the NORMAL section. The Operating Manual has an additional tabulated chart with many notes applicable to determining the expended and required brake energies.

Wheel Brakes Anti-Skid

- Takeoff with the wheel brakes anti-skid system inoperative is prohibited.

Instrument Markings

- Normal operating range – green vertical band
- Takeoff and caution range – yellow vertical band
- Maximum and minimum limitations – red radial line

NOTE: "Instrument Markings" as listed on the next three pages are NOT (in all cases) the same as the "Limitations" stated earlier in this chapter.

APU Exhaust Gas Temperature (EGT)

Green Band . . . . . 0 TO 680°C

Yellow Band . . . . . 680 TO 730°C

Red Radial Line . . . . . 730°C

APU Tachometer % RPM

Green Band . . . . . 0 TO 105%

Yellow Band . . . . . 105 TO 110%

Red Radial Line 110%

Engine Vibration Indicator

On S/Ns 5005 and subsequent (CAE Challenger Simulator):

Green Band . . . . . 0 TO 2.7 MILS D.A.

Yellow Band . . . . . 2.7 TO 4.0 MILS D.A.

On S/Ns 5001 to 5004:

Green Band . . . . . 0 TO 1.7 MILS D.A.

Yellow Band . . . . . 1.7 TO 4.0 MILS D.A.

Fan Speed – All Engines (N_1 % RPM)

Green Vertical Band . . . . . 0 TO 98.6%

Red Radial Line 98.6%

Fuel Temperature Indicator

On S/Ns 5135 and subsequent (GE CF34-3A1):

Yellow Band . . . . . -55 TO 4°C

Green Band . . . . . 4 TO 120°C

Yellow Band . . . . . NOT APPLICABLE

On S/Ns 5001 to 5134 (GE CF34-3A/3A2):

Yellow Band . . . . . -20 TO 5°C

Green Band . . . . . 5 TO 60°C

Yellow Band . . . . . 60 TO 70°C

Interstage Turbine Temperature (ITT)

S/N 5135 and subsequent (GE CF34-3A1)

Green Vertical Band . . . . . 0 TO 860°C

Yellow Vertical Band . . . . . 860 TO 928°C

Broken Red Radial Line . . . . . 900°C

Red Radial Line . . . . . 928°C

L/R red overtemperature lights illuminate when ITT reaches 928°C.

S/Ns 5001 to 5134 (GE CF34-3A/3A2)

Green Vertical Band . . . . . 0 TO 860°C

Yellow Vertical Band . . . . . 860 TO 871°C

Red Radial Line . . . . . 871°C

L/R red overtemperature lights illuminate when ITT reaches 871°C.

Oil Pressure

On S/N 5135 and subsequent (GE CF34-3A1)

Red Horizontal Line . . . . . 25 PSI

Green Vertical Band . . . . . 25 TO 115 PSI

Yellow Vertical Band . . . . . 115 TO 130 PSI

Red Radial Line . . . . . 130 PSI

The low oil pressure warning lights illuminate when oil pressure drops below 28 ±3 PSI.

On S/Ns 5001 to 5134 (GE CF34-3A/3A2)

Red Horizontal Line . . . . . 25 PSI

Green Vertical Band . . . . . 25 TO 95 PSI

Yellow Vertical Band . . . . . 95 TO 100 PSI

Red Radial Line . . . . . 100 PSI

The low oil pressure warning lights illuminate when oil pressure drops below 28 ±3 PSI.

Oil Temperature

Green Vertical Band . . . . . -40 TO 150°C

Yellow Horizontal Band . . . . . 150 TO 163°C

Red Radial Line . . . . . 163°C

Turbine Speed (N_2 % RPM)

Green Vertical Band . . . . . 0 TO 99.2%

Yellow Vertical Band . . . . . 99.2 TO 99.4%

Red Radial Line 99.4%

AFM Supplements (Limited Examples)

There are two sections of the AFM called “Supplements”.

- In the first located immediately following the Performance section, one finds numbered supplements published by Bombardier such as titled: Reduced Engine Power Take-off; Category II Ops; Ops from Unpaved/Gravel Runways; and Tail Cone Tank Installation (to name a few), each having additional limitations.
  - AFM Supplement 14, Operation with Airplane Systems Inoperative is worthy of note. Supplement 14 is applicable only when used in conjunction with a Minimum Equipment List approved by the appropriate authority.
  - Also in this section one normally finds supplements, each with a Limitations section, applicable to specific equipment for the specific aircraft, such as EFIS/MFD, TCAS, Oxygen System, Angle of Attack etc.
- Another AFM Supplement section is the “Unapproved Supplements” also known as the “Blue Pages”. These “blue pages” are located after the Appendix section of the AFM. There are three unapproved supplements herein; they are “Flight Planning Data”, “Operation on Contaminated Runways” and “Simplified Reduced Thrust Take-Off Procedure”.
  - Operation on Contaminated runways data has been tabulated and included in table form at the end of the FLIGHT PLANNING tabs in the QRH.
- The following supplemental limitations, is an incomplete list of available options and is provided for training purposes only. Please refer to your aircraft’s AFM for limitations that apply to your particular aircraft equipment.

Honeywell EDZ-815 EFIS and MDZ-815 MFD – STC ST31CH

- Honeywell SPZ-8000 Digital Integrated Flight Control System Pilot's Manual for the Challenger CL-601-3A, publication 28-1146-55-01, dated April 1988 with Revision No. 1, dated October 1991, and Temp Revision No. 1, dated January 1993, or later revision must be immediately available to the flight crew at all times.
- Both pilot's EADI and EHSI must be operational and driven from separate symbol generators for takeoff. The MFD symbol generator may be selected as a primary symbol generator to meet dispatch requirements.
- Both pilot and copilot EFIS CRT fans must be operational for takeoff. Dispatch with either pilots' COOL AIR FAIL annunciators illuminated is prohibited.
- The standby attitude indicator and compass must be operational for takeoff.
- The data contained in the Airplane Flight Manual take precedence over the data contained in the checklist display.

Honeywell TCZ-910 TCAS II System – STC SA1677GL

- The following manuals must be immediately available to the flight crew at all times whenever the TCAS system is in use.
  - Honeywell Traffic Alert and Collision Avoidance System Pilot's Manual, publication 28-1146-70-01, dated October 1990, Revised April 1991, or later revision.
  - Honeywell SPZ-8000 Digital Integrated Flight Control System Pilot's Manual for the Challenger CL-601-3A, publication 28-1146-55-01, dated April 1988, with Revision 1, dated October 1991, and Temp Revision No. 1, dated January 1993, or later revision.
  - Honeywell Primus II Integrated Radio System Pilot's Manual, publication 28-1146-50-03, dated November 1987, with Revision 3, dated December 1991, and Temp Revision No. 2, dated October 1992, or later revision.

- Pilots are authorized to deviate from their current ATC clearance to the extent necessary to comply with a TCAS II resolution advisory (RA).

Honeywell GPS Sensor – STC SA1652GL

- Honeywell FMZ Series Management System Pilot's Operating Manual, publication 28-1146-43-02, dated December 1990, with Temp Revision No. 3, dated September 1993, (or later revision) is applicable and must be accessible to the flight crew whenever the Global Positioning System Sensor is in use.
- Flight Management System operation with inputs from the GPS sensor only is not approved for navigation and is not to be used in the determination of the FMS blended position when it is the only sensor available. If the GPS is the only sensor available and the FMS is displayed on the the EFIS, the FMS DEGRAD annunciator will illuminate.
- GPS updating of the FMS systems may be accomplished in accordance with the FMS update feature. Additional navigation sensors, suitable to the routes flown, must be installed and operable. GPS updating is not allowed when other navigation sensors are deselected, inoperative or in any way not providing accurate navigational data to the FMS systems.
- This supplement is intended for use with one of the following options:
  - Single or dual Honeywell Global Positioning System Sensor Unit (GPSSU), P/N HG2021AB02, with Honeywell FMS NAV Computers, P/N 7004402-977, Software Version NZ-9102.
  - Single or dual Honeywell Global Positioning System Sensor Unit (GPSSU), P/N HG2021AB01, with Honeywell FMS NAV Computers, P/N 7004402-977, Software Version NZ-9102.
  - Single Honeywell Global Positioning System Sensor Unit(s) (GPSSU), P/N HG2021AB02, and Honeywell Global Positioning Inertial Reference Unit (GPIRU), P/N HG1075GE04, with Honeywell FMS NAV Computers, P/N 7004402-977, Software Version NZ-9102.

Oxygen System – STC SA589GL

A. The system is approved for all phases of flight operation. Step B does not apply when drop box is mounted in overhead ceiling panel.

B. Due to access panel covering the mask, the placard located above the third crew mask access panel shall state:

THIRD CREW OXYGEN DOOR MUST REMAIN OPEN WHEN THIRD CREW SEAT IS OCCUPIED.

Safe Flight Angle of Attack System

- The AOA system shall not be used as a primary airspeed indication.

Sundstrand Mk-V GPWS – STC SA7470SW

- The MKV Ground Proximity Warning System may give little or no warning or alert for flight into precipitous terrain with little or no preamble terrain.
- The MKV Ground Proximity Warning System may give little or no warning or alert for stabilized descent in landing configuration into terrain when no ILS Glideslope exists and the altitude awareness callout function is not activated.
- Terrain clearance or descent rates during radar vectoring that are not compatible with those required by the minimum regulatory standards for Ground Proximity Warning equipment may cause unwanted warnings or alerts.
- Windshear detection and annunciation is determined by onboard measurement of air mass and acceleration terms occuring to the aircraft; it cannot predict actual severity of wind shear ahead of the aircraft.