



CL-350

Bombardier
CHALLENGER 350



CL-350 SUPPLEMENTAL MANUAL

LIMITATIONS

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GENERAL

Observance of the limitations in this Airplane Flight Manual is mandatory.

BASIC LIMITATIONS

KINDS OF OPERATION

This airplane is certificated to the applicable regulations in the transport category and is eligible for the following kinds of operations when the appropriate instruments and equipment required by the airworthiness and operating requirements are installed and approved and are operable.

This airplane is approved for:

- VMC (Visual Meteorological Conditions)
- IMC (Instrument Meteorological Conditions)
- Day
- Night
- Icing.

Effectivity:

On Argentinean registered airplanes:

The equipment necessary for the different kinds of operations must comply with the applicable Argentine Regulations.

APPROVAL STATUS

The approvals listed in the OPERATIONAL CAPABILITIES do not constitute operational approval. Some operations require additional crew qualification, communication and surveillance equipment in order to obtain operational approval from regulatory authorities.

OPERATION IN ICING CONDITIONS

Do not hold in icing conditions with flaps extended.

Super-Cooled Large Droplet Icing:

Flight in super-cooled large droplet icing (SLD) conditions may, but not necessarily be indicated by ice accretion on the side windows.

When side window icing is observed:

- Wing and engine anti-icing systems must be on.
- Leave icing conditions as soon as possible.

Engine Anti-Ice Systems:

Ground operations. The engine anti-icing system must be ON when the outside air temperature (OAT) on the ground and for takeoff is 10 °C (50 °F) or below and visible moisture in any form is present (such as fog with visibility of one mile (1,500 m) or less, rain, snow, sleet, or ice crystals).

BASIC LIMITATIONS (CONT)

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

Flight operations. Icing conditions exist in flight at a total air temperature (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 static air temperature (SAT) is –40 °C (–40 °F) or below.

The engine anti-icing system must be ON when the ICE DETECTED CAS message is on, or in icing conditions.

Wing Anti-Ice System:

Ground operations. The wing anti-icing system must be ON for takeoff when the OAT is 5 °C (41 °F) or below and visible moisture in any form is present (such as fog with visibility of one mile (1,500 m) or less, rain, snow, sleet, or ice crystals).

The wing anti-icing system must also be ON when the OAT is 5 °C (41 °F) or below when operating on ramps, taxiways, or runways where surface snow, ice, standing water, or slush is present.

Flight operations. Icing conditions exist in flight at a total air temperature (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 static air temperature (SAT) is –40 °C (–40 °F) or below.

The wing anti-icing system must also be ON when:

- the ICE DETECTED CAS message is on, OR
- in icing conditions and the airspeed is less than 210 KIAS.

COLD WEATHER OPERATIONS

Airplane operations in cold weather conditions must be conducted in accordance with the Flight Crew Operating Manual – Volume 1, Supplement 1 – COLD WEATHER OPERATIONS .

DITCHING

This airplane is certified for ditching when the appropriate safety equipment is installed per applicable regulations.

BASIC LIMITATIONS (CONT)

APPROACHES

Operations with glidepath angles exceeding that shown in Figure 02-01-1 are prohibited unless they are accomplished in accordance with the supplement 10 – STEEP APPROACHES WITH PUBLISHED GLIDEPATH ANGLES FROM 4.5 TO 5.5 DEGREES.

APPROACH GLIDEPATH ANGLE OPERATING LIMITS

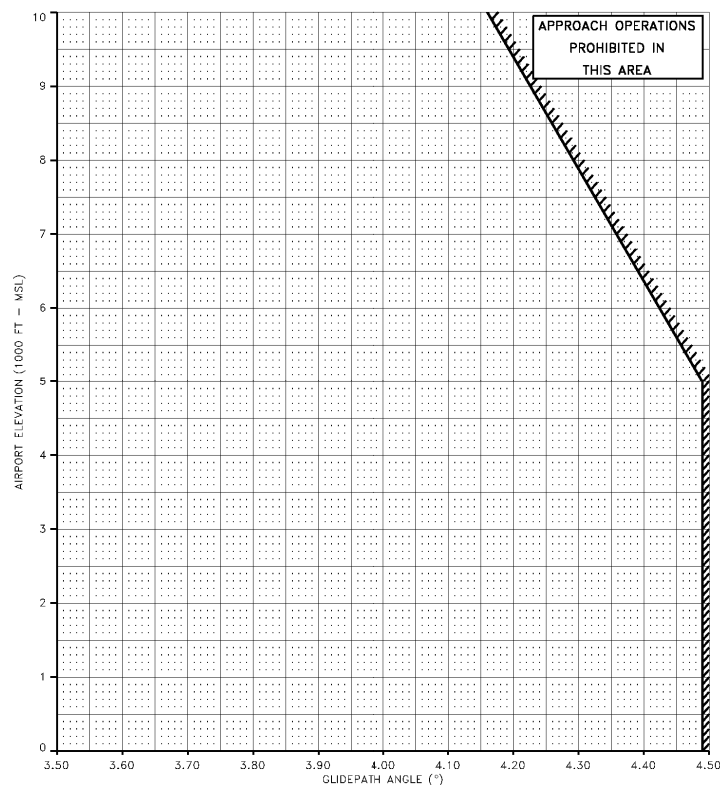


Figure 02-01-1

MINIMUM FLIGHT CREW

The minimum flight crew shall consist of a pilot and a copilot.

WEIGHT AND C.G. LIMITATIONS**MAXIMUM RAMP WEIGHT (MRW)**

Maximum Ramp Weight 40,750 lb (18,484 kg)

MAXIMUM TAKEOFF WEIGHT (MTOW)

Maximum Takeoff Weight 40,600 lb (18,416 kg)

MAXIMUM ZERO FUEL WEIGHT (MZFW)

Maximum Zero Fuel Weight 28,200 lb (12,791 kg)

MAXIMUM LANDING WEIGHT (MLW)

Maximum Landing Weight 34,150 lb (15,490 kg)

MINIMUM FLIGHT WEIGHT (MFW)

Minimum Flight Weight 24,800 lb (11,249 kg)

All weights in excess of Maximum Zero Fuel Weight must consist of fuel.

The Maximum Takeoff Weight (MTOW) and/or Maximum Landing Weight (MLW) may be further limited due to performance considerations.

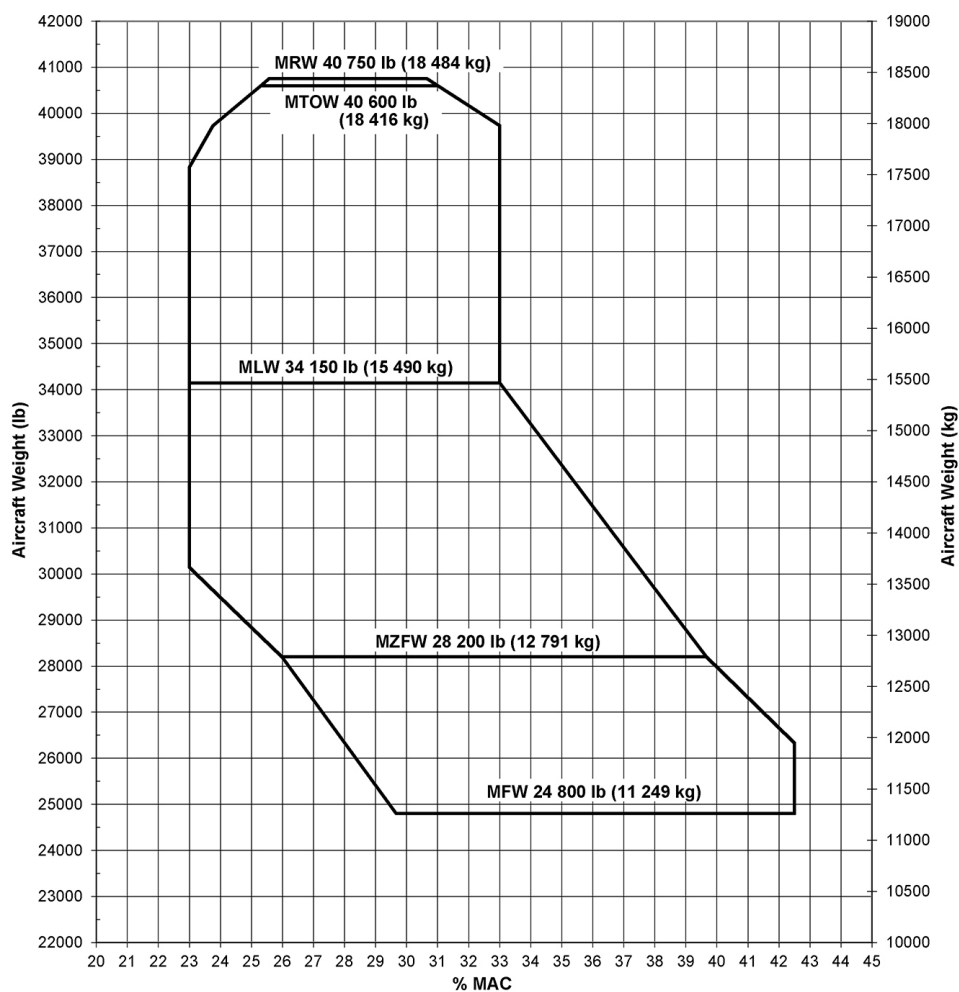
CENTER-OF-GRAVITY

The center of gravity of the airplane for all flight conditions must be maintained within the applicable CENTER-OF-GRAVITY ENVELOPE below. For specific details on the Center of Gravity Envelope, refer to the Weight & Balance Manual CH 350 WBM.

NOTE: The airplane must be loaded in accordance with the loading instructions associated with the weight and balance manual CH 350 WBM. The effect of landing gear retraction on the CG position is negligible.



WEIGHT AND C.G. LIMITATIONS (CONT)



SPEED LIMITATIONS**MAXIMUM OPERATING SPEED (V_{MO}/M_{MO})**

V_{MO} (up to 8,000 ft) 300 KIAS

V_{MO} (8,001 to 29,475 ft) 320 KIAS

M_{MO} (Above 29,475 ft) 0.83 M_I

V_{MO}/M_{MO} may 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.

NOTE: Overspeed alerting is based on baro-corrected altitude. This is applicable to both the primary flight displays and to the integrated standby instrument.

MANEUVERING SPEED (V_A)

V_A is the highest speed that full roll and yaw control can be applied without overstressing the aircraft. Full application of rudder and aileron controls as well as maneuvers that involve angles of attack near the stall, must be confined to speeds below V_A .

Refer to the applicable figure titled Airspeed/Mach Limitations in this section for V_A .

CAUTION: Rapid and large alternating control inputs, especially in combination with large changes in pitch, roll, or yaw (e.g. large sideslip angles) may result in structural failures at any speed, even including below V_A .

ROUGH AIR PENETRATION SPEED (V_{RA})

V_{RA} 265 KIAS/0.75 M_I

MAXIMUM LANDING GEAR OPERATING SPEED – RETRACTION

$V_{LO\ RET}$ 200 KIAS

MAXIMUM LANDING GEAR OPERATING SPEED – EXTENSION

$V_{LO\ EXT}$ 250 KIAS

MAXIMUM LANDING GEAR EXTENDED SPEED (V_{LE})

V_{LE} 250 KIAS

MAXIMUM FLAP EXTENDED SPEED (V_{FE})

V_{FE} :

Flaps 10 210 KIAS

Flaps 20 210 KIAS

Flaps 30 175 KIAS



SPEED LIMITATIONS (CONT)

MINIMUM OPERATING 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.

TIRE SPEED

Maximum tire speed (ground speed) 182 kts

SPEED LIMITATIONS (CONT)

AIRSPEED/MACH LIMITATIONS (PRIMARY PITOT-STATIC SYSTEM)

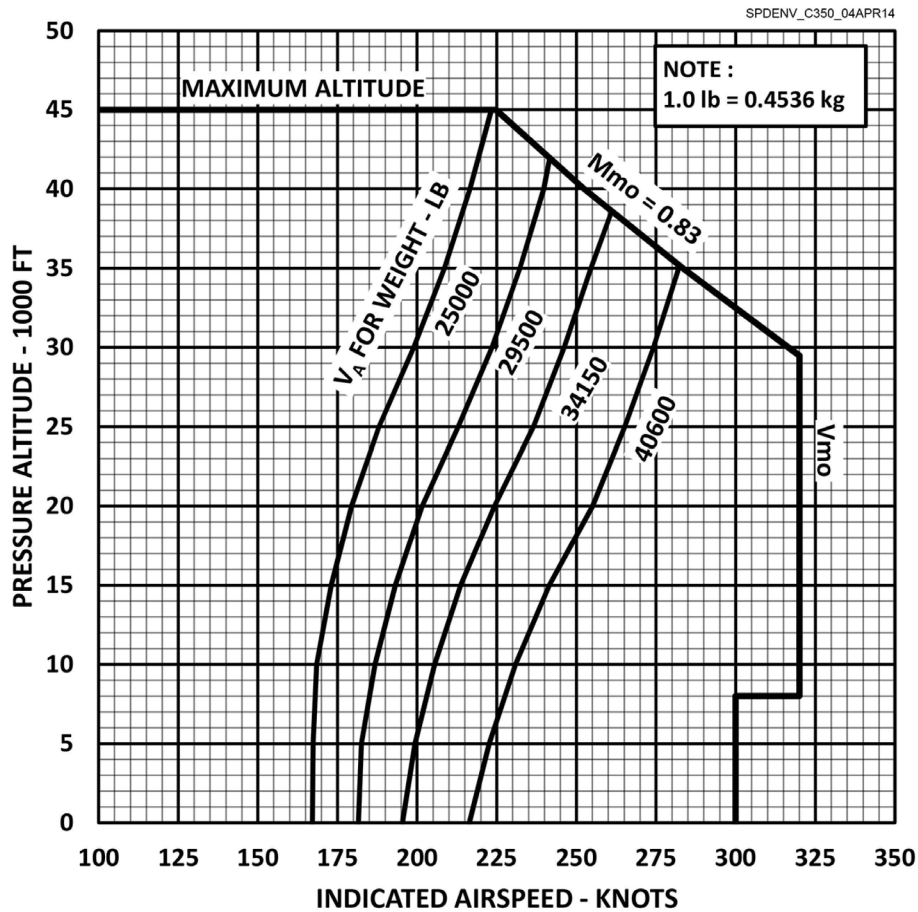


Figure 02-03-1

NOTE: Overspeed alerting is based on baro-corrected altitude. This is applicable to both the primary flight displays and to the integrated standby instrument.



OPERATIONAL LIMITATIONS

TAKEOFF AND LANDING

Maximum takeoff and landing pressure altitude 10,000 ft

Maximum tailwind component 10 kts

Takeoffs and Landings are limited to paved runways.

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

Effectivity:

For aircraft on the State Aviation Administration of Ukraine (SAAU) registry:

MAXIMUM CROSSWIND COMPONENT – DRY RUNWAYS

The maximum crosswind component for takeoff is 28 knots (14 meters/sec).

The maximum crosswind component for landing is 24 knots (12 meters/sec).

MAXIMUM CROSSWIND COMPONENT – WET RUNWAYS

The maximum crosswind component for takeoff and landing on a wet runway with water depth no more than 3.00 mm (0.125 inch) is defined in the following table for different values of the coefficient of friction:

REPORTED RUNWAY COEFFICIENT OF FRICTION	MAXIMUM CROSSWIND COMPONENT
0.3 (poor braking)	10 knots (5 meters/sec)
0.4 (average braking)	15 knots (8 meters/sec)
0.5 (good braking, equivalent to dry)	Takeoff – 28 knots (14 meters/sec) Landing – 24 knots (12 meters/sec)

1. Operation on runways with a coefficient of friction less than 0.3 is prohibited.

MAXIMUM CROSSWIND COMPONENT – CONTAMINATED RUNWAYS

1. The maximum crosswind component for takeoff and landing on a contaminated runway is 10 knots (5 meters/sec).
2. Operation on runways with a coefficient of friction less than 0.3 is prohibited.

OPERATIONAL LIMITATIONS (CONT)**Effectivity:**

For aircraft on the Russian Federation (RF) and Commonwealth of Independent States (CIS) countries' registry:

MAXIMUM CROSSWIND COMPONENT – DRY RUNWAYS

The maximum crosswind component for takeoff is 28 knots (14 meters/sec).

The maximum crosswind component for landing is 24 knots (12 meters/sec).

MAXIMUM CROSSWIND COMPONENT – WET RUNWAYS

The maximum crosswind component for takeoff and landing on a wet runway with water depth no more than 3.00 mm (0.125 inch) is defined in the following table for different values of the coefficient of friction:

REPORTED RUNWAY COEFFICIENT OF FRICTION	MAXIMUM CROSSWIND COMPONENT
0.3 – 0.35 (Poor braking)	10 knots (5 meters/sec)
0.35 – 0.5 (Medium braking)	15 knots (8 meters/sec)
0.5 – 0.6 (Good braking, equivalent to dry)	Takeoff – 28 knots (14 meters/sec) Landing – 24 knots (12 meters/sec)

1. Operation on runways with a coefficient of friction less than 0.3 is prohibited.

MAXIMUM CROSSWIND COMPONENT – CONTAMINATED RUNWAYS

1. The maximum crosswind component for takeoff and landing on a contaminated runway is 10 knots (5 meters/sec).
2. Operation on runways with a coefficient of friction less than 0.3 is prohibited.



OPERATIONAL LIMITATIONS (CONT)

COLD WEATHER OPERATIONS

WARNING: Even small amounts of frost, ice, snow, or slush on the wing leading edges and forward upper wing surface may adversely change the stall speeds, stall characteristics, and the protection provided by the stall protection system, which may result in loss of control on takeoff.

Takeoff is prohibited with frost, ice, snow, or slush adhering to any critical surface (wings, horizontal stabilizer, vertical stabilizer, control surfaces or engine inlets).

Although the upper fuselage is not defined as a critical surface, it must nonetheless be deiced to remove contamination, other than allowable frost, anytime the wing and tail surfaces require deicing.

- NOTE:**
1. Takeoff is permitted with frost adhering to:
 - the underside of the wing that is caused by cold soaked fuel; or
 - the upper surface of the fuselage,in accordance with the instructions provided in the Flight Crew Operating Manual, Supplement 1 – Cold Weather Operations.
 2. Comprehensive procedures for operating in cold weather are provided in the Flight Crew Operating Manual – Volume 1, Supplement 1 – COLD WEATHER OPERATIONS.

EN ROUTE

Maximum Pressure Altitude 45,000 ft

MANEUVERING LOAD FACTORS

Flaps Up +2.6 g to -1.0 g

Flaps Extended +2.0 g to 0.0 g

OPERATION WITH TYPE II, III & IV ANTI-ICING FLUIDS

When Type II, III & IV anti-icing fluids have been applied:

The wing anti-ice system must only be selected ON, if required, just prior to thrust increase for takeoff.

MANEUVERS

Aerobatic maneuvers and spins are prohibited.

OPERATIONAL LIMITATIONS (CONT)

ALTITUDE/TEMPERATURE LIMITATIONS

ALTITUDE/TEMPERATURE LIMITATIONS

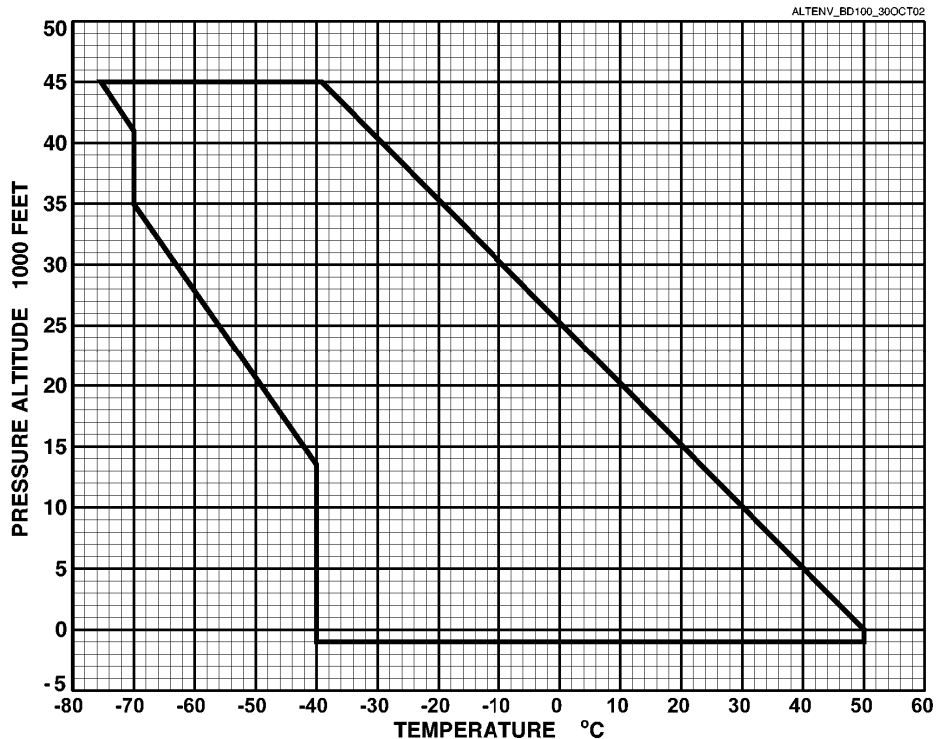


Figure 02-03-2

PERFORMANCE CALCULATIONS

Performance Calculations may be based exclusively from either the CAFM output or Quick Reference Handbook (QRH) Volume 1 tables and charts, but not both. Once the pilot has decided to use either the CAFM or QRH he/she must continue with that source and use only the performance data generated from that source.

The performance tables and charts contained in Quick Reference Handbook (QRH) Volume 1 may be used to calculate aircraft performance and are considered approved data ONLY for the following revision level:

Challenger 350 Quick Reference Handbook Volume 1, Publication No. CH 350 QRH-1, Initial Issue, dated Jun 11, 2014.



SYSTEMS LIMITATIONS

AIR CONDITIONING AND PRESSURIZATION

AIR CONDITIONING

Do not select the AIR SOURCE switch to TRIM AIR ONLY while the airplane is on the ground.

The pack must be operating (APU or engine running and AIR SOURCE switch – NORM or PACK ONLY) when the airplane electrical power is on (BATTs or EXT PWR – On) for more than 30 minutes and the OAT is above 40 °C (104 °F).

OXYGEN

The following airplane certification requirements are in addition to the requirements of applicable operating rules. The most restrictive requirements (certification or operating) must be observed.

Crew and passenger oxygen masks are not approved for use above 40,000 feet cabin altitude. Prolonged operation of passenger masks above 25,000 feet cabin altitude is not recommended.

PRESSURIZATION

The maximum differential pressure on the ground (during taxi) must not exceed 0.1 psi.

The maximum differential pressure during landing must not exceed 1.0 psi.

Effectivity:

For aircraft 20501 to 20886:

The maximum positive differential pressure is 9.4 psi. The maximum negative differential pressure is –0.5 psi.

Effectivity:

For aircraft 20887 to 22999:

The maximum positive differential pressure is 10.1 psi. The maximum negative differential pressure is –0.5 psi.

SYSTEMS LIMITATIONS (CONT)**AUTOFLIGHT**

WARNING: If an engine failure occurs during a climb while in, or just below (V) ALTS CAP or (V) ALTV CAP vertical FD modes, the FD/autopilot may not maintain the selected airspeed. Further, the Autothrottle (if installed) may have already begun to command a thrust reduction. Crew intervention may be required to ensure that the aircraft maintains a safe operating speed and avoid loss of control.

AUTOPILOT

Do not intentionally overpower the autopilot.

Autopilot Minimum Engage Height:

Climb, En Route, or Descent 700 feet AGL

Autopilot Minimum Use Height:

Approach

Precision with glidepath angle of 3.5 degrees or less 80 feet AGL

Precision with glidepath angle between 3.5 and 4.5 degrees 160 feet AGL

Visual and non-precision 200 feet AGL

The maximum altitude with yaw damper off is 31,000 ft.

It is prohibited to select the XFR button on the flight guidance panel while simultaneously making inputs on an FMS CDU.

AUTOTHROTTLE (IF INSTALLED)

For an Autothrottle engaged takeoff, the Autothrottle must be verified engaged, TLA in the takeoff detent, takeoff N1 verified and HOLD mode active prior to 80 KIAS.

It is prohibited to engage the Autothrottle following an engine failure on takeoff until flaps are retracted and the aircraft has accelerated to en route climb speed.

Autothrottle must be disengaged prior to 200 feet AGL for any abnormal procedure landing with flaps less than 30°.

The radio altimeter must be valid for Autothrottle retard mode operation. If radio altitude is unavailable or invalid, the Autothrottle must be disengaged prior to reaching 200 feet AGL.

It is prohibited to have the Autothrottle engaged during a single engine go-around until flaps are retracted and the aircraft has accelerated to en route climb speed.

Use of Autothrottle during touch and go landings is prohibited.



SYSTEMS LIMITATIONS (CONT)

AVIONICS

DATA LINK

All weather products data linked to the airplane are advisory.

Effectivity:

For airplanes on the Russian Federation (RF) and Commonwealth of Independent States (CIS) countries registry:

NOTE: Use of DATALINK is not permitted for ATC purposes.

Crew actions based on messages such as digital automatic terminal information service, weight and balance, take-off data (speeds, trim settings, runway distances) are prohibited unless the approved operational procedures are used to verify that the message is received by the intended recipient, that the message is valid, and that the content is not corrupted.

Effectivity:

On EASA registered airplanes:

ATN CPDLC shall only be used for routine datalink exchanges during en-route operations in upper airspace.

FANS CPDLC must be operated in accordance with ATN and FANS Interlocked CPDLC Applications Operators Guide (part number 5230822435 at the latest applicable revision).

The crew must ensure that the FMS is updated with the proposed flight plan and its associated constraints and procedures when receiving a route clearance via CPDLC.

Before executing any flight plan modification received via CPDLC, the crew must ensure that the entire content of the flight plan has been inserted.

Use of FANS INSERT MOD is prohibited within 5 NM of sequencing a waypoint.

It is prohibited to use the WX DEV TO from the FANS ROUTE REQ 1/2 page.

It is prohibited to use the DIVERT TO from the EMERGENCY MSG 1/2 page using the FANS REQUEST page.

Inmarsat L band satellite communication systems (SwiftBoardBand, Swift64 and Classical) interfere with Iridium systems. If both Inmarsat L band and Iridium systems are installed and the Iridium is capable of providing cockpit datalink services (including FANS 1/A+, and CDU datalink), then the Inmarsat L band system must be depowered and considered inoperative for the entire flight where cockpit datalink services are intended to be used.

SYSTEMS LIMITATIONS (CONT)**FLIGHT MANAGEMENT SYSTEM (FMS)**

The FMS must be operated in accordance with the latest revision of the following:

- Airplane Flight Manual, and
- Rockwell Collins Operators Guide – Bombardier Challenger 300/350 Pro Line 21 Advance Flight Management System (publication 523-0820888 at the latest applicable revision).

If a difference exists between the AFM and the Rockwell Collins FMS Pilot's Guide, the AFM shall take precedence. The Rockwell Collins FMS Pilot's Guide (Part number 523-0820888 at the latest applicable revision) must be immediately available to the flight crew whenever navigation is predicated on the use of the FMS.

The FMS is approved for use with software version [HSCD CPN 946-2720-101, or later applicable revision].

Effectivity:

On airplanes 20664 and subsequent, and airplanes incorporating SB 350-34-012:

The FMS is approved for use with software version [HSCD CPN 946-2720-130, or later applicable revision].

Effectivity:

On airplanes 20578 and subsequent, and airplanes incorporating SB 350-34-013:

The performance database part number must be verified to be 096-5327-001.

FMS performance data, ETE/ETA and Fuel Remaining information is advisory only. Airplane operation must not be predicated upon FMS performance data.

NOTE: Measured mode or manual entry fuel predictions will not be updated while a flight plan modification is open.

Effectivity:

On airplanes 20501-20663 not incorporating SB 350-34-012:

The V-speed database part number must be verified to be 096-5016-001.

NOTE: The FMS V-speed database (version 096-5016-001) does not permit calculation of Actual Landing Distances (ALD) on contaminated runways (ice, compacted snow, dry snow or water/slush). Use the CAFM or the QRH, as appropriate, to determine the ALD on a contaminated runway.

**SYSTEMS LIMITATIONS (CONT)****Effectivity:**

On airplanes 20664 and subsequent, and airplanes incorporating SB 350-34-012:

The V-speed database part number must be verified to be 096-5016-002.

- The FMS V-speed data does not need to be verified with the AFM, provided both Flight Management Computers are available.

For some high airport altitude conditions, the CAFM TOFL can be longer than the corresponding FMS V-speed TOFL. This results in a lower weight limited by runway length. For airport pressure altitudes of 8000 ft and above, the FMS V-speed TOFL must be compared to the corresponding CAFM result. If the CAFM TOFL is longer than the FMS value, then the CAFM TOFL and takeoff speeds (V_1 , V_R , V_2 and V_{FTO}) must be used for operation.

Effectivity:

For airplanes on the Russian Federation (RF) and Commonwealth of Independent States (CIS) countries registry:

- The FMS V-speed data does not need to be verified with the AFM, provided both Flight Management Computers are available.

Effectivity:

On airplanes 20501-20663 not incorporating SB 350-34-012:

- V-speed database part number must be verified to be: 096-5016-001.

NOTE: The FMS V-speed database (version 096-5016-001) does not permit calculation of Actual Landing Distances (ALD) on contaminated runways (ice, compacted snow, dry snow or water/slush). Use the CAFM or the QRH, as appropriate, to determine the ALD on a contaminated runway.

Effectivity:

On airplanes 20664 and subsequent, and airplanes incorporating SB 350-34-012:

- The V-speed database part number must be verified to be 096-5016-002.

It is prohibited to load pilot routes from the PILOT ROUTE LIST during flight.

It is prohibited to upload flight plans from ROUTE MENU (FPLN RECALL) during flight.

It is prohibited to select FPLN WIND UPDATE from the ROUTE MENU.

SYSTEMS LIMITATIONS (CONT)

It is prohibited to tune a localizer on the TUNE page using the identifier only.

It is prohibited to initiate a NAV RADIO SELF TEST from either the NAV radio tuning page on the FMS CDU or the MFD nav radio menu during flight.

Effectivity:

On airplanes 20664 and subsequent, and airplanes incorporating SB 350–34–012:

It is prohibited to use the FMS as a navigation source when it is not receiving suitable navigation information from the following:

- One GNSS; or
- Two DMEs; or
- One VOR / DME; or
- One IRS.

Effectivity:

On airplanes 20501–20663 not incorporating SB 350–34–012:

It is prohibited to use the FMS as a navigation source when it is not receiving suitable navigation information from the following:

- Two GNSSs.

Use of the FMS Secondary Flight Plan function is prohibited.

FMS navigation (FMS selected as NAV Source) and display of magnetic heading is prohibited in Canadian Northern Domestic Airspace and at the following locations:

- All latitudes greater than N82°.
- Latitudes greater than N73° if between W080° and W170° longitude.
- At latitude greater than S82°.
- Latitude greater than S60° if between E120° and E160° longitude.

It is prohibited to load FMS procedures that are referenced to True Heading into the flightplan.

It is prohibited to use the FMS as the primary source of navigation during periods of dead reckoning (indicated by the FMS DR message).

IFR navigation is prohibited unless the pilot verifies the currency of the database or verifies the waypoints for accuracy by reference to current publications.

When conducting RNP operations the pilot must verify the PFD CDI scale annunciation is appropriate for the RNP leg as follows:

- RNP APCH CDI Scale 0.3 nm
- BASIC RNP–1 CDI Scale 1.0 nm



SYSTEMS LIMITATIONS (CONT)

- RNP-2 CDI Scale 2.0 nm
- RNP-4 CDI Scale 4.0 nm (selected by pilot)
- RNP-10 CDI Scale 4.0 nm (selected by pilot).

When conducting BASIC RNP-1 operations, the length of each individual flight plan leg or between the airplane position and the TO waypoint must not exceed 200 NM.

When conducting RNP-2 operations, the length of each individual flight plan leg or between the airplane position and the TO waypoint must not exceed 400 NM.

When conducting RNP-4 or RNP-10 operations, the length of each individual flight plan leg or between the airplane position and the TO waypoint must not exceed 500 NM.

Pilot defined waypoints (e.g. along track offset) must not be used to create individual legs shorter than the limiting length.

When conducting non-AR RNP operations, pilots should maintain CDI lateral deviation less than ± 1 dot deviation except brief deviation in excess of ± 1 dot deviation during waypoint sequencing is permitted.

Effectivity:

On airplanes 20501–20663 not incorporating SB 350–34–012:

Performing any departure, arrival, approach or missed approach procedure that contains any radius-to-fix (RF) leg(s) is prohibited.

RNAV operations per AC 90-100A or AC 90-96A in RNAV 1, RNAV 2 or RNAV 5 are prohibited with any of the following FMS messages annunciated:

- FMS DR (PFD, MFD or CDU)
- IRS ONLY (PFD, MFD or CDU)
- VOR/DME ONLY (CDU) or V/D ONLY (PFD)
- VOR/DME DIST > 40.0 NM (CDU)
- CHK POS (PFD or CDU).

RNP operations with any of the following FMS messages annunciated, are prohibited:

- NO APPR (PFD)
- UNABLE RNP (PFD).

PERFORMANCE

The FMS will automatically display the displaced thresholds of runways provided that they are identified in the loaded active cycle FMS navigation database. If RUNWAY LENGTH is manually entered then the FMS will not compute headwind/crosswind; these must be manually entered.

SYSTEMS LIMITATIONS (CONT)**VERTICAL NAVIGATION**

Vertical guidance deviation information is an aid to assist pilots to comply with altitude restrictions and plan descent profiles. When using vertical guidance the pilot must use the primary barometric altimeter to ensure compliance with altitude restrictions, particularly during instrument approach operations.

Use of VNAV vertical guidance is prohibited when the barometric altitude is corrected to the landing field elevation (QFE).

Use of VFLC (FLC with VNAV) is prohibited during climb when the airspeed reference is displayed as Mach.

It is prohibited to select MCRZ from the FMS VNAV CRUISE page.

It is prohibited to select VNAV following a go-around during the missed approach procedure.

The flight crew must verify any altitude/speed constraints on the last waypoint of any entered STAR procedure and/or the first waypoint of any entered approach procedure. The flight crew may correct any such altitude/speed constraint(s) as required to agree with current chart procedures.

Effectivity:

On airplanes 20501–20663 not incorporating SB 350–34–012:

Use of barometric VNAV vertical guidance is prohibited.

CAUTION: Errors to VNAV defined paths may occur because of coding errors in the navigation data base and because of altimetry errors. The actual VNAV path may deviate significantly below the intended VNAV path in very cold temperatures; the temperature compensation function is used to correct for non-standard temperatures. Flight crew must coordinate use of temperature compensation with ATC prior to employing this function.

Database coding of VNAV altitudes for approach waypoints may result in VNAV paths continuing below Minimum Descent Altitude (MDA), Decision Altitude (DA), or Decision Height (DH), or ending at an altitude too high to continue a safe descent to landing. VNAV paths (often called pseudo glide paths) are not equivalent to an ILS glideslope.

Position along an approach must be verified prior to commencement of VNAV descent as displayed by the FMS. The required visual reference must be obtained prior to commencing descent below published MDAs, DAs, or DHs.



SYSTEMS LIMITATIONS (CONT)

APPROACH

Instrument approaches must be accomplished only in accordance with instrument approach procedures that are contained in the FMS database.

NOTE: Vectored ILS approaches are exempt from this limitation as they do not require nor do they rely on FMS guidance. ILS back course approaches also are exempt if they are vectored.

It is prohibited to conduct LPV Approach operations with FMS2 as pilot navigation source and FMS1 as copilot navigation source.

Use of FMS instrument approaches is prohibited unless RNP APPR or LPV APPR is annunciated on the PFD.

RNP operations down to LPV minimum when any of the following messages are present, are prohibited:

- Red boxed “VNV” flag (vertical deviation scale on PFD)
- NO APPR (on PFD)
- EFIS MISCOMPARE (CAS message)
- EFIS COMPARATOR INOP (CAS message)
- LPV NOT AVAIL (on CDU)

RNP operations down to LPV minimum must not be commenced or continued unless all required airborne equipment are operating satisfactorily.

The following airborne equipment must be installed and operational:

- Dual PFD
- Two GNSS/SBAS sensors must be available to commence an approach and one GNSS/SBAS sensor is required to continue an approach.
- Dual FMS.

LPV approach operations are prohibited in the area defined by A, B, C and D in Fig. 02-04-1.

SYSTEMS LIMITATIONS (CONT)

Effectivity:

For airplanes NOT incorporating Service Bulletins SB350-34-025 or SB350-34-033:

POINT	LAT	LONG
A	N75	W175
B	N75	W130
C	N50	W175
D	N50	W155

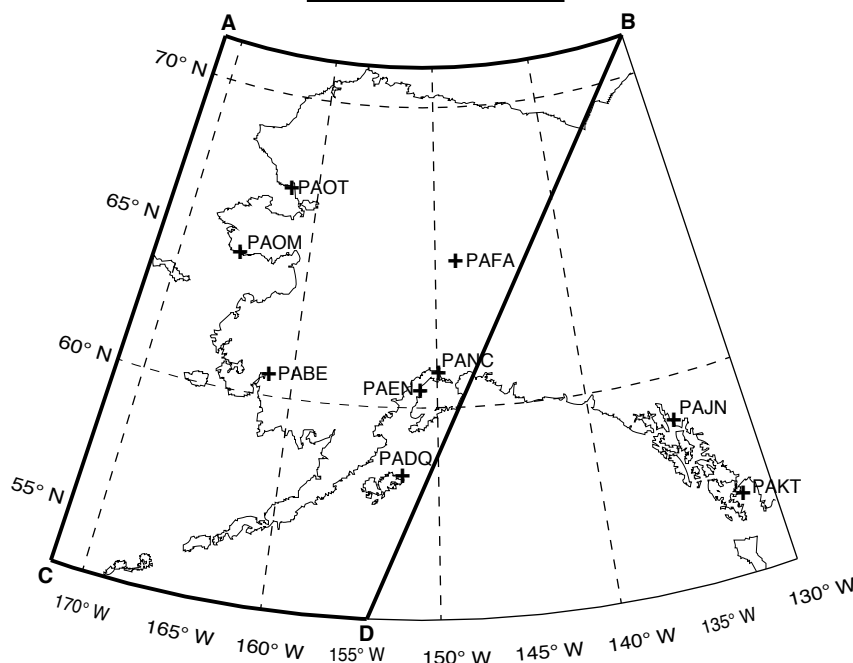


Figure 02-04-1

Use of VNAV vertical guidance for VMDA type approach between the final approach fix and the missed approach fix is prohibited.

FMS as a primary navigation source beyond the FAF is prohibited for ILS, LOC and LOCBC approaches.



SYSTEMS LIMITATIONS (CONT)

FMS as a supplementary navigation source beyond the FAF is permitted when APPR or REF APPR is annunciated on the PFD if the navigation aid referenced in the approach procedure is displayed and monitored by the flight crew during the approach.

NOTE: For the FMS approaches for which GNSS is not authorized as a primary navigation source (i.e. GNSS does not appear in the approach title), APPR will be annunciated on the PFD if the GNSS sensors are deselected; otherwise, REF APPR will be annunciated.

The FMS with inputs from GNSS may only be used for approach guidance if the reference coordinate data system for the instrument approach is WGS84 or NAD83.

GNSS sensors must be deselected when on approach in airspace not referenced to WGS84 or NAD83.

When conducting an instrument approach with a T-Transition and utilizing VNAV for descent guidance, indicated airspeed at the initial approach fix must be 210 KIAS or less.

Other than automatic FMS temperature compensation, changes to altitudes in the final approach segment (including FAF and step-down fixes) for any FMS approach procedures are prohibited.

SYNTHETIC VISION SYSTEM (SVS)

- TAWS alerts must take priority over the image depicted on SVS.
- Use of the SVS for airplane navigation is prohibited.
- Use of the SVS is prohibited when the barometric altitude is corrected to the landing field elevation (QFE).
- When conducting an approach in airspace not referenced to WGS-84 or NAD-83, the SVS shall be deselected prior to passing the FAF.
- When conducting an approach to a runway not entered in the FMS flight plan, the SVS shall be deselected.
- The SVS Airport/Runway database must incorporate the current update cycle. If not, the SVS shall be deselected prior takeoff and prior to passing the FAF.
- The SVS does not render a video image above latitude 85N and below latitude 85S. The SVS shall be deselected prior reaching these latitudes.

The Synthetic Vision System is intended as a situational awareness enhancement feature and shall not be the sole source of reference by the pilot for any of the following:

- Continuation of an approach, landing or takeoff below the minima published for that approach
- Execution of an approach, landing or takeoff in low visibility conditions

SYSTEMS LIMITATIONS (CONT)

- As a replacement for natural vision where there are specific visual requirements to be achieved
- As a replacement for the basic attitude, flight guidance or navigation displays and information
- The performance of any specific flight related task
- The flight crew making any judgment, decision or action that is solely based on the synthetic vision display
- The application of any operational credit.

NAVIGATION RECEIVER

It is prohibited to conduct ILS Approach operations with LOC2 as pilot navigation source and LOC1 as copilot navigation source.

It is prohibited to navigate using VOR or LOC as Nav source when displaying true heading mode.

STANDBY INSTRUMENT

Use of the standby instrument localizer deviation guidance is prohibited during localizer backcourse approaches.

STANDBY COMPASS

L and R WSHLD/WINDOW switches must be temporarily selected OFF while the standby compass is being read.

INTEGRATED FLIGHT INFORMATION SYSTEM

- Incorporation of Dual IFIS does not constitute operational approval to dispatch without adequate backup documentation.
- The IFIS related databases utilized (i.e. charts, airspace, airways, geographic, political, graphical weather) must incorporate the current update cycle.
- The IFIS does not include enroute charts.
- The airplane symbol on the electronic charts is advisory and is presented for increased situational awareness. It is not to be used for navigation.
- The display of geo-political boundaries, airspace and airways on the MFD (Enhanced Map overlays) is for enhanced situational awareness only, and use for navigation is prohibited.
- All weather products data linked to the airplane are advisory.
- For a single IFIS, adequate backup documentation must be immediately available to the flight crew.



SYSTEMS LIMITATIONS (CONT)

- The airplane symbol displayed on airport diagram charts during ground operations is advisory and is presented for increased situational awareness. It is not to be used for precision maneuvering on the ground.
- It is not possible to display landscape formatted approach charts in split view.

Effectivity:

For ANAC (Brazilian) registered airplanes:

VHF SYSTEM

Use of the VHF selected for 8.33 kHz channel spacing in airspace where 25 kHz channel spacing is used, is prohibited.

Effectivity:

For airplanes on the Russian Federation (RF) and Commonwealth of Independent States (CIS) countries' registry:

NAVIGATION

During normal flight, reversion of ATT, HDG and ADC is **not** permitted.

TERRAIN AWARENESS AND WARNING SYSTEM (TAWS)

Navigation must not be predicated upon the use of the terrain awareness display.

TAWS TERRAIN OFF must be selected when using QFE operations, and GPS is not available.

RUNWAY OVERRUN AWARENESS AND ALERTING SYSTEM (ROAAS) (IF INSTALLED)

The use of ROAAS for approach and landings to runways with the departure end of runway (far end) temporarily displaced is prohibited.

With ROAAS on, to avoid ROAAS alerts, the landing distance available must be equal to or greater than FOLD (Factored Operational Landing Distance). See Flight Crew Operating Manual – Volume 1, Chapter 6 – PERFORMANCE DATA for FOLD information.

TRAFFIC ALERT AND COLLISION AVOIDANCE SYSTEM (TCAS)

Maneuvers must not be based solely on information presented on the traffic map overlay.

SYSTEMS LIMITATIONS (CONT)**Effectivity:**

For airplanes on the Russian Federation (RF) and Commonwealth of Independent States (CIS) countries' registry:

Flight is not permitted along routes where ATC service provided is not in RBS mode.

TCAS II TA/RA mode is not recommended on routes where ATC modes not limited to RBS are provided. On these routes, while in TA mode, the pilot action shall be coordinated with ATC.

WEATHER RADAR

Weather Radar information must be displayed continuously on at least one (1) PFD or MFD during the entire flight.

Following a TAWS terrain caution or terrain warning, the Weather Radar information must be reinstated on at least one (1) PFD or MFD, after the encounter has been resolved.

Effectivity:

On Argentinean registered airplanes:

GLOBAL POSITIONING SYSTEM (GPS)

Pilot is not authorized to use the GPS for precision approach and landing.

EMERGENCY LOCATOR TRANSMITTER (ELT)

The ELT must comply with RAAC 91.207.

ELECTRICAL**GROUND OR FLIGHT OPERATIONS**

Continuous:

Two or three generators operating 400 amps

One generator operating (on the ground) 400 amps

One generator operating (in flight) 500 amps

Transient (5 minutes) 600 amps

NOTE: Refer to APU LIMITATIONS in this chapter for APU generator altitude limits.

It is prohibited to take off if battery temperatures are below -20°C (-4°F).



SYSTEMS LIMITATIONS (CONT)

FLIGHT CONTROLS

FLAPS

It is prohibited to extend the flaps above 18,000 ft.

SPOILERS

It is prohibited to select Flight Spoilers to EMER except during emergency conditions or as required by procedure.

Flight spoilers must not be extended in flight at airspeeds below approach speed + 8 KIAS.

Flight spoilers must not be extended in flight below 500 ft AGL.

HYDRAULICS

Hydraulic fluid of type Phosphate Ester Fire-Resistant per BAMS 564-003 Type IV, Skydrol LD-4, Hyjet IV-a Plus is approved for use.

LANDING GEAR, WHEELS & BRAKES

It is prohibited to extend the gear above 18,000 ft.

Brake cooling times (established in accordance with the procedures in Chapter 6 – PERFORMANCE DATA) must be observed between a landing or a rejected takeoff (RTO) and a subsequent takeoff, to ensure that a sufficient brake energy is available to bring the airplane to a complete stop, if the subsequent takeoff is rejected.

FUEL LIMITATIONS**APPROVED FUELS**

Fuels conforming to any of the following specifications are approved for use. Mixing of fuel types is permitted.

CANADIAN	AMERICAN	BRITISH	RUSSIAN/ UKRAINIAN	CHINESE
KEROSENE TYPE				
CAN/CGSB 3.23-97	ASTM D1655 JET A	Def-Stan 91-91/3	–	–
CAN/CGSB 3.23-97	ASTM D1655 JET A-1	Def-Stan 91-91/3	–	GB 6537-2006 No. 3 JET
3-GP-24c	MIL-DTL-5624 JP-5	Def-Stan 91-86/2	–	–
–	MIL-DTL-83133 JP-8	Def-Stan 91-87	–	–
–	–	–	TS-1 & RT	–
WIDE-CUT TYPE ††				
CAN/CGSB 3.22-97	ASTM D1655 JET B	Def-Stan 91-88/1	–	–
CAN/CGSB 3.22-97	MIL-DTL-5624 JP-4	Def-Stan 91-88/1	–	–
† When Russian/Ukrainian RT & TS-1 fuels are used, the maximum altitude is limited to 37,000 ft if the bulk fuel temperature is greater than 30°C (86°F).				
†† When JP-4 or JET B is used, the maximum altitude is limited to 16,000 ft.				

NOTE: ASTM D1655, Def. Std. 91-91 and CAN/CGSB-3-23 Jet fuels whose origin is ASTM D7566 (Aviation Turbine Fuel Containing Synthesized Hydrocarbons) and are re-identified as Jet A, A-1 fuels are considered equivalent to fossil based fuels.



FUEL LIMITATIONS (CONT)

APPROVED FUEL ADDITIVES

Fuel additives:

- Anti-icing additives MIL-DTL-27686 (0.1 to 0.15% by volume), or MIL-DTL-85470 (0.1 to 0.15% by volume), also referred to as Prist.

CAUTION: DO NOT add unblended Prist directly into the fuel tank. Unblended Prist may damage fuel tank components.

- Methyl cellosolve
 - Biobor JF biocide (270 ppm)
 - Shell ASA-3 anti-static additive
 - Corrosion inhibitors: Appollo PRI-19 (0.0227 g/l), Dupont DCI-4A (0.0227 g/l), Dupont DCI-6A (0.0227 g/l), Hitec E-515 (0.0457 g/l), Hitec E-580 (0.0227 g/l), Nalco 5403 (0.0227 g/l), Nalco 5405 (0.0227 g/l), Tolad 245 (0.0340 g/l).
 - Anti-static additive: STADIS 450 (a), (b), (e), Sigbol (cis), TU-38101741 (0.0005 wt% max.).
 - Anti-icing additives for Russian and Ukrainian fuels:
 - I (per GOST 8313-88), 0.10 to 0.30% max.*
 - I-M (per GOST TU-6-10-1458-79), 0.10 to 0.30% max.*
 - TGF (per GOST 17477-86), 0.10 to 0.30% max.*
 - TGF-M (per GOST TU-6-10-1457-79), 0.10 to 0.30% max.*
- *Standard concentration 0.10 to 0.20% by volume except for extreme cold conditions (below -40 °F).

FUELING

Single-point pressure refueling is limited to 55 psig (3792 hPa) and defueling is limited to -8 psig (-552 hPa).

FUEL TRANSFER SYSTEMS

The Power and Gravity shut-off valves shall be selected off for takeoff.

FUEL LIMITATIONS (CONT)**USABLE FUEL LOAD**

The maximum usable fuel load for each fuel tank is given below:

PRESSURE REFUEL		
FUEL TANK	FUEL MASS †	
Right	7,075 lb	3,210 kg
Left	7,075 lb	3,210 kg
Left & Right	14,150 lb	6,420 kg
† Based on a fuel density of 6.75 lb/USG (0.809 kg/litre), rounded to the nearest 5 lb or 5 kg.		

GRAVITY REFUEL (AIRPLANE LEVEL)		
FUEL TANK	FUEL MASS †	
Right	6,500 lb	2,950 kg
Left	6,500 lb	2,950 kg
Left & Right	13,000 lb	5,900 kg
† Based on a fuel density of 6.75 lb/USG (0.809 kg/litre), rounded to the nearest 50 lb or 25 kg.		

MINIMUM FUEL QUANTITY FOR GO-AROUND

The minimum fuel quantity for go-around is 500 lb (227 kg) per side.

MAXIMUM FUEL IMBALANCE

The maximum allowable fuel imbalance values are detailed in the Flight Crew Operating Manual, Volume 1.



FUEL LIMITATIONS (CONT)

TEMPERATURE LIMITATIONS

Takeoff with Bulk Fuel Temperature indications above 50 °C (122 °F) is prohibited.

With wing bulk fuel temperature indications at 45 °C (113 °F) or above:

- The minimum fuel load for takeoff is 2,800 lbs.
- With less than 1,000 lbs of fuel per side, do not operate engine for more than 30 minutes.

Takeoff with Bulk Fuel Temperature indications below the limits stated in the following table is prohibited:

FUEL TYPE	MINIMUM BULK FUEL TEMPERATURE @ TAKEOFF
Jet A	-30 °C (-22 °F)
Jet A-1	-35 °C (-31 °F)
JP-5	-35 °C (-31 °F)
JP-8	-35 °C (-31 °F)
Jet B	-40 °C (-40 °F)
JP-4	-40 °C (-40 °F)
Russian TS-1	-35 °C (-31 °F)
Russian RT	-40 °C (-40 °F)
Ukrainian TS-1 & RT	-40 °C (-40 °F)
GB 6537-2006 No. 3 JET	-37 °C (-34.6 °F)

POWERPLANT LIMITATIONS**ENGINE TYPE**

AS907–2–1A turbofan propulsion engines.

ENGINE OPERATION

The engine indicating system is designed to show system status with specified colors. The limits are indicated in red .

ENGINE OPERATING LIMITS

LIMIT	GROUND START	AIR START ⑦	IDLE	MAX REVERSE	MAXIMUM CONTINUOUS (CLB) ①	NORMAL TAKEOFF (TO) ②	APR (MAX POWER) ③
N1	--	--	--	70.7% ④	96.5%	96.8%	96.8%
N2	--	--	46.0% min.	--	98.0%	98.0%	98.6%
ITT	650 °C	800 °C ⑤	--	955 °C	950 °C	955 °C	955 °C
OIL TEMP	-40 °C min.	--	⑨	--	138 °C max.	138 °C max. 27 °C min. ⑥	138 °C max.
OIL PRESS	--	--	28 psi min.	⑧	⑧	⑧	⑧

① Climb (CLB) equals maximum continuous thrust (MCT).

② Normal Takeoff power is limited to 5 minutes.

③ APR power (one engine inoperative) is limited to 10 minutes.

④ Maximum reverse thrust is automatically reduced (ramped) commencing at 85 KIAS.

⑤ Maximum ITT limit varies with N2 speed (400 °C when N2 <18% and ITT at start initiation <250 °C).

⑥ Minimum oil temperature must be achieved before commencing takeoff. Below -30 °C (-22 °F) the minimum oil temperature limit is 15 °C provided a fuel system icing inhibitor is used and the Cold Weather Operations procedures in FCOM, Vol. 1 are followed.

⑦ The in flight re-start envelope is defined in figure in chapter 05–32 of this manual.

⑧ Minimum oil pressure varies with engine speed. Maximum allowable oil pressure increases with engine speed and with low oil temperature.

⑨ A minimum oil temperature of 5 °C is required to operate engines above ground idle power. Between 5 and 14 °C, the engines may be operated from idle up to but not including CLB power.

Figure 02–06–1

POWERPLANT LIMITATIONS (CONT)

ENGINE START:

Three consecutive engine start cycles may be conducted, followed by a cooling period of 15 minutes, prior to additional starts and motoring.

The engine must be motored for 30 seconds after an aborted start.

For engine ground starting altitude and temperature limits, refer to the following chart:

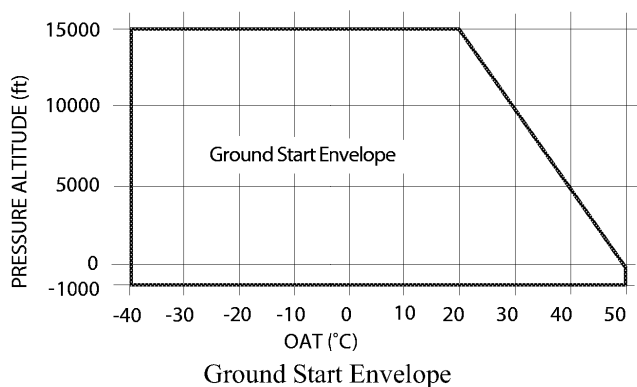


Figure 02-06-2

Fuel system icing inhibitor must be used when fuel temperature is below -20°C (-4°F) (for takeoff only), unless cold weather procedures are followed.

ENGINE CRANKING:

The engine can be motored (cranked) for up to 5 minutes, followed by a cooling period of 15 minutes prior to additional starts or motoring.

OIL

Oils conforming to Honeywell specification EMS 53110, Type II are approved.

THRUST REVERSERS

Limit thrust reverser system use to ground operations on paved surfaces.

Do not attempt to deploy thrust reversers in flight.

Do not use thrust reversers to back up the aircraft.

Do not use thrust reversers for touch-and-go landings.

Reverse thrust above idle reverse is prohibited below 40 KIAS.

AUXILIARY POWER UNIT (APU) LIMITATIONS**APU TYPE**

Honeywell 36–150BD auxiliary power unit.

MAXIMUM ALTITUDE

APU Operation 37,000 ft

APU GEN 30,000 ft

Bleed air for Engine Start 20,000 ft

Bleed air for ECS 20,000 ft

Do not use the APU to start the left engine on the ground above 9,000 ft.

Operation of the APU during fluid de-icing/anti-icing is prohibited.

APU START

The APU may be started up to an altitude of 30,000 ft (14,000 ft on the ground).

The crew must monitor the APU start and abort the start if the APU RPM is less than 30% after 30 seconds (hung start).

On Ground:

Three start attempts may be made, each followed by a one-minute cooling period. After a third start attempt, there must be a 20-minute cooling period. Two more start attempts may then be made. No further attempts may be made for at least 40 minutes. Six successive starts may be made at 10 minute intervals with a one hour waiting period prior to additional start attempts.

In Flight:

Do not start the APU above 285 KIAS.

Following an unsuccessful start or a hung start, do not attempt another start until after landing.

APU OPERATION

The EICAS system is designed to show system status with specified colors.

The maximum and minimum limits are indicated in red.

The maximum APU RPM is 108%.

The maximum APU EGT is:

973 °C for start

718 °C for normal operations.

APPROVED FUELS/OILS

Fuels approved for the main aircraft engines are also approved for the APU.

Refer to appropriate maintenance or servicing manual for approved oils.



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