OPERATIONAL LIMITATIONS

ALTITUDE

Maximum Operating Altitude (Service Ceiling)	41,000 FT
Maximum Takeoff Altitude	8,400 FT
Minimum altitude for Autopilot use on Takeoff	500 Ft AFL
Maximum Flap Extension Altitude	20,000 Ft.
Minimum Speedbrake Deployment Altitude	1000 Ft. RA
Final Flap Setting (Procedural)	1000 Ft. AFL

AMBIENT & ATMOSPHERIC

Maximum/Minimum Takeoff and Landing Temperature Limits	+54°C/-54°C
Maximum Fuel Tank Temp	+49°C
Minimum Inflight Tank Fuel Temp	Jet A - 40ºC, Jet A1 - 43ºC

FLIGHT PLANNING & WEIGHT AND BALANCE

Operational Envelope	Aircraft must only be operated within the approved weight and balance limits.
Maximum Distance for Takeoff Alternate	330NM (FM Part 1 Sec 6)

RUNWAY CONDITIONS

Maximum Runway slope	+/- 2%
Minimum Runway Width	148FT/45 Meters (FM Part 1 Sec 6)
Takeoff Not Authorized under the following conditions: (FM Part 1 Sec. 8 pg 6)	More than 3 inches of dry snow More than ½ inch of wet snow More than ½ inch of slush or standing water Chunks of hardened snow or ice

WIND LIMITS

Maximum T/O & Landing Crosswind	36Kts (Demonstrated, Company Policy)	
Maximum T/O & Landing Tailwind	10Kts, Up to 15Kts only if specified by Special Takeoff and Landing Analysis in Performance Manual	
Crosswind Limitations (Landing) • *Observe Most Restrictive Limit* • Rolling takeoff is strongly advised when crosswind exceeds 20 knots • All winds include gusts • May be further restricted for Restricted Captains (Exemption 5549, FM Part I, Sec. 10) • For dispatch to an airport, use steady state winds	***Runway Condition***	***Limit***
	Dry	36
	Fair	20
	Poor	10
	Visibility	
	Less than ¾ mi (4000 RVR)	15
	Less than ½ mi (1800 RVR)	10
	Instrument Approach	
	Non-ILS (Less than ¾ mi 4000 RVR)	15
	CAT I ILS	15
	CAT II or CAT III	10
Runway Width Less than Standard	20Kts (FM Part 1 Sec 6)	
Maximum Tailwind for CAT II and CAT III	10Kts	
Maximum Headwind for CAT II and CAT III	25kts	
Maximum Wind Gust	50Kts (Except in an emergency)	

AIR CONDITIONING AND PRESSURIZATION

With Engine Bleed Air Switches ON, do not operate the air conditioning packs in HIGH for takeoff, approach or landing.
Maximum Cabin Differential Pressure (System Relief): 9.1 PSI
Maximum Differential Pressure for T/O and Landing: 0.125 PSI
Use of wing anti-ice above approximately FL350 may cause bleed trip off and possible loss of cabin pressure.
Max Altitude for unpressurized flight following an inflight depressurization: 14,000FT (may be exceeded for terrain avoidance)
Maximum Altitude when aircraft is dispatched for unpressurized flight: 10,000FT

LIMITATIONS

AIRSPEEDS	
Maximum V Speed (Vmo)	340 knots (observe Vmo pointer and gear/flap placards)
Maximum Mach Operating Speed (Mmo)	.82 Mach
Turbulent Air Speed	280K/.76M
Maximum Landing Gear Extended	320K/.82M
Maximum Landing Gear Extension	270K/.82M
Maximum Landing Gear Retraction	235K
Maximum Speed with 1 LED stuck-out	300K/.65M (280KIAS in turbulence-QRH, FLT-C)
Maximum Speed with > 1 LED stuck out.	230K (QRH, FLT-C)
Maximum Alternate Flap Extension Speed	230K (QRH, FLT-C)
Elevator Tab Limit Cycle Oscillation (LCO) Speed	270K or less or until the vibration ceases (QRH, FLT-C)

APU

ALTITUDES

Maximum APU Operating Altitude	41,000 Ft.
Maximum APU Start Altitude	41,000 Ft. (FL250 Recommended)
Maximum APU Electrical Load Altitude	41,000 Ft.
Maximum APU Bleed Load Altitude	17,000 Ft.
Maximum APU Combined Bleed and Electrical Load Altitude	10,000 Ft.

Normal APU Fuel Source	Tank 1
Alternate APU Fuel Source	Center Tank with (L) CTR pump ON.
Maximum APU Start Time	120 Sec.
Minimum voltage for APU Start	18V (Removed from OM)
Time it takes for APU inlet door to close	20 seconds after OFF selected. (wait 1+20 before selecting BATT off)
APU Operation during refueling	Do not attempt to start or shutdown APU while refueling is in progress due to the possibility of vapors igniting.

APU Bleed valve must be closed when:

- Ground Air is connected and isolation valve is open
- Engine No. 1 bleed valve is open
- Isolation valve and engine No. 2 bleed valves are open

APU bleed valve may be open during engine start, but avoid engine power above idle.

ELECTRICAL

Integrated Drive Generators (IDG)

Number	2
Frequency	400 Hz ±10 Hz
Voltage	115 Volts ±5 Volts
Rated Output	90 KVA

Normal Battery Voltage	26Volts ±4 Volts

EVACUATION SYSTEMS

- Any time passengers are onboard prior to aircraft movement at least one floor level exit must be Open or Armed.
- Any time the airplane is in motion all door slides must be armed.
- Any time passengers are onboard and fueling is in-progress at least one flight attendant must be onboard and the Jetbridge or passenger stairs must be attached to the aircraft with an entry Door open. If stairs are not available, All useable exit doors must be closed and armed with a flight attendant manning each armed door or station (FM 1 Sec 7).
- Electrical power must be provided to the aircraft prior to passenger boarding (FM 1 Sec 7).
- Door 1L is the only door that may be opened with both engines running. Jetbridge must be attached.

FLIGHT CONTROLS

Holding in Icing Conditions	Prohibited with flaps extended (AFM)
Minimum Altitude for deployment of Speed brakes	Do not deploy speed brakes in flight at radio altitudes below 1000 FT (AFM)
Speed Brake extension limit	In flight, do not extend Speed Brake Lever beyond the FLIGHT detent. (AFM)
Maximum flap extension altitude	20,000 feet (AFM)

FLIGHT INSTRUMENTS

HEADS UP DISPLAY (HUD)	
HUD and No. 1 Radio Altimeter	Use of HUD with an inoperative Number 1 Radio Altimeter (RA) is prohibited. (AFM)
HUD Modes	NP – ILS approaches, terminal area or enroute flight. AI – CAT I approaches AII – CAT II approaches AIII – CAT III approaches, may be selected at any time above 500 ft AGL, needs up to seven seconds from selection to engagement (*before* reaching 500ft AGL).
Glideslope Angle	Default: 3° Valid range: 2.00° to 4.00° AIII valid range: 2.5° to 3.0°
Runway Length	Default: 10,000 ft. Valid range: 5000 to 15000 ft AIII valid range: 5500 to 13600 ft.
Runway Elevation	Default: -0- ft, when a runway is selected for departure or arrival, the navigation database runway elevation is set as the default. Valid range: -1000 to 12000 ft.

RVSM OPERATIONS	
Maximum allowable in-flight difference between Captain and First Officer altitude displays	200 Ft.
Maximum allowable on-the-ground difference between Captain and First Officer altitude displays	• 50 Ft. (From Sea Level to 5000 Ft.) • 60 Ft. (From 5001 to 10,000 Ft.)
Maximum allowable on-the-ground difference between Captain *or* First Officer altitude displays *and* field elevation	75 Ft.
Standby altimeter does not meet altimeter accuracy requirements of RVSM airspace.	

ICING CONDITIONS

Icing Conditions are said to exist when the OAT/TAT is 10°C (50°F) or below **and:**

- Visible moisture in any form is present (Clouds, Fog with visibility of less than 1 mile, Rain, Sleet, Snow and Ice Crystals)

-or-

- When operating on ramps, taxiways or runways where surface snow, ice, standing water or slush may be ingested by the engines or freeze on the engines and nacelles.

Engine ignition must be **ON** when operating in icing conditions.

Engine Anti-Ice must be **ON** during all ground operations and flight operations when ***icing conditions exist or are anticipated*** except during climb and cruise below SAT of -40°C.

Do not operate engine or wing anti-Ice when the total air temperature (OAT/TAT) is above +10°C (50°F).

LIMITATIONS

MISCELLANEOUS LIMITATIONS

AUTOFLIGHT

Autopilot use after takeoff	Do not engage autopilot below 500AFL
Single Channel Operations during approach	Autopilot shall not remain engaged below 50 FT AGL (AFM)
Aileron Trim	Must not be used with autopilot engaged
Minimum Altitude during Non-ILS Approaches	Autopilot must not be engaged below 50 FT below the MDA
Dual Channel Autopilot Approaches	Prohibited

COMMUNICATIONS

HF Radio Operations	If one HF radio is selected for transmission, deselect the other HF radio on all audio select panels to prevent audio interference.	
HF Radio Power Output (From maintenance manual)	**Modulation Technique**	**Power Output**
	USB	400 Watts PEP
	AM	125 Watts

FUEL

Minimum Dispatch Fuel	See FAR 121.639, 121.647 (FM Part 1 Sec 6)
Reserve Fuel (45 minutes)	4,080 LBS (for manual flight planning purposes)
Maximum Fuel Capacity	46,000 LBS – 6,875 Gallons (6.7 lbs/U.S. gallon)
Tank 1 and 2 Capacity	8,600 LBS – 1,288 Gallons
Center Tank Capacity	28,800 LBS – 4,299 Gallons
Minimum Fuel for ground operation of Electrical Hydraulic Pumps	1,675 LBS in related Main tank. (OM II – Hydraulics)
Maximum Fuel Tank Temp	49ºC
Minimum Inflight Tank Fuel Temp	Jet A - 40ºC, Jet A1 - 43ºC
Ballast Fuel	NOT AUTHORIZED
Crossfeed Valve	Must be closed for Takeoff & Landing
Maximum Lateral Moment	Main tanks 1 and 2 must be full if center tank contains more than 1000 LBS
Maximum Lateral Imbalance	• Tank 1 and Tank 2 must be scheduled to ZERO • Random fuel imbalance must not exceed 1000LBS for taxi, takeoff, flight or landing
Center Tank Fuel Pumps (AFM)	• For Ground Ops, Center Tank Fuel Pump Switches must not be ON unless the center tank fuel quantity exceeds 1000 pounds, except when defueling or transferring fuel. • Center Tank Fuel Pump Switches must be turned OFF when both center tank fuel pump LOW PRESSURE lights illuminate. If a center tank fuel pump LOW PRESSURE Light(s) illuminate during takeoff or climb, the center tank pump(s) may remain on until the climb attitude is reduced and the light(s) extinguish or workload allows for the pumps to be turned OFF. • Center Tank Fuel Pumps must not be ON unless personnel are available in the flight deck to monitor LOW PRESSURE Lights.
Fuel Specifications (Systems)	Standard Fuels: Jet A and Jet A-1 Alternate Fuels: JP-5 and JP-8 Prohibited Fuels: JP-4 and Jet B
Refueling (Systems) (Do not operate HF or WX radar [except in test mode], ground equipment must be positioned under wing-tips, fuel supply unit and aircraft must be properly bonded [ground wires])	• No.1 and No.2 Main tanks should normally be scheduled equally until full, additional fuel is then loaded into Center Tank. • Main tanks must be scheduled full if the Center tank contains more than 1000 pounds. With less than 1000 pounds of center tank fuel, partial main tank fuel may be loaded provided the effects of balance have been considered. • Recommended maximum nozzle pressure is 50 psi, this is approximately 300 U.S. gallons per minute. • A fueling control panel containing all the controls required for operation of the refueling system is located in the lower leading edge of the right wing.

MISCELLANEOUS LIMITATIONS

LANDING GEAR and TIRES

Brakes	Do NOT apply brakes until after touchdown
Tire Pressure	195 PSI Minimum on stem pressure gauge
Maximum Tire Speed	196 Kts (225 Mph as specified on tire)

OXYGEN

Minimum Crew Oxygen for Dispatch	1000 PSI Recommended, See Preflight and MEL 35-2 for pressure/temperature chart.
Maximum Preflight Oxygen pressure	1850 PSI
Normal Duration of Passenger Oxygen	12 mins

POWERPLANT

Powerplant	CFM56-7B26 22K, 24K, 26K, 27K Max Power Rating. Produces 26,400 LBS of static thrust at Sea Level (27,000 Lbs Thrust Bump Orange County (SNA) only)
Reverse Thrust	Intentional use of reverse thrust inflight is prohibited
Engine Display Markings	RED: Maximum and Minimum AMBER: Caution limits GREEN: Normal limits
EEC Operations	Both EEC's must be ON for Takeoff If EECs are in Alternate mode for Takeoff: • Both EEC's must be in Alternate mode • 26K Max (27K Max at KSNA) takeoff thrust must be used • Do not use the FMS takeoff N1 or V-Speed values • Use of autothrottle for takeoff is prohibited
Engine Ignition Must Be On	**TILT OVER** **T**akeoff [CONT or AUTO] **I**cing Conditions (Anti-ice operations) [CONT or AUTO] **L**anding [CONT or AUTO] **T**urbulence (Maneuvers [FLT]) **O**perating in heavy rain [CONT] **V**olcanic Ash (QRH MISC, [FLT]) **E**mergency Descents (Maneuvers/QRH 12.1 [CONT]) T**r**aining,Test & Thrust Bump Flights

FLIGHT DECK DOOR and ACCESS SYSTEM

Reinforced Flight Deck Door and Flight Deck Access System (AFM)	Accomplish Pre-Flight check prior to the first flight of the day

WEATHER RADAR

Weather Radar	Do not operate weather radar during fueling, near fuel spills, or people

NAVIGATION PERFORMANCE

Maximum Flight Operating Latitudes	82N through 82S
Operating Latitude Exceptions	80W–130W (70N) and 120E–160E (60S)
Non-ILS LNAV Approach RNP	0.3 NM
RNP Specified on Approach Plate	Use as specified
Air Data Inertial Reference Unit (ADIRU)	ADIRU alignment must not be attempted at latitudes greater than 78°15"
Global Positioning System (GPS) (AFM)	GPS updating must be disabled for approach operation when operating outside the United States National Airspace, if the FMC database and charts are not referenced to WGS-84 reference datum, unless other appropriate procedures are used.

LIMITATIONS

WARNING & ALERT

Ground Proximity Warning System (GPWS) (AFM)

- Do not use the terrain display for navigation.
- Do not use the look-ahead terrain alerting and terrain display functions within 15nm of takeoff, approach or landing at an airport not contained in the GPWS terrain database. Note: All company approved airports (regular, provisional, refueling, alternate and designated emergency airports) are in the GPWS airport database.

WEIGHTS

Weights	Pounds
Maximum Taxi Weight	**174,700 lbs**
Maximum Takeoff Weight (TOW)	**174,200 lbs**
Maximum Landing Weight	**144,000 lbs**
Maximum Zero Fuel Weight (ZFW)	**136,000 lbs**

CONDITIONS THAT PROHIBIT STANDARD THRUST FOR TAKEOFF

Maximum Takeoff Thrust at any thrust rating (22K, 24K, 26K) must be used:	• Tailwind. • Wet runway. • Load closeout weight (TOW) exceeds Assumed Takeoff Weight (ATOW). New closeout can be requested. • MEL/CDL items containing weight restriction. • Engine Anti-ice is used and the TPS THRUST/V-SPEED section does not indicate ANTI-ICE ON.
Maximum Takeoff Thrust (26K) must be used: (NO DERATE)	• Improved performance • Runway contaminated by standing water, slush, snow or ice. • Windshear is reported or expected. • When FM-II Airport Advisory requires Maximum Thrust.