PMDG MD-11 Simulation

Flight Crew Operating Manual

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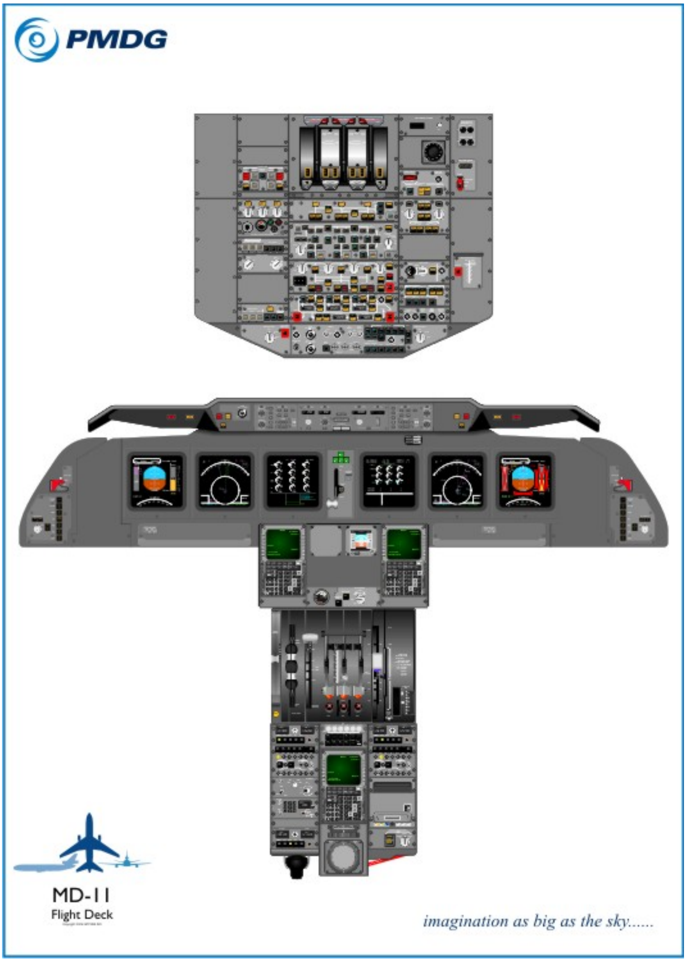

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Flight Crew Operating Manual

About this Manual

This PMDG MD-11 Flight Crew Operating Manual (FCOM) is designed to help simulator pilots learn how to operate the PMDG MD-11 simulation correctly in all phases of flight. The manual provides Normal Procedures, Supplemental Procedures, Abnormal Procedures and profiles that describe how the airplane simulation should be flown in various phases of flight.

How to use this Manual

The PMDG MD-11 represents a completely different type of airliner simulation than the community is accustomed to. Most users within the flight simulation community are comfortable flying simulations of the traditional Boeing and Airbus style cockpits, so the PMDG MD-11 will prove to be a unique and different learning experience. The beauty of the MD-11 is that the airplane is at once a marvelously automated airplane, (making it easy for beginning simulator pilots just stepping into the world of airliner simulations) but it is also an incredibly feature rich and highly sophisticated airliner that promises many hours of learning and exploration for experienced simulator pilots.

This FLIGHT CREW OPERATIONS MANUAL is designed to guide you through various aspects of operating, flying and managing the MD-11 simulation. While most simulator pilots will eventually feel right at home conducting takeoffs and landings in the PMDG MD-11, this manual will help you learn and utilize realistic procedures to conduct takeoffs, rejected takeoffs, engine out climbs, normal climbs, descents and various approaches to landing.

It is recommended that you spend at least some time going through the tutorial provided with your PMDG MD-11 simulation as this tutorial will take you through some of the basics of operating the PMDG MD-11. This manual will provide you with a far deeper understanding of what tasks the pilot should perform in each phase of flight, and how the tasks are put together to make a complete flight from startup to shutdown.

Gaining the most from this Manual

We recommend that you first scan through this manual without spending too much time studying in depth. This will acquaint you with the material covered in the manual, and better prepare you for the more detailed reading that will come next.

On subsequent readings, have the simulator available in front of you so that you can follow through with the procedures and see how the airplane and systems respond to pilot activities in each phase of flight.

When you are comfortable with each section, move on to the next section in order, and your knowledge of the airplane will grow with your progress.

The most enjoyable section of this manual, the Flight Profiles, is where you will learn how to fly the airplane through each critical phase of flight. From takeoff, to various types of approaches, to landing and taxiing on the airfield, this chapter will give you all of the skills you need to successfully maneuver the PMDG MD-11 simulation through any phase of flight.

Learning more about the PMDG MD-11

A full course of learning is a must for any aviator, and for this reason we recommend that simulator pilots first read through the PMDG MD-11 Systems Manual. Completing the Systems Manual will give you the foundation of knowledge necessary to understand how the airplane functions, and how your activities in the cockpit effect the operation of the airplane.

After completing the Systems Manual, moving on to this FLIGHT CREW OPERATING MANUAL will help you to build upon your understanding of the airplane by introducing you to proper procedures and operating techniques for your simulated flights.

In combination with one another, this FCOM and the Systems Manual provide a complete course of study for pilots who wish to operate the PMDG MD-11 effectively.

What should I know before I read this Manual?

The best way to gain benefit from this material is to Use this manual as your constant reference when getting started with the PMDG MD-11. Whether you are a novice simulator pilot or a veteran captain for your virtual airline, this manual will keep you flying safely.

Understanding the following "norms" will help you to understand how this manual is laid out and how each section is useful to you.

Normal procedures: Normal Procedures are the step by step instructions that crewmembers should follow while conducting the normal operation of the airplane. Following the normal procedures will help you to keep the operation of the MD-11 airplane moving forward in a logical and systematic manner.

Supplementary Procedures: This chapter is similar to the normal procedures section except that it provides specific procedures to be followed in situations that are not normally encountered in day-to-day line operations of the MD-11, such as various packs on/off configuration takeoffs, unpressurized flight instructions, Cat II and Cat III notes and procedures, etc. Pilots should be familiar with what topics are covered in the supplementary chapter in order to know when they should reference this chapter for assistance in operating the airplane correctly.

Emergency Procedures: This chapter provides checklists and decision making trees to assist with many of the more common emergency type situations that may arise in flight. (Your QRH should always take precedence when handling emergency conditions.)

Performance Data: This chapter contains many performance related tables to assist in flight planning.

Procedures and Techniques: This chapter provides recommended methods for accomplishing many standard operations such as ILS approaches, VOR approaches, NDB approaches, engine out approaches, etc. Use this chapter thoroughly when learning to fly the simulation.

Limitations: The Limitations section will help you to become familiar with the manufacturers recommended limitations as they apply to the operation of the airplane and its systems. Pilots should be familiar with all aspects of the MD-11's limitations.

The emergency procedures section of this manual and the Quick Reference Handbook (QRH) provide the pilot with many decision making trees to assist in trouble shooting, localizing problems with the airplane, and configuring the airplane for continued safe flight after the loss of a system

The decision making trees, along with the various types of warnings and annunciations play an important role in the safe operation of the airplane.

Example of a Decision Tree

AIRCRAFT ON GROUND

NO

Call Maintenance.

No takeoff is permitted.

[END]

Land at nearest suitable airport.

Expect battery direct bus failure.

[END]

When a procedure has been completed, no matter where on the page this occurs, the word [END] as depicted here will appear.

Warnings/Cautions/Notes

The following definitions and presentations apply to WARNINGS, CAUTIONS, and NOTES.

<u>**WARNING:**</u> **Operating procedures, techniques, etc., which could result in personal injury or greater consequences if not carefully**

followed. Warnings are printed in bold face type and the word/WARNING is underlined.

CAUTION: **Operating procedures, techniques, etc., which could result in damage to equipment if not carefully followed. Cautions are printed in boldface type.**

NOTE: Operating procedures, techniques, etc., which are considered essential to emphasize. Information contained in notes may also be safety related. The heading and text are italicized.

Alerts and Consequences

There are four basic levels of alert information. Most alerts are inhibited from throttle advance or 80 knots to 400 or 1000 feet on takeoff, and from 1000 feet to 80 knots on landing. Additionally the alert inhibit function is released after 2 minutes if the aircraft has not landed.

Level 3 Alerts

Level 3 alerts (red) indicate emergency operational or aircraft system conditions which require immediate awareness and action by the crew. These action(s) either correct or compensate for, the aircraft system condition. Level 3 alerts are displayed on the Engine and Alert Display (EAD) within a red rectangular box with the alert message preceded by a red triangle. The two red MASTER WARNING lights will flash and an aural warning will sound simultaneously with the display of a Level 3 alert. The MASTER WARNING lights can be reset by pushing the associated illuminated cue switch in the System Display Control Panel or by pushing either MASTER WARNING light.

The Level 3 alerts are not resettable and will remain on the EAD until the condition is corrected or no longer exists.

Example of a Level 3 Alert:

▶AIR MANF__FAIL

Level 2 Alerts

Level 2 alerts indicate abnormal operational or aircraft system conditions which

require immediate awareness and action by the crew. These action(s) either correct or compensate for, the aircraft system condition. Level 2 alerts are displayed on the EAD enclosed within an amber rectangular box. The two amber MASTER CAUTION lights will illuminate simultaneously with the display of a Level 2 alert. The MASTER CAUTION lights can be reset by pushing the associated illuminated cue switch on the System Display Control Panel, or by pushing either amber MASTER CAUTION light. Pushing the cue switch will also cause the associated system synoptic to be displayed and, in most cases, the Level 2 alert will be removed from the EAD and be replaced by a reminder message in the lower right-hand corner of the EAD.

Level 2 alerts are generally resettable and under certain conditions may be inhibited by a display of a more serious alert.

AVNCS AIR FLO OFF

Level 1 Alert

Level 1 alerts indicate abnormal operational or aircraft system conditions which require crew awareness and may require subsequent compensatory action. However, they normally do not affect safety of flight. Level 1 alerts are amber and not enclosed in a rectangular box. They may be displayed on the EAD or only on the system synoptic display. The two MASTER CAUTION lights may illuminate simultaneously with the display of a Level 1 alert on the EAD. Other Level 1 alerts may be annunciated by a flashing reminder message in the lower right-hand corner of the EAD and illumination of a system display cue switch. Some level 1 alerts that appear on the EAD are resettable.

The MASTER CAUTION lights can be reset by pushing the associated illuminated cue switch on the system display control panel, or by pushing either amber MASTER CAUTION light. A flashing reminder message can be reset by pushing the associated cue switch which will display the system synoptic display. The Level 1 alert on the EAD or the flashing reminder message will then be replaced by a steady (non-flashing) reminder message on the EAD.

Level 0 Alerts

Level 0 alerts indicate operational or systems status information. They are

displayed on the EAD in cyan and are not enclosed in a box. Level 0 alerts do not activate the MASTER WARNING or MASTER CAUTION lights. Level 0 alerts are not resettable but will be removed from the EAD when the condition causing them no longer exists.

Consequences

When certain level 3, 2, or 1 alerts are displayed, electronic messages called "consequences" will be displayed at the bottom of the system synoptic page.

These statements may include both the consequences of the malfunction and guidance toward necessary crew action. Information contained in the consequence statements includes system capability or limitations (e.g., WING A-ICE NOT AVAILABLE), crew response required by the condition (e.g., MAY HAVE TO DEPART ICING AREA), a prohibition as a result of the condition (e.g., DO NOT CONNECT EXTERNAL POWER) or cause of the failure (e.g., YAW DAMP CHAN FAILED).

System Controller Auto and Manual Operation

The aircraft systems are designed to be operated primarily in the automatic mode, each managed by a single-channel or dual-channel automatic system controller. In the case of a single-channel failure in a dual-channel controller, the controller will continue to operate normally. In the event of a total controller failure, each system will revert to a safe programmed configuration and can be manually operated by the flight crew. The associated system display synoptic and the Pilot's overhead panel will always display the actual system configuration.

When the automatic system controllers are operating in the automatic mode and an overhead panel switch is pushed, no switch action will result and the associated system's MANUAL light will flash. If manual operation of the panel switch is required, the system must be transferred to the manual mode by pushing the system switch.

In the automatic system controllers of the HYDRAULIC system, AIR system and FUEL system (which are dual-channel controllers), certain transient failures can be reset by switching to the other channel of the controller. This can be accomplished by selecting the associated system to MANUAL mode, and then back to AUTO. Note any fault in the maintenance log that is cleared by this procedure. Preflight tests that are in progress will be interrupted by this procedure and must be re-accomplished either automatically or manually.

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Limitations/Recommendations

General

The following include suggested operational recommendations and FAA approved limitations. The FAA approved limitations are from the FAA Approved Airplane Flight Manual and are preceded by an asterisk (*). The suggested operational recommendations in this section are not preceded by an asterisk.

General Description

Limitations

* This aircraft must be operated in compliance with the limitations contained in this section.

Maximum Weight

* The weights below may be further reduced by the following limitations:

- Operating Limitations
- Center of Gravity Envelope
- Fuel Loading
- Fuel Management

*Maximum Weight Tables

TAXI (LB)	START OF T/O (LB)	INFLIGHT (LANDING FLAPS) (LB)	LANDING (LBS)	ZERO FUEL (LB)	AIRCRAFT SERIAL NUMBERS
633,000	630,500	491,500	491,500	461,300	N/A (1)(2)(3)
633,000	630,500	484,500	481,500	451,300	N/A (1)(2)(3)
621,000	618,000	474,500	440,000	410,000	

NOTE: (1) The maximum taxi weight is 621,000 pounds and the maximum start of takeoff weight is 618,000 pounds.

(2) This particular weight configuration is applicable to model MD-11F (Freighter) only.

(3) The maximum taxi weight of 633,000 pounds and the maximum start of takeoff weight of 630,500 pounds.

*Maximum Weight Tables Center Gear Retracted

TAXI (LB)	START OF T/O (LB)	INFLIGHT (LANDING FLAPS) (LB)	LANDING (LBS)	ZERO FUEL (LB)	AIRCRAFT SERIAL NUMBERS
448,000	445,000	403,000	400,000	370,000	N/A

Minimum Flight Weight

* The minimum flying weight is 257,000 pounds.

Kinds of Aircraft Operation

* This aircraft is certified in the transport category for the following kinds of operation (both day and night) when the required equipment is installed and approved as required by the appropriate Federal Aviation Regulations.

- VFR
- IFR

- Icing Conditions
- Extended Overwater

Minimum Flight Crew

* Two (2) pilots appropriately qualified.

Main Deck Cargo Door (For Aircraft So Equipped)

* Before flight it must be verified that the external lockpin handle is flush and visually verify the latch lockpin is positioned past the cam as per the placard.

NOTE: These limitations are NOT applicable when Main Deck Cargo Door is equipped with automatic vent door and electrical control panel.

Spoilers

* **Inflight Speed Brakes.** Used only in the zero (0) degree flap configuration, with or without slats extended.
* **Auto-Ground Spoilers.** Must be operative for takeoff except when the aircraft operation is based on the Auto-Ground Spoilers Inoperative Appendix.

Center Gear

* The center gear must be extended for takeoff and landing except when the aircraft performance is based on Center Gear Retracted Appendix. If the center gear is removed/ retracted, the aircraft operations must be based on the Center Gear Retracted Appendix.

Elevator Load Feel

* The ELEV FEEL switch must be in the AUTO position except for an abnormal condition.

Reduced Vertical Separation Minimums (RVSM)

* Manual switching to the alternate static system is prohibited for RVSM operation.

Onboard Maintenance Terminal (OMT) (If Installed)

* Use of OMT keyboard and display is restricted to authorized maintenance personnel

Reverse Thrust

* Use of reverse thrust is prohibited in flight.

Anti-Skid

* Anti-skid must be operative for takeoff except when the aircraft operation is based on the Anti-Skid Inoperative Appendix.

System Controller Test

* Do not switch environmental system controller from AUTO to MANUAL or MANUAL to AUTO during preflight test.

NOTE: Air system preflight test is initiated by pushing and holding ANNUN LT TEST button until "AIR SYS TEST" alert is displayed.

Weather Radar

* The accuracy of the turbulence detection mode has not been evaluated by the FAA and flight is not to be predicated on its use.

Para Visual Director (PVD) System (If Installed)

* The PVD system is not approved for use as a primary guidance device in low visibility conditions.

Aircraft Communications Addressing Reporting System (ACARS) (If Installed)

* The Aircraft Communications and Reporting System (ACARS) is limited to the transmission and receipt of messages which do not create an unsafe condition if:

  • The message or parts of the message are delayed or not received,

  • The message is delivered to the wrong recipient, or

- The message content may be frequently corrupted.

Reactive Windshear Detection and Recovery Guidance System (WSS)

* During sustained banks of greater than 15 degrees the Honeywell Windshear Detection and Recovery Guidance System (WSS) is desensitized and alerts resulting from encountering windshear conditions will be delayed.

Predictive Windshear System (PWS)

* The predictive windshear system, if installed and operable, must be on for takeoff.

Centralized Fault Display System (CFDS)

The CFDS is primarily a maintenance system.

Only authorized (CFDS trained) flight crew may have access to the CFDS.

Structural Design Limitations

Flight Maneuvering Load Acceleration Limitations

* Use the following configurations for flight maneuvering load acceleration limitations.
  - Flaps up/slats retracted+2.5g to -1.0g
  - Flaps and slats extended+2.0g to 0.0g
  - Flaps or slats extended+2.0g to 0.0g

The positive maneuvering limit load factors limit the angle of bank in turns and limit the severity of pull-up maneuvers.

Maximum Operating Speeds

* The maximum operating speed Vmo/Mmo may not be deliberately exceeded in any regime of flight (climb, cruise, or descent.)

* The MD-1 1 has two Vmo/Mmo speed ranges which are defined on the following pages.

* When the wing tip fuel tanks are 60% full or less, the Vmo/ Mmo is 320 KIAS at sea level to 30,704 feet and .85 Mach above 30,704 feet. The transition between the two speeds begins at 90% tip fuel and varies linearly down to 60% tip fuel. VLO landing gear retraction and VLO landing gear extension are the maximum speeds for which retraction and extension of the aircraft landing gear can be safely flown.
The landing gear extended speed, VLE, is the maximum speed at which the aircraft can be safely flown with the gear extended.

* Full application of elevator controls, as well as maneuvers that involve angles of attack near stall, should be confined to speeds below Va, the design maneuvering speed.

  • Autoslat extended maximum speed is 280 KIAS or .55 Mach.

Center of Gravity Envelope

* Refer to center of gravity envelope section in the MD-1 1 Performance volume.

Weight and Balance

The aircraft must be loaded in accordance with a loading schedule compatible with the information in the applicable manufacture's Weight and Balance manual,

* The weight and balance system is supplementary and must not be used as the primary data source. The aircraft must be loaded in accordance with a loading schedule compatible with the information in the applicable manufacture's Weight and Balance manual, MDC-K0032 (passenger aircraft), MDC-K5 542 (freighter aircraft), MDC-K5 543 (freighter - combi aircraft), or MDC-93K1 163 (convertible freighter aircraft).

* Fuel system scheduling/testing must be completed and tug disconnected for WBS operation.

* WBS data must not be loaded into FMS data fields unless the TOGW agrees within +1/-0% of the load sheet gross weight and TOCG/ZFWCG agrees within ±1% MAC.

Operational Limits

Operating Limitations

* Limits for altitude and temperatures are shown on the Environmental Envelope, in this section.
* Runway slope ±2%.
* Limiting tailwind component 10 knots for takeoff and landing.
* Quick turn-around time limits are presented in the applicable Performance volume.
* REQUIRED PERFORMANCE CORRECTIONS found in Section 4A must be applied.

Demonstrated Crosswind

For takeoff and landing, the maximum demonstrated crosswind value is 35 knots.

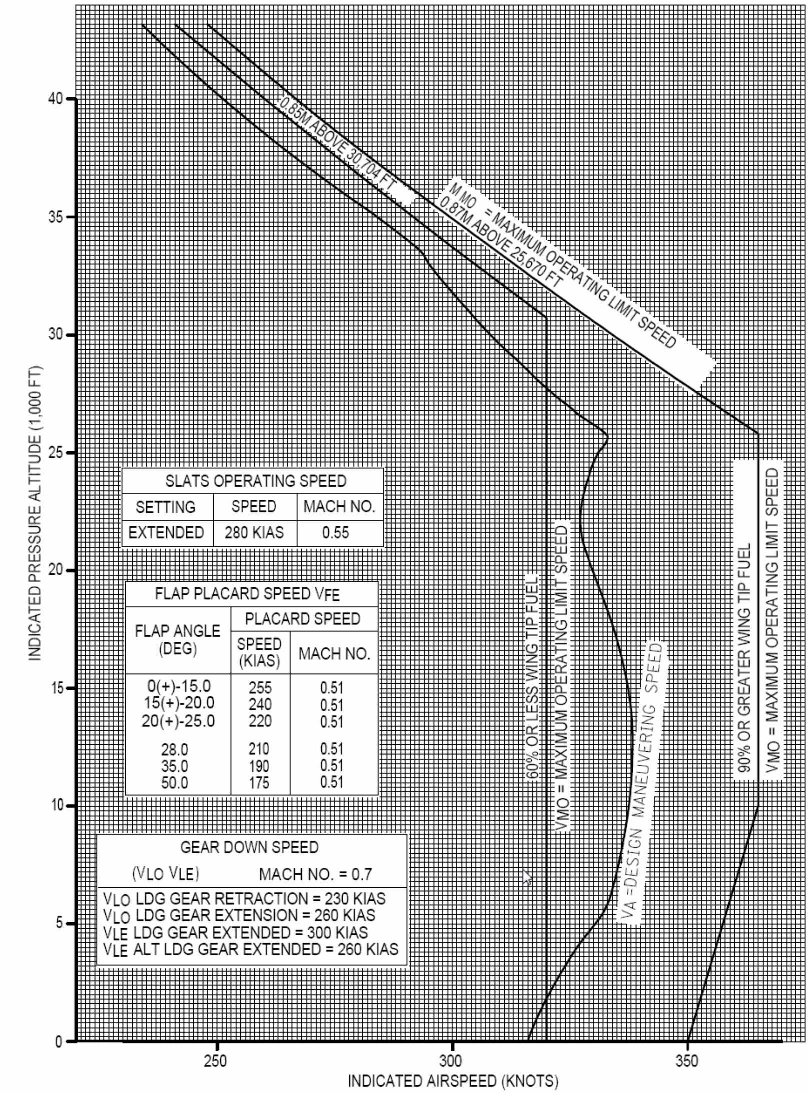
This value is valid with normal hydraulic systems operating or with one hydraulic system inoperative.

Start of Takeoff Weight

* Maximum takeoff weight can be determined by the following charts but may be limited by the most restrictive applicable charts:
    - SECOND SEGMENT LIMITING WEIGHT
    - WEIGHT LIMITED BY FUEL DUMPING
    - MAXIMUM TIRE SPEED LIMITING WEIGHT
    - OBSTACLE CLEARANCE, TAKEOFF FLIGHT PATH
* Takeoff field length requirements can be determined from either the balanced field length method or the unbalanced field length method.

* The balanced field length method uses the following charts:
  - MAXIMUM TAKEOFF WEIGHT FIELD LENGTH LIMITS
  - TAKEOFF FIELD LENGTH WHEN LIMITED BY MAXIMUM BRAKE ENERGY
* The unbalanced field length method uses the following charts:
  - MAXIMUM TAKEOFF WEIGHT FIELD LENGTH LIMITS
  - CORRECTIONS TO TAKEOFF DISTANCE TO 35 FEET
  - CORRECTIONS TO ACCELERATION-STOP DISTANCE
  - UNBALANCED TAKEOFF FIELD LENGTH

MAXIMUM OPERATING SPEEDS



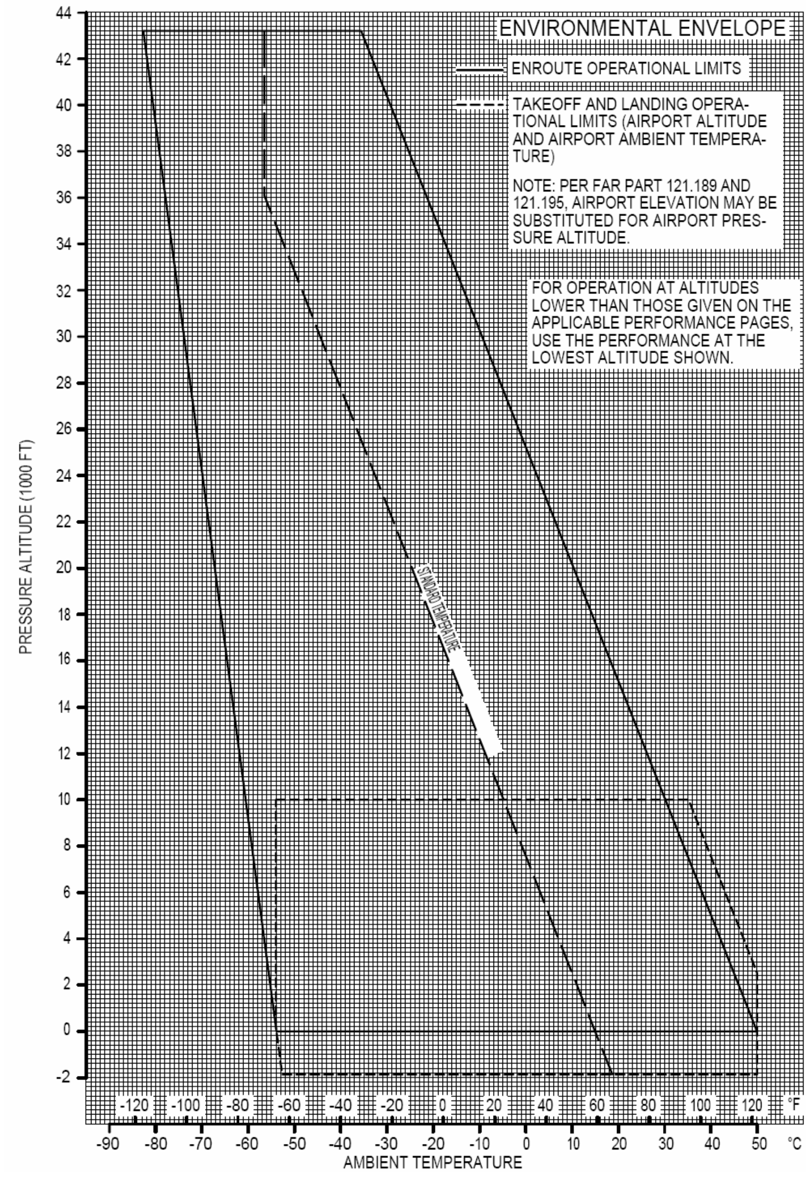
SLATS OPERATING SPEED		
SETTING	SPEED	MACH NO.
EXTENDED	280 KIAS	0.55

FLAP PLACARD SPEED V_{FE}		
FLAP ANGLE (DEG)	PLACARD SPEED	
	SPEED (KIAS)	MACH NO.
0(+)-15.0	255	0.51
15(+)-20.0	240	0.51
20(+)-25.0	220	0.51
28.0	210	0.51
35.0	190	0.51
50.0	175	0.51

GEAR DOWN SPEED	
(V_{LO} V_{LE})	MACH NO. = 0.7

V_{LO} LDG GEAR RETRACTION = 230 KIAS
V_{LO} LDG GEAR EXTENSION = 260 KIAS
V_{LE} LDG GEAR EXTENDED = 300 KIAS
V_{LE} ALT LDG GEAR EXTENDED = 260 KIAS

Environmental Envelope Chart



Zero-Fuel Weight

* If the maximum takeoff weight determined using the preceding procedure is less than or equal to the weight determined from the APPROACH CLIMB LIMITING WEIGHT chart at the takeoff conditions, the zero-fuel weight is not limited by operational requirements. Otherwise, the maximum zero-fuel weight is the weight determined from the APPROACH CLIMB LIMITING WEIGHT chart at takeoff conditions, decreased by 42,300 pounds.

Landing Weight

* Maximum landing weight is determined from the following charts and is limited by the most restrictive.
* Maximum approach and landing weight is determined from APPROACH CLIMB LIMITING WEIGHT or LANDING CLIMB LIMITING WEIGHT charts.
* Landing field length requirements are determined from MAXIMUM LANDING WEIGHT FIELD LENGTH LIMITS chart.

Air System

Cabin Pressurization

* Maximum relief valve differential pressure = 9.1 psi.
* Maximum differential pressure at takeoff and landing = 0.5 psi.
* Unpressurized flight must be conducted with the cabin pressure control in MANUAL and the outflow valve between 1/2 to 2/3 open.

Air System Management

* Do not interconnect two or more active engine pneumatic supply systems.

Maximum recommended operation for any one engine pneumatic supply in addition to lavatory/galley vent and cargo heat and vent is as follows:

- Two air conditioning packs, unless airfoil anti-ice or engine cross bleed start is required.
- If airfoil anti-ice is required, and one bleed system is inoperative:
  - One pack plus wing anti-ice (both wings) or,
  - One pack plus wing anti-ice (one wing only) and tail anti-ice.
  - If airfoil anti-ice is required, and two bleed systems are inoperative:
  - Avoid/depart icing conditions
  - One pack plus wing anti-ice (both wings) and tail anti-ice while departing icing.
- If engine cross bleed start is required, one pack.
- Engine anti-ice operation does not change maximum recommended bleed air usage.

Fire

Engine/APU Fire

An engine/APU fire test must be manually conducted prior to the first flight of the day.

Flight Guidance

Flight Management System (FMS)

FMC Part No. 4059050-911, -912, or -920

***** The following limitations apply only to aircraft with FMC Honeywell System part no. 4059050-911, -912, or -920. The system part number can be verified by checking the FMS A/C STATUS page under the title OP PROGRAM as PS 4070541-911, -912, or -920 as applicable.

* For any approved thrust level, FMS-computed V1, Vr, and V2 speeds must be verified with AFM derived data unless both of the following conditions are met:
  - Dry runway
  - Balanced field length
* The accuracy of the FMS performance predictions has not been demonstrated. Therefore, aircraft range calculations, fuel management, and engine out terrain clearance must not be predicted on FMS information.
* For ILS and IGS approaches with an inoperative GLIDESLOPE, FMS PROF mode and its vertical deviation indication must not be used for descent after final approach fix (FAF).
* FMS PROF mode must not be used in descent/approach below minimum
* descent altitude/height (MDA/H) or decision altitude/height (DA/H).
* The FMS amber Vmin foot must not be used for setting any approach or landing target speeds if the aircraft has not transitioned through the acceleration altitude as defined on the FMS TAKEOFF page under the title ACCEL.
* For aircraft with GPS not installed, deselected or inoperative, it is required that, for NDB or VOR approaches, the appropriate bearing pointer or course deviation indicator must be displayed on at least one APPR or VOR display.
* GPS updating must be disabled for approach and terminal area operations when operating outside the United States National Airspace if the FMS Navigation Data Base and charts are not referenced to NAD-83 or WGS-84 reference datum.
* If the pilot modifies the FMS NAV Data Base Approaches, the modified approach must comply with the approved published procedures.

* Operations in airspace or routes that require RNP, GPS, or RTA functionality are not authorized without incorporation of Service Bulletin 31-69 or production equivalent.

Autopilot

* For nonprecision approaches, the autopilot must be disengaged no lower than the applicable minimums minus 50 feet.

* Do not exceed 200 KIAS with single land or dual land modes of the autopilot engaged.

Automatic Landings

* Automatic landings are prohibited above 8,000 feet MSL (aircraft certified under FAA regulations).

* Automatic landings are prohibited above 7,000 feet MSL (aircraft certified under JAA regulations).

* Automatic landings are prohibited at weights greater than 481,500 pounds.

Longitudinal Stability Augmentation System (LSAS)

* Two LSAS channels must be operative for takeoff and must originate from a common flight control computer.

Yaw Damper

* Two yaw damper channels must be operative for takeoff and must originate from a common flight control computer.

Traffic Alert and Collision Avoidance System (TCAS) (If Installed)

* Pilots are authorized to deviate from their current ATC clearance to the extent necessary to comply with a TCAS II resolution advisory (RA). When a TCAS II voice message, "CLEAR OF CONFLICT" is announced, the pilot must promptly return to the previous ATC clearance.

The pilot must not initiate evasive maneuvers using information from traffic display only, or on a traffic advisory (TA) only, without visually sighting traffic. These displays and advisories are intended only for assistance in visually locating traffic and lack the resolution necessary for use in evasive maneuvering.

Compliance with TCAS resolution advisories (RA) is required unless the pilot considers it unsafe to do so. However, maneuvers which are in the opposite direction of the RA are extremely hazardous, especially RAs involving altitude crossing, and are prohibited unless it is visually determined to be the only means to assure safe operation.

A target may occasionally drift on the outer boundary of the TCAS display. This anomaly will not degrade TA or RA functions.

All resolution advisory (RA) and traffic advisory (TA) aural messages are inhibited at a radio altitude of less than 1,100 feet above ground level (AGL) climbing, and less than 900 feet (AGL) descending.

Fuel

Fuel Density/Temperature

***** The fuel density must be within the range of 6.0 to 7.1 pounds/gallon (.719 to .850 kilograms/liter). The allowable fuel temperature at takeoff ranges from -40°F (-40°C) to 122°F (50°C).

***** The following takeoff gross weight limitation (items 1 and 2) apply when takeoff center of gravity is equal to forward of 22% MAC.

- Freighter configuration:
  - The MTOGW must be reduced 2,500 pounds for each 0.1 pound/gallon (1,134 kilograms for each 0.0 12 kilograms/liter) of fuel density below 6.5 pounds/gallon (.779 kilograms/liter).

When tank 3 has less than 12,000 pounds/5,400 kilograms of fuel, the temperature reflects air temperature, not fuel temperature and is not subject to the AFM fuel temperature limitation.

When the tail tank contains less than 12,000 pounds/5,400 kilograms of fuel, or after incorporation of Service Bulletin 28-50 or production equivalent, when the tail tank contains less than 5,000 pounds/2,300 kilograms of fuel, the temperature reflects air temperature, not fuel temperature and is not subject to the AFM fuel temperature limitation.

Fuel Loading

* The loading of fuel in each tank must be in accordance with the structural and usable fuel values shown under Fuel Tank Capacity in the FAA Approved Airplane Flight Manual, Section 3.
* The fuel fill schedule applies only to the quantity of fuel in each tank upon completion of filling.
* When full wing tank fuel is not required, load all three main tanks equally to quantity desired.
* For greater fuel loads, load all three main tanks equally until tanks 1 and 3 are full, then load fuel into tank 2 until it is full, then load fuel into the upper aux tank until it is full, then load fuel into the lower aux tank until it is full. For aircraft without forward auxiliary tanks, load any additional fuel into the tail tank.
* For fuel loading that utilizes the **Dual Forward Auxiliary Tanks** (3,969 gallons/15,022 liters) (if installed), load two-thirds of the auxiliary fuel (a minimum of 3,000 pounds/1,360 kilograms) into the dual forward auxiliary tanks, and the remaining third of the auxiliary fuel into the tail tank.
* If use of the dual forward auxiliary tanks is not desired, the additional fuel must be loaded into the tail tank.
* For fuel loading that utilizes the **Single Forward Auxiliary Tank** (1,984 gallons/7,509 liters) (if installed), load equal quantities of the fuel (a minimum of 3,000 pounds/1,361 kilograms) into the single forward auxiliary tank and the tail tank.

* If use of the single forward auxiliary tank is not desired, the additional fuel must be loaded into the tail tank.

* For aircraft utilizing a single forward auxiliary tank (3,060 gallons/11,582 liters), refer to Airplane Flight Manual (AFM) Appendix 18A. For aircraft with single forward auxiliary tank (3,060 gallons/11,582 liters) installed, but not utilized, refer to the Center of Gravity Envelope Ground Fuel Schedule Ratio of 7.5 to 1 chart in the Limitation section of the AFM.

Ballast Fuel

* Ballast fuel may only be loaded into main tank 2, the upper auxiliary tank or the tail tank. Ballast fuel may not be loaded in more than one tank at the same time. Tank 2 is limited to a maximum of 25,000 pounds (11,340 kilograms) ballast fuel.

* The tail tank cannot contain both ballast and usable fuel. It must be either all ballast or all usable.

* When the tail tank contains ballast fuel, the two TAIL TANK BALLAST switches on the cockpit maintenance panel must be set to TRANS OFF.

Fuel Management

* The fuel use schedule is as follows:

* Fuel will be transferred from the upper auxiliary tank to each main tank, keeping them full. Simultaneously, fuel will be transferred from the lower auxiliary tank, keeping the upper auxiliary tank full until the lower auxiliary tank is empty.

* Forward auxiliary tank(s) (if installed) fuel must be transferred manually.

NOTE: The manual fuel transfer should be started after takeoff when stabilized in climb. Fuel will be transferred from the forward auxiliary tank to the upper auxiliary tank. This fuel will remain in the upper auxiliary tank until the lower auxiliary tank is empty. Forward auxiliary tank(s) pumps should not be operated for more than ten minutes after first indication of steady low fuel pressure.

* When the upper auxiliary tank is empty, fuel will be transferred from tank 2 to 1 and 3 until all three main tanks contain equal amounts of fuel. Fuel is then used equally from each tank. The fuel quantity in the tail tank is controlled automatically by the fuel system controller.

* Lower auxiliary and tail tank transfer pumps must be off for takeoff and landing.

* Maximum lateral fuel imbalance between tank 1 and tank 3:
  - Passenger aircraft: 4,000 pounds (1,814 kilograms).
  - Freighter and combi aircraft: 2,500 pounds (1,134 kilograms).

* With an operative quantity indicator system, fuel remaining in the fuel tanks when the quantity indicator reaches ZERO is not usable in flight.

Fuel Pump Circuit Breakers

* Do not reset any tripped fuel pump circuit breakers.

Type of Fuels

JP-4 and JET B fuels may be used when the aircraft operation is based on the JP-4/JET B Fuel Appendix 14.

Ground Proximity Warning System With Terrain Awareness Features (If Installed)

* Federal Aviation Regulations sections 121.360 and 135.153 require the use of an approved ground proximity warning system (GPWS) on certain aircraft. The following limitations apply only to the aircraft equipped with ground proximity warning system with terrain awareness features.

* Pilots are authorized to deviate from their current air traffic control (ATC) clearance to the extent necessary to comply with a GPWS warning.

* The GPWS alerting functions require barometric altitude referenced to mean sea level (QNH). If altimeter settings

referenced to field elevation (QFE) are entered on either the Captain's or First Officer's altimeter, then GPWS terrain awareness alerting and display functions must be inhibited by selecting the terrain override switch to OVRD.
In order to avoid unwanted alerts, the terrain awareness alerting functions must be inhibited by selecting the terrain override switch to OVRD when landing at an airport not contained in the GPWS airport terrain data base. The GPWS airport terrain data base contains airports which have at least one hard surfaced runway 3,500 feet (1,067 meters) in length, or greater, which have a published instrument approach procedure.

Hydraulics

System 3 minimum hydraulic quantity for dispatch is 6.0 gallons.

Ice and Rain Protection

Wing Anti-Ice System

There are no limitations.

Wing anti-ice should be on when an "ICE DETECTED" alert is displayed from the ice detecting system (if installed). If the ice detection system is not installed, the wing anti-ice switches should be turned on any time icing conditions are expected or encountered.

Tail Anti-Ice System

There are no limitations.

Tail anti-ice should be on when an "ICE DETECTED" alert is displayed from the ice detecting system (if installed). If the ice detection system is not installed, the tail anti-ice switches should be turned on any time icing conditions are expected or encountered.

Nacelle/Engine Anti-Ice System

* If the automatic anti-ice system is in manual or is not installed, the ENG ANTI-ICE switches must be turned ON when an "ICE DETECTED" alert is displayed from the ice detection system. If the ice detection system is not installed, the ENG ANTI-ICE switches must be turned ON any time icing conditions are expected or when the total air temperature is at or below 42°F (6°C) and either moisture is visible or outside dewpoint and air temperature are within 5°F (3°C) of each other. This applies both on the ground and in flight.

Ignition Override

* Select engine ignition OVRD ON whenever conditions call for use of engine or engine and airframe anti-ice. OVRD ON may be operated continuously, and must be selected for the duration of the icing encounter.

Icing Conditions

* Icing conditions exist when the outside air temperature (OAT) on the ground and for takeoff, or total air temperature (TAT) inflight is 6°C or below, and visible moisture in any form is present (such as clouds, fog with visibility of one mile or less, rain, snow, sleet, and ice crystals). Icing conditions also exist when the OAT on the ground and for takeoff is 6°C or below when operating on ramps, taxiways or runways where surface snow, ice, standing water, or slush may be ingested by the engines, or freeze on engines, nacelles, or engine sensor probes.

Ice Detection System (If Installed)

* The ice detection system is to be used as the primary means of detecting icing conditions.

Automatic Anti-Ice System (If Installed)

* When the automatic anti-ice system is in AUTO mode, the performance data labeled ENGINE AND AIRFRAME ICE PROTECTION ON must be used any time icing conditions are expected or when the total air temperature is at or below 42°F

(6°C) and either moisture is visible or outside dew point and air temperature are within 5°F (3°C) of each other.

Windshield Heat

There are no speed limitations associated with windshield heat off.

The windshield anti-ice selectors should be in NORM for flight when "ICE DETECTED" alert is displayed from the ice detecting system (if installed) or when icing conditions are imminent.

The windshield anti-ice selectors should be in HIGH only for the duration of moderate to heavy icing.

Windshield Defog

Windshield defogging should be operated for all flight conditions.

Windshield Rain Repellent (If Installed)

Apply rain repellent only in rain.

Do not apply rain repellent to second windshield until repellency is established on first windshield.

Do not turn wipers on if repellent is inadvertently applied to a dry windshield.

Windshield Wipers

Do not operate windshield wipers at high speed for more than 30 minutes. Do not operate windshield wipers on a dry windshield.

Power Plants/APU

Engines

General Electric, Model CF6-80C2 or Pratt Whitney 4000 series

Engine Limits

* Engine limitations are presented in the applicable AFM performance sections. The engine limits and THRUST SETTING charts must be observed.

Operating Limits

MAXIMUM RPM	
N1 RPM	**N2 RPM**
117.5%	112.5%

MAXIMUM EGT		
CONDITION	**EGT LIMIT**	**TIME LIMIT**
Starting	750ºC	No Time Limit
	750ºC to 870ºC	40 Seconds
Maximum Continuous	925ºC	Continuous
Takeoff	960ºC	5 Minutes

Oil Temperature/Pressure

* Maximum oil temperature
  - 160°C - Continuous
  - 160°C-175°C - For 15 minutes
* Minimum oil pressure
  - 9.5 PSID
* Low oil pressure caution range
  - 10-34 PSID (variable depending on N2 speed)

Engine Starting

The starter motor may be operated continuously for 5 minutes. It must be cooled for at least 30 seconds for each minute of operation before subsequent use.

After two 5-minute starter operations and a cooling period, a 10-minute cooling period is required between additional 5-minute starter operations.

Starter reengagement should be made at the lowest practical N2 to reduce potential for starter crash engagement.

Normally reengagement should be made with N2 below 20%. In an emergency, reengagement may be made when N2 is as high as 30%.

Do not engage starter when N2 is above 30%.

During Start

A log book entry is required whenever EGT exceeds 750°C during start.

If EGT exceeds 750°C for more than 40 seconds, or rises rapidly above 750°C and is likely to exceed 870°C, terminate start by moving fuel lever to OFF.

If the EGT is between 820°C and 870°C for less than 40 seconds, maintenance action must be taken prior to the next start. One start is allowed in the 820°C to 870°C range. Advise maintenance of the temperature reached and request approval for delayed inspection and availability of maintenance at the next station. Repetitive starts where the EGT exceeds 750°C but does not exceed 820°C for 40 seconds are cause for corrective action.

Engine Ignition

Ignition OVRD should be used for flameout protection during severe turbulence and/or heavy rain.

Ignition OVRD may be used at any time at the discretion of the Captain.

The OVRD position has no time limit although excessive use will reduce ignition service life.

GE FCF6-80C2 Engines

OVERSPEED/OVERTEMPERATURE RANGE			RECOMMENDED PILOT ACTIONS
N1	**N2**	**EGT**	
117.6 to 124.0%	112.6 to 114.0%	961 to 1000 C	Reset thrust and continue normal engine operation to landing.
Above 124.0%	Above 114.0%	1001 C and above	Reduce to idle. Use higher thrust only at pilot's discretion.
NOTE: If any engine indications are abnormal at minimum thrust, a precautionary shutdown should be considered. All overspeed and/or over temperature occurrences must be recorded in the flight log (magnitude and duration) and reported to maintenance.			

APU

OPERATING CONDITIONS		OPERATING LIMITS	
Starting, ground, inflight	Max speed	N1	N2
		110.0%	110.0%
	Max EGT	Start	Continuous
		872 C	585 C

APU starter duty cycle is limited to two consecutive start attempts. After 10 minutes of required cooling time, two additional starts may be attempted followed by a cooling period of 1 hour.

Introduction

General

This section contains detailed procedures necessary for conducting a normal flight in a safe and orderly manner. These procedures are specifically designed to be used with all system controllers operating in automatic mode. In the event one or more systems controllers are operating in the manual mode the procedures identified with boxed text for that respective system should be used to ensure normal operation.

Procedures are listed in phase of flight sequence, starting with inspection and preparation at the aircraft for flight, and extending through post-flight duties at destination.

The chapter is divided into two sections: Normal Operating Procedures and Checklists.

Normal Operating Procedures

The Normal Operating Procedures are amplified where necessary to provide more detailed information. In some cases the amplification is contained in Supplemental Procedures or the Procedures & Techniques section of the FCOM and is referenced in the text.

All items of a given procedure are intended to prepare the aircraft for the next phase of flight. They are listed in a sequence which follows a standard scan pattern except when logic of actions requires a different priority. Scan sequence is used to ensure that panels are thoroughly inspected so that specific actions and observations will be performed.

Each procedure is intended to be completed from memory. Checklists are to be accomplished when procedurally called for to ensure required and essential procedures have been accomplished in an appropriate manner.

Checklist Philosophy

After completion of the normal procedures for a given task or phase of flight, a checklist is normally used to verify systems are correctly configured and/or specific actions have been performed. The Normal Operating Procedures contain detailed procedures to be followed in order to properly comply with each item contained in the checklists. Checklists do not include all items listed in the Normal Operating Procedures.

Exterior Inspection

Exterior inspection should be accomplished by Captain or his designee prior to each flight.

Transit Check

A transit (quick turn-around) check may be substituted for a normal preflight check when the following conditions are met:

1. No crew change made during the turn-around
2. At least one crew member remains with the aircraft
3. All aircraft electrical buses remain powered during the entire turn-around
4. All first flight of the day items have been previously accomplished
5. No maintenance actions other than normal service items performed
6. The IRUs are realigned

The complete preflight, panel scan and checklist should be accomplished prior to every flight, except the following preflight tests are not required for transit checks:

1. Engine and APU fire test
2. Annunciator lights and air system test

3. Cargo fire test
4. Voice recorder test
5. Hydraulic system test
6. Fuel system test
7. GPWS warning test
8. Takeoff warning test
9. Crew oxygen mask check

Panel Scan and Cockpit Preparation

The Preflight Panel Scan illustration describes the flow of the panel scan and Cockpit Preparation Checklist. If both pilots are present for the panel scan each would complete his/her portion of the panel scan, then both would perform the checklist by challenge and response. If one pilot is not present during the panel scan the other pilot would normally complete all of the panel scan and then complete the checklist by challenge and response when both pilots are present.

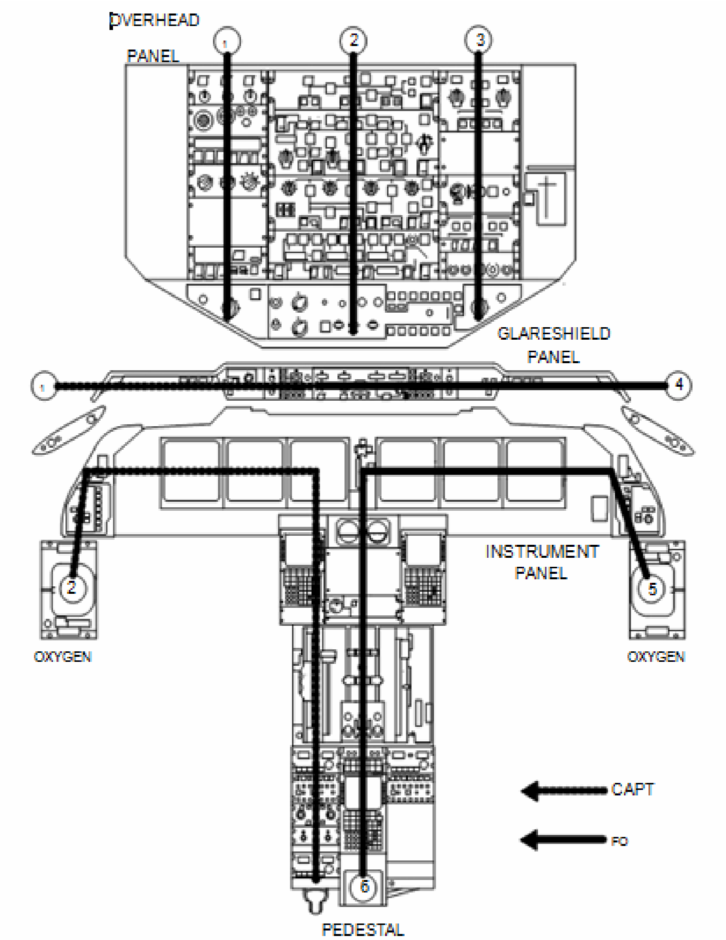
Events Requiring Maintenance Inspections

During ground and flight operations, events may occur which require a maintenance inspection before the next flight. Most operators have established a procedure/policy to ensure than crews document these events so that proper maintenance can take place. These include, but are not limited to:

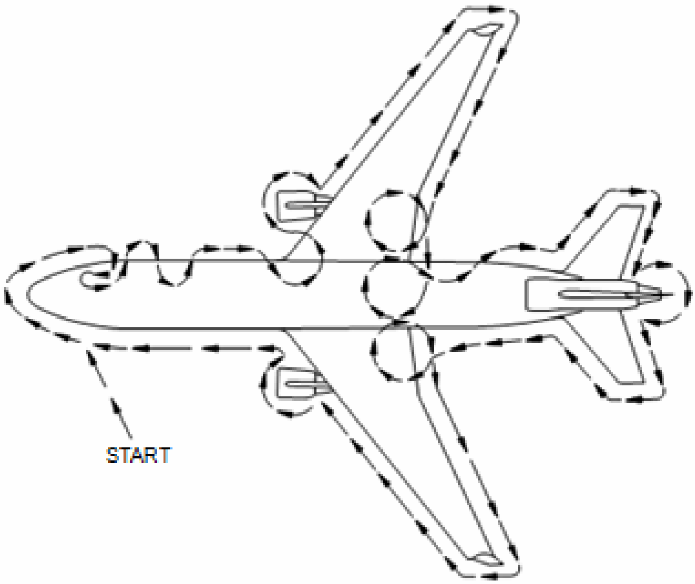
- Hard landings
- Severe turbulence
- Lightning strikes
- Bird strikes
- Tail strikes
- Overweight landings
- Volcanic ash encounters

Additional events that are not listed may require inspection should also be reported. An example of such an event is an overly aggressive pitch up during a TCAS event or a Terrain Avoidance maneuver that could cause structural damage. The best course of action is, if in doubt, report it.

Preflight Panel Scan Flow



Exterior Inspection



Inspect the following areas for proper configuration and acceptable conditions:

Nose Section

- No. 1 and 2 pack inlet and exhaust are clear
- No. 1 and 2 air conditioning compartment doors latched
- External ground pneumatic connection doors latched
- Left landing light condition.
- Left forward cabin door
- Avionics compartment cooling exhaust port clear
- Left angle of attack sensor
- Oxygen blow out disc intact

- Forward avionics door closed/handle stowed
- Pitot tube covers removed/condition
- Radome latched/condition
- TAT probe condition
- Right angle of attack sensor condition
- Conditioned air ground connection doors latched
- Right forward cabin door
- Right landing light condition
- No. 3 air conditioning compartment door latched
- ADG door closed
- No. 3 pack inlet and exhaust area clear

Nose Gear and Wheelwell

- Tires
- Glideslope antennas condition
- Landing/taxi lights
- Gear pin - as required
- Gear well condition
- Strut extension - visible, no leaks
- Ground shift rod attachment
- Steering bypass pin - as required
- Aft avionics compartment door closed/handle locked

Right Forward Fuselage

- Antennas clean and undamaged
- Mid cabin door
- Static ports free of foreign objects

- Forward cargo door checked
- Cabin pressure relief valves checked
- Overwing cabin door
- Wing and turnoff lights

Lower Center Fuselage

- CAC door closed/handle flush
- Aux fuel tank level sticks flush/no leaks
- Shroud drain
- Brake cooling airscoops clear

Right Wing and Engine

- Inboard slat
- Access doors latched and fuel level sticks flush.
- No. 3 engine panels closed and fastened/cowling and undamaged blades.
- Thrust reversers stowed and undamaged. Outboard slats.
- Outboard fuel level sticks flush
- Fuel vent/no leakage
- Wing tip, winglet and lights
- Outboard aileron and trailing edge
- Fuel dump pipe clear
- Outboard flap condition
- Inboard aileron
- Inboard flap/fairings

Right Landing Gear

- Tires condition/inflation
- Brake wear pins
- Drag links
- Hydraulic lines
- Strut extension - visible, no leaks
- Wheel assembly
- Retract cylinder and anti-skid valves. Gear pin - as required
- Gear position indicator rod
- Gear door handle position

Center Landing Gear

- Tire and wheel condition - same as RLG. Strut extension - visible, no leaks
- Gear pin - as required
- Center gear doors and cooling ducts clear and undamaged

Tail Section and Aft Fuselage

- Lower collision light and antennas
- No. 2 engine inlet
- Vertical stabilizer
- Right aft cabin door secured
- Center cargo door
- Doors, vents and drain masts secured, dry and clear.
- Drain masts, VHF 3 antenna, and underside of fuselage -
- Observe no evidence of tail strike
- Tail cone access door closed, hinge fairings intact and secure.

- Right horizontal stabilizer and elevator aft tail cone latches secure
- No. 2 engine cowling doors secured and fan reversers stowed and undamaged
- Left horizontal stabilizer and elevator. Tail tank fuel measuring stick secured. Tail tank fuel vent clear
- Left aft cabin door
- Aft cargo door checked

Left Lower Fuselage

- APU external fire control panel/door secured

Left Landing Gear

- Same as right side

Left Wing and Engine

- Same as right wing and engine. Left Forward

Fuselage - same as right side

- Cabin pressurization outflow valve
- Potable water service panel secured

Intentionally Left Blank

Cockpit Preparation

Captain’s Cockpit Preparation Procedure

Before initiating this procedure verify the FO has completed the first ten items of the FO COCKPIT PREPARATION PROCEDURE. If the FO has not completed these items the first person arriving at the aircraft must accomplish these items to ensure the proper configuration prior to establishing power to the aircraft.

Log Book

Examine log book for previous discrepancies. Observe that uncorrected items not required for dispatch are placarded appropriately and so noted in technical log. Verify that maintenance performed on the aircraft is signed off.

Glareshield

Select IN or HP as required. Select BAROSET to QNH. Rotate inner BAROSET control knob to the desired setting. Set MINIMUMS control knob to RA position. Select HDG readout to MAG. Select TRFC, DATA, and VOR/NDB switches as desired. Verify all selections appear on PFD or ND.

On the flight control panel, confirm IAS/MACH display window reads IAS 250. Confirm the HDG/TRK display window reads HDG and displays the actual aircraft heading. Cross-check aircraft heading with standby compass, PFD and ND. Confirm bank angle selector is in AUTO, the AFS OVRD OFF switches are up and the altitude display window reads FT 10000.

Oxygen System and Masks

Push the INT volume control knob on the audio control panel and adjust the INT volume control. Adjust the overhead speaker volume control. To check the oxygen system and oxygen mask microphone verify mask storage box doors are closed, dilution control lever is in 100% position, and EMERGENCY pressure control knob is in the normal position. Push the INT/RADIO switch to INT and simultaneously push and hold the PRESS-TO-TEST AND RESET lever and EMERGENCY pressure control knob. Listen for the oxygen flow sound through the overhead speaker and at the same time observe the oxygen flow indicator displays a yellow cross.

Release the PRESS-TO-TEST AND RESET lever, EMERGENCY pressure control knob, and microphone switch, and observe the oxygen flow indicator turns black as oxygen flow ceases.

Source Input Select Panel (SISP) on Captain's Auxiliary Panel

Move EIS SOURCE selector to AUX. Verify proper operation of AUX DEU by normal presentation on the Captain's three display units. Reposition Captain's EIS SOURCE selector to 1 and confirm all lights are extinguished.

Static Air Selector

Ensure STATIC AIR selector is in NORM.

Display Units

Confirm display units are powered and appropriate indications are displayed.

NOTE: Autopilot box will remain amber until V speeds are confirmed and IRUs are aligned. Autothrottle box will remain amber until an engine is started.

Clock

Observe that the time on clock on the ND is correct. Reset the elapsed time on clock/chronograph to zero.

NOTE: If the time is incorrect, it must be reset at the maintenance control panel.

IRS Present Position

Confirm the aircraft position entered on the F-PLN INIT page of the MCDU is correct.

Communication Radio Panel 1

Select VHF-1 by pushing VHF-1 Radio selector switch on communication radio panel 1.

Audio Control Panel

Select the desired transmitter by pushing the associated MIC/CALL switch. Transmission is now possible on the selected radio. Any radio may be monitored when its respective volume control knob is selected to protrude up and volume adjusted.

Final Cockpit Preparation

Continue final cockpit preparation with both pilots present.

FO's Cockpit Preparation Procedure

The first ten items of the FO COCKPIT PREPARATION PROCEDURE must be accomplished prior to establishing power to the aircraft to ensure proper configuration and prevent damage to equipment or injury to personnel.

Log Book

Examine log book for previous discrepancies. Observe that uncorrected items not required for dispatch are placarded appropriately and so noted in the technical log. Verify that maintenance performed on the aircraft is signed off. Review status of log with the Captain.

Circuit Breakers

Observe all circuit breaker panels and verify circuit breakers are set (some may be tripped and placarded or collared as required). If a circuit breaker is tripped and not collared, notify maintenance.

NOTE: Do not reset any tripped fuel pump circuit breakers.

CAUTION: One reset of any other tripped circuit breaker may be attempted after a cooling period of approximately 2 minutes. If the

circuit breaker trips again, do not attempt another reset.

Indiscriminate pulling or resetting of circuit breakers for systems or components may cause unanticipated results because of systems interrelationships.

Emergency Equipment

Verify fire axe is installed and secured. Verify required fire extinguishers are installed, safetied and secured. Check protective breathing equipment (PBE) is installed and tamper evident seals are intact. Verify escape ropes are installed and are properly stowed and secured. Verify life vests are on board.

Weather Radar

Verify weather radar switch is off.

Fuel Switches

Verify fuel switches are off.

Parking Brake

Parking brakes are released only when main gear is chocked.

CAUTION: Damage to the center gear may occur if the center gear is chocked or the parking brake is set when the aircraft is being loaded or unloaded.

Spoiler and FLAP/SLAT Handles

Verify spoiler handle is in the retract detent and disarmed. Verify FLAP/SLAT handle position correctly reflects actual position of flaps/slats observed during exterior inspection. When slats are in the retracted position, ensure the FLAP/SLAT lever is firmly engaged in the UP/RET detent.

NOTE: Coordinate with ground maintenance before pressurizing any hydraulic system or moving any flight control surface.

Gear Handle

Verify GEAR handle is down.

Fuel Dump and Manifold Drain Switches

Ensure DUMP and FUEL DUMP EMER STOP switches are guarded and safetied, and MANF DRAIN switch is guarded.

Emergency Power Selector

Verify EMER PWR selector is in the OFF position.

Battery Switch

Verify BAT switch is ON and guard is closed. Observe BAT BUS OFF light is extinguished.

NOTE: After incorporation of Service Bulletin 24-102 or production equivalent, an aural warning will sound, if the BAT switch is on, the aircraft is on the ground, and AC buses are not powered.

External Electrical Power

If EXT PWR AVAIL light is illuminated and external electrical power is desired, push EXT PWR switch and observe EXT PWR ON light illuminates. AC and DC 1, 2 and 3 OFF lights extinguish and GEN 1, 2 and 3 ARM lights will be illuminated. All BUS OFF lights for powered buses will be extinguished.

NOTE: If external power is being used, a separate external power source must be used for galley power. When external galley power is available, push the GLY EXT PWR switch on the ELEC control panel and observe the GLY EXT PWR ON light illuminates.

Engine/APU Fire Test - AC Buses Powered

Push ENG/APU FIRE TEST button on the overhead panel. Observe all three ENG FIRE handle lights, APU FIRE handle light, and all three engine FUEL switches are illuminated. In addition to the MASTER WARNING lights flashing, the fire bell, attention tone and voice warning "Eng 1 fire, eng 2 fire, eng 3 fire" sound. Observe "ENG 1, 2, 3 FIRE" and "APU FIRE" alerts are displayed on the EAD. While holding the ENG/APU FIRE TEST button, push either MASTER WARNING light to extinguish both lights and silence the aural warnings.

Engine/APU Fire Test - Battery Power Only

Push ENG/APU FIRE TEST button on overhead panel. Observe all three ENG FIRE handle lights, APU FIRE handle light, and all three engine FUEL switches are illuminated. Engine/APU fire tests must be repeated after AC buses are powered.

NOTE: If EIS is operational, fire messages will be displayed during test.

MASTER WARNING light and fire bell will not operate and fire alerts will not display on EAD and SD unless aircraft power or emergency power is available.

APU Power

If APU electrical power or air is desired, push APU PWR switch. APU PWR AVAIL light will blink while APU goes through its start cycle. When start cycle is complete, observe APU PWR AVAIL light illuminates steady, APU PWR ON light illuminates, and AC and DC 1, 2 and 3 OFF lights extinguish. AC TIE 1, 2 and 3 ARM lights and GEN 1, 2 and 3 ARM lights will illuminate. All BUS OFF lights for powered buses will be extinguished.

NOTE: If APU fails to start, attempt to start APU with APU START/STOP switch on APU panel.
"BAT CHARGING" alert may be displayed as a normal result of an APU start. This alert should

extinguish within 2 to 5 minutes. Do not takeoff with alert displayed.

Annunciator Lights

Verify TRIM AIR OFF light is extinguished. Push and hold ANNUN LT TEST button. Observe annunciator lights are illuminated, and aural overspeed warning sounds. After "AIR SYS TEST" alert is displayed on EAD, release ANNUN LT TEST button.

NOTE: *The following annunciator lights will not illuminate with the ANNUN LT TEST:*

- *PA/ON (if installed) and MAINT INTPH/ON - forward overhead panel*
- *MIC and IDENT ON - pedestal audio control panel*
- *Engine and APU fire indicators*

A failure of air system components will be indicated by an "AIR SYS TEST FAIL" or "AIR MANF TST FAIL" alert displayed on the EAD, and effective for aircraft fuselage 575 and subs (burst anti-ice duct detection installed), "ENG DUCT TST FAIL" alert will be displayed on the EAD.

Air Conditioning

NOTE: *If an external air source is to be used for air conditioning prior to engine start, refer to Supplemental Procedures under Air - AIR CONDITIONING USING EXTERNAL CONDITIONED AIR or AIR CONDITIONING USING EXTERNAL PNEUMATICS TO OPERATE PACKS.*

Before applying conditioned air, ensure CABIN PRESS control panel is in automatic mode and cabin outflow valve is open.

If APU air is to be used, push AIR APU switch and observe ON light illuminates. If air system is operating in manual mode, use following procedure:

AIR MANUAL **AIR CONDITIONING FROM APU**
Push Air APU switch and observe ON light illuminates.
Push 1-2 and 1-3 ISOL switches and observe ON lights illuminate.
Push each PACK switch and observe FLOW and OFF lights extinguish.

Adjust zone temperatures as required.

IRS Cargo Fire Test

Move NAV/OFF selectors to NAV and observe "CARGO FIRE TEST' alert is displayed on EAD. If moving NAV/OFF selector does not initiate the test or "CRG FIRE TST FAIL' alert is displayed on EAD, a manual cargo fire test must be performed.

MANUAL CARGO FIRE TEST
Push and hold CARGO FIRE MANUAL TEST switch until “CARGO FIRE TEST” alert is displayed on EAD.
NOTE: During the test, the CRG FLO FWD DISAG” and “CRG FLO AFT DISAG” alerts may be displayed. *Failed heat or smoke detectors are displayed on the AIR synoptic as amber rectangles with an “F” inside. Passed heat detectors are displayed as amber circles and passed smoke detectors are displayed as amber triangles.*

IRS Initialization

On A/C STATUS page, verify current navigation data base and select F-PLN INIT.

On MCDU F-PLN INIT page, enter CO ROUTE or departure and destination airports in FROM/TO, and INITIALIZE IRS*.

NOTE: If the "INITIALIZE IRS" prompt is not selected within 10 minutes of selecting NAV, the NA V/OFF lights will begin flashing.

Voice Recorder

Push and hold test button for approximately 5 seconds and observe indicator on the test meter deflects into the green band.

NOTE: Two short test tones can be heard from the HEADPHONE jack during test pass. There will be no tones if the test fails.

GEN BUS FAULT RESET

Observe BUS FAULT lights are extinguished.

Cargo Temperature

Set FWD and AFT CARGO TEMP selectors.

NOTE: If the AFT CARGO TEMP selector is set to the full COLD position, an erroneous "CRG TEMP CTL OFF" alert will be displayed.

Engine Ignition

Verify ENG IGN OFF light is illuminated.

Hydraulic Control Panel

WARNING: Before performing HYD PRESS TEST or pressurizing any hydraulic system, contact ground crew to obtain clearance.

Verify hydraulic system is in auto mode and HYD SYS 1, 2 and 3 PRESS lights are illuminated. Push HYD PRESS TEST switch and observe "HYD PRESS TEST" alert is displayed on EAD.

NOTE: If it is necessary to terminate the hydraulic pressure test before it is complete, push the HYD PRESS TEST switch a second time. Terminating the test by *any other means may cause the system controller to lock up, requiring maintenance.*

If hydraulic system is operating in manual mode, perform following procedure:

HYDRAULICS MAUNUAL
Select HYD on system display. • Push AUX PUMP 1 switch and observe AUX PUMP 1 indicates on and SYS 3 pressure indicates in normal range. • Push AUX PUMP 2 switch and observe AUX PUMP 2 indicates on. • Push 1-3 RMP switch and observe 1-3 RMP indicates on and SYS 1 pressure indicates in normal range. • Push 1-3 RMP switch to observe 1-3 RMP indicates off and SYS 1 pressure decreases. • Push 2-3 RMP switch and observe 2-3 RMP indicates on and SYS 2 pressure indicates normal range. • Push 2-3 RMP switch and observe 2-3 RMP indicates off and SYS 2 pressure decreases. • Push AUX PUMP 1 switch and observe AUX PUMP 1 indicates off and SYS 3 pressure indicates in normal range. • Push AUX PUMP 2 switch and observe AUX PUMP 2 indicates off and SYS 3 pressure decreases.

ELEC Control Panel

NOTE: Do not perform emergency power check if "BAT CHARGING" alert is displayed

Check SMOKE ELEC/AIR selector is in NORM. Check DRIVE 1, 2 and 3 and CAB BUS switches are guarded. Move EMER PWR selector from OFF to ARM and observe OFF light extinguishes. The EMER PWR ON light illuminates for approximately 30 seconds during test.

If EMER PWR ON light does not illuminate or if "EMER PWR TST FAIL" alert is displayed, call maintenance.

NOTE: *"BAT CHARGING" alert may be displayed following the emergency power test. Taxi is permitted, but takeoff is not permitted until alert is no longer displayed.*

AIR Control Panel

Check for normal configuration. Check that MASK switch is guarded.

FUEL Control Panel

If manual mode is desired and has not been previously selected, push FUEL SYSTEM SELECT switch and observe MANUAL light illuminates. Wait for a minimum of 4 seconds, then turn off all tank pumps and transfer pumps that are not required.

NOTE: *If fuel system is in AUTO, selecting MANUAL will turn on 1, 2, 3 tank PUMPS, AUX TANKS L and R TRANS pumps, and TAIL TANK TRANS pumps. TANK 2 TRANS pump and all FILL valves will remain in their previously selected position.*

Switching from AUTO to MANUAL and immediately activating pump switches does not give fuel system controller (FSC) manual reversion logic enough time to coordinate pump sequence.

If pumps get out of sequence, select AUTO then MANUAL and allow at least 4 seconds for FSC to coordinate pump sequence before selecting any pumps.

If operating in manual mode, when refueling is completed, preflight fuel system as follows:

FUEL MANUAL
Select FUEL on system display. Push each tank pump switch and observe OFF lights extinguish. On FUEL synoptic, observe each pimp switch to OFF and observe OFF light illuminates and FUEL synoptic indicates each tank pump off. Push and hold tank 1 and 3 FILL switches and observe ARM lights illuminate and remain illuminated while switch is held. On FUEL synoptic, observe fill valve spigots are displayed. Release FILL switches. *NOTE: Tank 1 and 3 fill valves will remain armed after switch is released and spigots will remain displayed if tank 2 contains more than 40,000 pounds/18,144 kilograms.* If FILL switch ARM lights remain illuminated, push tank 1 and 3 FILL switches and observe ARM lights extinguish. On FUEL synoptic, observe fill valve spigots are no longer displayed. Push each XFEED switch to ON. DISAG light will illuminate momentarily as valve transitions to on. Observe crossfeed valves are open on FUEL synoptic. Push each XFEED switch and observe ON lights extinguishes. DISAG light will illuminate momentarily as valve transitions to off. Observe crossfeed valves are closed on FUEL synoptic. Push tank 1, 2 and 3 TRANS switches to ON. On FUEL synoptic, observe tank 1, 2 and 3 TRANS pumps indicate on and no pump indicates low pressure. Push 1, 2 and 3 TRANS switches and observe ON lights extinguish. On FUEL synoptic, observe pumps indicate off. If aux tank contains usable fuel, push AUX TANKS L and R TRANS switches to ON. On FUEL synoptic, observe each pump indicates on and no pump indicates low pressure for a tank that contains usable fuel. Upper aux fill valve spigot is displayed. Push tank 2 FILL switch and observe ARM light illuminates. On FUEL synoptic, observe fill valve spigot is displayed.

FUEL MANUAL (CONTINUED)

Push AUX TRANS L and R TRANS switches and observe ON lights extinguish and ARM light for tank 2 FILL switch extinguishes when both L and R TRANS switch ON lights are extinguished. On FUEL synoptic, observe each pump indicates on, no pump indicates low pressure, and upper aux fill valve spigot is displayed. Push TAIL TANK TRANS and ALT PUMP switches and observe ON lights extinguish. On FUEL synoptic, observe each pump indicates off and fill valve spigot for upper aux tank is no longer displayed.

Emergency Light Switch

Move EMER LT switch to ARM. Push and hold TEST switch for up to 8 seconds and observe "EMER LTS TST PASS" alert is displayed. Release TEST switch and observe alert is no longer displayed.

NOTE: "EMER LTS DISARM" alert will be displayed with switch in ON or OFF position.

No Smoke/Seat Belts Switches

Set NO SMOKE switch as required and SEAT BELTS switch to ON.

Exterior Lights

Verify the following:

- LDG LT switches are in RET.
- NOSE LT switch is OFF.
- L and R WING & RUNWAY TURNOFF switch lights are extinguished.
- NAV switch light is extinguished.
- LOGO switch light is as desired.
- BCN and HI-INT switch OFF lights are illuminated.

Evacuation Control Panel

Set EVACUATION SIGNAL switch on evacuation control panel to ARM.

Ground Proximity Warning System

Verify that the TERRAIN OVRD switch on the overhead panel is not in OVRD.

Observe the mode box on the lower right corner of the Captain's and/or the First Officer's ND. If "TERRAIN" is not displayed there, push the WXR switch and verify "TERRAIN" is displayed in the box.

Rotate the WXR knob to full clockwise.

Momentarily hold the GPWS switch in the TEST position. Observe aural and visual annunciations are operative.

If a check of all aural annunciations is desired, hold GPWS switch until "GLIDESLOPE" is heard on cockpit speakers. Test will continue when switch is released.

A terrain test pattern will be displayed on each ND on which TERRAIN DISPLAY has been selected.

Automatic Flight System Control Panel (AFSCP)

Verify FLAP LIMIT and ELEV FEEL selectors are in AUTO and all lights are extinguished.

Cabin Pressurization

Verify cabin pressure controller is in AUTO, CABIN PRESS VALVE is OPEN and DITCHING switch is guarded.

ANTI-ICE/WINDSHLD Control Panel

Ensure all ANTI-ICE and DEFOG switch lights are extinguished. FUEL USED RESET Button.

If no refueling is planned, do not reset.

NOTE: If FUEL USED RESET button is reset after engine start, a "FUEL QTY/USED CHK" alert may be displayed in flight.

Glareshield

Select IN or HP as required. Set BAROSET to QNH. Rotate inner BAROSET control knob to desired setting. Set MINIMUMS control knob to RA position. Select HDG readout to MAG. Select TRFC, DATA, and VOR/ADF switches as desired. Verify all selections appear on PFD of ND.

On flight control panel, confirm IAS/MACH display window reads IAS 250. Confirm HDG/TRK display window reads HDG and displays the actual aircraft heading. Cross-check aircraft heading with standby compass, PFD and ND. Confirm bank angle selector is in AUTO, AFS OVRD OFF switches are up and altitude display window reads FT 10000.

Oxygen System and Masks

Move and hold OXY QTY/LINE PRESS switch to LINE PRESS position and observe line pressure is adequate for intended flight. Release switch and verify oxygen quantity is adequate.

Push INT volume control knob on audio control panel and adjust INT volume control knob. Adjust overhead speaker volume control. To check oxygen system and oxygen mask microphone verify mask storage box doors are closed, dilution control lever is in 100% position, and EMERGENCY pressure control knob is in normal position. Push INT/RADIO switch to INT and simultaneously push and hold PRESS-TO-TEST AND RESET lever and EMERGENCY pressure control knob. Listen for oxygen flow sound through overhead speaker and at the same time observe oxygen flow indicator displays a yellow cross.

Release PRESS-TO-TEST AND RESET lever, EMERGENCY pressure control knob and microphone switch, and observe oxygen flow indicator turns black as oxygen flow ceases.

Source Input Select Panel (SISP)

Ensure EIS SOURCE selector is on 2 and all lights are extinguished.

STATIC AIR Selectors

Ensure STATIC AIR selector is in NORM.

Display Units

Confirm display units are powered and appropriate indications are displayed.

NOTE: Autopilot box will remain amber until V-speeds are confirmed and IRUs are aligned. Autothrottle box will remain amber until an engine is started.

Clock

Observe the time on clock on ND is correct. Reset the elapsed time on clock/chronograph to zero.

NOTE: If the time is incorrect, it can be reset at maintenance control panel.

Cyan elapsed time display will be reset when V2 is entered for the next flight.

Gear Warning System and Systems Display CONFIG Synoptic

Observe four green lights are illuminated and CTR GEAR NORM/UP light is extinguished. Select CONFIG synoptic, verify four green gear lights are illuminated and verify configuration display is complete. Pull gear handle out of down detent but not up. Observe gear lights indicate red on both instrument panel and synoptic. Release gear handle to down detent and observe all gear indications return to green.

NOTE: A blanked-out portion of the tires/brakes display indicates a component failure in the brake temperature monitor/tire pressure indicating (BTM/

TPI) system. If any portion of the required display is blanked out, call maintenance.

Standby Altimeter, Airspeed Indicator, and Attitude Indicator

Set standby altimeter and observe standby attitude indicator is erect and there are no flags in view.

Takeoff Warning System

Verify overboost stop on throttle quadrant is set. Move throttle 1 full forward and observe warning horn sounds. Move throttle 1 to idle position and observe warning horn is silenced. Move throttles 2 and 3 full forward and observe warning horn sounds. Move throttles 2 and 3 to idle and observe warning horn is silenced.

System Display STATUS Page

Push STATUS switch and review all items on STATUS page.

Communication Radio Panel 2

Select VHF 2 by pushing VHF 2 radio selector switch on communication radio panel 2.

Audio Control Panel

Select desired transmitter by pushing associated MIC/CALL switch. Transmission is now possible on selected radio. Any radio may be monitored when its respective volume control knob is selected to protrude up and volume adjusted.

Communication Radio Panel 3

Select VHF-3 by pushing VHF-3 radio selector switch on Communication Radio Panel 3.

Rudder/Aileron Trim

Verify rudder trim and aileron trim are set to zero.

ADG RELEASE Handle

Verify ADG RELEASE handle is full down and safetied.

Ships Papers

Confirm ships papers are on board and accomplish Final Cockpit Preparation with both pilots present.

Final Cockpit Preparation Procedure

Fuel Quantity . . . . C/FO

Determine weight of fuel loaded and add this amount to the value recorded prior to fueling. Compare these values against total fuel quantity indicated.

NOTE: Whenever the difference between compared total fuel value is 4,000 pounds or greater, magnetic stick readings should be considered as actual fuel on board.

Verify total quantity indication on secondary engine display equals the sum of the individual FUEL QTY indicator readings. Compare total fuel with flight plan requirements and verify fuel is correctly distributed.

NOTE: Fuel may remain in the upper aux tank prior to engine start due to automatic fuel preflight test.

FMS . . . . C/FO

Enter/check appropriate data.

Flap T.O. Selector. . . . . C/FO

Rotate FLAP T.O. SEL thumbwheel until required flap setting is indicated.

Flight Control Panel (FCP) . . . . C/FO

Set airspeed to 250 KIAS or Vcl, whichever is higher.

Verify heading and altitude are set for departure.

IRS . . . . C/FO

Verify TAXI is indicated on PFD.

AUTO BRAKE Control Panel

Select T.O. position on AUTO BRAKE selector and verify ABS DISARM light on glareshield extinguishes.

NOTE: The automatic brake system will not arm if IRUs 1 and 2 are not fully aligned or if brake pressure is low.

Cockpit Preparation Checklist . . . . C/FO

Perform Cockpit Preparation challenge and response checklist.

When checklist is complete, First Officer will announce "Cockpit Preparation checklist complete."

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Start Procedures

Before START/PUSHBACK Procedure

Doors/Windows . . . . C/FO

Verify doors are closed and slides armed. Observe no door alerts are displayed. Observe carriage roller is against track bumper and window locklatch handle is full down (forward) and locked.

Auxiliary Hydraulic Pump 1 C

If pushback is to be initiated before engine start, push AUX HYD PUMP 1 switch and observe the ON light is illuminated.

Parking Brake C

If no pushback is to be made, verify parking brake is set. If pushback is to be made, release parking brake upon clearance from ground crew.

Ground Crew Clearance C

Coordinate engine start with ground crew. Maintain positive ground crew communication throughout pushback and engine start.

Beacon. . . . . FO

Turn BCN light on.

Engine Ignition Switch C

Push ENG IGN switch A or B and observe appropriate light illuminates.

FUEL Control Panel . . . . FO

If fuel system is operating in manual mode, perform the following procedure.

FUEL MANUAL
Push tank 1, 2, and 3 PUMPS switches and observe tank 1, 2, and 3 PUMPS OOFF and LOW light are extinguished.

AIR Control Panel. . . . . FO

If air system is operating in manual mode, perform the following procedure:

AIR MANUAL
Verify AIR APU and 1-2 and 1-3 ISOL ON lights are illuminated.
NOTE: For start with an external air source, AIR APU switch ON light should be extinguished.
Push PACK 1, 2, and 3 switches and observe PACK FLOW lights are extinguished and PACK OFF lights are illuminated.
Push BLEED AIR 1, 2, and 3 switches and observe OFF lights illuminate.

Before Start Checklist . . . . C/FO

Accomplish Before Start challenge and response checklist.

When checklist is complete, First Officer announce "Before Start checklist complete."

Perform engine start.

Engine Start Procedure

Normal engine start sequence is engine 3, engine 1, and engine 2.

CONDITION	CAPTAIN	FIRST OFFICER
Engine start switch on	Pull START switch and observe switch light illuminates indicating start valve is open.	
FUEL switch ON	At 15% N2, move FUEL switch to ON and call “FUEL ON.”	Start clock
	Observe normal fuel flow indication and EGT indicates an increase within 25 seconds.	
EGT rises	Call “EGT” when indication increases.	Stop clock
	Check for normal EGT increase and peak EGT does not exceed engine start limits.	
Approximately 45% to 52% N2	Observe ENG START increase peak EGT does not exceed engine start limits.	
Ground Idle RPM	N2 and N1 indications stabilize at ground idle RPM. EGT and ENGINE OIL quantity/pressure gages indicate in normal range. **CAUTION: If no N1 rotation 30 seconds after reaching N2 idle, shut down engine and investigate cause.**	

NOTE: Engines should be operated at idle power for a minimum of 3 minutes before takeoff. Power required for normal taxiing, including short power applications, is considered equivalent to idle power for warm-up purposes.

When making starts at low ambient temperatures (below 0°F/-18°C), long acceleration times (up to 2 minutes) from EGT rise to idle can be expected and are acceptable provided the EGT indication is within limits.

If engine start switch pops in each time switch is pulled and the switch-light illuminates and extinguishes, pull and hold engine start switch. Observe switch-light illuminates. Continue procedure. At 45% N2, release switch and observe switch-light extinguishes.

If engine start switch pops in before N2 indicates 45% and engine decelerates, allow engine rotation to decay to below 20%, then pull and hold switch and observe switch-light illuminates. Continue procedure. At 45% N2, release switch and observe switch-light extinguishes.

For abnormal start conditions, refer to the Abnormals section of the FCOM. For battery start or cross bleed start, refer to the Supplemental Procedures section of the FCOM.

When a "CARGO DOOR TEST FAIL" alert is displayed, a manual cargo door test must be performed prior to takeoff. All cargo doors must be closed before a manual cargo door test is attempted.

MANUAL CARGO DOOR TEST
Push and hold cargo door test switch for a minimum of 4 seconds and verify cargo door test alert is displayed. If cargo door test fail alert is displayed after manual test is complete, notify maintenance.

After Start Procedure

Engine Anti-ice and Airfoil Anti-ice . . . . FO

Set engine and airfoil anti-ice as required for conditions. Refer to Supplemental Procedures under All Weather Operations - COLD WEATHER OPERATIONS.

AIR Control Panel/APU . . . . FO

Push AIR APU switch off and observe ON light extinguishes.

NOTE: When using external pneumatics, the ESC will reconfigure the system for normal operation within 1 minute after removal of external pneumatics.

If air system is operating in manual mode, perform the following procedure.:

AIR MANUAL
Push 1-2 ISOL and 1-3 ISOL switches and observe ON lights extinguish and DISAG lights are not illuminated.
Push BLEED AIR 1, 2, and 3 switches and observe OFF lights extinguish.
Push PACK 1, PACK 2 and PACK 3 switches and observe FLOW and OFF lights are extinguished.

HYD Control Panel. . . . . FO

If hydraulic system is operating in manual mode, perform following procedure:

HYDRAULICS MANUAL
Select HYD on system display.
Verify auxiliary pumps and RMPs are off.
Verify system pressure indicates in normal range.
Push L PUMP switch for hydraulic systems 1, 2, and 3 and observe respective pumps have been commanded OFF.
Verify R PUMP for hydraulic systems 1, 2, and 3 have been commanded ON and system pressure indicates in the normal range.
Push L PUMP switch for hydraulic systems 1, 2, and 3 and observe respective L pumps have been commanded ON and R pumps indicate ARM after a delay of approximately 20 seconds.

Ground Equipment/Gear Pins C

Coordinate with ground crew to ensure chocks are removed, all equipment is clear of aircraft and gear pins are removed prior to taxi operations.

Cabin Report C

Obtain report to confirm cabin is prepared for taxi.

After Start Checklist . . . . C/FO

Accomplish After Start challenge and response checklist.

When checklist is complete, First Officer announce "After Start checklist complete," and obtain ATC clearance to taxi.

Before Takeoff Procedures

Taxi Procedure

Flaps/Slats . . . . C/FO

Verify FLAP T.O. SEL is set as required and move FLAP/SLAT handle to required position for takeoff. Verify position of FLAPS/SLATS on PFD.

Spoilers . . . . C/FO

Arm spoilers.

Flight Controls . . . . C/FO

Select CONFIG synoptic on system display. Rotate control wheel to full left and full right. Observe green aileron and spoiler boxes indicate full deflection. Rotate wheel to neutral position. Move control column full forward and full aft, then neutral while observing corresponding green indication of ELEV boxes. Hold nosewheel steering to prevent nosewheel movement. Operate rudder pedals full left, full right, then neutral, while observing UPR and LWR RUD position boxes for corresponding green indications.

NOTE: If the appropriate display of a green box is not achieved when performing the aileron rollout, it is permissible to rotate both Captain's and First Officer's control wheels simultaneously (approximately 135°) to achieve the aileron green box indication.

If deflected ailerons system is installed, aileron symbols on CONFIG synoptic will be displayed symmetrically deflected down when control yoke is level. Additionally, there will be a noticeable increase in force required to rotate the control wheel through approximately the final one-third of travel. Green aileron and spoiler boxes will be displayed at full deflection.

Any test that does not result in the appropriate display of green boxes requires maintenance prior to takeoff.

Stabilizer Trim . . . . C/FO

Verify/set STAB trim as required for takeoff.

Takeoff Data . . . . C/FO

Confirm proper runway and V-speeds are selected and set. Confirm desired ACCEL altitudes and thrust reduction altitudes are entered on FMS TAKEOFF page. Arm NAV mode as desired.

NOTE: If for any reason V-speeds disappear from the PFD speed scale after confirming V-speeds, cycle the THRUST LIMITS on the FMS thrust limits page (AUTO-MANUAL-AUTO) and then confirm the V-speeds again. Throttles must be at idle to perform this action.

Cabin Report C

Receive report that cabin is secured for takeoff.

Takeoff/Departure Briefing . . . . PF

Pilot Flying briefs the takeoff and departure to include possible takeoff emergency procedures, normal takeoff and departure procedures.

Accomplish Taxi Checklist.

Perform Taxi challenge and response checklist.

When checklist is complete, First Officer will announce "Taxi checklist complete" and ensure flight clearance has been obtained from ATC.

Before Takeoff Procedure

Takeoff Clearance . . . . FO

FO obtain takeoff clearance from ATC when ready for departure.

EAD . . . . C/FO

Review EAD for alert reminder messages and green box prior to taking the active runway for departure.

Cabin/Crew Announcement . . . . FO

FO makes cabin and crew announcements for takeoff.

High Intensity/Landing Lights . . . . C/FO

Move L and R LDG LT switches to EXT ON. Move NOSE LT switches to TAXI or LAND as required. Push HI-I NT light switch and observe OFF light is extinguished.

Weather Radar/Transponder . . . . FO

Turn weather radar on. Set transponder as required.

HYD Control Panel. . . . . FO

If hydraulic system is operating in manual mode, perform procedure below.

HYDRAULICS MANUAL
Push 1-3 and 2-3 RMPs to ON.

AIR Control Panel

If a PACKS OFF takeoff is desired and air system is operating in manual mode, the following procedure must be accomplished:

AIR MANUAL (PACKS OFF TAKEOFF)
Push PACK 1, 2, and 3 and BLEED AIR 1, 2, and 3 switches and verify OFF lights are illuminated. *NOTE: Power should be advanced within 20 seconds of selecting BlEES OFF to prevent “AIR SYSTEM OFF” alerts.* *If AIR FOIL ANTI-ICE is required, takeoff should be accomplished with bleeds on, packs off.*

If a PACKS ON takeoff is desired in either automatic or manual mode, refer to Supplemental Procedures under Air - PACKS ON TAKEOFF.

Before Takeoff Checklist. . . . . C/FO

Perform Before Takeoff challenge and response checklist.

When checklist is complete, First Officer announce "Before Takeoff checklist complete."

Takeoff

Takeoff Procedure

<table>
<tr><th>CONDITION</th><th>PILOT FLYING</th><th>PILOT NOT FLYING</th></tr>
<tr><td>Cleared for takeoff</td><td colspan="2">Align aircraft on runway.</td></tr>
<tr><td>Power advance</td><td>When aircraft is aligned with runway, PF set throttles to approximately 70% N1. Verify symmetrical thrust. Call “Auto flight.” Verify autothrottles advance to T/O thrust. Call “Check Thrust.” PF keeps hand on throttles until reaching V1.</td><td>Select and call “Auto flight” and verify T/O THRUST appears in FMA altitude window. Call “Thrust set” when throttles are at T/O thrust setting. Verify that V-speeds are displayed between throttle and advance to T/O thrust and call “80 knots.”</td></tr>
<tr><td colspan="3">NOTE: Engines should be operated at idle power for a minimum of 3 minutes before takeoff. Power required for normal taxiing, including short power applications, is considered equivalent to idle power for warm-up purposes.
The use of a rolling takeoff will reduce the possibility of FOD to the wing-mounted engines. When runway conditions permit, a rolling takeoff is recommended.
Some decrease in oil quantity is normal at takeoff thrust. As thrust is reduced, oil quantity will rise proportionately.</td></tr>
<tr><td colspan="3">Verify airspeed is active prior to 80 knots and monitor airspeed indications for abnormalities.</td></tr>
<tr><td>80 KIAS</td><td>Verify airspeed and T/O CLAMP in the PFD altitude window, and call “Checked.”

NOTE: If throttles fail to clamp, disengage autothrottles and continue takeoff with manual throttle control.</td><td>Verify T/O CLAMP in PFD altitude window and call “80 Knots.”

NOTE: If throttles fail to clamp, call “No clamp.”</td></tr>
</table>

CONDITION	PILOT FLYING	PILOT NOT FLYING
V1 speed	Verify airspeed at V1 and place both hands on the control wheel.	Call “V1.”
Vr speed	Rotate at 2.5º /second to attain V2 + 10 at 35 feet AGL with three engines operating or V2 35 feet AGL with one engine inoperative. Tail strikes may occur at rotation rates of 3.8º/ second or greater or pitch angles in excess of 12º below 35 feet AGL.	Call “Vr.”
Positive rate of climb	Call “Gear up.”	Verify positive rate. Retract gear and call “Gear up.”

Refer to Procedures & Techniques under Takeoff - REJECTED TAKEOFF and ENGINE FIRE/FAILURE TAKEOFF CONTINUED.

Initial Climb Procedure

<table>
<tr><th>PILOT FLYING</th><th>PILOT NOT FLYING</th></tr>
<tr><td>Continue acceleration to and maintain V2 + 10 or maximum pitch (25º).</td><td></td></tr>
<tr><td>At or above 200 feet (400 feet if NAV armed), call “Auto Flight.”</td><td>Push AUTO FLIGHT switch and call “Auto Flight” when engaged.</td></tr>
<tr><td colspan="2">NOTE: Autoflight will engage in the existing speed, roll and pitch mode.</td></tr>
<tr><td>Below CLB THRUST altitude, select PROF or LEVEL CHANGE as desired.</td><td></td></tr>
<tr><td colspan="2">NOTE: PROF or LEVEL CHANGE is available above 400 feet AGL. Selection of PROF or LEVEL CHANGE will cause T/O CLAMP to change to T/O THRUST and will enable automatic acceleration altitude unless altitude is captured.</td></tr>
<tr><td>At or above acceleration altitude and flap retract speed, call “Flaps up.”</td><td>Confirm flap retract speed, move the FLAP/SLAT handle to 0/EXT position and call “Flaps up.”</td></tr>
<tr><td>When the aircraft is at or above Vsr and accelerating call “Slats retract.”</td><td>Confirm slat retract speed, move FLAP/SLAT handle to UP/RET, and call “SLats retract.”</td></tr>
<tr><td colspan="2">NOTE: If the aircraft is in a sustained turn, or in moderate or greater turbulence, slat retract may be delayed to a speed greater than Vsr.</td></tr>
<tr><td></td><td>Disarm spoiler handle; select AUTO BRAKE OFF.</td></tr>
<tr><td colspan="2">If air system is operating in manual mode and a PACKS OFF takeoff was selected, use the following procedure.

Air Manual

Push BLEED AIR 1, 2, and 3 switches and observe OFF lights are extinguished.

Push PACK 1, 2, and 3 switches and observe OFF lights are extinguished</td></tr>
</table>

PILOT FLYING	PILOT NOT FLYING
If hydraulic system is operating in manual mode, use the following procedure. **Hydraulics Manual** Push 1-3 and 2-3 RMP switches and verify pumps are off and ON/DISAG lights are extinguished.	
If fuel system is operating in manual mode, use the following procedure. **Fuel Manual** Push AUX TANKS L TRANS, R TRANS and TAIL TANK TRANS pump switches to ON and push FILL valve switches to ARM. When “AUX UPR PUMPS LO” or “TAIL PUMPS LO” alert is displayed, push appropriate TRANS switch(es) to OFF. Push TANK 2 TRANS pump switch to ON. When TANK 2 quantity equals TANK 1 and 3, push TANK 2 TRANS pump switch to OFF.	
	Check EAD for alerts and status. Accomplish After Takeoff checklist down to the dashed line.

Climb/Cruise Procedure

PILOT FLYING	PILOT NOT FLYING
At 10,000 feet, verify acceleration to en route climb speed.	Move SEAT BELTS switch as required. Move LDG LT switch to RET and NOSE LT switch to OFF. Push WING & RUNWAY TURNOFF lights off.
Both pilots ensure that altimeter change over to standard setting is accomplished at transition altitude by pulling out on BAROSET knob. In addition, set standby altimeter to desired setting. Crosscheck all altimeters.	
	Complete AFTER TAKEOFF checklist and announce “After Takeoff checklist complete.”

Descent/Approach

Preparation For Descent Procedure

ATIS . . . . PNF

Acquire the destination weather information from destination ATIS or other appropriate source.

FMS Set for Approach . . . . PNF

Select/confirm desired destination, STAR, and runway. Verify desired landing flap setting. Edit Vapp speed if necessary.

NOTE: Vapp is the greater of Vref + 5 or Vref + wind additive. Wind additive is one-half of the steady state wind greater than 20 kt or full gust, whichever is greater (maximum 20 kt).

WINDSHLD Anti-Ice. . . . . PNF

Use of windshield anti-ice when descending into high humidity conditions will prevent window fogging.

Glareshield. . . . . PF/PNF

On EIS control panel, rotate RA/BARO selector to RA or BARO as required and rotate MINIMUMS control knob to correct decision height or minimum descent altitude as appropriate for approach being flown.

Crew Briefing . . . . PF

This briefing should include but is not limited to:

1. Weather and type approach.
2. Transition level, minimum safe altitude, approach altitudes and field elevation.
3. FMS and NAV radio setup.
4. Crew actions and callouts.
5. Missed approach procedures.

SEAT BELTS Switch. . . . . PNF

Move SEAT BELTS switch to ON when beginning descent from cruise altitude.

Descent/Approach Checklist . . . . PNF

Begin the Descent/Approach checklist by accomplishing checklist through SEAT BELTS.

NOTE: Refer to Supplemental and Procedures & Techniques sections of FCOM for operation of AUTO FLIGHT and MCDUs during descent phase of flight.

Approach Procedure

Altimeters . . . . PF/PNF

At transition level using BAROSET control knob on EIS panels, set the current altimeter setting in the primary altimeters. Using BARO set knob on standby altimeter, set in the current altimeter setting. Crosscheck all altimeters.

HYD Control Panel . . . . PNF

If hydraulic system is operating in manual mode, the following procedure must be performed:

HYDRAULICS MANUAL
Push 1-3 and 2-3 RMP switches to ON.

Exterior Lights. . . . . PNF

At 10,000 ft MSL, turn LDG LT switch to EXT ON and NOSE LT switch to LAND. Push WING & RUNWAY TURNOFF switches and verify LEFT ON and RIGHT ON lights illuminate. Verify HI-I NT OFF light is extinguished.

Descent/Approach Checklist . . . . PF/PNF

Complete the Descent/Approach checklist and announce "Descent/Approach checklist complete."

NOTE: If holding is required, perform the holding procedure described in Procedure & Techniques.

SLATS . . . . PF/PNF

When appropriate, PF calls for "Slats extend, set speed." PNF confirms speed, moves FLAP/SLAT handle to 0/EXT and announces "Slats extended, speed set." PF slows to a speed above minimum maneuver speed for configuration.

FLAPS . . . . PF/PNF

NOTE: If desired, flaps may be selected between flaps 10 and flaps 25 to facilitate desired airspeed and/or lower deck angles.

When appropriate, PF calls for "Flaps 28, set speed." PNF confirms below limiting speed, moves FLAP/SLAT handle to 28/EXT and announces "Flaps 28, speed set." PF slow to a speed at or above minimum maneuver speed for configuration.

Approach and Landing. . . . . PF/PNF

Perform appropriate approach as cleared. Refer to Supplemental Procedures and Procedures & Techniques sections of FCOM for AUTO FLIGHT operation and approach procedures.

Before Landing Procedure

PILOT FLYING	PILOT NOT FLYING
Call “Landing gear down.”	Verify below limiting airspeed and place GEAR handle to DOWN position.
	When landing gear indicates 4 green, raise SPOILER handle to ARM position.
Request “Auto brake OF, MIN, MED, or MAX” as desired.	Select OFF, MIN, MED, or MAX on AUTO BRAKE selector and verify proper annunciation on EAD.
Prior to final approach fix, call for “Flaps 35” (or “Flaps 50”), set speed (unless in FMS speed). Slow to Vref + 5 for configuration being flown.	Verify below limiting airspeed and move FLAP/SLAT handle to requested position and monitor flap movement to desired position. Call “Flaps 35” (or “Flaps 50”), speed set.
NOTE: If Vapp is 140 knots or less and RA or DH is selected to 50 feet or less, the aural warning “MINIMUMS” is inhibited. If it is desired to set RA or DH to less than 50 feet, manually select a Vapp sufficiently high to keep airspeed above 140 knots during flare.	
Both pilots cross check altimeter settings including the standby altimeter and adjust if necessary.	
Check EAD for alerts, reminder messages and green box. *NOTE: If the landing essential items checklist box displays LANDING GEAR in white with the gear handle down, observe the primary gear lights. If the primary gear lights indicate safe, landing gear down and locked.* Call for Before Landing Checklist.	Perform Before Landing checklist and announce “Before Landing checklist complete.” Receive landing clearance.

Landing

Landing Roll Procedure

PILOT FLYING	PILOT NOT FLYING
At 50 feet AGL, verify throttles retard to idle. After touchdown, fly nosewheel to the runway while raising reverser levers to reverse idle, apply reverse thrust and verify ground spoiler deployment.	Ensure throttles are retarded to idle. Monitor spoiler operation. Call “SPOILERS DEPLOYED” or “NO SPOILERS.” When REV indicates green, call “REVERSE THRUST AVAILABLE.”
<u>WARNING:</u> After reverse thrust is initiated, a full stop landing must be made. *NOTE: Below 10 feet with aircraft fully flared (sink rate approximately 2 to 4 feet/second), the basic technique is to maintain attitude by applying the required control wheel pressures. A more advanced technique is to actually begin lowering the nose (approximately 1º) prior to main gear touchdown.* *Ground spoiler deployment causes a nose up pitching moment. This effect is most noticeable at aft centers of gravity. It is important to resist any pitch up tendency with forward pressure on the control column and smoothly lower the nosewheel to the runway. The LSAS, on aircraft with FCC 908 will assist the pilot in the nose lowering task.* *Pilots must be aware that if the number 2 engine throttles is not at idle at main gear wheel spinup, it is possible that immediately after AGS deployment the ground spoilers will retract. If this occurs, ground spoilers must be manually extended.*	
Apply reverse thrust as runway and conditions dictate. Verify autobrake application; apply manual braking if required.	

PILOT FLYING	PILOT NOT FLYING
NOTE: Maximum reverse thrust may be selected without delay and may occur prior to nosewheel touchdown. However, there should be no effort to delay lowering the nosewheel to the runway; aerodynamic braking is ineffective and not a recommended decelerating technique. *Reverse thrust is most effective at high speeds. Maintaining reverse thrust below 80 knots has a minimal effect on stopping ability.*	
At 80 KIAS, smoothly move reverse thrust levers to reverse idle detent by 60 KIAS. Move reverser levers to forward idle position by turnoff speed. Verify reversers are stowed prior to turnoff. If First Officer is PF, transfer aircraft control to Captain when reversers are stowed.	Monitor airspeed during deceleration. At 80 KIAS, call “80 knots,” at 60 KIAS, call “60 knots.”
Terminate autobrakes by retracting spoilers or depressing brake pedals.	

After Landing Procedure

Ground Spoilers . . . . FO

Retract ground spoilers.

Flaps/Slats . . . . FO

Move FLAP/SLAT handle to UP/RET detent.

NOTE: If landing approach was made in icing conditions or landing was made with snow or slush on runway, do not retract flaps less than 28°.

Weather Radar/Transponder . . . . FO

Turn weather radar off. Rotate mode select switch to STBY.

Auto Brake . . . . FO

Turn AUTO BRAKE selector to OFF and verify proper indications on EAD.

Stabilizer Trim . . . . FO

Set stabilizer position at 3° ANU.

Exterior Lights . . . . FO

Move NOSE LT to TAXI, push HI-INT lights to OFF and set WING & RUNWAY TURNOFF lights as required. Set LDG LT switches as required.

Anti-Ice. . . . . FO

On the ANTI-ICE/WINDSHLD control panel, select anti-ice as required.

APU . . . . FO

Start APU as required.

Engine 2 FUEL Switch . . . . FO

If thrust is not required for taxiing, at the Captain's discretion, confirm throttle is in idle and move engine 2 FUEL switch to OFF. On EAD observe EGT and FF decrease.

NOTE: For operation on narrow and/or contaminated runways and taxiways, reduced power setting for wing-mounted engines should be used when possible.

Engines should be operated at taxi power or near idle power for a minimum of 3 minutes before shutdown to stabilize the hot section. If desired, engine shutdown may be accomplished 1 minute after completion of the landing roll provided EGT has not exceeded 650°C during approach (outer marker to flare) or 750° C during normal reverse thrust application.

Accomplish After Landing challenge and response checklist.

Parking

Parking Procedure

Park Brake . . . . CAPT/FO

Set parking brakes by holding equal pressure on brake pedals, pull PARK BRAKE lever and hold while releasing brake pedals. PARK BRAKE lever will remain aft with the brakes set.

Ground Interphone Communication. . . . . CAPT

Coordinate with ground crew prior to shutting down engines or releasing parking brakes.

HYD Control Panel. . . . . FO

If HYD control panel is in manual mode, the following procedure should be accomplished

HYDRAULICS MANUAL
Push 1-3 and 2-3 RMP switches and verify ON lights extinguish.

Electrical Power . . . . CAPT/FO

Prior to shutting down engines, confirm electrical power is available from APU or the tie bus.

Anti-Ice. . . . . FO

On the ANTI-ICE/WINDSHLD control panel, select all ANTI-ICE off.

Engines . . . . CAPT/FO

Move engine fuel switches to OFF. On EAD, observe EGT and FF decrease.

Seat Belts Sign . . . . FO

Move SEAT BELTS switch to OFF.

Exterior Lights. . . . . FO

Move NOSE LT switch to OFF position and LDG LT switches to RET. Push WING & RUNWAY TURNOFF L & R switches and ensure LEFT ON and RIGHT ON lights extinguish. Push BCN switch and ensure OFF light is illuminated, and LOGO and NAV lights are as required.

FUEL Control Panel . . . . FO

If FUEL control panel is in manual mode, the following procedure must be accomplished.

FUEL MANUAL
Push 1, 2 and 3 pump switches on FUEL control panel and observe OFF lights illuminate. If any transfer pump is on, push appropriate TRANS pump switch and observe associated ON lights extinguish. Verify all crossfeeds are closed.

CAUTION: Aircraft tip-over could occur if forward cargo is removed before removing ballast fuel from tail tank.

Emergency Power Selector . . . . FO

Move EMER PWR selector to OFF.

Park Brake . . . . CAPT

Confirm with ground crew that chocks are in place and release PARK BRAKE by depressing and releasing brake pedals.

IRS . . . . CAPT/FO

If leaving aircraft or changing crews, turn IRS selectors to OFF. For a through-flight with no crew change, a quick alignment of IRS may be performed as described in the Supplemental Procedures under Auto Flight.

System Display STATUS Page . . . . CAPT/FO

Review STATUS page for discrepancies and make appropriate entries in aircraft log.

Accomplish Parking checklist.

Leaving Aircraft Procedure

Emergency Light Switch . . . . FO

Turn the EMER LT switch to OFF.

Evacuation Signal Switch. . . . . FO

Turn the EVAC switch to OFF.

APU . . . . FO

If APU is not required, push the START/STOP switch on the APU control panel to initiate the cooling period and shutdown of the APU.

Battery Switch . . . . FO

If leaving the aircraft, after the APU has shut down, raise the guard and push the BAT switch.

Accomplish the Leaving Aircraft checklist.

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Checklists

Cockpit Preparation

• (1.)	SD Status Page		CKD	C/FO
2.	HYD Panel		AUTO or MAN CKD	FO
•	[MANUAL]			
	-	HYD System Display	SEL	
	-	AUX PUMP 1	ON/CK	
	-	AUX PUMP 2	ON/CK	
	-	1-3 RMP	ON/CK	
	-	System 1 & 3 Pressure	CK	
	-	1-3 RMP	OFF	
	-	2-3 RMP	ON/CK	
	-	System 2 Pressure	CK	
	-	2-3 RMP	OFF	
	-	AUX PUMP 1	OFF/CK	
	-	AUX PUMP 2	OFF	
3.	Fuel Panel		AUTO or MAN CKD	FO
•	[MANUAL]			
	-	Fuel System Display	SEL	
	-	TANK Pumps/ XFEEDs	CK	
	-	TRANS Pumps/FILL Valves	CK	
	-	ALT PUMP	CK	
(4.)	Exterior Lights		SET	FO

• Items must be accomplished for full stop taxi-back
( ) Items must be accomplished for transit check

(Cockpit Preparation - Continued)

(5.)	EVAC Command	ARMD	FO
6.	Oxygen System/Masks	CKD/SET 100%	C/FO
7.	T/O Warning System	CKD	FO
(8.)	FUEL Switches	OFF	C
• (9.)	Rudder/AIL Trim	CKD	C
• (10.)	FMS	SET/CKD	C/FO
• (11.)	FLAP T.O. SEL	SET	C/FO
(12.)	FCP	SET	C/FO
(13.)	IRS	TAXI	C/FO
* (14.)	AUTO BRAKE	T.O.	C/FO

Before Start

1.	Doors/Windows	CLOSED/LOCKED	C/FO
2.	PARK BRAKE	AS REQD	C
3.	BCN	ON	FO
4.	Engine Ignition	A or B	C
5.	FUEL Panel	AUTO or MAN SET	FO
•	[MANUAL]		
	- 1,2, & 3 PUMPS	ON	
6.	AIR Panel	AUTO OR MAN SET	FO
•	[MANUAL]		
	- ISOL Valves	ON	
	- PACKS	OFF	
	- BLEEDS	OFF	
	-		
	-		

• Items must be accomplished for full stop taxi-back
( ) Items must be accomplished for transit check

After Start

1.	ANTI-ICE	AS REQD	FO
2.	AIR Panel	AUTO or MAN SET	FO
•	[MANUAL]		
	- ISOL Valves	OFF	
	- PACKs	ON	
	- BLEEDS	ON	
3.	APU	OFF	FO
4.	HYD Panel	AUTO or MAN CKD	FO
•	[MANUAL]		
	- HYD System Display	SEL	
	- HYD Pumps	CK/SET	
5.	Ground Equipment/Gear Pins	REMOVED	C
6.	Cabin Report	RCVD	C

Taxi

• 1.	FLAPS	FLAPS__	C/FO
• 2.	Spoilers	ARMD	C/FO
3.	Flight Controls	CKD	C/FO
• 4.	STAB TRIM	SET/__	C/FO
• 5.	Takeoff Data	CONFRIM/SET	C/FO

• Items must be accomplished for full stop taxi-back

Before Takeoff

• 1.	EAD	CKD	C/FO
• 2.	Hi-INIT/LDG LTs	ON	C/FO
• 3.	HYD Panel	AUTO OR MAN SET	C/FO
•	[MANUAL]		
	- 1-3, 2-3 RMPs	ON	
• 4.	AIR Panel	AUTO OR MAN SET	FO
•	[MANUAL]		
	- PACKs	AS REQD	
	- BLEEDS	AS REQD	
• 5.	WX Radar/Transponder	ON/AS REQD	FO

After Takeoff

** 1.	GEARS/Lights	UP/LTS OFF	PNF
2.	AIR Panel	AUTO OR MAN SET	PNF
•	[MANUAL]		
	- PACKs	ON	
	- BLEEDS	ON	
** 3.	Spoiler Handle	DISARMD	PNF
** 4.	AUTO BRAKE	OFF	PNF
5.	FLAPS/SLATS	UP/RET	PNF
6.	HYD Panel	AUTO OR MAN SET	PNF
•	[MANUAL]		
	- 1-3, RMPs	OFF	
	-		
	-		

** Items must be accomplished downwind between multiple approaches.
• Items must be accomplished for full stop taxi-back.

(After Takeoff - Continued)

7.	FUEL Panel	AUTO OR MAN SET	PNF
•	[MANUAL]		
	- L & R AUX TRANS Pumps	ON	
	- TAIL TANK TRANS Pumps	ON	
	- FILL Valves	ARM	
	- TANK 2 TRANS Pump	ON	
8.	EAD	CKD	PNF
9.	SEAT BELTS	AS REQD	PNF
10.	Exterior Lights	AS REQD	PNF
11.	Altimeter	__SET/CROSS CKD	PF/PNF

Descent/Approach

** 1.	Landing Data	CKD/SET	PF/PNF
2.	WINDSHLD ANTI-ICE	AS REQD	PNF
** 3.	DH/MDA	__SET	PF/PNF
4.	SEAT BELTS	ON	PNF
** 5.	Altimeters	__SET/CROSS CKD	PF/PNF
6.	HYD Panel	AUTO OR MAN SET	PNF
•	[MANUAL]		
	- 1-3, 2-3 RMPs	ON	
7.	Exterior Lights	AS REQD	PNF

** Items must be accomplished downwind between multiple approaches.

Before Landing

1.	GEAR/Lights	DOWN/__GREEN	PF/PNF
2.	Spoilers	ARMD	PF/PNF
3.	AUTO BRAKE	CKD/SET__	PF/PNF
4.	FLAPS	FLAPS__	PF/PNF
5.	Altimeters	__SET/CROSS CKD	PF/PNF
6.	EAD	CKD	PF/PNF

After Landing

1.	Spoilers	RET	FO
2.	FLAPS/SLATS	UP/RET	FO
3.	WX RADAR/Transponder	OFF/STBY	FO
4.	AUTO BRAKE	OFF	FO
5.	STAB TRIM	3 ANU	FO
6.	Exterior Lights	SET	FO
7.	ANTI-ICE	AS REQD	FO
8.	APU	ON	FO

Parking

1.	ANTI-ICE	OFF	C/FO
2.	HYD Panel	AUTO OR MAN SET	FO
•	[MANUAL]		
	- 1-3, 2-3 RMPs	OFF	
3.	FUEL Switches	OFF	C/FO
4.	SEAT BELTS	OFF	FO
5.	FUEL Panel	AUTO OR MAN SET	FO
•	[MANUAL]		
	- 1, 2, & 3 Pumps	OFF	

(Parking - Continued)

6.	EMER PWR	OFF	FO
7.	Exterior Lights	OFF	FO
8.	PARK BRAKE (Chocks In)	REL	C/FO
9.	IRS	AS REQD	C/FO
10.	SD STATUS	REVIEWED	C/FO

Leaving Aircraft

1.	EMER LT	OFF	FO
2.	EVAC Command (Passenger Configuration)	OFF	FO
3.	APU (If Not Required)	OFF	FO
4.	BAT	OFF	FO

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Introduction

General

This chapter contains procedures that are not routinely accomplished by the crew in normal day-to-day operation of the PMDG MD-11. As such, it is assumed that the crew will require a published reference for these types of procedures, such as adverse weather operation, engine crossbleed starts, etc.

The Supplemental procedures are designed to be referenced when the procedures are accomplished, as an aid to pilot memory and to ensure that the procedures are accomplished correctly.

Supplemental procedures are provided by section. Section titles correspond to the related systems being addressed, except for the All Weather section.

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Air Systems

Air Conditioning Using External Conditioned Air

Commence Use of External Air

When external air conditioning system is used to ventilate the cabin and before ground crew connects air conditioning cart,

AIR SYSTEM MANUAL

NO

Pack 1, 2, and 3 switches . . . . OFF

Push PACK 1, 2, and 3 switches and observe OFF lights illuminates.

Request ground crew to connect external air conditioning air source.

Cease Use of External Air

After external conditioned air cart is disconnected and pneumatic air is supplied by APU or engines:

AIR SYSTEM MANUAL

NO

PACK switches 1, 2, and 3 . . . . ON

Push PACK 1, 2, and 3 switches and observe OFF lights extinguish.

[END]

Air Conditioning Using External Pneumatics To Operate Packs

When an external pneumatic source is required to operate packs, request ground crew to connect external pneumatic source to aircraft.

AIR SYSTEM AUTO

NO

ECON switch . . . . VERIFY ON

If ECON switch is off, push the switch and observe the OFF light extinguishes.

No further action required.

[END]

ECON Switch . . . . VERIFY ON

If ECON switch is off, push the switch and observe the OFF light extinguishes.

1-2 and 1-3 ISOL Switches. . . . . ON

Push 1-2 and 1-3 ISOL switches and observe associated ON lights illuminate.

PACK 1, 2, and 3 Switches. . . . . ON

Push PACK 1, 2, and 3 switches and observe associated OFF and FLOW lights extinguish.

Set cargo temperature selectors as desired.

NOTE: If pneumatic pressure is not adequate to maintain 3 pack operation, push 1-3 ISOL switch and, if required, 1-2 ISOL switch to OFF (ON light[s] extinguished) and operate only those packs powered by external pneumatics.

[END]

Cabin Pressurization - Manual Operation

CABIN PRESS SYSTEM SELECT Switch. . . . . MANUAL

Push CABIN PRESS SYSTEM SELECT switch and observe MANUAL light illuminates.

ECON Switch . . . . AS REQUIRED

NOTE: With ECON switch off, cabin rate of climb may be less sensitive to outflow valve movement.

With ECON switch off, fuel consumption may increase up to 0.6%. If desired, increase PERF FACTOR on A/C STATUS page by 0.6 to revise FMS predictions.

CABIN PRESS Manual Rate Selector . . . ROTATE AS NECESSARY

Rotate CABIN PRESS manual rate selector, as necessary, to maintain desired cabin altitude and/or cabin rate.

When below 9,500 ft and cabin altitude equals outside altitude,

Outflow VALVE Indicator . . . . 10:30 POSITION

NOTE: Selection of a position of the outflow VALVE indicator greater than 10:30 can cause a negative pressure inside the aircraft. This may allow some cabin doors to unseat and cause noise in the cabin.

After landing,

Outflow VALVE Indicator . . . . .SET FULL OPEN

Rotate CABIN PRESS manual rate selector to CLIMB and set outflow VALVE indicator to full open.

[END]

Outflow Valve Control-Unpressurized Flight

CABIN PRESS SYSTEM SELECT Switch . . . . MANUAL

Push the CABIN PRESS SYSTEM SELECT switch and observe the MANUAL light illuminates.

Outflow VALVE Indicator. . . . . SET 10:30 POSITION

Rotate the CABIN PRESS rate selector to set outflow VALVE indicator to 10:30 position.

NOTE: Selection of a position greater than 10:30 may cause a negative pressure in the aircraft. This will allow the cabin doors to unseat and cause noise in the cabin.

FWD and AFT CARGO TEMP Selectors . . . . OFF

After landing and prior to door opening,

Outflow VALVE Indicator. . . . . .SET FULL OPEN

Rotate CABIN PRESS rate selector to set outflow VALVE indicator to full open.

[END]

Packs on Takeoff

Push TO/APPR key on FMS MCDU to access takeoff page.
Push line select key 2L and observe ON in large font.

AIR SYSTEM AUTO

NO

No further crew action required.

[END]

BLEED AIR 1, 2, and 3 . . . . VERIFY ON

If BLEED AIR 1, 2 or 3 OFF lights are illuminated push switch and observe OFF lights extinguish.

PACKs 1, 2, and 3 . . . . VERIFY ON

If PACK 1, 2 or 3 OFF lights are illuminated, push switch and observe OFF and FLOW lights are extinguished.

NOTE: Consider possible effects on takeoff performance calculations.

[END]

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Cold Weather Operations

General

Cold weather operations, particularly those associated with icing conditions, freezing rain, and slush or snow-covered runways present flight crews with potentially hazardous conditions. The following information is intended to supplement or amplify the normal operating procedures and should be applied appropriately. It will be necessary for the operator to identify specific procedures for the weather conditions peculiar to its operation.

NOTE: Icing can occur under the following conditions:

- On ground when OAT is 6°C (42°F) or below, and - Visible moisture present, or
    - OAT and dewpoint within 3°C (5°F) of each other, or
    - When operating on ramps, taxiways, and/or runways, where slush/standing water may impinge and freeze on exterior surfaces.
- In flight when TAT is 6°C (42°F) or below, and
    - Visible moisture is present, or
    - "ICE DETECTED" alert is displayed (if installed), or
    - Ice has built up on edges of the windshield and other visible portions of the aircraft.

NOTE: The liquid water content of a cloud and severity of icing decreases with lower OAT. However, severe icing has been encountered at OAT as low as -60°C (-76°F). Unusual icing conditions can occur - the only simple rule is, when in doubt, turn on ice protection. Visible moisture may exist in the form of clouds, fog with visibility of one mile or less, rain, snow, sleet, and ice crystals.

Since winter weather is often characterized by rapidly changing and widespread adverse conditions, it is everyone's responsibility to have a thorough knowledge of existing and forecast weather conditions, to exercise extreme caution, and to adhere to standard operating procedures.

Cold weather protection and servicing of the aircraft, including deicing, should be carried out in accordance with procedures outlined in the Boeing MD-11 Maintenance Manual.

Preflight Check

A careful visual inspection of the aircraft fuselage, wings, tail, control surfaces, surface actuators, nacelle inlets, landing gear, and gear doors must be made. Frost or ice on upper wing surfaces, or on upper or lower horizontal tail surfaces is not permitted and must be removed prior to flight.

A light coating of loose dry powdery snow (which would blow off during takeoff roll) is acceptable provided that the surface beneath the snow is free of adhering ice, snow, or frost that may have accumulated due to melting and refreezing.

Frosting of the underside of the wings below the fuel tanks will occur when the fuel temperature is low, the outside air temperature is above freezing and the humidity is high. This type of frost may re-form after removal on the ground. Takeoff with frost on the fuel tank underwing surfaces is permitted, provided frost is not excessive. A coating of frost thicker than 1/8 inch (3.2 mm) should be removed before departure. Operation with frost adhering on areas of the wing other than the lower surface fuel tank region is not permitted.

Pay particular attention to the underside of the flaps. Descent through icing conditions with flaps extended may have caused considerable ice to accumulate on the lower surface of the flaps.

Frost or ice may form on the upper or lower surfaces of the horizontal stabilizer due to super cooled ballast fuel in the tail tank. As a result, the fuel must be transferred forward after landing and replaced with warmer fuel.

Special consideration must be given to the fuselage and the inlet of engine 2, where ice from the fuselage may be ingested. Make sure the fuselage is clean. If there is any chance of ice or snow collection in the inlet of engine 2, a visual inspection should be made.

The removal of snow from the fuselage should be accomplished before prolonged heating of the interior, since after melting, subsequent refreezing of water on the fuselage may occur. Similarly, the hangaring of aircraft or the application of external heat for snow removal should be carefully monitored. If heat is used, it should be applied for a period sufficient to allow the aircraft surfaces to dry completely.

A thin coating of frost on the upper surface of the fuselage is acceptable, provided all vents or ports are clear. Thin frost is defined as a uniform white deposit of fine crystalline texture through which surface features such as paint lines, markings, or letters can be distinguished. This must not be confused with rime ice, which is not acceptable, that may form on windward surfaces in freezing fog conditions.

The area around pitot tubes, static ports, vanes, etc., should be carefully inspected and verified to be clear. Air conditioning pack inlets and outflow valves, cabin air outflow valves, cabin pressure relief valves, and windshields should have ice or snow formations completely removed.

De-icing fluids must be applied in accordance with the Boeing MD-11 Maintenance Manual by qualified personnel. The flight crew should be aware that contamination of the wheel brakes by de-icing fluids may cause erratic brake performance, vibration and brake damage. Landing gear components should be covered, if possible, prior to de-icing fluid application. In addition, if de-icing fluid is allowed to enter an engine or APU inlet duct, it may cause white acrid smoke to enter the aircraft via the air conditioning system. All engine bleed valves should be closed while applying de-icing fluid.

After de-icing is completed, the aircraft should be taxied clear at low power settings to minimize ingestion of fluids. When clear of area, restore air system to normal, bleeds on and air system in AUTO. The aircraft should be thoroughly inspected by qualified ground personnel or the flight crew. The lower surface elevator slot should be free of ice residue before elevator operation. Operate the flight controls, slats, and flaps through full travel. If precipitation continues, the de-icing fluid already on the aircraft could be diluted. If takeoff is delayed, consider the possibility of subsequent refreezing on the aircraft surfaces which could require additional de-icing. The requirement for further de-icing (exceeding holdover time) depends on the type and concentration of de-icing fluid used, rate and type of precipitation, outside air temperature, temperature of the fuel and aircraft surface exposure to the elements and aircraft exhaust. Operators are responsible for establishing procedures appropriate to their specific operations.

Engine Start

When parked on a slippery area, make sure that chocks are applied to nose wheel and main wheels both in front and behind prior to starting engines. Chocks may not hold on slippery areas unless they are sanded. Be especially alert when crossbleed starting is to be used.

There is no specific minimum oil temperature. However, during cold ambient conditions, an oil temperature rise must be noted before takeoff.

NOTE: During starts under extreme cold conditions, oil pressure may reach maximum indication due to high oil viscosity. Pressure should subside as oil temperature increases. If oil pressure remains above normal range after oil temperature stabilizes within limits, the engine should be shut down and the cause investigated.

After engine start, engine and airfoil anti-ice should be on during ground operations when "ICE DETECTED" alert is displayed (if installed) or when icing conditions are expected.

NOTE: During ground operation of more than 30 minutes (including taxi), in icing conditions, power should be advanced to approximately 60% N1 for a period of 30 seconds to clear ice from the spinner and fan blades at intervals not to exceed 30 minutes.

If airport surface conditions or congestion do not permit the throttles to be advanced up to 60% N1, then power should be set as high as practical for as long as conditions permit.

Taxiing

Avoid high thrust settings while taxiing, especially when leaving the ramp area. Allow a few seconds for the aircraft to respond after applying power. Advance power only as necessary to start the aircraft moving, up to approximately 40% N1, then retard the throttles smoothly to idle or to the minimum thrust necessary to maintain appropriate taxi speed. Also, consider the ingestion capability of the wing-mounted engines.

Sand used on contaminated runways and taxiways presents a FOD hazard. Reduced power settings for the wing engines should be used when possible while operating under these conditions.

Taxi speed should be as low as practical on slippery surfaces and a taxi speed of 5 knots or less is recommended while turning.

Extend the flaps/slats to the takeoff setting when commencing taxi as in normal established procedures. Before moving the flaps/slats to the takeoff position, select the CONFIGURATION page on the system display control panel and closely monitor flap movement. If the flaps should stop, prior to reaching the selected setting, the flap handle should be placed immediately in the same position as indicated to prevent damage to the flap system. Cause of the flap restriction should be corrected before takeoff. Prudent taxi speeds on contaminated taxi areas provide sufficient protection from contamination of exposed flap/slat surface areas.

The following points are valid during all taxi operations on surfaces affected by snow/slush/ice:

- Be aware that snow or ice blown by engine exhaust can cause damage at considerable distances.

- Adjust speed to surface conditions. Brake effectiveness is reduced. Excessive speed will present problems in stopping and making turns.
- A crowned slippery taxiway or runway can cause sideways slipping. Taxi on the centerline.
- Maintain increased separation behind other aircraft. Expect them to require engine run-ups to counteract ice formation.
- Be aware of snow banks if flaps are extended during taxi because flaps are particularly susceptible to damage from such hazards.
- Do not taxi through deep snow/slush covered areas.

When deicing spraying is required and aircraft is cleared to the deicing area:

NO SMOKE Switch . . . . .VERIFY AUTO

APU (For Taxi-thru Facility Only) . . . . VERIFY OFF

Just prior to reaching spray area,

AIR SYSTEM SELECT Switch . . . . MANUAL

APU BLEED Switch (APU Running) . . . . OFF

BLEED AIR Switches . . . . ALL OFF

Stabilizer Trim . . . . .SET/3° ANU

FLAPS/SLATS . . . . UP/RET

Parking Brake . . . . AS REQUIRED

Ground Crew Communications . . . . ESTABLISH

WARNING: **Once the deicing operation begins, any aircraft movement or changes in configuration must be coordinated with ground crew.**

During spraying operations do not spray into engines. Avoid spraying directly into the outflow valve opening or onto the brakes. Landing gear components should be covered, if possible. Use minimum power to taxi after deicing to reduce fluid ingestion.

When deicing is complete,

AIR SYSTEM SELECT Switch . . . . AUTO
FLAPS/SLATS. . . . . CYCLE 50/EXT, SET T/O
FLAPS STAB TRIM. . . . . .SET/__
Flight Controls. . . . . CHECKED Complete Taxi checklist.

Takeoff

Observe crosswind and tailwind limits on slippery runways. Loss of directional control is possible after a rejected takeoff at any speed, especially under crosswind conditions.

If freezing rain/drizzle is falling, takeoff is not permitted unless the airframe is determined to be free of ice and precautions taken to prevent accumulation.

Reduced thrust is not permitted under any of the following conditions: in a tail wind condition, with an inoperative anti-skid system or on runways contaminated with standing water, snow, slush, or ice.

Reduced thrust takeoffs are not authorized on wet runways unless suitable performance accountability is made for the increased stopping distance on the wet surface.

Maximum depth of wet snow/slush/water is 1/2 inch (12.7 mm) and maximum depth of dry snow is 4 inches (10 cm). Refer to Contaminated Runway charts in the Performance volume.

When the depth of wet snow/slush/water is less than 1/4 inch (6.3 mm), use the performance appropriate to 1/4 inch (6.3 mm) slush. When the depth of wet snow/slush/water is between 1/4 inch (6.3 mm) and 1/2 inch (12.7 mm), use performance appropriate to 1/2 inch (12.7 mm) slush.

It is recommended that the same takeoff performance penalty be considered for 2 inches (5 cm) of dry snow as for 1/4 inch (6.3 mm) of water/slush. Similarly, on 4 inches (10 cm) of dry snow, the takeoff penalty associated with 1/2 inch (12.7 mm) water/slush should be considered.

Under icing conditions, takeoff should be preceded by a static run-up of 60% N1 for 30 seconds, observing all primary engine parameters to ensure normal operation.

With a contaminated runway, the following procedures should be accomplished. Align the aircraft with the runway centerline and ensure that the nosewheel is straight before applying power for takeoff. on slippery surfaces, ensure that the parking brakes are released prior to setting takeoff power to preclude a takeoff with the parking brakes set. Advance the throttles to approximately 70% N1. Verify symmetrical thrust and continue with normal takeoff procedures. Asymmetrical thrust can adversely affect directional control on slippery runways. Throttle alignment at partial power may not assure alignment at takeoff power. Be alert to asymmetric spool-up rates. Check all engine instruments for proper indications during the early part of the takeoff roll.

Apply slight nose down elevator to improve nose wheel traction and directional control until rudder control becomes effective for steering the aircraft.

CAUTION: On a slippery runway, maintain the heading during rolling takeoff, by using small rudder pedal steering inputs.
Nose gear steering of 3° or more may cause the nose gear to slip on the icy (wet) runway.
Do not use differential thrust.

NOTE: After takeoff in slush or wet snow and when clear of obstacles, extending and retracting landing gear may reduce ice accumulation and possibility of gear door freeze- up.
During a takeoff rejection, especially under crosswind conditions, both nosewheel steering and differential braking effectiveness are reduced on slippery runways. While the use of reverse thrust on slippery runways is recommended to reduce the stopping distance, its use may reduce the directional control capability of the aircraft. Consequently, reverse thrust should be applied gradually and symmetrically commensurate with the ability to

maintain directional control under the existing conditions.
Using high levels of reverse thrust at low ground speed on a contaminated runway, could lead to flameout of the wing mounted engines due to ingestion of large amounts of water spray, slush or snow.

Inflight

Wing, tail and engine anti-ice should be on whenever an "ICE DETECTED" alert (if installed) is displayed or when icing conditions are expected.

In moderate to severe icing conditions with prolonged periods of N1 settings less than 70% N1, every 10 minutes IGN OVRD should be selected and (one engine at a time) throttle reduced toward idle, then advanced to a minimum of 70% N1 for 10 to 30 seconds.

NOTE: During this procedure, CONFIRM ENG OUT CLEAR prompt may appear on the MCDU.

Landing

Landing on, or dispatch to a runway with poor braking action is undesirable, and should not be planned.

The flight crew must be aware of the condition of the runway with respect to snow, ice, slush, or precipitation. The most favorable runway in relation to surface condition, wind, and weather should be used. Landing on a wet or icy runway greatly increases the stopping distance. The appropriate landing distances should be obtained from the applicable sections of the Performance manual. Maximum flap extension is recommended when landing on runways with reduced braking conditions.

If a landing is planned on a runway contaminated with snow, slush, standing water or during heavy rain, the following factors must be considered: available runway length; visibility of runway markers and lights; snow banks and drifts along the runway; wind direction and velocity; crosswind effect on directional control; braking action; awareness of the effect on aircraft from slush and water spray (e.g., engine ingesting, damage to flaps, gear doors); and the possibility of hydroplaning and the resultant increase in stopping distances.

Braking action will be degraded following the application of a chemical de-icer on an icy runway. When first applied, the chemicals form a watery film over snow and ice that results in extremely poor braking. When in doubt about the type of runway de-icing, ask the tower specifically if chemical deicers were used.

Blowing or drifting snow can create optical illusions or depth perception problems during landing or taxi-in. Crosswind conditions may create a false impression of aircraft movement over the ground. It is thus possible to have an impression of no drift when, in fact, a considerable drift may exists. When landing under these conditions, runway markers or runway lights can help supply the necessary visual references.

When it has been established that a safe landing can be made, the aircraft must be flown with the objective of minimizing the landing distance. The approach must be stabilized early. Precise control over drift and approach speeds is mandatory. Execute a missed approach if zero-drift condition cannot be established prior to touchdown.

The aircraft should be flown to a positive touchdown on the runway. Be prepared to deploy the spoilers manually since automatic deployment may not occur, due to delayed wheel spin-up.

On touchdown take positive action to lower the nose gear to the runway and maintain slight forward pressure on the control column to assist in directional control. Maintain centerline tracking, ensure spoiler deployment and simultaneously apply brakes smoothly and symmetrically. On contaminated surfaces, full braking should be used to realize optimum ant-skid operation. Autobrakes should be used in the maximum setting. Reverse thrust should be applied smoothly and symmetrically to maximum allowable as soon as possible since reverse thrust effectiveness is greatest at higher speeds. Do not use differential reverse thrust for directional control, as this may further aggravate the effects of weathervaning. The use of reverse thrust may cause a visibility problem from blowing snow forward as ground speed decreases. Using high levels of reverse thrust at low ground speeds on a contaminated runway, could lead to flameout of the wing mounted engines due to ingestion of large amounts of water spray, slush or snow. Take action as appropriate to the braking action and runway length available. Avoid rapid return to forward thrust when engine RPM is high; the resultant forward thrust may be high enough to cause the aircraft to accelerate.

Maintain directional control primarily with rudder pedals. Be alert for drift towards downwind side of the runway. The rudder required in strong crosswinds may cause the nose gear to turn to an angle which could induce skidding. Therefore, it may be necessary to hold the nose wheel centered and control steering with rudder and brakes to maintain tracking.

If a skid develops, especially in crosswind conditions, reverse thrust will increase sideward movement of the aircraft. In this case, modulate brake pressure and reduce reverse thrust to reverse idle, and if necessary, forward idle. Apply rudders necessary to realign the aircraft with the runway and reapply braking and reversing to complete landing roll. Use of nose gear steering wheel inputs to try to correct a skid at high speeds is extremely hazardous. Use as much runway as necessary to slow the aircraft and do not attempt to turn off a slippery runway until speed is reduced sufficiently to turn without skidding.

Taxiing

If the approach was made through icing conditions or if the runway was covered by slush or snow, do not retract flaps to less than 28°. Damage to the flaps/slats could occur if ice is present and flaps and slats are fully retracted.

Inspection after parking will show whether the necessity to de-ice the flaps exists. After inspection, flaps and slats should be moved to UP/RET.

Slush in puddles or runway low spots may be deeper than the 1/2 inch (12.7 mm) maximum and cause damage to flaps or other parts.

Therefore, inspection is required after each landing in slush or snow conditions.

Parking

Both main and nose gear should be properly chocked. Parking brakes should be released to eliminate the possibility of brakes freezing. If concerned about chocks holding on an icy ramp, parking brakes may be left on.

If parking for an extended period and extreme cold temperatures are expected, consider parking on sand or similar material to prevent freeze down.

In blowing snow, engine covers may be required, depending on length of ground time.

If the aircraft is parked in an area where exposure to an accumulation of freezing precipitation is anticipated, set 3 units ANU with the horizontal stabilizer trim and power down the hydraulic system. This will allow the inboard elevator panels to droop, trailing edge down, while the outboard panels remain faired. This configuration minimizes ice accumulation in the elevator slot and avoids elevator nose damage during elevator movement.

Engine and Airfoil ANTI-ICE

AIRCRAFT ON GROUND BEFORE TAKEOFF

NO

ENG, WING and TAIL ANTI-ICE Switches . . . . ON

Push ENG, WING and TAIL ANTI-ICE switches and verify ON lights illuminate and “A-ICE ALL ON” alert is displayed.

If ground operation exceeds thirty minutes in icing conditions, advance throttles to 60% N1 for 30 seconds, every 30 minutes.

NOTE: If airport surface conditions or congestion does not permit the throttles to be advanced to 60% N1, then power should be set as high as practical for as long as conditions permit.

Prior to throttle advance to takeoff thrust, advance throttles to 60% N1 for 30 seconds, observing all engine parameters are normal.

[END]

ENG, WING, and TAIL ANTI-ICE Switches . . . . ON

Push ENG, WING, and TAIL ANTI-ICE switches and verify ON lights illuminate and "A-ICE ALL ON" alert is displayed. If "A-ICE ALL ON" alert is not displayed, depart icing area.

N1 SETTING IS LESS THAN 70%
FOR 10 MINUTES OR MORE

NO

In moderate to severe icing conditions with prolonged periods of N1 settings less than 70% N1, every 10 minutes push IGN OVRD switch to OVRD ON and (one engine at a time) reduce throttles toward idle, then advance throttles to a minimum of 70% N1 for 10 to30 seconds. When anti-ice is no longer required, push IGN OVERD switch to OFF.

NOTE: During this procedure, “CONFORM RNG OUT CLEAR” prompt may appear on the MCDU.

ENG, WING, and TAIL ANTI-ICE Switches. . . . . OFF

Push ENG, WING, and TAIL ANTI-ICE switches and observe ON lights extinguish.

[END]

Autopilot

Automatic Flight System (AFS)

General Overview

The Automatic Flight System (AFS) includes dual autopilots (AP) and Flight Directors (FD) controlled by dual flight control computers (FCC), dual autothrottles (ATS), an Elevator Load Feel (ELF) system, a Flap Limiter (FL) system, stability augmentation and optional roll control wheel steering (RCWS). Each FCC is an independent system which can provide all AFS functions except DUAL LAND which requires that both FCCs be operative.

Commands to the AFS can be made through the flight control panel (FCP) using speed, heading/track and altitude knobs or the vertical speed/flight path angle pitch wheel. These controls are active during all phases of flight except while in dual FD control below 1,500 feet AGL, SINGLE LAND or DUAL LAND. The pitch wheel will not be active 400 feet AGL in the pitch AP or FD takeoff (T/O) or go-around (GA) modes. Inputs can also be made through the flight management system (FMS) derived vertical (PROF), lateral (NAV), and speed (FMS SPD) targets by selection of respective control switches. FMS NAV may be armed before T/O at pilot's discretion. If NAV is armed prior to T/O, FD NAV guidance will be available at 100 feet AGL. The AP may not be connected below 400 feet AGL if NAV is armed/engaged (CAWS AP disconnect will sound if attempted). FMS PROF mode may be armed prior to T/O (if pin option enabled) and guidance will be available at 400 feet AGL.

The AP is disconnected by pushing the AP disconnect switch located on either the Captain's or the First Officer's outboard yoke handle. This activates the AP disengage warning system, which consists of a flashing red AP OFF text and a flashing red box around the flight mode annunciator on the PFD. It also consists of a cyclic aural warning tone and a central aural warning system "AUTOPILOT" optional announcement. If the autopilot disconnect button is held depressed, and the RCWS option is installed, the RCWS will be disabled until the button is released.

The pilot is responsible for monitoring the autopilot whenever it is engaged. If the pilot is not satisfied with the autopilot performance, or is unsure that it is operating correctly, it should be immediately disconnected by using one of the autopilot disconnect switches. The pilot should smoothly stabilize the aircraft attitude, re-trim if necessary and reengage the autopilot if desired.

NOTE: Because the autopilot cannot respond correctly when inputs are made to the control wheel or column, it is designed to disconnect automatically if there are sustained pilot inputs. However, the pilot should never make control inputs when the autopilot is engaged, because at disconnect there will be a sudden and abrupt movement of some flight control surfaces with an associated but unpredictable aircraft response.

WARNING: Applying a force to the control wheel or column while the autopilot is still engaged has resulted in autopilot disconnects and subsequent abrupt aircraft maneuvers. Pilots have over-controlled the aircraft while trying to return to stabilized level flight. The pilot should never apply force to the control wheel or column while the autopilot is engaged. If the pilot is not satisfied with the autopilot performance, or is unsure that it is operating correctly, it should be immediately disconnected by using one of the autopilot disconnect switches. If the autopilot disengages while a force is applied to the control wheel or column, there will be a rapid, commanded change in some of the control surface positions. This will result in an abrupt and unpredictable aircraft response. Additionally, the pilot should not

attempt to disconnect the autopilot while applying a control force. If an inadvertent autopilot disconnect occurs, the pilot must smoothly stabilize the aircraft attitude, releasing the flight controls, if necessary, until the aircraft motion dampens out.

Takeoff

When aligned with departure runway and cleared for takeoff, advance throttles to at least 70% N1 and ensure symmetrical engine acceleration. Push the AUTO FLIGHT switch on the FCP and verify that ATS engage. Monitor increase in thrust to computed thrust rating on engine and alert display (EAD). Observe the flight mode annunciator (FMA) changes from T/O CLAMP to T/O THRUST. At approximately 80 KIAS, the altitude window of the FMA will return to T/O CLAMP.

NOTE: In T/O mode, AP is available at 100 feet AGL but it is not authorized for use below 200 feet.

If AP is engaged, white AP OFF box will be removed from the FMA. Pulling IAS/MACH select knob above 400 feet AGL will cause AP and/or FD to accelerate to the speed in IAS/MACH display window on the FCP. If an engine out is recognized, a more aggressive speed capture will result. The FMS vertical profile may be selected by pushing the PROF switch on the FCP at any altitude above 400 feet AGL for takeoff and go-around.

Flaps and slats should be retracted while accelerating at T/O power. Pull altitude select knob to allow thrust to reduce from T/O rating to climb power when reaching CLB THRUST altitude as set in FMS. Pulling knob before CLB THRUST altitude arms thrust rating to automatically reduce thrust when altitude is reached. If knob is pulled after CLB THRUST altitude, thrust will reduce immediately. If altitude select knob is not used, thrust limit will reduce to climb power at first altitude capture.

Climb, Cruise, and Descent

The initial altitude assignment should be preset in the altitude display window of the FCP. With PROF mode engaged, AP will follow flight plan profile as limited by pilot-entered altitude in the FCP. With PROF mode disengaged, climbs and descents are accomplished by level change, V/S or FPA modes.

When using level change for climbs or descents, ATS will normally set thrust to the FMS computed or manually selected thrust limits for climbs and to idle thrust for descents. For climbs or descents of 5,000 feet or less, the ATS will compute a thrust setting which may be lower than displayed FMS thrust limit in climb and higher than idle in descent.

The AFS will back up normal FMS (PROF) controlled engine out driftdown profiles. This backup will become active if airspeed decreases to FMS computed Vmin speeds minus 10 knots (Vmin - 10), and an engine out has been detected. Driftdown will occur at maximum continuous thrust (MCT) at a speed target of Vmin. The system will honor requests to capture intermediate altitudes above two engine level-off altitude, but will resume drift down if unable to maintain FMS Vmin - 10 knots at that intermediate altitude.

Approach

ILS, VOR, and NDB approach profiles are contained in the Procedures & Techniques section of this volume. These profiles provide a step-by-step depiction which correlates FCP switch commands and FMA indications with phase of flight.

ILS (Category III, II, I) Approaches

ILS approaches may be flown in Category III, Category II, or Category I weather minimums. During all automatic (coupled) approaches, DUAL LAND (fail operational), SINGLE LAND (fail passive), or APPR ONLY mode will be annunciated in the FMA.

Category IIIB approaches require DUAL LAND, a fully coupled automatic approach and landing, through touchdown and ground rollout. If system reverts to SINGLE LAND, a Category II approach may be continued automatically. The AP should remain engaged until a safe stop is assured and adequate visibility exists for safe pilot control.

Category II approaches may be flown in DUAL LAND, SINGLE LAND, or APPR ONLY mode using AP or both FDs. SINGLE LAND provides same performance as DUAL LAND but requires higher minimums due to its fail passive capability. The APPR ONLY mode means that no autoland mode is available and AP will automatically disconnect at 100 feet AGL. The pilot completes landing manually.

Category I approaches may be flown using any of above AP modes or manually using FD.

If prior to LOC capture, aircraft passes through glideslope without G/S capture, pilot must take action to capture the G/S from above.

When in FD LOC CAP mode and/or G/S mode, subsequent engaging of the AP may result in AP mode reversion to HEADING/VS if AP ILS capture criteria are not met.

After passing 1,500 feet RA, on LOC and G/S, with AP and ATS engaged, AFS performs a logic and system status check. If satisfactory, DUAL LAND or SINGLE LAND will be annunciated in the FMA. If all of its logic cannot be satisfied, the AFS will continue attempting to engage DUAL LAND until 400 feet AGL, then SINGLE LAND or APPR ONLY will be annunciated.

Since lowest weather minimums are directly related to system status, both pilots must monitor autoland status during approach. Should the autoland status degrade, approach may not be continued below the applicable minimums unless required visual reference is established and aircraft is in a position to land.

NOTE: For localizer intercepts, avoid high speeds and high intercept angles. Intercept angles greater than 30° may cause a localizer overshoot.

Do not exceed 200 knots with DUAL LAND or

SINGLE LAND engaged.

Tracking the glideslope at speeds in excess of 180 knots may result in slight control column pitch oscillations.

At least two yaw damper channels and two LSAS channels in the same FCC must be active to achieve an autoland status (SINGLE LAND).

Circling Approach - ILS Approach Circle to Land

A circling approach may be flown following an ILS approach to MDA (CIRCLE-TO-LAND minimums). To perform this maneuver the following procedures need to be accomplished.

- Select MDA (CIRCLE-TO-LAND minimums) by setting the BARO minimum on either or both EIS control panels to the desired altitude.
- When established on the ILS localizer and prior to DUAL/ SINGLE LAND annunciation, preselect the FCP altitude to the same as the MDA value.

The FMA will annunciate APPR ONLY and a "NO AUTOLAND" alert will display on the MISC page of the system display. Upon reaching the selected MDA, the autopilot/flight director will command a level off and the FMA will change to heading and altitude hold. The appropriate circling maneuver may now be flown using the desired heading or track select mode.

Exit From Approach Modes

After localizer is captured and LOC annunciation is displayed in the FMA roll window, any roll mode change will exit LOC track mode. After LOC and G/S are annunciated on the FMA, these modes may be exited by selecting either a different pitch mode or a different roll mode. Pushing the altitude knob on the GCP will not produce altitude hold mode at any time that glideslope is the active pitch mode. After DUAL LAND or SINGLE LAND or APPR ONLY is displayed on the FMA, the GCP controls are disabled to protect the autoland. Exit from those modes is possible by use of the go-around button. Special exit procedures for the side-step maneuver are addressed below.

Side-Step Maneuver From ILS Approaches

Because of the additional protection required to guard against uncommanded frequency changes during autoland, simply inserting a new ILS frequency and course on the NAV RAD page will not result in a new frequency being tuned any time after the FMA shows LOC and G/S. Therefore, there is a need for a special procedure if a side-step from one ILS to another is required.

Any time a side-step is required and the FMA shows LOC and G/S or DUAL LAND or SINGLE LAND or APPR ONLY, perform the following procedure if guidance to the new ILS is required for landing.

- Disconnect the autopilot.
- Insert the new ILS frequency and course in the NAV RAD page.
- Push the APPR/LAND switch on the GCP.

The autopilot system will then immediately drop to basic modes, heading and vertical speed, and the FMA will display those modes plus LAND ARMED. Maneuver the aircraft as required to intercept the new localizer. The use of the autopilot for the continued side-step approach is not recommended inside the final approach fix.

VOR and NDB Approaches

VOR approaches may be flown as follows:

- FMS data base approach flown in NAV mode.
- With reference to raw data using HEADING/TRACK.
- With reference to raw data using TRACK mode.
- VOR TRACK mode.

NDB approaches may be flown as follows:

- FMS NDB approach in NAV mode.
- With reference to raw data using HEADING mode 3. With reference to raw data using TRACK mode.

FMS data base VOR approaches and FMS NDB approaches flown in the NAV mode must be monitored using raw data to ensure correct navigation. Any of the above approaches may be hand flown or coupled to the AP.

Go-Around

If GA is selected in a turn, the AFS will roll the wings level. As bank angle rolls through 3 degrees, AFS will hold heading that exists at the time. Desired missed approach heading should be selected.

GA pitch is limited to 22 degrees. In an engine out go-around, speed selection will cause a more aggressive speed capture than with three engines operating.

Pitch axis GA may be canceled above 400 feet AGL by selecting any pitch mode or automatically at altitude capture. Roll axis GA mode, including parallel rudder operation, may be exited above 400 feet AGL by selecting any other roll mode. This is independent of pitch axis GA operation.

[END]

Fuel System

Fuel Crossfeed

FUEL SYSTEM SELECT Switch . . . . VERIFY MANUAL

If fuel system is in automatic mode, push FUEL SYSTEM SELECT switch and observe MANUAL light illuminates.

TANK TRANS Switch (Supplying Tank) . . . . ON

Push appropriate TANK TRANS switch and observe ON light illuminates.

TANK XFEED Switch (Receiving Engine) . . . . ON

Push appropriate TANK XFEED switch and observe ON light illuminates.

NOTE: XFEED DISAG light illuminates briefly while valve is in transit.

If fuel crossfeed valves are opened so that tank 2 and tank 1 or 3 are supplying fuel to the engines through the fuel manifold, tank 2 can be expected to override the other tank and feed all engines.

TANK PUMPS Switch (Receiving Engine) . . . . OFF

Push appropriate TANK PUMPS switch and observe OFF light illuminates.

Confirm proper crossfeed operation by observing fuel synoptic.

NOTE: Below approximately 10,000 pounds/4,600 kilograms, fuel transfer rate from outboard to inboard compartment during an extended tank to tank transfer or crossfeed is not sufficient to sustain flow to more than one engine operating at cruise power.

Manage fuel distribution so transfer or crossfeed from tanks 1 or 3 is not required below 10,000 pounds/4,600 kilograms remaining in each tank and balance of fuel between tanks 1 and 3 is within 2,500 pounds/1,100 kilograms.

When fuel quantity reaches desired level,

Tank PUMPS Switch (Receiving Engine) . . . . ON

Push appropriate Tanks PUMPS switch and observe OFF light extinguishes.

Tank XFEED Switch (Receiving Engine) . . . . OFF

Push appropriate Tank XFEED switch and observe ON light extinguishes.

TANK TRANS Switch (Supplying Tank) . . . . OFF

Push appropriate TANK TRANS switch and observe ON light extinguishes.

[END]

Minimum Fuel Approach and Manifold Drain Operation

Manage fuel in tanks to approximately equal so crossfeed or transfer is not required during approach.

NOTE: Approximately 2,000 pounds/900 kilograms in each main tank is sufficient for a missed approach and VFR return.

FUEL SYSTEM MANUAL

NO

When fuel quantity in any main tank reaches approximately 2,000 pounds/900 kilograms,

All Tank TRANS Switches . . . . OFF

Push all tank TRANS switches and observe ON lights extinguish.

FUEL SYSTEM MANUAL

NO

(Continued)

All tank XFEED Switches . . . . OFF

Push all tank XFEED switches and observe ON light extinguish.

MANF DRAIN Switch . . . . DRAIN

Open MANF switchguard, push MANF DRAIN switch and observe DRAIN light illuminates. “FUEL MANF DRAIN” level 1 alert will be displayed.

NOTE: In drain position, manifold drain valves will open and allow fuel in crossfeed manifold (approximately 400 pounds/180 kilograms to drain into tank 2 when fuel quantity in tank 2 is less than approximately 2,000 pounds/900 kilograms.

Fuel Quantity Indicators . . . . MONITOR

CAUTION: Crossfeed valves should not be on nor transfer pumps operated after a fuel manifold drain operation.

Do not attempt a missed approach when fuel in any main tank is less than 1,500 pounds/700 kilograms.

Avoid pitch up attitudes in excess of that required for a safe climb gradient.

NOTE: If "TNK__FWD PUMP LO" alert is displayed while in a pitch up attitude, no crew action is required. The alert will extinguish when pitch attitude is lowered.

[END]

Tail Fuel Fwd

When "TAIL FUEL FWD" alert is displayed, push FUEL SYSTEM SELECT switch from AUTO to MANUAL then back to AUTO.

“TAIL FUEL FWD” ALERT EXTINGUISHED

NO

No further crew action required.

[END]

Cruise performance may be affected.

NOTE: The fuel burn penalty for tail fuel management system inoperative (tail tank empty) is dependent on the zero fuel weight center of gravity as follows:

ZFWCG (% MAC)	FUEL BURN PENALTY (%)
Below 22	2.7
22 to 28	2.0
Above 28	1.0

The cruise penalty can be entered as a PERF FACTOR (+) on the FMS A/C STATUS page to correct FMS enroute predictions.

LESS THAN 4 HOURS REMAIN IN FLIGHT LEG, OR “FUEL TEMP FAIL” ALERT DISPLAYED, CG DISPLAY INOPERATIVE, OR TAIL TANK EMPTY

NO

Continue flight with fuel system in AUTO.

[END]

FUEL SYSTEM SELECT Switch . . . . MANUAL

Push FUEL SYSTEM SELECT switch and observe MANUAL light illuminates.

NOTE: When switching the fuel system from AUTO to MANUAL, fuel system controller (FSC) will turn on tank pumps 1, 2 and 3, L and R aux tank transfer and tail tank transfer pumps. Tank 2 transfer pump and 1, 2 and 3 fill valves will remain in previously selected positions. Wait 4 sec for the FSC to coordinate pump sequence before selecting any pump.

Select FUEL synoptic. Verify the transfer path from the tail tank to the aux tanks. Verify the tail tank transfer pumps are on and green flow lines are illuminated, and the upper aux tank fill spigot is displayed. Verify upper and lower aux pumps are functioning by observing the green flow and pressure indications on the synoptic.

TAIL TANK TRANS Switch. . . . . OFF

Push TAIL TANK TRANS switch and observe ON light illuminates.

Tank 1, 2 and 3 FILL Switches. . . . . AS REQUIRED

Monitor aircraft center of gravity and tail tank fuel temperature.

Maintain center of gravity forward of 32% MAC and tail tank fuel temperature warmer than -35°C.

CG $\geq$ 32% MAC

NO

TAIL TANK TRANS Switch . . . . ON

Push TAIL TANK TRANS switch and observe ON light illuminates.

When CG decreases to 30% MAC,

CG ≥ 32% MAC

NO

(Continued)

TAIL TANK TRANS Switch . . . . OFF

Push TAIL TANK TRANS switch and observe ON light extinguishes.

Tank 1, 2, and 3 FILL Switches . . . . AS REQUIRED

Monitor aircraft center of gravity and tail tank fuel temperature. Maintain center of gravity forward of 32% MAC and tail tank fuel temperature warmer than -35ºC.

[END]

TAIL FUEL TEMP -35ºC OR COLDER, OR TAIL FUEL QUANTITY ≤ 5,000 LB/ 2268 KG, OR UPPER AUX TANK EMPTY

NO

FUEL SYSTEM SELECT Switch . . . . .AUTO

Push FUEL SYSTEM SELECT switch and observe MANUAL light extinguishes.

NOTE: “TAIL FUEL FWD” alert may, and fuel will transfer forward or normal tail fuel management will occur.

[END]

Monitor center of gravity.

[END]

APU Inflight Operation

NOTE: The APU may be started at altitudes up to 25,000 feet and operated within the APU In flight Operating Envelope.

APU . . . . START

Push APU power switch on electrical control panel to start APU. If APU fails to start, push APU START/STOP switch on APU panel, and observe ON light illuminates. When APU is started from APU START/STOP switch, APU PWR switch must be pushed to ON to supply electrical power.

NOTE: An in flight start may take as long as 3 minutes and be characterized by fluctuations of N1, EGT, and N2 during acceleration to operating speed.

Battery Start

CAUTION: Ensure wheels are chocked. The brake system may have insufficient hydraulic pressure to maintain adequate braking until HYD SYS 1 or 3 is pressurized.

Log Book . . . . REVIEW

Review log book for discrepancies.

Emergency Equipment. . . . . CHECK

Verify emergency equipment is installed and properly secured.

Circuit Breakers . . . . SET

Gear Handle. . . . . DOWN

FLAP/SLAT and SPOILER Handles. . . . . CHECK

Verify FLAP/SLAT and SPOILER handles agree with external position observed.

DUMP and MANF DRAIN Switches. CHECK

Verify DUMP and MANF DRAIN switches are guarded and safetied.

BAT Switch . . . . ON

Push BAT switch and observe BAT BUS OFF light extinguishes.

ENG/APU FIRE Detection System . . . . TEST

Push ENG/APU FIRE TEST button on overhead panel. Observe all three ENG FIRE handle lights, APU FIRE handle light, and all three engine FUEL switches are illuminated. Engine/APU fire test must be repeated after AC buses are powered.

NOTE: MASTER WARNING light and fire bell will not operate and fire alerts will not display on EAD and SD unless aircraft power or emergency power is available.
ENG/APU fire detection and extinguishing systems are available during a battery start.
The fire extinguishing ENG 2 AGT LOW lights are operative during a battery start.

Parking Brake . . . . SET

EMER PWR Selector . . . . ON

Ground Communications . . . . ESTABLISH

NOTE: Interphone communication is available with ground crew at flight interphone jack from Captain's audio control panel.
VHF communications is available through VHF-1.

Determine pneumatic source for engine start.

EXTERNAL PNEUMATIC SOURCE DESIRED

NO

Direct maintenance to connect external pneumatic source to pneumatic duct 1.

NOTE: If a second pneumatic source is needed, direct maintenance to connect a second source to pneumatic duct 2 and manually open pneumatic 1-2 ISOL valve.

APU PNEUMATIC SOURCE DESIRED

NO

AIR APU Switch . . . . ON

Direct maintenance to manually open pneumatic 1-2 isolation valve.

For aircraft without Service Bulletin 24-72 incorporated, direct maintenance to manually open APU load bleed valve and pneumatic 1-2 isolation valve.

NOTE: To prevent battery discharge, complete engine start procedure without delay and power electrical bus as soon as possible.

ENG IGN . . . . System A

Push ENG IGN A switch and observe ENG IGN A light illuminates and the OFF light extinguishes.

PACKs . . . . VERIFY OFF

NOTE: Pack OFF lights will not illuminate until DC BUS 3 is powered. Verify there is no air conditioning flow. If air conditioning flow is detected, push appropriate pack switch.

Engine 1 . . . . START

NOTE: The light in the engine start switch will not illuminate until electrical buses are powered. The secondary engine instruments will not operate during a battery start.

Engine 1 is recommended for battery start. If it is not practical to start engine 1, it is possible to start engine 3. To provide engine 3 start pneumatic pressure, select 1-3 ISOL ON. The 1-3 isolation valve is powered from the L EMER bus.

Observe associated GEN ARM light is extinguished and all electrical buses are powered.

EMER PWR Selector . . . . OFF/ARM

Rotate the EMER PWR selector to OFF and then back to ARM. Observe EMER PWR ON light is extinguished and the "BAT CHARGING" alert is displayed.

Prior to starting remaining engines, accomplish all applicable line items through BEFORE START/PUSHBACK procedure.

NOTE: The emergency power preflight test cannot be performed with an engine running. The emergency power system was adequately functioned during the ENGINE START procedure. No further check of emergency power is required.

[END]

Cross Bleed Start

Complete BEFORE START procedure.

ECON Switch . . . . OFF

Push ECON switch and observe "ECON OFF" alert is displayed.

AIR SYSTEM MANUAL

NO

BLEED AIR Switch (Engine Supply Bleed). . . . . ON

BLEED AIR Switches (Engines Being Started). . . . . OFF

Appropriate ISOL VALVE Switch(es) . . . . ON

PACK Switches (ALL) . . . . OFF

START Switch . . . . PULL

Pull START switch and observe switch light illuminates indicating start valve is open.

“START AIR PRES LO” ALERT DISPLAYED

NO

Advance throttle on supplying engine to maintain a minimum of 25 psi.

Start engine(s) using normal starting procedure.

NOTE: On ground, if throttle on supplying engine was advanced previously, it may be reduced to idle after starter disengagement.

AIR SYSTEM MANUAL

NO

After engine(s) are started,

AIR SYSTEM MANUAL

NO

ISOL VALVE switches . . . . OFF
BLEED AIR Switches (All) . . . . ON
PACK Switches (All) . . . . ON

ECON Switch . . . . AS REQUIRED

Complete AFTER START procedure.

[END]

Engine Ignition Manual Operation

NOTE: When "ENGINE IGN MANUAL" or "MSC AUTO FAIL" alert is displayed, the automatic function of the ignition system is inoperative.

A or B ENG IGN switch MANUAL light illuminated indicates power is being supplied continuously to the selected ignition.

When the automatic function of the ignition system is inoperative, select A or B ignition system as follows:

Prior to Engine Start . . . . ENG IGN A OR B MANUAL
After All Engines Have Started . . . . ENG IGN OFF
Prior To Takeoff. . . . . ENG IGN A OR B MANUAL
After Slat Retraction . . . . ENG IGN OFF

Prior To Selecting Engine Anti-Ice On . . . ENG IGN A OR B MANUAL

After Engine Anti-Ice Has Been Selected Off. . . . . ENG IGN OFF

Prior To Landing. . . . . ENG IGN A OR B MANUAL

After Landing . . . . ENG IGN OFF

NOTE: Although the ignition systems have no time limit, excessive use will reduce service life.

[END]

Manual Throttle Operation

Takeoff

N1 setting for takeoff can be found on the THRUST LIMITS page of the MCDU or in the FCOM Volume IV, PREFLIGHT, TAKEOFF section.

When aircraft is aligned on runway and cleared for takeoff, PF advances throttles to approximately 70% N1, and after insuring symmetrical thrust, advances throttles to approximate takeoff N1. PNF should then refine the throttle setting to the desired takeoff setting prior to 80 KIAS and respond "THRUST SET." At 80 knots, the PNF should call "80 KNOTS, NO CLAMP."

Climb

At the normal thrust reduction altitude the PNF should reduce thrust to the climb thrust N1. (Reference THRUST LIMITS page of MCDU or FCOM Volume IV, IN FLIGHT, CLIMB section.)

NOTE: N1 tends to increase as aircraft climbs. Close monitoring and adjustment of the N1 is required during climb.

Cruise

Thrust should be set as required to maintain desired speed during cruise. Reference the cruise tables in the FCOM Volume IV for target cruise performance. MCT N1 setting can be located on the THRUST LIMITS page of the MCDU or FCOM Volume IV, PREFLIGHT, TAKEOFF section.

Descent, Approach, and Landing

Thrust should be set as required to maintain desired speed. Go-around N1 thrust setting is located on the THRUST LIMITS page of the MCDU or FCOM Volume IV, INFLIGHT, APPROACH AND LANDING section. Auto retard is not available on landing.

[END]

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Introduction

General

This section amplifies the procedures to be performed in the event of emergency conditions.

Emergency procedures fall into two categories: Emergency Alert procedures and Emergency Non-Alert procedures.

Emergency Alert procedures are provided alphabetically in the Emergency Alert section, and are annunciated by the display of a red LEVEL 3 alert and an aural warning. All alert procedure titles use the exact wording of the EAD alert message.

> *NOTE: On very rare occasions a parameter may "X" out and then return. In this case, the data is as valid as it was prior to the "X" being displayed and the pilots should comply with any related alerts as they would normally.*

Emergency Non-Alert procedures are provided alphabetically in the Emergency Non-Alert section. These emergencies are not annunciated by the alerting system.

All emergencies require immediate attention and corrective or subsequent action by the crew.

Emergency procedures assume the overhead circuit breaker panel, lights, and displays will be checked when appropriate to any procedure. Resetting of a tripped circuit breaker by the flight crew is not recommended.

> *NOTE: Do not reset any tripped fuel pump circuit breakers.*

> **CAUTION: One reset of any other tripped circuit breaker may be attempted after a cooling period of approximately two minutes. If the circuit breaker trips again, do not attempt another reset. Indiscriminate pulling or resetting of circuit breakers for systems or components may cause unanticipated results because of systems interrelationship.**

Most emergency procedures are written considering single failures only. If more than one failure exists within a system, the engine and alert display (EAD) will normally display only the most serious problem. In certain cases the alert will indicate a procedure for multiple failures. If failures occur simultaneously in more than one system, it is the Captain's responsibility to establish the priority of actions.

The flight crew is responsible to make a log book entry of all abnormal indications or events that occur.

Emergency Checklist Philosophy

As soon as an emergency condition is detected, the detecting crew member will announce the condition and, when applicable, reset the alerting system.

> *NOTE: The primary method of resetting the alerting system is to push the associated cue switch on the systems display control panel (SDCP). This action will reset the MASTER WARNING light and display the appropriate synoptic on the system display. In the event of an engine fire warning, the red MASTER WARNING light must be pushed or the associated fire handle must be pulled to silence the aural warning.*
>
> *For all emergency alerts, if conditions do not permit (i.e., short final approach), the MASTER WARNING light may be reset by pushing either MASTER WARNING light. In this case, the associated cue light will remain illuminated and can be pushed to select the system display when time permits.*

The Pilot Flying (PF) will dedicate his attention to airplane control. Time permitting, the Pilot In Command (PIC) will then call for appropriate memory items and the Volume I checklist. The Pilot Not Flying (PNF) will accomplish the memory items with PF confirmation. The PNF will then verify the appropriate checklist and refer to the Volume I procedure. The checklist should be accomplished by the

"Challenge-Do-Verify" method. The PNF will accomplish each item in the procedure if it is in his area of responsibility or coordinate the action with the PF if the action is in the PF's area of responsibility. The PNF will announce procedural and advisory items given in the checklist. He will also read the consequences and assure verbal confirmation by the PF.

When the checklist is completed, the PNF will announce "CHECKLIST COMPLETE."

In the following procedures, as with all checklist items, any item that is contained in a box is considered to be a memory item for that procedure. Any boxed item listed under an emergency procedure or non alert emergency procedure should be recognized by the pilot as being a memory item, and the boxed steps should be accomplished from memory before resorting to the checklist/procedure to complete the crew response.

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Alerts

▶AIR MANF__FAIL

Consequences:

LAND AT NEAREST SUITABLE AIRPORT

NOTE: In addition to the "AIR MANF__FAIL" alert displayed, an aural warning will sound.

When flight conditions permit,

Associated Throttle . . . . IDLE

When alert is no longer displayed, operate associated engine at a thrust level that will keep alert from being displayed.

Land at nearest suitable airport.

NOTE: Do not repressurize affected air system.

[END]

▶APU FIRE

Consequences:

LAND AT NEAREST SUITABLE AIRPORT ENG 2 AGENTS TO APU, NONE FOR ENG

NOTE: When the "APU FIRE" alert is displayed, a cockpit aural warning will sound.
APU fire indication may be caused by a fire or rupture of air manifold in APU compartment.
The APU will shut down automatically and the APU bleed air load valve will be commanded closed when the "APU FIRE" alert is displayed or the APU fire handle is pulled. If the air system is in AUTO, pack 2, bleed air 2 and isol valve 1-2 will be commanded off.

APU FIRE Handle/AGT LOW Light . . . PULL AND ROTATE/CHECK

When handle is rotated to discharge agent, verify discharge by observing AGT LOW light adjacent to ENG 2 FIRE handle illuminates.

NOTE: When APU shuts down, "APU FIRE" alert is no longer displayed when signal ceases.
Insure fire handle is pulled to fullest extent before rotating it to discharge agent.
Pulling APU FIRE handle deenergizes APU generator field and arms APU fire extinguishing system.

APU START/STOP Switch . . . . OFF

Push APU START/STOP switch and observe flashing ON light extinguishes.

NOTE: If APU shuts down due to fire signal. APU START/ STOP ON light will flash until OFF is selected.

AIR SYSTEM MANUAL

NO

BLEED AIR 2 switch . . . . OFF

Push BLEED AIR 2 PRESS switch and observe OFF light illuminates.

1-2 ISOL Switch. . . . . OFF

Push 1-2 ISOL switch and observe ON light extinguishes.

PACK 2 . . . . OFF

Push PACK 2 switch and observe OFF light illuminates.

After 30 seconds,

FIRE WARNING CONTINUES

NO

Remaining Agent. . . . . DISHCH/CHECK

Pull and rotate handle in opposite direction to discharge remaining agent. Observe appropriate AGT LOW light illuminates.

NOTE: Fire handle is spring-loaded to an intermediate position. It must be pulled again prior to discharge of remaining agent.

All APU and engine 2 fire agents have been depleted.

Land at nearest suitable airport.

[END]

▶BLD AIR__TEMP HI

Consequences:

NONE . . . .

NOTE: In addition to the "BLD AIR__TEMP HI" alert displayed, an aural warning will sound.

Affected BLEED AIR Source . . . . OFF

Push affected BLEED AIR MANF/TEMP HI switch and observe "AIR SYS__OFF" alert is displayed.

NOTE: BLEED AIR MANF/TEMP HI switch is in parallel with BLEED AIR PRESS/OFF switch and operates identically.

After 30 seconds,

"BLD AIR__TEMP HI" ALERT DISPLAYED AGAIN

NO

If flight conditions permit, slowly reduce thrust on associated engine until alert is no longer displayed. Operate engine at a thrust level which will keep alert from being displayed for rest of flight.

[END]

Associated PACK Switch . . . . OFF

Push associated PACK switch and observe OFF light illuminates.

Associated ISOL Switch . . . . ON

Push associated ISOL switch and observe ON light illuminates.

[END]

▶CABIN ALTITUDE

Consequences:

NONE

NOTE: In addition to the "CABIN ALTITUDE" alert displayed, an aural warning will sound.

Oxygen Masks. . . . . ON 100%

Outflow Valve. . . . . ON 100%

If outflow VALVE is not closed, push CABIN PRESS SYSTEM SELECT switch and observe MANUAL light illuminates. Rotate CABIN PRESS manual rate selector to DESC.

Crew/Courier(s) Communication . . . . ESTABLISH

AVIONICS FAN Switch. . . . . VERIFY OVRD

If AVNCS FAN switch OVRD light is not illuminated, push the switch and observe OVRD light illuminates.

CABIN ALTITUDE CONTROLLABLE

NO

Operate cabin pressure system as required.

[END]

Perform and emergency decent.

Altitude Select Knob. . . . . REDUCE/PULL

Preselect a lower altitude and pull altitude select knob to initiate descent in pitch mode.

Initiate descent to 10,000 feet or minimum safe altitude, whichever is higher.

SPOILER Handle . . . . SPD BRK FULL

Squeeze and pull SPOILER handle to SPD BRK FULL.

WARNING: **If structural damage is suspected or turbulence present, do not exceed .82 Mach/ 305 KIAS.**

IAS/MACH Select Knob . . . . SELECT .85 MACH/320-350 KIAS

Descent . . . . MAX PITCH 1 0°/MAX BANK 30°

Transponder (Unless Otherwise Required) 7700

NO SMOKE and SEAT BELTS Switches . . . . ON

The "NO SMOKING" and "SEAT BELTS" alerts will be displayed.

[END]

▶CABIN SMOKE

Consequences:

LAND AT NEAREST SUITABLE AIRPORT

NOTE: In addition to the "CABIN SMOKE" alert displayed, an aural warning will sound.

Oxygen Masks ON/100%

Don smoke goggles as required.

Use EMER O2 pressure, as required to purge mask and goggles of smoke and/or fumes.

AIR SYSTEM MANUAL

NO

Reduce to single pack operation.

CABIN AIR Switch . . . . OFF

Lift guard then push CABIN AIR switch and observe OFF light illuminates.

CABIN PRESS Panel . . . . SYSTEM MANUAL/CLIMB

Push CABIN PRESS SYSTEM SELECT switch and observe MANUAL light illuminates.

Rotate CABIN PRESS manual rate selector to CLIMB.

After 1 minute,

"CAB AIR NOT OFF" ALERT DISPLAYED

NO

AIR SYSTEM SELECT Switch . . . . MANUAL

Operating PACK Switch . . . . OFF

Descend as required to maintain maximum cabin altitude of 25,000 feet to starve fire.

When aircraft is depressurized,
Outflow VALVE Indicator . . . . SET 9:00 POSITION

Rotate CABIN PRESS manual rate selector to set outflow VALVE indicator to 9:00 position.

NOTE: With no packs operating, selection of a position greater than 9:00 can cause cabin doors to unseat and allow outside air to flow into the cabin.

When cockpit is clear of smoke and/or fumes, move oxygen dilution control lever to NORMAL in order to extend useable oygen time.

Land at nearest suitable airport.
After landing and prior to opening door,

Outflow VALVE Indicator . . . . SET FULL OPEN

Rotate CABIN PRESS manual rate selector to set outflow VALVE indicator to full open.

[END]

AIRCRAFT AT OR ABOVE FL270

NO

Maintain 25,000 feet cabin altitude until approaching FL250 during descent.

Below 27,000 feet,

Maintain 0.5-psi cabin differential pressure.

When cockpit is clear of smoke and/or fumes, move oxygen dilution control lever to NORMAL in order to extend usable oxygen time.

Just prior to landing,

CABIN PRESS Manual Rate Selector . . . . CLIMB

When aircraft is depressurized,

Outflow VALVE Indicator. . . . . SET 10:30 POSITION

Rotate CABIN PRESS manual rate selector to set outflow VALVE indicator to 10:30 position.

NOTE: With a pack operating, selection of a position greater than 10:30 can cause a negative pressure in the aircraft. This will cause cabin doors to unseat and allow outside air to flow into the cabin.

Land at the nearest suitable airport.

After landing and prior to opening door,

Outflow VALVE Indicator. . . . . .SET FULL OPEN

Rotate CABIN PRESS manual rate selector to set outflow valve indicator to full open.

[END]

▶CAC MANF FAIL

Consequences:

NONE

NOTE: In addition to the "CAC MANF FAIL" alert displayed, an aural warning will sound.

PACK Switch(es) . . . . OFF

Push PACK switch(es) and observe OFF light(s) illuminate(s).

AVNCS FAN Switch . . . . .OVRD

Push AVNCS FAN switch and observe OVRD light is illuminated.

AIRCRAFT ON GROUND

NO

Call maintenance.

[END]

All Engine BLEED AIR Switches . . . . ON (5 SECONDS), THEN OFF

Push all BLEED AIR switches, observe OFF lights are extinguished for 5 seconds (to perform pressure manifold decay check), then push again and observe OFF lights are illuminated.

Compare air system pressure decay rates on synoptic.

BLEED AIR Switch (System With Slowest Rate of Decay) . . . . . . ON

Push BLEED AIR switch for system with slowest decay rate and observe OFF light extinguishes.

Associated PACK Switch . . . . ON

Push associated PACK switch and observe OFF light extinguishes.

MANF lights on the overhead panel should go off within approximately 5 minutes.

After 5 minutes,

"CAC MANF FAIL" ALERT REMAINS DISPLAYED

NO

Recheck manifold decay rates to verify correct system has been selected.

Restoration of an additional system may be attempted if required.

CAUTION: Do not repressurize the manifold that has the suspected failure.

AVNCS FAN Switch . . . . AS REQD

Push AVNCS FAN switch and observe the OVRD light is extinguished.

NOTE: Air system 3 provides heat to the forward cargo compartment and air system 2 provides heat to the aft cargo compartment.

Avoid icing conditions.

[END]

▶CRG FIRE LWR__

Consequences:

LAND AT NEAREST SUITABLE AIRPORT

NOTE: In addition to the "CRG FIRE LWR__" alert displayed, an aural warning will sound.

Flashing CARGO FIRE AGENT DISCH Switch. . . . . .PUSH

NOTE: CARGO FIRE AGENT DISCH switch will continue to flash until LOW light illuminates.

If CARGO FIRE AGENT 1 DISCH LOW light was illuminated due to prior low pressure condition, associated CARGO FIRE AGENT 2 DISCH switch will begin flashing.

If CARGO FIRE AGENT 2 DISCH switch is pushed inadvertently, AGENT 2 cylinder will discharge and associated CARGO FIRE AGENT 1 DISCH switch will continue flashing.

Associated CARGO FLOW Switch . . . . OFF

Push associated CARGO FLOW switch and observe OFF light illuminates.

Associated CARGO TEMP Selector . . . . OFF

"CRG FLO AFT DISAG" ALERT DISPLAYED

NO

NOTE: "CRG FLO AFT DISAG" alert may be displayed after a cargo fire procedure is completed and airflow through aft cargo compartment is detected.

AIR SYSTEM SELECT Switch . . . . MANUAL

Push AIR SYSTEM SELECT switch and observe MANUAL light illuminates.

BLEED AIR 1 Switch . . . . OFF

Push BLEED AIR 1 switch and observe OFF light illuminates.

PACK 1 Switch . . . . OFF

Push PACK 1 switch and observe OFF light illuminates.

1-2 and 1-3 ISOL Switches . . . . OFF

Push 1-2 and 1-3 ISOL switches and observe ON lights extinguish.

NOTE: A jet pump is incorporated in the aft cargo compartment ventilation system. Selecting BLEED AIR 1 OFF shuts down the jet pump.

Depart icing conditions (if applicable).

After approximately 1 minute elapsed time,

CARGO FIRE AGENT DISCH LOW LIGHT ILLUMINATED

NO

Approximately 90 minutes after agent 1 has been discharged, “DISCH CARGO AGENT” alert will be displayed on EAD and CARGO FIRE AGENT 2 DISCH switch will flash. The flashing CARGO FIRE AGENT DISCH switch should be pushed at that time.

NOTE: If “MSC AUTO FAIL” alert is subsequently displayed, manual timing will be required to determine discharge of agent 2.

Land at nearest suitable airport.

[END]

Associated CARGO FIRE AGENT 2 DISCH Switch

(Located Below Flashing Switch). . . . . .PUSH

Land at nearest suitable airport.

[END]

▶ENG 2 A-ICE DUCT

Consequences:

NONE

NOTE: In addition to the "ENG 2 A-ICE DUCT" alert displayed, an aural warning will sound

ENGINE 2 Throttle. . . . . IDLE

ENGINE 2 FUEL Switch . . . . OFF

AIR SYSTEM MANUAL

NO

Engine 2 BLEED AIR Switch . . . . OFF

Push BLEED AIR 2 switch and observe OFF light illuminates and “AIR SYS 2 OFF” alert is displayed.

PACK 2 Switch . . . . OFF

Push PACK 2 switch and observe OFF light illuminates.

1-2 ISOL Switch. . . . . ON

Push 1-2 ISOL switch and observe ON light illuminates.

Transponder/TCAS Selector . . . . TA

Land at nearest suitable airport.

[END]

▶ENGINE__FIRE

Consequences:

LAND AT NEAREST SUITABLE AIRPORT

2 TO ENG, NO ENGINE AGENTS FOR APU

NOTE: In addition to "ENGINE__FIRE" alert, fire warning bell will sound and ENG FIRE handle will be illuminated.

Throttle . . . . IDLE

FUEL Switch. . . . . OFF

ENG FIRE Handle/AGT LOW Light . . . . DOWN, DISCH/CHECK

Pull associated ENG FIRE handle full down. Rotate handle left or right to discharge extinguishing agent. Observe appropriate AGT LOW light illuminates.

After 30 seconds,

“ENGINE__FIRE” ALERT REMAINS DISPLAYED OR “FIRE DET__FAIL” DISPLAYED

NO

Remaining Agent. . . . . DISCH/CHECK

Rotate handle in opposite direction to discharge second bottle. Observe appropriate AGT LOW light illuminates.

NOTE: Discharging both fire agents to engine 2 leaves no engine fire agent for APU.

AIR SYSTEM MANUAL

NO

Associated BLEED AIR Switch . . . . OFF

Push associated BLEED AIR switch and observe OFF light illuminates and associated “AIR SYS__OFF” alert is displayed.

Associated ISOL Switch . . . . OFF

Push associated ISOL switch and observe ON light extinguishes.

CONTINUOUS HIGH AIRFRAME
VIBRATION PRESENT

NO

Without delay, reduce airspeed and descend to a safe altitude which results in an acceptable vibration level.

NOTE: *If high vibration returns and further airspeed reduction and descent are not practicable, increasing airspeed may reduce vibration.*

Transponder/TCAS Selector . . . . TA

Land at nearest suitable airport.

[END]

▶HYD 1 & 2 FAIL

Consequences:

LAND AT NEAREST SUITABLE AIRPORT
CONSIDER FUEL DUMP TO < MAX LDG WT
FLAP EXTENSION/RETRACTION INOP
AUTOPILOT NOT AVAILABLE
PLAN LONG FINAL APPROACH
ALTERNATE GEAR EXTENSION REQUIRED
DO NOT ARM AUTOBRAKES
LEAVE GEAR DOWN FOR GO-AROUND
FLAP < 35, SPOILERS AT NLG TDN ONLY
NOSEWHEEL STEERING RESTRICTED LEFT

NOTE: *Increased fuel consumption, up to approximately 15%, may result due to control surface float.*
In addition to the display of the "HYD 1 & 2 FAIL" alert, an aural warning will sound.
Hydraulic system controller will not shut off hydraulic pumps in taxi, takeoff, or landing phases of flight.

“HYD 3 ELEV OFF” ALERT DISPLAYED

NO

Elevators are inoperative. Pitch control is available from engine thrust and/or stabilizer trim (one-half rate).

Rudders are inoperative. Directional control is available from ailerons, spoilers, and engine thrust.

NOTE: For additional information, refer to Procedures & Techniques- HYDRAULIC SYSTEM 1 AND 2 FAILURE WITH “HYD 3 ELEV OFF” ALERT procedure.

“RUDDER BOTH INOP” ALERT DISPLAYED

NO

Directional control is available from ailerons, spoilers and engine thrust.

If a wing engine is shut down, a missed approach should not be attempted.

FLAPS EXTENDED

NO

Leave FLAP/SLAT handle in existing position.

GPWS Switch . . . . FLAP OVRD

Recommended maximum crosswind component is 12 knots. Review effects on controllability:

- AUTOPILOT: Both autopilots are inoperative.
- AUTOTHROTTLES: May be used for approach but must be disconnected before 50 feet AGL if flaps are not in the landing configuration.
- RUDDER: Upper rudder is inoperative. Vmca is 160 KIAS. Recommended maximum crosswind component is 12 knots. Lower rudder is operative through 3-2 nonreversible motor pump if "HYD 3 ELEV OFF" alert is not displayed. If alert is displayed, both rudders are inoperative.
- FLAPS: Inoperative. If second system failure occurred with flaps extended, leave FLAP/SLAT handle in existing position.
- SLATS: Operative. Slats may not extend until speed is reduced. Outboard slats may not retract if they were extended before the loss of pressure occurred. "SLAT DISAG" alert will be displayed when flap/slat handle is in the 0/RET position.
- LANDING GEAR: Use alternate landing gear extension. Maximum speed 230 KIAS.
- SPOILERS: Only one spoiler panel on each wing is operative. With only one hydraulic system operating, spoiler drive system may not have enough power to move handle to ground spoiler position.
- NOSEWH EEL STEERING: Limited to 25° to left and 70° (full) to right.
- BRAKES: System 1 accumulator only; system 2 full brakes. Anti-skid is operative.
- AUTO BRAKE: Do not use. Hydraulic systems 1 and 3 required for normal auto brake operation.
- ELEVATORS: Inboard elevators are operative if "HYD 3 ELEV OFF" alert is not displayed. If displayed, all elevators are inoperative.

- AILERONS: Operative. Normal operation is available through hydraulic system 3.
- STAB TRIM: One-half the normal rate is available. Use trim system sparingly (short periods only).

Reduce gross weight as desired

When ready for approach,

FLAPS RETRACTED

NO

0/EXT APPROACH SPEEDS
HYDRAULIC SYSTEMS 1 & 2 FAIL

Weight (1000 LB)	360	380	400	420	440	460	480	500
Vapp (Vref + 15)	169	173	177	181	185	189	193	196

0/EXT ESTIMATED LANDING DISTANCES (FEET)
HYDRAULIC SYSTEM 1 AND 2 FAIL

General Electric CF6-80C2 Engines

Weight (1000 LB)		360	380	400	420	440	460	480	500
S.L. STD= 15ºC	Dry	6040	6330	6640	6980	7320	7670	8030	8420
	Wet	7510	7870	8220	8590	8960	9320	9700	10110
2000 FT STD= 11ºC	Dry	6430	6750	7080	7460	7830	8200	8600	9030
	Wet	8020	8380	8770	9180	9590	9980	10390	10830
4000 FT STD= 7ºC	Dry	6870	7220	7580	7990	8400	8810	9240	9720
	Wet	8560	8960	9390	9840	10270	10710	11150	11640
6000FT STD= 3ºC	Dry	7360	7740	8140	8580	9040	9490	9970	10490
	Wet	9170	9610	10070	10550	11040	11510	12000	12540

8000 FT STD= -1ºC	Dry	7900	8320	8760	9260	9760	10260	10790	11370
	Wet	9850	10330	10840	11360	11900	12420	12960	13550
10000 FT STD= -5ºC	Dry	8500	8980	9470	10020	10570	11230	11920	12690
	Wet	10610	11130	11700	12280	12860	13530	14240	15000
NOTE:	*Standard day, no wind, Zero Slope, Three engines at maximum reverse thrust to 80 KIAS, then reverse idle to 60 kIAS, then three engines at forward idle to stop (includes air run distances).*								

CORRECTIONS

TEMPERATURE: VALID FROM STD -20ºC TO STD +40ºC		
FEET PER ºC	**DRY**	**WET**
BELOW Standard Day	-19	-23
ABOVE Standard Day	+66	+70

SLOPE: VALID FROM -2% DOWNHILL +2% UPHILL		
FEET PER 1% SLOPE	**DRY**	**WET**
Uphill	-111	-195
Downhill	+659	+907

WIND: VALID FROM -10 KNOT TAILWIND +20 KNOT HEADWIND		
FEET PER KNOT	**DRY**	**WET**
Headwind	-50	-66
Tailwind	+213	+226

FLAP/SLAT Handle 0/EXT

NOTE: Slats may not extend until speed is reduced.

When ready to extend landing gear,

Airspeed . . . . MAX 230 KIAS

Alternate Gear Extension Lever . . . . RAISE/LATCH

After three green lights illuminate,

Center Gear Alternate Extension Handle/Lights PULL/4

GREEN GEAR Handle . . . . DOWN

After 2 minutes,

Alternate Gear Extension Lever . . . . STOW

AUTO BRAKE Selector . . . . OFF

Cross threshold at Vapp, reduce sink rate slightly, disconnect autothrottles, retard throttles to idle and fly a positive touchdown. Do not hold aircraft off. Excessive flare will result in float and excessive use of runway.

CAUTION: Tail strike may occur at pitch attitudes greater than 10°.

Manually assist spoiler handle as it deploys.

NOTE: If go-around is required, it is recommended that landing gear not be retracted. If gear retraction is necessary, delay until aircraft is clear of obstacles.

[END]

▶HYD 1 & 3 FAIL

Consequences:

LAND AT NEAREST SUITABLE AIRPORT
CONSIDER FUEL DUMP TO < MAX LDG
WT SLAT EXTENSION/RETRACTION
INOP IF SLATS EXTENDED, MAX
35 FLAPS IF SLATS RETRACTED, MAX
28 FLAPS AUTOPILOT 2 NOT AVAILABLE
PLAN LONG FINAL APPROACH
ALTERNATE GEAR EXTENSION

REQUIRED DO NOT ARM AUTOBRAKES
FLAP < 35, SPOILERS AT NLG TDN ONLY
BRAKES ON ACCUMULATORS ONLY
NOSEWHEEL STEERING INOPERATIVE

NOTE: Increased fuel consumption, up to approximately 15%, may result due to control surface float.
In addition to the display of the "HYD 1 & 3 FAIL" alert, an aural warning will sound.
Hydraulic system controller will not shut off hydraulic pumps in taxi/takeoff/landing phase of flight.

Review effects on controllability:

- AUTOPILOT: Autopilot 1 may be used but manual aircraft trimming must be accomplished for speed or configuration changes.
- SLATS: Inoperative. If second system failure occurred with slats extended, do not attempt to retract slats.
- NOSEWHEEL STEERING: Inoperative.
- AUTOTHROTTLES: May be used for approach but must be disconnected before 50 feet AGL if flaps are not in landing configuration.
- RUDDER: Operative through the 2-1 nonreversible motor pump; Vmca is 140 KIAS. If "RUDDER UPR INOP" alert is displayed, Vmca is 160 KIAS. Recommended maximum crosswind component is 12 knots.
- FLAPS: Flaps may not extend until speed is reduced.
- LANDING GEAR: Use alternate landing gear extension. Maximum speed 230 KIAS.
- SPOILERS: Two spoiler panels on each wing are operative. With only one hydraulic system operating, spoiler drive may not have enough power to move handle to ground spoiler position.
- BRAKES: Accumulators only. Anti-skid is operative.
- AUTO BRAKES: Do not use auto brakes. Brake pressure limited to accumulator pressure only.

- ELEVATORS: Three elevators operative.
- AILERONS: All except right inboard is operative.
- STAB TRIM: Available through the 2-1 nonreversible motor pumps. One-half normal rate is available. No auto trim. Use trim system sparingly (short periods only).

Reduce Gross Weight as desired.

When ready for the approach:

SLATS RETRACTED

NO

SLAT STOW Switch . . . . .SLAT STOW

FLAP/SLAT Handle. . . . . .0/EXT POSITION

“RUDDER UPR INOP” ALERT DISPLAYED

NO

Vmca is 160 KIAS.

Recommended maximum crosswind component is 12 knots.

Stabilizer is inoperatve.

Complete Abnormal Non-Alert procedure- STABLIZER INOPERATVE, then continue with this procedure.

FLAP/SLAT Handle . . . . .28/EXT POSITION

When ready to extend landing gear:

Alternate Gear Extension Lever. . . . . RAISE/LATCH

After three green lights illuminate:

Center Gear Alternate Extension Handle/Lights . . . . PULL/4 GREEN

GEAR Handle . . . . DOWN

AUTO BRAKE Selector . . . . OFF

SLATS EXTENDED

NO

Plan a 35/EXT approach and landing.

Manually assist spoiler handle as it deploys.

[END]

GPWS Switch . . . . FLAP OVRD

Plan a 28/RET approach and landing.

28/RET APPROACH SPEEDS
HYDRAULIC SYSTEMS 1 AND 3 FAIL

Weight (1000 LB)	360	380	400	420	440	460	480	500
Vapp (Vref + 5)	177	182	186	191	195	199	203	207

28/RET ESTIMATED LANDING DISTANCES (FEET)
HYDRAULIC SYSTEMS 1 AND 3 FAIL

General Electric CF6-80C2 Engines

Weight (1000 LB)		360	380	400	420	440	460	480	500
S.L. STD= 15ºC	Dry	7670	8020	8320	8670	8970	9320	9640	9980
	Wet	9940	10390	10790	11240	11640	12090	12540	12990
2000 FT STD= 11ºC	Dry	8110	8500	8820	9180	9500	9870	10200	10580
	Wet	10580	11060	11490	11970	12400	12890	13340	13840
4000 FT STD= 7ºC	Dry	8610	9010	9350	9740	10080	10470	10830	11220
	Wet	11270	11810	12260	12760	13240	13750	14230	14770
6000FT STD= 3ºC	Dry	9140	9570	9930	10350	10710	11130	11510	11920
	Wet	12080	12630	13110	13660	14150	14700	15230	15790
8000 FT STD= -1ºC	Dry	9720	10180	10560	11010	11390	11840	12240	12680
	Wet	12910	13500	14020	14620	15160	15750	16300	16900
10000 FT STD= -5ºC	Dry	10350	10840	11240	11730	12130	12740	13340	13930
	Wet	13850	14490	15030	15680	16240	17030	17830	18600
NOTE: *Standard day, no wind, zero slope, three engines at maximum reverse thrust 80 KIAS, then reverse idle to 60 KIAS, then three engines at forward idle to stop (includes air run distances).*									

CORRECTIONS

TEMPERATURE: VALID FROM STD -20ºC TO STD +40ºC		
FEET PER ºC	**DRY**	**WET**
Below Standard Day	-21	-29
Above Standard Day	+48	+69

SLOPE: VALID FROM -2% DOWNHILL +2% UPHILL		
FEET PER 1% SLOPE	**DRY**	**WET**
Uphill	-197	-390
Downhill	+560	+1293

WIND: VALID FROM -10 KNOT TAILWIND +20 KNOT HEADWIND		
FEET PER KNOT	**DRY**	**WET**
Headwind	-57	-85
Tailwind	+111	+194

Cross threshold at Vapp, reduce sink rate slightly. Disconnect autothrottles, retard throttles to idle and raise nose of aircraft to at least a level attitude. Do not hold aircraft off. Excessive flare will result in float and excessive use of runway.

CAUTION: Tail strike may occur at pitch attitudes greater that 10°.

Manually assist spoiler handle as it deploys.

[END]

▶HYD 2 & 3 FAIL

Consequences:

LAND AT NEAREST SUITABLE AIRPORT
CONSIDER FUEL DUMP TO < MAX LDG WT AUTOPILOT 1
NOT AVAILABLE PLAN LONG FINAL APPROACH
ALTERNATE GEAR EXTENSION REQUIRED
DO NOT ARM AUTOBRAKES (DEU 910 and Subs only)
FLAP<35, SPOILERS AT NLG TDN ONLY NOSEWHEEL
STEERING RESTRICTED RIGHT

NOTE: Increased fuel consumption, up to approximately 15%, may result due to control surface float. In addition to the display of the "HYD 2 & 3 FAIL" alert, an aural warning will sound. Hydraulic system controller will not shut off hydraulic pumps in taxi, takeoff, or landing phase of flight.

Review effects on controllability:

- AUTOPILOT: Autopilot 1 is inoperative.
- AUTOTHROTTLES: Autothrottles must be disconnected before 50 feet AGL.
- RUDDER: Lower rudder is inoperative and "RUDDER LWR INOP" alert will be displayed. Vmca 180 KIAS. Recommended maximum crossword component is 12 knots.
- FLAPS: Flaps may not extend until speed is reduced.
- SLATS: Slats may not extend until speed is reduced. Outboard slats may not retract if they were extended before the loss of pressure occurred. "SLAT DISAG" alert will be displayed when flap/slat handle is in the 0/RET position.
- LANDING GEAR: Use alternate landing gear extension, maximum speed 230 KIAS.
- SPOILERS: Two spoiler panels on each wing are operative. With only one hydraulic system operating, spoilers drive system may

not have enough power to move handle to ground spoiler position.

- NOSEWH EEL STEERING: Limited to 25° to right and 70° (full) to left.
- BRAKES: System 1 full brakes; system 2 accumulator only. Anti-skid is operative.
- AUTO BRAKES: Do not use. Hydraulic systems 1 and 3 required for normal auto brake. Rotate AUTO BRAKE selector to OFF.
- ELEVATORS: Three operative.
- AILERONS: Right inboard aileron operative.
- STAB TRIM: One-half the normal rate is available. Use trim system sparingly (short periods only).
- Lower rudder is inoperative. Vmca is 180 KIAS.

CAUTION: Do not attempt a go-around at speeds below Vmca.

Recommended maximum crosswind component is 12 knots. Reduce gross weight as desired.

FLAP/SLAT Handle . . . . 28/EXT POSITION

When ready to extend landing gear:

Alternate Gear Extension Lever . . . . RAISE/LATCH

After three green lights illuminate:

Center Gear Alternate Extension Handle/Lights. . . . .PULL/4 GREEN

Gear Handle . . . . DOWN

BRAKE Selector . . . . OFF

28/EXT APPROACH SPEEDS
HYDRAULIC SYSTEMS 2 AND 3 FAIL

Weight (1000 LB)	360	380	400	420	440	460	480	500
Vapp (Vref + 5)	150	154	158	161	165	168	172	175

28/EXT ESTIMATED LANDING DISTANCES (FEET)
HYDRAULIC SYSTEMS 2 AND 3 FAIL

General Electric CF6-80C2 Engines

Weight (1000 LB)		360	380	400	420	440	460	480	500
S.L. STD= 15ºC	Dry	5250	5510	5750	6010	6300	6560	6860	7190
	Wet	6600	6910	7180	7490	7790	8080	8390	8730
2000 FT STD= 11ºC	Dry	5590	5850	6120	6410	6710	7000	7320	7680
	Wet	7030	7340	7660	7980	8310	8610	8950	9320
4000 FT STD= 7ºC	Dry	5950	6240	6520	6840	7170	7480	7830	8220
	Wet	7500	7830	8170	8520	8890	9220	9590	9980
6000FT STD= 3ºC	Dry	6350	6670	6980	7310	7690	8030	8410	8830
	Wet	8010	8380	8740	9110	9520	9890	10280	10730
8000 FT STD= -1ºC	Dry	6800	7150	7490	7850	8250	8630	9050	9540
	Wet	8580	8990	9380	9800	10220	10630	11070	11570
10000 FT STD= -5ºC	Dry	7300	7680	8050	8450	8920	9400	9900	10430
	Wet	9220	9660	10080	10550	11040	11560	12080	12620

NOTE: Standard day, no wind, zero slope, three engines at maximum reverse thrust 80 KIAS, then reverse idle to 60 KIAS, then three engines at forward idle to stop (includes air run distances).

CORRECTIONS

TEMPERATURE: VALID FROM STD -20ºC TO STD +40ºC		
FEET PER ºC	**DRY**	**WET**
Below Standard Day	-16	-19
Above Standard Day	+48	+55

SLOPE: VALID FROM -2% DOWNHILL +2% UPHILL		
FEET PER 1% SLOPE	**DRY**	**WET**
Uphill	-105	-199
Downhill	+501	+779

WIND: VALID FROM -10 KNOT TAILWIND +20 KNOT HEADWIND		
FEET PER KNOT	**DRY**	**WET**
Headwind	-45	-64
Tailwind	+160	+191

Cross threshold at Vapp, reduce sink rate slightly. Disconnect autothrottles, retard throttles to idle and fly to a positive touchdown. Do not hold aircraft off. Excessive flare will result in float and excessive use of runway.

CAUTION: Tail strike may occur at pitch attitudes greater than 10°.

Manually assist spoiler handle as it deploys.

[END]

▶NO MASKS

Consequences:

MANUALLY DEPLOY OXYGEN MASKS

NOTE: In addition to the "NO MASKS" alert displayed, an aural warning will sound.

NO MASKS Switch . . . . PUSH AND HOLD 3 TO 5 SECONDS

Open guard, push and hold NO MASKS switch 3 to 5 seconds and observe NO MASKS light is extinguished and "NO MASKS" alert is removed.

NOTE: When NO MASKS switch is pushed, all oxygen compartment doors will open.

[END]

▶TNK__FUEL QTY LO

Consequences:

STOP FUEL DUMP

NOTE: In addition to the "TNK__FUEL QTY LO" alert displayed, an aural warning will sound.

DUMP Switch. . . . . OFF

Open guard, push DUMP switch and observe ON light extinguishes.

DUMP SWITCH ON LIGHT FAILS
TO EXTINGUISH

NO

FUEL DUMP EMER STOP Switch . . . . .STOP

Open guard, push FUEL DUMP EMER STOP switch and observe STOP light illuminates.

Reschedule fuel distribution as required.

NOTE: This alert is displayed during fuel dump when the inboard compartment for tank 1 or 3, or tank 2 quantity is less than approximately 3,500 pounds.

[END]

Non-Alerts

Airspeed: Lost, Suspect Or Erratic

NOTE: The following information and displays can be considered reliable: PFD attitude, NAV display, ground speed, engine N1and stick shaker.

AFS OVRD Switches . . . . OFF

Aircraft Pitch/Thrust . . . . STABILIZE

Disregard IAS/flight director pitch bar and high speed warnings. Use pitch attitude and thrust as the primary flight reference. Should stick shaker be encountered, lower nose to horizon and increase thrust. Resume pitch/thrust reference using the AIRSPEED: LOST, SUSPECT OR ERRATIC tables after the stick shaker ceases.

Flight Director. . . . . OFF

Disregard all alerts and warnings, except stick shaker, until after aircraft is stabilized and safe operations achieved. Alerts and aural warnings can produce conflicting and disorienting cues.

CAUTION: Under certain failures FPA and PLI may be unreliable. Check against primary flight references before using FPA or PLI.

If practical fly to VFR conditions at earliest possible opportunity. After the aircraft is safely stabilized in flight, ensure terrain avoidance.

NOTE: Approximately 10° pitch attitude and MCT thrust will provide a safe initial climb condition if a climb is required.

Pilot and Standby Flight Instruments . . . . COMPARE

ABLE TO IDENTIFY UNRELIABLE AIR DATA SOURCE

NO

CADC (Unreliable Side). . . . . SELECT TO OTHER SIDE

NOTE: The OVERSPEED aural warning may continue since the CAWS does not know that the CADC switch was activated.

Static Air Switch (Unreliable Side) . . . . ALT

AIR DATA RETURNS TO NORMAL

NO

AFS OVRD OFF Switch (Reliable Side) . . . NORMAL POSITION

Use autopilot and autothrottles associated with the reliable ADC.

NOTE: The following information and displays may or may not be reliable: FMC (unreliable side) data associated with air data and TAS and WIND on ND (unreliable side).

Continue to monitor pitch, thrust, and airspeed to ensure accuracy of selected instruments.

[END]

Attitude and Thrust . . . . .ADJUST

Maintain normal pitch attitude and thrust for the phase of flight.

NOTE: The following may or may not be reliable depending on the cause of lost or suspect airspeed: FPA, PLI, low speed pitch protection, VSI, altimeter, altitude reporting, and TCAS. FMS NAV function may be inoperative.
The following will not be reliable: flight director pitch

bar, autothrottle speed protection, high speed pitch protection, and overspeed warning.

Use the following AIRSPEED: LOST, SUSPECT OR ERRATIC tables to determine thrust/pitch relation for remainder of flight.

NOTE: IAS and vertical speed (VS) values in the following tables are approximate.

General Electric CF6-80C2 Engines							
FLIGHT PHASE	**CONFIG**	**PRESSURE ALTITUDE**	**REF**	**WEIGHT (1000 LB)**			
				450	**550**	**600**	**630**
CLIMB Use max thrust (throttles to overboost bar)	Up/RET	5000	Pitch IAS	14.0 250	11.6 275	10.5 288	9.5 299
		FL 100	Pitch IAS	12.5 251	10.0 285	8.5 302	8.0 311
		FL 150	Pitch IAS	10.5 260	8.0 296	7.0 312	6.5 321
		FL 200	Pitch IAS	8.5 270	6.5 305	5.5 322	5.0 331
CRUISE Use N1 for thrust setting	Up/RET	FL 100	Pitch N1 IAS	2.0 76.7 330	3.0 79.1 330	3.0 80.3 330	2.5 81.1 330
		FL 200	Pitch N1 IAS	2.0 83.6 330	2.5 86.1 330	3.0 87.4 330	3.0 88.3 330
		FL 300	Pitch N1 Mach IAS	2.0 89.2 .827 315	2.5 92.4 .827 315	3.0 94.3 .827 315	3.0 95.6 .827 315
		FL 350	Pitch N1 Mach IAS	2.0 91.3 .830 283	- - - -	- - - -	- - - -

General Electric CF6-80C2 Engines							
FLIGHT PHASE	**CONFIG**	**PRESSURE ALTITUDE**	**REF**	**WEIGHT (1000 LB)**			
				450	**550**	**600**	**630**
DESCENT Use Idle thrust	Up/RET	FL 350	Pitch Mach IAS VS	1.0 .768 260 2030	- - - -	- - - -	- - - -
		FL 300	Pitch Mach IAS VS	1.5 .693 260 1920	1.5 .729 275 2040	1.5 .760 287 2140	- - - -
		FL 200	Pitch IAS VS	1.5 260 1760	2.5 260 1770	2.5 273 1850	- - -
		FL 100	Pitch IAS VS	2.0 250 1500	2.5 267 1600	2.5 281 1680	- - -
ARRIVAL LVL FLT Use N1 for thrust setting	Up/RET	5000	Pitch N1 IAS	5.0 58.9 221	5.0 62.3 236	5.0 65.5 250	5.0 67.3 258
	0/EXT	3000	Pitch N1 IAS	8.5 61.5 182	8.5 65.1 194	8.5 68.4 205	8.5 70.3 211
	15/EXT	3000	Pitch N1 IAS	6.0 64.7 174	6.0 68.4 185	6.5 71.8 196	6.5 73.7 202
	28/EXT	3000	Pitch N1 IAS	4.0 70.1 168	4.0 74.0 179	4.5 77.5 189	4.5 79.4 195
APPROACH IAS APPROX Vref +15 Use N1 for thrust setting	35/EXT Gear Down	Descent	Pitch N1 IAS	2.5 62.1 153	2.5 65.6 162	2.5 68.7 171	3.0 70.5 176
	Maintain pitch and adjust power to maintain glide path.						
GO AROUND	28/EXT Gear Up	Sea LVL	Pitch IAS	20.0 180	20.0 172	19.5 171	18.0 176
		5000	Pitch IAS	20.0 160	18.5 162	16.5 171	15.5 177

When ready for approach and landing,

- Maintain VFR conditions.
- Establish landing configuration early.
- Use IRS ground speed and reported winds to verify airspeed.
- Use radar altimeter.
- Use a runway with electronic or visual glideslope.

[END]

All Engine Flameout

NOTE: All engine flameout can be recognized by decrease in EGT, N2, and fuel flow. This will be followed closely by a decrease in N1.

Air-start envelope is 250 KIAS to Vmo, SL to FL300. Control aircraft at an IAS to obtain a minimum N2 of 15% for air start.

ENG IGN OVRD Switch . . . . .OVRD ON

ADG. . . . . DEPLOY

MINIMUM AIRSPEED FOR CONTROLLABILITY (KIAS)

GROSS WEIGHT (1000 LB)	300	350	400	450	500	550	600
Up/RET	173	187	199	212	223	234	244
0/EXT	155	155	162	172	181	190	199
28/EXT	155	155	155	159	166	175	183

NOTE: If desired, and time permits, CABIN PRESS system may be operated in MANUAL and outflow valve selected CLOSED to minimize cabin rate of climb until an engine restart is achieved. When an engine restarts, return system to automatic mode.

ANY ENGINE RESTARTS

NO

ADG ELEC Switch. . . . . ON

Remaining Engine(s). . . . . RESTART

Verify all systems are operating as required.

Land at nearest suitable airport.

[END]

Throttles (All) . . . . .IDLE

Flaps/Slats . . . . MAINTAIN

DITCHING REQUIRED

NO

Landing Gear. . . . . UP

Refer to Abnormal Non-Alert procedure-DITCHING.

[END]

Main Landing Gear . . . . .ALTN EXT

Center gear may be extended as desired.

Move gear handle down.

Do not stow alternate gear extension lever.

[END]

Emergency Descent

Altitude Select Knob. . . . . REDUCE/PULL

Initiate descent to 10,000 feet or minimum safe altitude, whichever is higher.

SPOILER Handle . . . . SPD BRK FULL

IAS/MACH Select Knob . . . . SELECT .85 MACH/320-350 KIAS

WARNING: **If structural damage is suspected or turbulence present, do not exceed .82 Mach/ 305 KIAS.**

Descent . . . . .MAX PITCH 10°/MAX BANK 30°

Transponder (Unless Otherwise Required) 7700

NO SMOKE and SEAT BELTS Switches. . . . . ON

To reactivate boom mike when O2 mask is no longer required,

EROS O2 Mask Doors. . . . . .CLOSE

PRESS TO TEST AND RESET Lever . . . . .PUSH

[END]

Reverser Deployed or U/L or REV Displayed in Flight

AIRCRAFT BUFFET OR TRIM CHANGE

NO

Take immediate corrective action as necessary to maintain aircraft control.

Throttle (Affected Engine . . . . .IDLE

Reverser Levers . . . . .FULL DOWN (FWD IDLE)

U/L OR REV REMAINS DISPLAYED OR AIRCRAFT BEHAVIOR STILL ABNORMAL

NO

Fuel Switch (Affected Engine . . . . OFF

Refer to Abnormal Non-Alert Procedure-ENGINE SHUTDOWN IN FLIGHT.

Set autopilot and autothrottles as desired.

Gross Weight . . . . .REDUCE, AS REQUIRED
Use 35º flaps for landing.

[END]

Continue use of affected engine at Captain's discretion. Set autopilot and autothrottles as required.
[END]

Continue normal engine operation.

[END]

Smoke/Fumes of Electrical, Air Conditioning, or Unknown Origin

CAUTION: Removing the source of ignition from a fire may not cause the fire to extinguish. If conditions permit, delay fuel dump until smoke switch is in its final position. If fuel dump is started prior to or during smoke switch operation, various valves and pumps may not be controllable which may result in an uncontrollable fuel dump.

NOTE: If fumes are identified as fuel/oil and an increase in oil quantity is observed, refer to Abnormal Non-Alert procedure - ENGINE OIL QUANTITY INCREASE.

Oxygen Masks ON/100%

Don smoke goggles as required.

Crew/Courier(s) Communications . . . . ESTABLISH

EMER LT Switch . . . . ON

CAB BUS Switch . . . . OFF

Pause long enough to evaluate whether smoke or fumes decrease.

SMOKE/FUMES DECREASE

NO

Continue with cabin buses inoperative.

[END]

CAB BUS Switch . . . . ON

EMER LT Switch . . . . .ARM

VHF-1 or HF-1 . . . . SELECT VHF-1 AND/OR HF-1

Autothrottles. . . . . OFF

Throttles . . . . REDUCE AT LEAST 20% BELOW MCT

FADEC MODE Switches (All Engines). . . . . SELECT ALTN

AP 1 (If Desired) . . . . .SELECT

SMOKE ELEC/AIR Selector . . . . 3/1 OFF

Pause long enough to evaluate if smoke/fumes decreases.

SMOKE/FUMES DECREASE

NO

Leave SMOKE ELEC/AIR selector in 3/1 OFF for remainder of flight.

NOTE: If "FLAP DISAG" alert is displayed, use left inboard flap indication on CONFIG synoptic or PFD to determine flap position.

ENG IGN . . . . VERIFY A SELECTED

FLAP LIMIT Selector . . . . OVRD 1

Manual Thrust Limits . . . . SELECT G/A

AUTO BRAKE Selector . . . . OFF

NOTE: G/A switch is inop.

GO AROUND REQUIRED

NO

Autopilot/Autothrottles . . . . DISCONNECT

Thrust . . . . SET

Speed . . . . Vref(28)+5

When positive rate of climb is indicated,

Gear Handle . . . . UP

Land at nearest suitable airport.

[END]

SMOKE ELEC/AIR Selector . . . . 2/3 OFF

Pause long enough to evaluate if smoke/fumes decrease.

SMOKE/FUMES DECREASE

NO

Leave SMOKE ELEC/AIR selector in 2/3 OFF for remainder of flight.

Land at nearest suitable airport.

NOTE: Landing gear position indications may be observed on CONFIG synoptic.
Control wheel trim switches are inoperative. Use LONG TRIM handles when stabilizer trim is desired.

[END]

AP 2 (If Desired) . . . . .SELECT

VHF-2 or HF-2 . . . . SELECT VHF-2 AND/OR HF-2

SMOKE ELEC/AIR Selector . . . . 1/2 OFF

Pause long enough to evaluate if smoke/fumes decrease.

SMOKE/FUMES DECREASE

NO

Leave SMOKE ELEC/AIR selector in 1/2 OFF for remainder of flight.

NOTE: If “FLAP DISAG” alert is displayed, use night inboard flap indication on CONFIG synoptic or PFD to determine flap position.

ENG IGN. . . . . .VERIFY B SELECTED

FLAP LIMIT Selector. . . . . OVRD 2

Manual Thrust Limits. . . . . SELECT G/A

CAPT FLT DIR OFF Switch . . . . OFF

AUTO BRAKE Selector. . . . . OFF

NOTE: Autopilot will become inop when IRU 1 and IRU AUX become inop.

G/A switch is inoperative.

GO AROUND REQUIRED

NO

Autopilot/Autothrottles . . . . DISCONNECT
Thrust . . . . SET
Speed . . . . Vref (28)+5
When positive rate of climb is indicated,
GEAR Handle . . . . UP

Land at nearest suitable airport.

[END]

SMOKE ELEC/AIR Selector . . . . NORM
FADEC MODE Switches (All Engines) . . . . PUSH

Land at nearest suitable airport.

[END]

Two Engines Inoperative

NOTE: During a two-engine approach, if a second engine fails on final and the gear is down, add power as required. Set flaps to FLAPS 28, maintain speed to reach Vref + 5 for FLAPS 28 and continue approach. Move GPWS switch to FLAP OVRD, conditions permitting.

Throttles . . . . MCT

FLAPS (Unless on Final). . . . . UP

Speed (Unless on FInal) . . . . . .DRIFTDOWN OR UP/RET Vmin + 30

NOTE: Delay gear retraction until flaps are up.

Gear (Unless Committed) . . . . UP

Slats (Unles on Final) . . . . RET

ENG IN OVRD Switch . . . . ON
Plan to land at nearest suitable airport.

DRIFTDOWN REQUIRED

NO

Autothrottles . . . . OFF
Thrust . . . . MCT
Driftdown Speed Schedule . . . . Check

DRIFTDOWN

General Electric CF6-80C2 Engines

ALT (1000 FT)	UNITS	INITIAL GROSS WEIGHT (1000 LB)						
		300	**350**	**400**	**450**	**500**	**550**	**600**
40	Kt	223	243	249	Start of driftdown speed			
	Ft	26107	22369	19077	Max one eng alt (airfoil & engine A-ice ON, reduce by 1500 ft.)			
	NMi	343	373	390	Distance to one engine altitude			
	Lb	9069	11117	12983	Fuel burn to one engine altitude			
	Kt	213	229	245	Bottom of driftdown speed one eng altitude			
	Lb/Hr	9914	11634	13402	Fuel flow at one engine altitude			
35	Kt	220	240	258	275	279		
	Ft	26055	22328	19051	15741	12677		
	NMi	301	338	364	398	422		
	Lb	8397	10591	12613	15077	17475		
	Kt	213	230	245	259	272		
	Lb/Hr	9939	11652	13414	14998	16658		
30	Kt	218	237	254	271	287	302	312
	Ft	25950	22255	18998	15699	15644	9224	5147
	NMi	238	292	327	365	397	450	539
	Lb	7044	9644	11874	14458	17021	20978	27452
	Kt	214	230	245	259	272	284	294
	Lb/Hr	9989	11685	13439	15019	16672	18128	19278

DRIFTDOWN

General Electric CF6-80C2 Engines

ALT (1000 FT)	UNITS	INITIAL GROSS WEIGHT (1000 LB)						
		300	350	400	450	500	550	600
25	Kt		234	251	268	283	298	312
	Ft		22086	18902	15628	12584	9169	5095
	NMi		213	274	323	361	418	510
	Lb		7462	10517	13419	16199	20284	26826
	Kt		231	245	259	272	284	294
	Lb/Hr		11760	13484	15053	16699	18148	19296
20	Kt			249	265	280	294	308
	Ft			18645	15492	12481	9074	5008
	NMi			167	260	313	378	474
	Lb			6894	11413	14789	19158	25787
	Kt			247	260	273	284	294
	Lb/Hr			13605	15120	16744	18182	19326
15	Kt					278	292	305
	Ft					12239	8903	4854
	NMi					230	320	424
	Lb					11476	16963	23951
	Kt					273	285	295
	Lb/Hr					17850	18246	19379
10	Kt						290	303
	Ft						8438	4550
	NMi						200	345
	Lb						11236	20312
	Kt						286	296
	Lb/Hr						18413	19484

Minimum Safe Altitude/Range Capability . . . . . DETERMINE

Fuel Dump. . . . . CONSIDER

Driftdown Altitude . . . . .SELECT

Review the following and then continue checklist.

At bottom of driftdown:

- Level at maximum one engine altitude.
- Maintain altitude and allow aircraft to accelerate to 290 KIAS as gross weight is reduced by fuel burn.
- Maintain 290 KIAS for cruise/climb (autothrottles may be used).

Appropriate Engine Shutdown Procedure . . . . COMPLETE

ENG IGN OVRD Switch . . . . OFF

NOTE: Consider fuel dump to reduce gross weight to minimum practical.

Autothrottles . . . . AS REQUIRED

Altimeters . . . . SET/CROSS CHECKED

GPWS. . . . . FLAP OVRD

At or below 10,000 feet MSL,

AIR MANUAL

NO

Pack Switches (All) . . . . OFF

HYDRAULIC SYSTEM MANUAL

NO

1-3/2-3 RMPs . . . . ON

Maintain clean configuration and UP/RET Vmin + 30 until maneuvering has been completed.

TWO ENGINES INOPERATIVE SPEEDS

Weight (1000 LB)	360	380	400	420	440	460	480	500
Up/RET Vmin +30	219	224	229	234	239	244	249	253
0/EXT Vmin +30	184	188	192	196	200	204	208	211
0/Ext Vmin +15	169	173	177	181	185	189	193	196

0/EXT ESTIMATED LANDING DISTANCES (FEET) TWO ENGINES INOPERATIVE

General Electric CF6-80C2 Engines

WEIGHT (1000 LB)		**360**	**380**	**400**	**420**	**440**	**460**	**480**	**500**
S.L. STD= 15ºC	Dry	5080	5330	5560	5800	6070	6290	6540	6800
	Wet	6970	7350	7690	8060	8450	8780	9160	9540
2000 FT STD= 7ºC	Dry	5660	5960	6220	6510	6820	7080	7380	7680
	Wet	7840	8280	8680	9110	9570	9960	10410	10860
6000 FT STD= 3ºC	Dry	6000	6310	6610	6920	7260	7540	7860	8190
	Wet	8340	8820	9250	9720	10220	10640	11130	11620
8000 FT STD= -1ºC	Dry	6360	6710	7030	7360	7740	8040	8400	8770
	Wet	8890	9400	9880	10380	10930	11400	11930	12470
10000 FT STD= -5ºC	Dry	6770	7150	7490	7860	8270	8670	9130	9630
	Wet	9490	10050	10570	11120	11730	12330	12990	13720
NOTE: Standard day, no wind, zero slope, no reverse thrust (includes air run distances).									

CORRECTIONS

TEMPERATURE: VALID FROM STD -20ºC TO STD +40ºC		
FEET PER ºC	**DRY**	**WET**
BELOW Standard Day	-15	-22
ABOVE Standard Day	+44	+64

SLOPE: VALID FROM -2% DOWNHILL +2% UPHILL		
FEET PER 1% SLOPE	**DRY**	**WET**
Uphill	-77	-182
Downhill	+320	+788

WIND: VALID FROM -10-KNOT TAILWIND +20-KNOT HEADWIND		
FEET PER KNOT	**DRY**	**WET**
Headwind	-37	-61
Tailwind	+134	+213

Review the following MISSED APPROACH caution.

CAUTION: Do not attempt a go-around under any of the following conditions:

- Less than 1,000 feet AGL.
- Airspeed below 0/EXT Vmin + 30.
- Gear is extended.
- Hydraulic 1 or 3 failed and Service Bulletin MD11-27-062 or production equivalent incorporated (outboard slats will not retract). "SLAT DISAG" alert will be displayed when flap/slat handle is in the 0/RET position.
- Weight, altitude and temperature in excess of those shown in the following chart.

MAXIMUM WEIGHT FOR TWO ENGINES INOPERATIVE MISSED APPROACH

General Electric CF6-80C2 Engines

PRESS ALT	TEMPERATURE MAXIMUM WEIGHT (1000 LB)								
					STD TEMP				
S.L.	-65ºC 519	-45ºC 523	-25ºC 527	-5ºC 530	15ºC 532	25ºC 535	35ºC 490	45ºC 454	55ºC 417
2000 FT	-69ºC 500	-49ºC 505	-29º 509	-9ºC 512	11ºC 513	21ºC 515	31ºC 472	41ºC 437	51º 402
4000 FT	-73ºC 487	-53ºC 490	-33ºC 492	-13ºC 491	7ºC 490	17º 489	27ºC 457	37ºC 419	47ºC 387
6000 FT	-77º 465	-57ºC 466	-37ºC 467	-17ºC 466	3ºC 464	13ºC 462	23ºC 444	33ºC 408	43ºC 372
8000 FT	- -	-61ºC 439	-41ºC 437	-21ºC 434	-1ºC 431	9ºC 430	19ºC 427	29ºC 395	39º 358
10000 FT	- -	-65ºC 408	-45ºC 406	-25ºC 403	-5ºC 401	5ºC 399	15ºC 398	25ºC 381	35ºC 349
NOTE: Packs off, engine and airfoil ice protection off.									

On final,

FLAP/SLAT Handle 0/EXT

Speed. . . . . 0/EXT Vmin + 30

NOTE: For go-around protection, maintain 0/EXT Vmin + 30 until committed to land (1,000 feet AGL). Achieve Vmin + 15 at or above 50 feet AGL.

MISSED APPROACH REQUIRED

NO

Go-Around Thrust . . . . SET

FLAP/SLAT Handle . . . . UP/RET

Speed . . . . UP/RET Vmin + 30

Maintain approach descent rate during slat retraction until attaining UP/RET Vmin +30, then initiate climb.

[END]

At 1,000 feet AGL,

GEAR Handle/Lights . . . . DOWN/4 GREEN

NOTE: Do not use autobrakes.

Spoilers. . . . . .ARM

Speed (Achieve at or above 50 feet) . . . . 0/EXT Vmin + 15

Zero rudder trim before touchdown.

NOTE: Do not attempt to achieve a smooth touchdown. At threshold, reduce throttles to idle and use a slight flare. Excessive flare will result in float, excessive use of runway and possible tail strike.

Reverse Thrust. . . . . AS REQUIRED

[END]

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General

This section provides the procedures to be performed in the event of abnormal conditions.

Abnormal procedures fall into two categories: Abnormal Alert procedures and Abnormal Non-Alert procedures.

Abnormal Alert procedures are listed alphabetically in the Abnormal Alert section, and are annunciated by the display of an amber Level 2 alert. All alert procedure titles use the exact wording of the EAD alert message.

> *NOTE: On vary rare occasions a parameter may "X" out and then return. In this case, the data is as valid as it was prior to the "X" being displayed and the pilots should comply with any related alerts as they would normally.*

Abnormal Non-Alert procedures are listed alphabetically in the Abnormal Non-Alert section. These abnormals are not annunciated by the alerting system.

These procedures assume the overhead circuit breaker panel, lights, and displays will be checked when appropriate to any procedure. (Circuit breaker operation is not modeled in this simulation and any reference to actuating a circuit breaker within this manual should be treated as if the action was complied with.)

Most Abnormal procedures are written considering single failures only. If more than one failure exists with a system, the EAD alert will normally display only the most serious problem. If failures occur simultaneously in more than one system, it is the Captain's responsibility to establish the priority of actions.

The flight crew is responsible to make a log book entry of all abnormal indications or events that occur.

Abnormal Checklist Philosophy

As soon as an abnormal condition is detected, the detecting crew member will announce the condition and, when applicable, reset the alerting system.

NOTE: The primary method of resetting the alerting system is to push the associated cue switch on the system display control panel. This action will reset the MASTER CAUTION light, and display the appropriate synoptic on the system display. The amber alert message will usually be removed from the EAD and be replaced by a reminder message in the lower right-hand corner of the EAD.

If conditions do not permit (i.e., short final) the MASTER CAUTION light may be reset by pushing either MASTER CAUTION light. In this case, the amber alert message will remain on the EAD, the associated cue light will remain illuminated and can be pushed to select the system display when time permits.

The Pilot Flying (PF) will dedicate his attention to aircraft control. Time permitting, the Pilot In Command (PIC) will then call for the appropriate checklist. The Pilot Not Flying (PNF) will then verify the appropriate checklist and where necessary refer to the published procedure. The checklist should be accomplished by the "Challenge-Do-Verify" method. The PNF will accomplish each item in the procedure if it is in his area of responsibility or coordinate the action with the PF if the action is in the PF's area of responsibility. The PNF will announce procedural and advisory items given in the checklist. He will also read the consequences and assure verbal confirmation by the PF.

When the checklist is completed, the PNF will announce "Checklist complete.”

Air

AIR SYS 1-2 OFF

When manifolds 1 and 2 are no longer displayed red on synoptic,
BLEED AIR 2 Switch . . . . ON

“AIR SYS 1-2 OFF” ALERT DISPLAYED AGAIN WITHIN 15 MINUTES

NO

PACK 2 Switch . . . . OFF

Do not repressurize air system 2.

When manifolds 1 and 2 are no longer displayed red on synoptic, BLEED AIR 1 Switch . . . . ON

“AIR SYS 1-2 OFF” ALERT DISPLAYED AGAIN WITHIN 15 MINUTES

NO

PACK 1 Switch . . . . OFF

Do not repressurize air system 1 or 2.

[END]

No further crew action required.

[END]

Do not repressurize air system 1.

[END]

AIR SYS__PRES LO

Affected BLEED AIR Source . . . . OFF

Associated PACK Switch . . . . OFF

Associated ISOL Switch . . . . ON

[END]

BLEED AIR__FAULT

Throttle for Affected Bleed Air System . . . . SLOWLY ADVANCE

“BLEED AIR__FAULT” REMOVED

NO

If safety of flight permits, operate engine at or above thrust level necessary to keep “BLEED AIR__FAULT” alert from being displayed.

[END]

Return throttles as needed.

Affected BLEED AIR Source . . . . OFF

Associated PACK . . . . OFF

Associated ISOL Switch . . . . ON

NOTE: When in icing with only one bleed air source, exit icing area and maintain ice protection until clear of icing. When airfoil anti-ice use has been terminated, the affected bleed air source may be reinstated for normal usage.

[END]

TAIL A-ICE DISAG

CAUTION: Leading edge of horizontal stabilizer may be damaged if tail anti-ice is operated for more than 30 seconds on the ground.

AIRCRAFT ON GROUND

NO

TAIL ANTI-ICE Switch. . . . . OFF

AIR APU Switch . . . . OFF

Notify maintenance to remove external air.

BLEED AIR 2 Switch. . . . . VERIFY OFF

1-2 ISOL Switch . . . . .VE RIFY OFF

[END]

TAIL ANTI-ICE SWITCH OFF

NO

Assume tail anti-ice is on.

AIR SYSTEM MANUAL

NO

After landing,

BLEED AIR 2 Switch . . . . OFF

1-2 ISOL Switch . . . . OFF

After landing, do not pressurize pneumatic system 2.

[END]

Depart icing area.

After departing icing area,

TAIL ANTI-ICE Switch . . . . OFF

Land with maximum of 35º flaps.

[END]

TRIM AIR OFF

COCKPIT Temperature Selector . . . . .SET AS DESIRED

NOTE: Select cockpit zone, set temperature at least 4ºF/2ºC less than cabin zone set temperature (cyan).

[END]

WING A-ICE__DISAG

CAUTION: Slats may be damaged if wing anti-ice is operated on ground for more than 30 seconds.

AIRCRAFT ON GROUND

NO

WING ANTI-ICE Switch. . . . . OFF

Notify maintenance to remove external air.

Associated BLEED AIR 1 or 3 Switch . . . . VERIFY OFF

Associated ISOL Switch(es) . . . . VERIFY OFF

[END]

WING ANTI-ICE SWITCH OFF

NO

Assume wing anti-ice is on.

AIR SYSTEM MANUAL

NO

After landing,

Associated BLEED AIR 1 or 3 Switch . . . . OFF

Associated ISOL Switch(es). . . . . OFF

After landing, do not pressurize associated pneumatic system.

[END]

WING ANTI-ICE Switch . . . . OFF

Depart icing area.

[END]

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Configuration

BRAKE OVERHEAT

AIRCRAFT ON GROUND

NO

Do not take off. Advise ground personnel to remain clear of main gear.

CAUTION: If temperature exceeds 800ºC, stop aircraft and call emergency services.

NOTE: Temperatures above 936ºC cannot be measured. The display will go blank for the affected brake(s). As the temperature falls back below 936ºC, the temperature(s) will appear again if sensors are not damaged.

[END]

Flight conditions permitting, extend landing gear for cooling for 10 minutes or until alert is not displayed.

Record applicable brake position(s) and maximum temperature reading in maintenance log.

[END]

FLAP DISAG

Place FLAP/SLAT handle to match flap position. Allow several seconds for system response. If alert remains displayed, select the last symmetrical configuration.

PROBLEM WAS ASYMMETRIC FLAPS

NO

Land at nearest suitable airport using existing flap/slat setting.

If final flap setting is less than 35º,

GPWS Switch . . . . FLAP OVRD

Autobrakes . . . . OFF

At 50 feet,
Autothrottles . . . . OFF

[END]

ALERT APPEARED DURING ATTEMPTED FLAP RETRACTION

NO

Land at nearest suitable airport.

If flaps now less than 50º, further extension may be attempted if desired.

NOTE: If after selecting a greater flap setting, flaps do not move as selected, place FLAP/SLAT handle to match actual flap position.

If final flap setting is less than 35º,

GPWS Switch . . . . FLAP OVRD

Autobrakes . . . . OFF

ALERT APPEARED DURING
ATTEMPTED FLAP RETRACTION

NO

(Continued)

At 50 feet,
Autothrottles . . . . OFF

[END]

Airspeed. . . . . REDUCE

Reduce speed to minimum maneuver speed displayed on PFD.

NOTE: During the next step, FLAP/SLAT handle forces will be higher than normal.

Place FLAP/SLAT handle to 50/EXT, then return handle to desired position. Allow several seconds for system response. (This action may allow flaps to reset to normal operation.)

FLAPS EXTEND AS DESIRED

NO

No further crew action is required.

[END]

Return FLAPS/SLAT handle to match actual flap position.

FLAP POSITION 0 DEGREES

NO

Refer to Abnormal Non-Alerts Procedures - NO FLAPS/SLAT ESTENDING LANDING.

[END]

Land with existing flap/setting.

If flaps less than 35º,

GPWS Swtich . . . . FLAP OVRD

Autobrakes . . . . OFF

At 50 feet,

Autothrottles . . . . OFF

[END]

LSAS ALL FAIL

Autopilot . . . . .DISCONNECT

LSAS Switches . . . . ALL OFF

Any One LSAS Switch . . . . .ON

ASSOCIATED LSAS LIGHT ILLUMINATED

NO

Associated LSAS Switch . . . . OFF

Attempt to restore remaining LSAS channels by pushing any one LSAS switch on and observe its FAIL light. Any LSAS switch that illuminates FAIl should be pushed to OFF prior to pushing next switch.

ANY LSAS CHANNEL OPERATIVE

NO

Attempt to reengage autopilot.

NOTE: Autopilot requires an operative inboard LSAS channel.

[END]

LSAS is inoperative. Autopilot is not available.

NOTE: Pitch rate damper, pitch protection and positive nose lowering will not be available.

Pitch sensitivity increases with altitude,

Avoid over-controlling. Also avoid pitch attitudes above 7 degrees during landing.

[END]

SEL ELEV MAN

“SEL FADEC ALTN” AND/OR “SEL FLAP LIM OVRD” AND/OR “IAS COMPARATOR MONITOR” ALSO DISPLAYED

NO

Refer to Emergency Non-Alert Procedure - AIRSPEED LOST, SUSPECT OR ERRATIC.

[END]

ELEV FEEL Selector . . . . MANUAL

ELF Speed . . . . SET AS REQUIRED

NOTE: When ELEV FEEL is in MANUAL, ELF speed is displayed on CONFIG synoptic.

Slew ELF reference speed bug to maintain approximate agreement with aircraft indicated airspeed.

[END]

SEL FLAP LIM OVRD

NOTE: FLAP LIMIT MANUAL light will be illuminated.

‘SEL FADEC ALTN” AND/OR “SEL ELEV FEEL MAN” AND/OR “IAS COMPARATOR MONITOR” ALSO DISPLAYED

NO

Refer to Emergency Non-Alert Procedures - AIRSPEED: LOST, SUSPECT OR ERRATIC.

[END]

FLAP LIMIT Selector . . . . OVRD 1

After 20 seconds,

“FLAP LIMIT DISAG” ALERT DISPLAYED

NO

FLAP LIMIT Selector . . . . OVRD 2

After 20 seconds,

“FLAP LIMIT DISAG” ALERT DISPLAYED

NO

Flap extension may be limited.

[END]

Observe placarded flap limit speed.

[END]

SLAT DISAG

ALERT APPEARED DURING CLIMBOUT, WITH SLATS EXTENDED AND FLAPS/SLAT HANDLE IN A SLAT EXTENDED POSITION

NO

Stick shaker may actuate temporarily.

If flaps greater than 15º, retract to 15º.

Accelerate and retract flaps and slats on schedule.

CAUTION: Anticipate "SLAT DISAG" alert to appear during extension. Utilize "ALERT APPEARED DURING ATEEMPTED EXTENSION" decision point in this procedure.

[END]

AIRSPEED ABOVE 280 KIAS/.55 MACH

NO

FLAP/SLAT Handle . . . . UP/RET

[END]

ALERT APPEARED DURING
ATTEMPTED EXTENSION

NO

"SLATS INHIBITED" ALERT
DISPLAYED ON SD CONFIG
SYNOPTIC

NO

FLAP/SLAT Handle. . . . . 10/EXT or GREATER

"SLATS DISAG" ALERT
REMOVED

NO

Plan a normal flap/slat landing

[END]

FLAP/SLAT Handle . . . . UP/RET

SLAT STOW Handle . . . . SLAT STOW

FLAT/SLAT Handle . . . . 0/EXT POSITION

GPWS Switch . . . . FLAP OVRD

Plan a 28/RET landing

NOTE: Autothrottles will not automatically retard at 50 feet with flaps less than landing range. Autothrottles must be disconnected prior to 50 feet AGL.

15/RET REFERENCE SPEEDS
SLATS DISAG

Weight (1000 LB)	360	380	400	420	440	460	480	500
Vref	178	183	187	192	197	201	206	210

25/RET REFERENCE SPEEDS
SLATS DISAG

Weight (1000 LB)	360	380	400	420	440	460	480	500
Vref	173	177	182	186	190	195	199	204

28/RET APPROACH SPEEDS
SLATS DISAG

Weight (1000 LB)	360	380	400	420	440	460	480	500
Vapp (Vref +5)	177	181	185	190	194	198	203	207

28/RET LANDING DISTANCES (FEET)
SLATS DISAG

General Electric CF6-80C2 Engines									
Weight (1000 LB)		360	380	400	420	440	460	480	500
S.L. STD= 15ºC	Dry	6810	7200	7540	7930	8300	8700	9060	9450
	Wet	8300	8740	9130	9580	10010	10460	10880	11310
2000 FT STD= 11ºC	Dry	7260	7690	8050	8480	8870	9310	9710	10130
	Wet	8860	9330	9760	10240	10690	11190	11640	12110
4000 FT STD= 7ºC	Dry	7770	8230	8620	9100	9520	10000	10440	10900
	Wet	9460	9980	10440	10980	11460	11990	12480	12991
6000 FT STD= 3ºC	Dry	8320	8830	9270	9780	10250	10770	11250	11760
	Wet	10140	10710	11210	11790	12310	12880	13420	13980
8000 FT STD= -1ºC	Dry	8950	9500	9980	10550	11070	11640	12170	12730
	Wet	10900	11510	12060	12690	13260	13890	14470	15080
10000 FT STD= -5ºC	Dry	9650	10260	10790	11420	11990	12770	13640	14270
	Wet	11740	12410	13010	13700	14330	15160	15970	16740

NOTE: Standard day, no wind, Zero Slope, Three engines at maximum reverse thrust to 80 KIAS, then reverse idle to 60 kIAS, then three engines at forward idle to stop (includes air run distances).

CORRECTIONS

TEMPERATURE: VALID FROM STD -20ºC TO STD +40ºC		
FEET PER ºC	**DRY**	**WET**
BELOW Standard Day	-22	-26
ABOVE Standard Day	+72	+77

SLOPE: VALID FROM -2% DOWNHILL +2% UPHILL		
FEET PER 1% SLOPE	**DRY**	**WET**
Uphill	-141	-237
Downhill	+701	+1004

WIND: VALID FROM -10 KNOT TAILWIND +20 KNOT HEADWIND		
FEET PER KNOT	**DRY**	**WET**
Headwind	-54	-69
Tailwind	+202	+228

Cross threshold at Vapp and reduce sink rate slightly. Disconnect autothrottles, retard throttles to idle and raise nose of aircraft to at least a level attitude. Do not hold aircraft off. Excessive flare will result in float and excessive use of runway.

Tail strike may occur at deck angles greater than 10º.

[END

FLAP/SLAT Handle 0/EXT

Plan a normal flap/slat landing.

[END

USE MAIN SPOILERS

Determine landing distance from the following applicable tables.

At Nose Gear Touchdown . . . . DEPLOY SPOILERS

NOTE: The pitch rate damper, pitch protection and positive nose lowering may not be available

50/EXT ESTIMATED LANDING DISTANCES (FEET)
USE MAIN SPOILERS

General Electric CF6-80C2 Engines

Weight (1000 LB)		360	380	400	420	440	460	480	500
S.L. STD= 15ºC	Dry	4315	4480	4650	4803	4949	5126	5274	5453
	Wet	5156	5388	5604	5805	6008	6240	6443	6677
2000 FT STD= 11ºC	Dry	4520	4695	4876	5039	5195	5384	5542	5734
	Wet	5466	5688	5927	6140	6355	6605	6827	7084
4000 FT STD= 7ºC	Dry	4738	4925	5118	5292	5459	5661	5830	6036
	Wet	5777	6021	6275	6510	6743	7007	7241	7527
6000 FT STD= 3ºC	Dry	4975	5175	5381	5568	5747	5963	6145	6367
	Wet	6125	6395	6658	6917	7166	7449	7710	7999
8000 FT STD= -1ºC	Dry	5229	5443	5663	5864	6057	6290	6488	6725
	Wet	6497	6787	7084	7354	7628	7939	8212	8538
10000 FT STD= -5ºC	Dry	5505	5734	5972	6188	6418	6693	6931	7208
	Wet	6920	7220	7544	7842	8155	8532	8853	9223

NOTE: Standard day, no wind, Zero Slope, Three engines at maximum reverse thrust to 80 KIAS, then reverse idle to 60 kIAS, then forward idle to stop (includes air run distances).

CORRECTIONS

TEMPERATURE: VALID FROM STD -20ºC TO STD +40ºC		
FEET PER ºC	**DRY**	**WET**
BELOW Standard Day	-12	-14
ABOVE Standard Day	+25	+35

SLOPE: VALID FROM -2% DOWNHILL +2% UPHILL		
FEET PER 1% SLOPE	**DRY**	**WET**
Uphill	-84	-137
Downhill	+229	+444

WIND: VALID FROM -10 KNOT TAILWIND +20 KNOT HEADWIND		
FEET PER KNOT	**DRY**	**WET**
Headwind	-32	-46
Tailwind	+83	+132

35/EXT ESTIMATED LANDING DISTANCES (FEET)
USE MAN SPOILERS

General Electric CF6-80C2 Engines

Weight (1000 LB)		360	380	400	420	440	460	480	500
S.L. STD= 15ºC	Dry	4632	4803	4974	5155	5340	5496	5685	5856
	Wet	5577	5795	6020	6257	6502	6717	6969	7197
2000 FT STD= 11ºC	Dry	4856	5039	5221	5414	5613	5780	5983	6465
	Wet	5890	6131	6173	6631	6893	7128	7394	7642
4000 FT STD= 7ºC	Dry	5096	5291	5486	5693	5906	6085	6304	6500
	Wet	6249	6509	6763	7037	7317	7571	7864	8133
6000 FT STD= 3ºC	Dry	5357	5566	5775	5998	6227	6420	6655	6867
	Wet	6631	6914	7190	7489	7798	8060	8380	8674
8000 FT STD= -1ºC	Dry	5637	5862	6087	6326	6574	6782	7037	7317
	Wet	7047	7348	7660	7980	8308	8600	8943	9324
10000 FT STD= -5ºC	Dry	5943	6185	6428	6687	6963	7267	7546	7854
	Wet	7513	7841	8166	8522	8888	9294	9675	10074
NOTE: Standard day, no wind, Zero Slope, Three engines at maximum reverse thrust to 80 KIAS, then reverse idle to 60 kIAS, then three engines at forward idle to stop (includes air run distances).									

CORRECTIONS

TEMPERATURE: VALID FROM STD -20ºC TO STD +40ºC		
FEET PER ºC	**DRY**	**WET**
BELOW Standard Day	-13	-16
ABOVE Standard Day	+95	+143

SLOPE: VALID FROM -2% DOWNHILL +2% UPHILL		
FEET PER 1% SLOPE	**DRY**	**WET**
Uphill	-94	-155
Downhill	+275	+522

WIND: VALID FROM -10 KNOT TAILWIND +20 KNOT HEADWIND		
FEET PER KNOT	**DRY**	**WET**
Headwind	-35	-50
Tailwind	+95	+143

YAW DAMP ALL FAIL

YAW DAMP Switches . . . . ALL OFF

Any One YAW DAMP Switch . . . . ON

ASSOCIATED YAW DAMP FAIL
LIGHT ILLUMINATED

NO

Associated YAW DAMP Switch . . . . OFF

Attempt to restore remaining yaw damp channels by pushing any one YAW DAMP switch on and observing its FAIL light. Any YAW DAMP switch that illuminates FAIL should be pushed to OFF prior to pushing next switch.

[END]

Electrical

BUS L EMER AC OFF

EMER PWR Selector . . . . OFF

DISPLAY UNITS 1 AND/OR 3 OPERATING

NO

NOTE: The left emergency AC bus sensing circuit has failed.

If subsequent electrical malfunction(s) occur requiring use of emergency power, rotate EMER PWR selector to ARM or ON and deploy the ADG.

NOTE: The emergency power system is designed to provide power for approximately 15 minutes until the ADG is deployed.

No further crew action required.

[END]

Land at the nearest suitable airport.

Captain's EIS SOURCE Selector . . . . AUX (OR 2)

Captain's CADC Switch . . . . CAPT ON 2

Captain's IRS Switch . . . . .CAPT ON AUX

"ENG IGN NOT ARMED" LEVEL 1 ALERT DISPLAYED

NO

ENG IGN Switch . . . . SELECT B

If subsequent electrical malfunction(s) occur requiring use of emergency power, rotate the EMER PWR selector to ARM or ON and deploy the ADG.

NOTE: The emergency power system is designed to provide power for approximately 15 minutes until the ADG is deployed.

[END]

BUS L EMER DC OFF

EMER PWR Selector . . . . OFF

CAPTAIN'S FLIGHT DIRECTOR AND/OR AUTOPILOT 1 OPERATIONAL

NO

The left emergency DC bus sensing circuit has failed.

If subsequent electrical malfunction(s) occur requiring use of emergency power, rotate the EMER PWR selector to ARM or ON and deploy the ADG.

NOTE: The emergency power system is designed to provide power for approximately 15 minutes until the ADG is deployed.

No further crew action required.

[END]

Land at nearest suitable airport.

If subsequent electrical malfunction(s) occur requiring use of emergency power, rotate EMER PWR selector to ARM or ON and deploy the ADG.

NOTE: The emergency power system is designed to provide power for approximately 15 minutes until the ADG is deployed.

[END]

GEN ALL OFF

CAUTION: With all generators off, the HYD, AIR and FUEL panel illumination will not be functioning. Operation of switches on these panels could change system configuration. These changes would not be indicated to the crew.

NOTE: Battery emergency power is limited to 15 minutes until ADG is deployed.

ENG IGN OVRD Switch . . . . OVRD ON

AIRCRAFT ALTITUDE > 38,000 FEET

NO

While continuing this procedures, begin descent to an altitude of 38,000 feet or less.

NOTE: Engines may not sustain fuel suction feed at altitudes about 38,000 feet.

ELEC SYSTEM MANUAL

NO

Gen Switches With OFF Light Illuminated. . . . . .PUSH

CAUTION: Only one reset attempt is permitted.

GENERATOR BUSES 1 AND 3 POWERED

NO

EMER PWR Selector . . . . OFF THEN ARM

If required, start engine 2. Refer to Abnormal Non-Alert procedure - ENGINE RESTART IN FLIGHT.

Land at nearest suitable airport.

[END]

ADG . . . . DEPLOY

ADG ELEC Switch . . . . .ON

NOTE: Horizontal stabilizer trim is available only through the LONG TRIM handles on the pedestal.

CAPT SISP FMS and APPR Switches. . . . . .PUSH

NOTE: SISP lights will not illuminate; however, the switches are functional

If required, restart engine 2. Refer to Abnormal Non-Alert procedure - ENGINE RESTART IN FLIGHT.

NOTE: Landing gear position indications on the instrument panel and configuration synoptic are not available when DC bus 2 and DC bus 3 are not powered. Flap position indications on the PFD and configuration synoptic are not available when AC bus 1 and AC bus 3 are not powered.

AIRSPEED KNOWN AT TIME OF FAILURE

NO

Refer to following chart for maximum landing flap setting.

AIRSPEED AT TIME OF FAILURE	MAXIMUM LANDING FLAP SETTING
At or above 211 KIAS	22º
191 KIAS to 210 KIAS	28º
176 KIAS to 190 KIAS	35º
At or below 176 KIAS	50º

Land at nearest suitable airport.

Refer to tables listed below for configuration speeds and estimated landing distances.

22/EXT APPROACH SPEEDS
GEN ALL OFF

Weight (1000 LB)	360	380	400	420	440	460	480	500
Vapp = Vref +5	149	153	157	160	164	167	171	174

FLAP 22/EXT ESTIMATED LANDING DISTANCES (FEET)
GEN ALL OFF

General Electric CF6-80C2 Engines

Weight (1000 LB)		360	380	400	420	440	460	480	500
S.L. STD= 15ºC	Dry	6850	7180	7500	7830	8140	8510	8840	9220
	Wet	10590	11050	11500	11970	12940	13410	10880	13960
2000 FT STD= 11ºC	Dry	7270	7620	7970	8320	8660	9050	9410	9820
	Wet	11290	11780	12270	12770	13250	13810	14320	14910
4000 FT STD= 7ºC	Dry	7730	8100	8470	8860	9220	9640	10030	10480
	Wet	12040	12570	13090	13640	14150	14750	15300	15940
6000 FT STD= 3ºC	Dry	8220	8630	9030	9450	9840	10290	10710	11200
	Wet	12870	13440	14000	14590	15140	15790	16380	17070
8000 FT STD= -1ºC	Dry	8760	9200	9630	10080	10500	11000	11450	11980
	Wet	13750	14360	14970	15600	16200	16900	17540	18290
10000 FT STD= -5ºC	Dry	9350	9830	10300	10810	11340	11880	12440	13020
	Wet	14720	15380	16040	16770	17500	18260	19040	19850

NOTE: Standard day, no wind, zero slope, no anti-skid, manual spoilers, flight idle, and no reverse thrust. (includes Air Run Distances).

CORRECTIONS

TEMPERATURE: VALID FROM STD -20ºC TO STD +40ºC		
FEET PER ºC	**DRY**	**WET**
BELOW Standard Day	-23	-37
ABOVE Standard Day	+57	+86

SLOPE: VALID FROM -2% DOWNHILL +2% UPHILL		
FEET PER 1% SLOPE	**DRY**	**WET**
Uphill	-241	-112
Downhill	+904	+2655

WIND: VALID FROM -10 KNOT TAILWIND +20 KNOT HEADWIND		
FEET PER KNOT	**DRY**	**WET**
Headwind	-67	-112
Tailwind	+215	+416

28/EXT APPROACH SPEED GEN ALL OFF								
Weight (1000 LB)	360	380	400	420	440	460	480	500
Vapp = Vref +5	147	151	155	158	162	165	169	172

28/EXT ESTIMATED LANDING DISTANCES (FEET)
GEN ALL OFF

General Electric CF6-80C2 Engines

Weight (1000 LB)		360	380	400	420	440	460	480	500
S.L. STD= 15ºC	Dry	6720	7040	7350	7720	8010	8330	8650	9020
	Wet	10290	10730	11170	11680	12100	12550	13010	13530
2000 FT STD= 11ºC	Dry	7130	7470	7810	8200	8520	8860	9200	9600
	Wet	10970	11440	11910	12460	12910	13390	13880	14440
4000 FT STD= 7ºC	Dry	7570	7940	8300	8720	9060	9430	9810	10230
	Wet	11690	12190	12700	13290	13780	14290	14830	15430
6000 FT STD= 3ºC	Dry	8060	8450	8840	9300	9670	10060	10470	10930
	Wet	12490	13030	13580	14210	14730	15290	15860	16510
8000 FT STD= -1ºC	Dry	8580	9000	9420	9920	10320	10750	11190	11690
	Wet	13340	13920	14510	15190	15750	16360	16980	17670
10000 FT STD= -5ºC	Dry	9150	9610	10070	10600	11070	11600	12150	12710
	Wet	14270	14900	15530	16270	16920	17650	18410	19200
NOTE: Standard day, no wind, zero slope, no anti-skid, manual spoilers, flight idle, and no reverse thrust. (includes Air Run Distances).									

CORRECTIONS

TEMPERATURE: VALID FROM STD -20ºC TO STD +40ºC		
FEET PER ºC	**DRY**	**WET**
BELOW Standard Day	-23	-36
ABOVE Standard Day	+54	+82

SLOPE: VALID FROM -2% DOWNHILL +2% UPHILL		
FEET PER 1% SLOPE	**DRY**	**WET**
Uphill	-238	-650
Downhill	+875	+2523

WIND: VALID FROM -10 KNOT TAILWIND +20 KNOT HEADWIND		
FEET PER KNOT	**DRY**	**WET**
Headwind	-67	-110
Tailwind	+208	+398

35/EXT APPROACH SPEEDS
GEN ALL OFF

Weight (1000 LB)	360	380	400	420	440	460	480	500
Vapp = Vref +5	145	149	152	155	159	162	166	170

35/EXT ESTIMATED LANDING DISTANCES (FEET)
GEN ALL OFF

General Electric CF6-80C2 Engines

Weight (1000 LB)		360	380	400	420	440	460	480	500
S.L. STD= 15ºC	Dry	6519	6827	7126	7505	7778	8064	8369	8724
	Wet	9868	10286	10713	11225	11616	12017	12456	12942
2000 FT STD= 11ºC	Dry	6913	7240	7570	7968	8269	8576	8893	9276
	Wet	10516	10963	11413	11969	12390	12814	13276	12802
4000 FT STD= 7ºC	Dry	7331	7694	8043	8464	8784	9120	9480	9873
	Wet	11198	11669	12164	12752	13216	13664	14179	14738
6000 FT STD= 3ºC	Dry	7808	8179	8557	9023	9372	9721	10112	10543
	Wet	11957	12466	13000	13627	14115	14611	15149	15755
8000 FT STD= -1ºC	Dry	8304	8704	9111	9621	9999	10381	10801	11271
	Wet	12763	13313	13878	14559	15079	15624	16210	16844
10000 FT STD= -5ºC	Dry	8848	9286	9733	10253	10675	11192	11716	12252
	Wet	13642	14238	14839	15551	16135	16834	17552	18309

NOTE: Standard day, no wind, zero slope, no anti-skid, manual spoilers, flight idle, and no reverse thrust. (includes Air Run Distances).

CORRECTIONS

TEMPERATURE: VALID FROM STD -20ºC TO STD +40ºC		
FEET PER ºC	**DRY**	**WET**
BELOW Standard Day	-22	-34
ABOVE Standard Day	+51	+77

SLOPE: VALID FROM -2% DOWNHILL +2% UPHILL		
FEET PER 1% SLOPE	**DRY**	**WET**
Uphill	-230	-616
Downhill	+825	+2335

WIND: VALID FROM -10 KNOT TAILWIND +20 KNOT HEADWIND		
FEET PER KNOT	**DRY**	**WET**
Headwind	-66	-107
Tailwind	+198	+375

50/EXT APPROACH SPEEDS
GEN ALL OFF

Weight (1000 LB)	360	380	400	420	440	460	480	500
Vapp = Vref +5	145	149	152	155	159	162	166	170

FLAP 50/EXT ESTIMATED LANDING DISTANCES (FEET)
GEN ALL OFF

General Electric CF6-80C2 Engines

Weight (1000 LB)		360	380	400	420	440	460	480	500
S.L. STD= 15ºC	Dry	5910	6190	6470	6730	6990	7290	7550	7860
	Wet	8700	9080	9470	9830	10180	10590	10950	11370
2000 FT STD= 11ºC	Dry	6250	6550	6860	7140	7410	7740	8010	8340
	Wet	9250	9650	10070	10450	10830	11270	11650	12110
4000 FT STD= 7ºC	Dry	6630	6950	7280	7580	7870	8220	8510	8870
	Wet	9840	10270	10720	11130	11530	12000	12410	12900
6000 FT STD= 3ºC	Dry	7030	7380	7730	8060	8370	8740	9060	9450
	Wet	10490	10950	11430	11870	12300	12810	13250	13770
8000 FT STD= -1ºC	Dry	7470	7840	8220	8570	8910	9310	9660	10080
	Wet	11170	11670	12180	12650	13110	13660	14140	14700
10000 FT STD= -5ºC	Dry	7950	8650	8760	9140	9540	10020	10440	10920
	Wet	11920	12450	13010	13520	14060	1410	15270	15920

NOTE: Standard day, no wind, zero slope, no anti-skid, manual spoilers, flight idle, and no reverse thrust. (includes Air Run Distances).

CORRECTIONS

TEMPERATURE: VALID FROM STD -20ºC TO STD +40ºC		
FEET PER ºC	**DRY**	**WET**
BELOW Standard Day	-19	-30
ABOVE Standard Day	+44	+65

SLOPE: VALID FROM -2% DOWNHILL +2% UPHILL		
FEET PER 1% SLOPE	**DRY**	**WET**
Uphill	-197	-506
Downhill	+662	+1806

WIND: VALID FROM -10 KNOT TAILWIND +20 KNOT HEADWIND		
FEET PER KNOT	**DRY**	**WET**
Headwind	-59	-96
Tailwind	+171	+320

[END]

Plan a 22/EXT approach and landing.

Refer to 22/EXT APPROACH SPEED and ESTIMATED LANDING DISTANCE tables in this procedure.

Land at nearest suitable airport.

[END]

GEN BUS__FAULT

ELEC SYSTEM MANUAL

NO

Associated GEN Switch. . . . . PUSH to RESET

CAUTION: Only one reset attempt is permitted.

GEN BUS POWERED

NO

“EMER PWR ON” ALERT DISPLAYED AND/OR EMER PWR ON LIGHT ILLUMINATED

NO

EMER PWR Selector. . . . . OFF THEN ARM

[END]

No further crew action required.

[END]

“GEN BUS 1 FAULT” AND/OR “GEN BUS 3 FAULT” ALERT DISPLAYED

NO

Generator bus 1 fault condition may cause activation of right stick shaker. Stick shaker may be deactivated by disconnecting cannon plug on control column or pulling F/O STICK SHAKER circuit breaker on overhead circuit breaker panel.

"GEN BUS 1 FAULT" AND/OR "GEN BUS 3 FAULT" ALERT DISPLAYED

NO

(Continued)

Generator bus 3 fault condition may cause activation of left stick shaker. Stick shaker may be deactivated by disconnecting cannon plug on control column or pulling CAPT STICK SHAKER circuit breaker on overhead circuit breaker panel.

ADG . . . . DEPLOY

ADG ELEC Switch . . . . ON

"GEN BUS 2 FAULT" ALERT DISPLAYED

NO

Battery charger is inoperative.

If battery charging is desired, consider deploying the ADG and pushing the ADG ELEC switch to ON to allow the battery charger to be powered by the right emergency AC bus.

Continue with affected circuits inoperative.

Land at the nearest suitable airport.

Review applicable consequences.

[END]

GEN DRIVE__FAULT

ANY OTHER ENGINE GENERATOR OPERATING

NO

DRIVE Switch . . . . DISC

[END]

Do not disconnect IDG. Continue with “GEN DRIVE__FAULT” alert displayed.

[END]

GEN__OFF

Associated GEN Switch . . . . PUSH TO RESET

CAUTION: Only one reset attempt is permitted.

If reset attempt is not successful, continue flight with generator inoperative.

[END]

Engines

ENG__EGT HI

Affected Throttle. . . . . .RETARD

EGT REMAINS ABOVE REDLINE

NO

Shut down engine.

Refer to Abnormal Non-Alert procedure - ENGINE SHUTDOWN IN FLIGHT

[END]

EGT EXCEEDED 1000°C

NO

Throttle (Affected Engine) . . . . FLIGHT IDLE

Use higher thrust at Captain's discretion.

NOTE: If any engine indications are abnormal at minimum thrust, a precautionary shutdown should be considered.

[END]

Operate engine at a throttle setting necessary to maintain EGT below red line.

[END]

ENG__OIL PRES LO

OR ENGINE OIL PRESSURE BELOW REDLINE

INDICATOR PRESSURE BELOW REDLINE AND “ENG__OIL PRES LO” ALERT DISPLAYED

NO

Shut down affected engine. Refer to Abnormal Non-Alert procedure - ENGINE SHUTDOWN IN FLIGHT

[END]

Associated oil quantity,

Temperature and Pressure . . . . MONITOR

[END]

ENG__OIL TEMP HI

Throttle . . . . .ADJUST

NOTE: Advanced throttle results in increased fuel flow and may decrease oil temperature.

Record maximum temperature reading in maintenance log.

NOTE: Operation in caution range is permissible for 15 minutes. Operation above redline is not permitted.

OIL TEMPERATURE WITHIN LIMITS

NO

Continue engine operation. Monitor oil temperature.

[END]

Shut down engine.

Refer to Abnormal Non-Alert procedure - ENGINE SHUTDOWN IN FLIGHT.

[END]

ENG__RPM HI

Affected Throttle. . . . . .RETARD

RPM REMAINS ABOVE REDLINE

NO

Shut down engine.

Refer to Abnormal Non-Alert procedure - ENGINE SHUTDOWN IN FLIGHT.

[END]

RPM EXCEEDED 124% N1 OR 114% N2

NO

Throttle (Affected Engine) . . . . FLIGHT IDLE

Use higher thrust only at Captain's discretion.

NOTE: If any engine indications are abnormal at minimum thrust, a precautionary shutdown should be considered.

[END]

Operate engine at a throttle setting necessary to maintain N1 and N2 below relines.

[END]

ENG__RPM LO

Observe engine parameters on EAD.

EGT AND FUEL FLOW NORMAL

NO

Continue engine operation.

Assume defective RPM source.

[END]

RESTART DESIRED

NO

Refer to Abnormal Non-Alert procedure - ENGINE RESTART IN FLIGHT.

[END]

Refer to Abnormal Non-Alert procedure - ENGINE SHUTDOWN IN FLIGHT.

[END]

SELECT FADEC ALTN

“SEL FLAP LIM OVRD” AND/OR
“SEL ELEV FEEL MAN” AND/OR
“IAS COMPARATOR MONITOR”
ALSO DISPLAYED

NO

Refer to Emergency Non-Alert procedure - AIRSPEED: LOST, SUSPECT OR ERRATIC.

[END]

Autothrottles . . . . DISENGAGE

Associated Throttle . . . . REDUCE AT LEAST 20% BELOW MCT

Illuminated FADEC MODE Switch . . . . PUSH

Associated FADEC MODE Switch . . . . PUSH AGAIN

NOTE: First push selects FADEC ALTN mode. Second push attempts to return FADEC to normal mode.

“SELECT FADEC ALTN” ALERT
EXTINGUISHES

NO

Autothrottles . . . . ENGAGE

[END]

Illuminated FADEC MODE Switch . . . . PUSH

Associated Throttle . . . . SET AS DESIRED

Remaining Engines (One at a Time) . . . REDUCE THRUST/SELECT ALTN

Autothrottles . . . . ENGAGE

During landing roll, limit reverse thrust to 90% N1.

[END]

Intentionally Left Blank

Fuel

BALST FUEL DISAG

AIRCRAFT ON GROUND

NO

Compare FMS ballast fuel entry with actual ballast fuel quantity and distribution.

FMS BALLAST FUEL QUANTITY CORRECT

NO

BALLAST TANK FUEL QUANTITY CORRECT

NO

Call maintenance.

[END]

Advise ground personnel to correct ballast fuel tank quantity.

[END]

Enter correct quantity into FMS.

[END]

FUEL SYSTEM SELECT Switch . . . . MANUAL

Operate fuel pumps as necessary to stop erroneous transfer.

[END]

CG OUT OF LIMIT

NOTE: Alert may appear after fuel dump is completed and DUMP switch is moved to OFF, even if fuel system is operating in automatic mode.

FUEL SYSTEM AUTO MODE

NO

Observe FUEL synoptic.

FUEL BEING RESCHEDULED

NO

No further action required.

[END]

FUEL SYSTEM SELECT Switch . . . . MANUAL

Reschedule fuel distribution and monitor fuel usage as required.

[END]

DUMP VLV__DISAG

DUMP SWITCH ON

NO

Fuel dump time will be increased.

[END]

Do not pressurize the fuel crossfeed manifold for remainder of flight.

Tank TRANS Switches (All) . . . . VERIFY OFF

Tank XFEED Switches (All) . . . . VERIFY OFF

[END]

FUEL DUMP LEVEL

DUMP Switch. . . . . OFF

DUMP SWITCH LIGHT FAILS TO EXTINGUISH

NO

FUEL DUMP EMER STOP Switch . . . . STOP

[END]

No further action required.

[END]

FUEL OFF SCHEDULE

FUEL SYSTEM IN AUTO MODE

NO

Observe FUEL synoptic.

FUEL BEING RESCHEDULED

NO

No further action required.

[END]

FUEL SYSTEM SELECT Switch . . . . MANUAL

Reschedule fuel distribution and monitor fuel usage as required.

[END]

FUEL QTY ALERTS

FUEL SYSTEM SELECT Switch . . . . MANUAL

OVERHEAD FUEL QUANTITY
READOUTS BLANK

NO

NOTE: Fuel quantity system is inoperative. Use FMS UFOB on WEIGHT INIT PAGE to determine fuel remaining. FMS UFOB and GW are now calculated using fuel flow only.

TANKS 1 AND 3 FILL VALVES
ARMED

NO

TANK FILL Valve Switches (All) . . VERIFY ARM/FILL

When “TAIL PUMPS LO” alert is displayed,

TAIL TANK TRANS Switch. . . . . OFF

When “AUX UPR PUMPS LO” alert is displayed,

AUX TANK L and R TRANS Switches . . . . OFF

TANK 2 TRANS Switch . . . . ON

If “TNK__DFUEL QTY LO” alert is displayed,

Tank XFEED Switches (All) . . . . ON

NOTE: FMS UFOB and GW are not accurate during or after fuel dump. If fuel dump is required, calculate dump time by using 5,000 pounds per minute dump rate. When fuel dump time has elapsed, push dump switch off. Subtract the amount of fuel dumped from FMS UFOB. Enter the result as FMS UFOB.

[END]

TANK 2 FILL Valve Switch. ARM/FILL

When “TAIL PUMPS LO” alert is displayed,

TAIL TANK TRANS Switch . . . . OFF

When “AUX UPR PUMPS LO” alert is displayed,

AUX TANK L and R TRANS Switches. . . . . OFF

If “TNK__FUEL QTY LO” alert is displayed,

All TANK FEED Switches . . . . .ON

NOTE: FMS UFOB and GW are not accurate during or after fuel dump. If fuel dump is required, calculate dump time by using 5,000 pounds per minute dump rate. When fuel dump time has elapsed, push dump switch off. Subtract the amount of fuel dumped from FMS UFOB. Enter the result as FMS UFOB>

[END]

First Officer’s EIS SOURCE Selector. . . . . AUX (OR 1)

“FUEL QTY ALERTS” REMAINS DISPLAYED

NO

First Officer’s EIS Source Selector . . . ORIGINAL POSITION

Monitor fuel quantity readouts on overhead panel.

NOTE: On the system synoptic, an X will cover the area of removed or invalid data. Subsequent alerts for removed or invalid data will not be displayed.

FMS UFOB and GW are not now calculated using fuel flow only. If fuel dump is required, calculate dump time using 5,000 pounds per minute rate. When fuel dump time has elapsed, push dump switch off. After fuel dump add total fuel on overhead fuel panel and enter the amount as FMS UFOB.

[END]

Fuel quantity alerts and system display data are normal.

FUEL SYSTEM SELECT Switch . . . . AS REQUIRED

[END]

FUEL QTY FAULT

(AMBER, “X”ED, OR FROZEN)

Select appropriate procedure below:

IF TANK FUEL QUANTITY ON SD - AMBER

NOTE: Affected tank fuel qty is valid, but displayed in amber.

Enter fuel quantity fault in maintenance log.

[END]

IF TANK FUEL QUANTITY ON SD - "X"ED

TANK 1, 2, OR 3, X”ED” OR ANY TANK CONTAINS BALLAST FUEL

NO

FUEL SYSTEM Select Switch. . . . . MANUAL

ANY TANK CONTAINS BALLAST FUEL

NO

Maintain ballast fuel as required.

Calculate fuel quantity in affected tank.

NOTE: Calculate fuel quantity in affected tank by subtracting the sum of the total fuel used and the total fuel of operational gages from the departure fuel.

FMS UFOB and GW are now calculated using fuel flow only.

FMS UFOB and GW are not accurate during or after fuel dump. If fuel dump is required, calculate dump time by using 5,000 pounds per minute dump rate. When fuel dump time has elapsed, push dump switch off and subtract the amount of fuel dumped from FMS UFOB. Enter the result as FMS UFOB.

IF FUEL QUANTITIES DO NOT CHANGE (FROZEN)

FUEL SYSTEM SELECT Switch . . . . MANUAL

NOTE: Fuel quantity system is inop. Subtract total fuel used from departure fuel. Enter the result as FMS UFOB on WEIGHT INIT page. FMS UFOB and GW are now calculated using fuel flow only.

TANKS 1 AND 3 FILL VALVES CAN BE LATCHED IN ARM

NO

TANK FILL Valve Switches (All). . . . . VERIFY ARM/FILL

When “TAIL PUMPS LO” alert is displayed,

TAIL TANK TRANS . . . . OFF

When “AUX UPR PUMPS LO” alert is displayed,

AUX TANK L and R TRANS Switches. . . . . OFF

TANK 2 TRANS Switch . . . . ON

If “TNK__FUEL QTY LO” alert is displayed,

Tank XFEED Switches (All) . . . . ON

NOTE: If an extra crew member is available, consider cycling FUEL QTY NORNMAL POWER and FUEL QUANTITY ALTN POWER C/Bs (located on the upper main C/B panel) simultaneously to attempt to

restore system operation.
FMS UFOB and GW are not accurate during or after fuel dump. If fuel dump required, calculate dump time by using 5,000 pounds per minute dump rate. When fuel dump time has elapsed, push dump switch off. Subtract the amount of the fuel dumped from FMS UFOB. Enter the result as FMS UFOB.

[END]

Tank 2 FILL Valve Switch. .VERIFY ARM/FILL

When “TAIL PUMPS LO” alert is displayed,

TAIL TANK TRANS Switch. . . . . OFF

When “AUX UPR PUMPS LO” alert is displayed,

AUX TANK L and R TRANS Switches . . . . OFF

If “TNK__FUEL QTY LO” alert is displayed,

Tank XFEED Switches (All) . . . . ON

NOTE: If an extra crew member is available, consider cycling FUEL QTY NORMAL POWER and FUEL QUANTITY ALTN POWER C/Bs (located on the upper main C/B panel) simultaneously to attempt to restore system operation.

FMS UFOB and GW are not accurate during or after fuel dump. If fuel dump required, calculate dump time by using 5,000 pounds per minute dump rate. When fuel dump time has elapsed, push dump switch off. Subtract the amount of the fuel dumped from FMS UFOB. Enter the result as FMS UFOB.

[END]

LAT FUEL UNBAL

NOTE: If a fuel leak is suspected, accomplish the "FUEL LEAK" procedure in the Abnormal Non-Alert section to this manual.

The "FUEL QTY/USED CHK" alert is inhibited with the fuel system in MANUAL mode.

If alert appeared during fuel dump, complete or terminate fuel dump prior to accomplishing this procedure.

FUEL SYSTEM IN AUTO MODE

NO

FUEL BEING RESCHEDULED

NO

No further action required.

[END]

FUEL SYSTEM SELECT Switch . . . . MANUAL

FUEL CROSSFEED DESIRED

NO

Tank TRANS Switch (Supplying Tank . . . . ON

Tank XFEED Switche(s) (Receiving Engine[s]) . . . . ON

Tank PUMPS Switch(es) (Receiving Engine[s]) . . . . OFF

Fuel Quantities . . . . MONITOR

When tank quantities are approximately balanced,

Tank PUMPS Switch(es) (Receiving Engine[s]) . . . . ON

Tank XFEED Switch(es) (Receiving Engine[s]). . . . . OFF

Tank TRANS Switch (supplying Tank). . . . . OFF

[END]

Tank TRANS Switch (Supplying Tank). . . . . ON

Tank FILL Switch(es) (Receiving Tank[s]) . . . . PUSH AND HOLD

Fuel Quantities. . . . . MONITOR

When tank quantities are approximately balanced,

Tank FILL Switch(es) (Receiving Tank[s]) . . . . RELEASE

Tank TRANS Switch (Supplying Tank). . . . . OFF

[END]

TANK FUEL QTY LO

Tank 2 PUMPS Switch . . . . ON

TAIL TANK ALT PUMP Switch . . . . OFF

CAUTION: Immediate action is required to prevent flameout of engine 2 due to fuel starvation.

[END]

TAIL PUMPS LO

TAIL TANK QUANTITY LESS THAN 1,000 POUNDS

NO

TAIL TANK TRANS Switch . . . . OFF

[END]

TAIL TANK ALT PUMP Switch . . . . ON

CAUTION: Observe synoptic to verify fuel supply from tail tank alternate pump to engine 2. The next action will cause engine 2 to flame out if tail tank alternate pump is not supplying fuel to engine 2.

Tank 2 PUMPS Switch . . . . OFF

CAUTION: Do not allow fuel quantity in tail tank to decrease below 1,000 pounds as flameout of engine 2 could occur.

When tail tank quantity has decreased to 1,000 pounds or “TAIL FUEL QTY LO” alert is displayed,

Tank 2 PUMPS Switch . . . . ON

TAIL TANK ALT PUMP Switch . . . . OFF

[END]

TANK__PUMPS LO

Associated TANK TRANS Switch. . . . . ON

Associated XFEED Switch . . . . ON

Associated tank PUMPS Switch. . . . . OFF

[END]

TNK__AFT PMP LO

Associated tank TRANS Switch . . . . ON
Associated XFEED Switch . . . . ON

TNK__FWD PMP LO

At top of descent,

TANK FUEL QUANTITY LESS THAN 11,500 POUNDS

NO

Associated XFEED Switch . . . . ON
Another XFEED Switch . . . . ON
[END]

No further crew action required.

[END]

TNK__XFER PMP LO

Associated XFEED . . . . ON
Associated Tank TRANS Switch . . . . OFF

[END]

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Hydraulics

HYD 1 FAIL

“HYD 3 ELEV OFF” ALERT DISPLAYED

NO

Land at nearest suitable airport.

AUTO BRAKE Selector . . . . OFF

Plan a 35/EXT landing.

[END]

HYD 2 FAIL

“HYD 3 ELEV OFF” ALERT DISPLAYED

NO

Land at nearest suitable airport.

Lower rudder is inoperative.

Vmca is 180 KIAS.

CAUTION: Do not attempt a go around at speeds below Vmca.

Recommended maximum crosswind component is 12 knots.

Plan a 35/EXT landing.

[END]

HYD 3 FAIL

NOTE: Autoland is not approved.Auto pilot must be disconnected by 100 feet AGL.

Autopilot GA not recommended.

Plan a 35/EXT landing.

When gear extension is required,

Airspeed . . . . .MAX 230 KIAS

Main Gear Alternate Extension Lever. . . . . RAISE/LATCH

After three green lights illuminate,

Center Gear Alternate Extension Handle/Lights. PULL/4GREEN

GEAR Handle. . . . . DOWN

AUTO BRAKE Selector . . . . OFF

Autopilot . . . . DISCONNECT BY 100 FEET AGL

[END]

HYD__PRES LO

Affected HYD PUMP Switch(es). . . . . OFF

Repressurize system for approach and landing.

If system does not repressurize,

Refer to Abnormal Alert procedure - HYD1 FAIL, HYD2 FAIL, or HYD3 FAIL, as appropriate.

[END]

HYD__QTY LO

Affected HYD SYS PUMP and RMP Switches . . . . OFF

NOTE: Hydraulic system may be used for approach and landing.

[END]

HYD__PRES HI

HYDRAULIC SYSTEM IN MANUAL MODE

NO

Associated HYD SYS L PUMP Switch . . . . OFF

"HYD__PRES HI" ALERT REMAINS DISPLAYED

NO

After 10 seconds.

Associated HYD SYS L PUMP Switch. . . . . ON

Make log entry.

NOTE: If alert remains displayed, system pressure sensor has failed.

[END]

[END]

Make log entry.

NOTE: If alert remains displayed, system, pressure sensor has failed.

[END]

HYD__TEMP HI

AIRCRAFT IN FLIGHT

NO

If phase of flight permits.

Affected HYD SYS PUMPs and RMP Switches . . . . OFF

NOTE: Hydraulic system should be on for approach and landing.

[END]

Flight Controls . . . . .CYCLE

NOTE: Cycling flight controls, with affected engine hydraulic pumps operating, will circulate and cool hydraulic fluid and may cause “HYD__TEMP HI” alert to extinquish. If alert remains displayed, call maintenance.

[END]

Miscellaneous

CARGO DOOR__

SINGLE ALERT DISPLAYED

NO

Cargo Door Test . . . . PERFORM

OTHER SENSOR ON FAULTED DOOR TESTS CORRECTLY ON MISC SYSTEM DISPLAY

NO

No further crew action required. Enter fault in maintenance log.

[END]

CABIN PRESS SYSTEM SELECT Switch. . . . . MANUAL

Rotate CABIN PRESS manual rate selector towards CLIMB and observe indicator moves toward OP.

Descend aircraft to 15,000 feet or minimum safe altitude, whichever is higher.

Reduce cabin differential pressure to 2 psi or less.

NOTE: An aircraft altitude of 15,000 feet provides 9,500-feet cabin altitude at 2-psi differential pressure.

Land at nearest suitable airport.

[END]

IRU__FAIL

Associated IRS Mode Selector . . . . OFF

IRU 1 OFF

NO

IRS Switch (Captain's SISP Panel) . . . . CAPT ON AUX

IRU 2 OFF

NO

IRS Switch (F/O's SISP Panel) . . . . F/O ON AUX

[END]

MSC AUTO FAIL

Operate engine ignition manually. Refer to Supplemental Procedures under Eng/APU.

-ENGINE IGNITION MANUAL OPERATION

The ENG START switch must be held out. Release the switch when the engine reaches 45% N2.

NOTE: If a cargo fire condition exists, manual timing of agent discharge is required.

If a "CRG FIRE LWR__" alert is received, both AGENT DISCH lights will remain illuminated as long as the fire is detected. Only agent 1 should be discharged, followed by 90 minutes to agent 2.

[END]

Non-Alert

Ditching

Crew and Couriers . . . . ALERT
Transponder . . . . SET 7700
ATC . . . . ADVISE
Fuel Quantity . . . . REDUCE
Vapp . . . . CHECKED
APU . . . . VERIFY OFF
First Aid and Survival Equipment/Loose Equipment . . . . . . STOWED
Left Observer's Seat . . . . FACING FORWARD
Right Observer's Seat (If Occupied) . . . . FACING FORWARD
NO SMOKE/SEAT BELTS . . . . ON
Courier(s) Ditching Preparation . . . . COMPLETED
Crew Vests, Belts, Harnesses . . . . ON/FASTENED
DITCHING Switch . . . . ON

AIR SYSTEM MANUAL

NO

AVNCS FAN Switch . . . . OVRD
At or below 10,000 feet,
PACK/BLEED Switches . . . . OFF

CABIN PRESS CONTROLLER
MANUAL

NO

At or below 10,000 feet,

CABIN PRESS Manual Rate Selector . . . . CLIMB

When aircraft is depressurized (cabin differential pressure less that 0.5 psi),

CABIN PRESS Manual Rate Selector . . . . FULL DESC

Crew/Courier(s) Briefing . . . . COMPLETED

NOTE: When beginning final approach, advise crew and courier(s) to brace for impact (30 seconds prior to touchdown) and not to release harness until aircraft has come to complete stop.

GEAR Handle/Lights . . . . UP/OFF

FLASP/SLAT Handle 50/EXT

NOTE: Continuous aural warnings will sound. If time permits, prior to leaving aircraft, move all ENG FIRE handles to full forward. If cockpit door is jammed, exit via smoke panel. If debris jams exit to cabin, use windows.

[END]

Engine Abnormal Start

(HOT, HUNG, OR NO START)

FUEL Switch . . . . OFF

STARTER DISENGAGED

NO

Allow N2 RPM to decrease to 15% or less.

Verify IGN A or B is selected.

ENG START Switch . . . . PULL

Motor engine with starter for 30 seconds.

ENG START Switch . . . . .PUSH

Determine type of abnormal start:

Hot Start

Record maximum EGT and elapsed time EGT was above 750ºC.

Call Maintenance.

[END]

Hung Start/No Start - Engine 1 or 3

ENG IGN A IS SELECTED

NO

Call maintenance

[END]

Select ENG IGN A and attempt another start.

Observe started air pressure, starting fuel flow, maximum N2 achieved, and maximum EGT.

If unsuccessful, call maintenance.

[END]

HUNG START/NO START - ENGINE 2

Select other ENG IGN (A or B) and attempt another start.

Observe started air pressure, starting fuel flow, maximum N2 achieved, and maximum EGT.

If unsuccessful, call maintenance.

[END]

Engine Compressor Stall(s)

ENGINE OPERATION NORMAL

NO

Continue engine operation.

[END]

Autothrottles . . . . DISENGAGE

Throttle (Affected Engine). RETARD TO IDLE

ENG IGN OVRD Switch . . . . OVRD ON

Associated ENG & WING or TAILO ANTI-ICE Switches . . . . ON

ECON Switch . . . . OFF

ENGINE OPERATION NORMAL

NO

CAUTION: Continued operation of an engine that exhibits stall tendencies must be done with extreme caution. If a high EGT becomes evident or a rapid EGT rise occurs during slow throttle advance, or if an increase in vibration level is noted, shut down engine.

Throttle (Affected Engine) . . . . (SLOWLY) ADVANCE

NOTE: If compressor stall recurs, at Captain's discretion, operate engine at a reduced thrust level at which compressor stall is not experienced.

If compressor stall does not recur, continue engine operation. Monitor engine indications.

ENG IGN OVRD Switch . . . . OFF

ENG, WING and TAIL ANTI-ICE Switches . . AS REQUIRED

ECON Switch . . . . ON

Shut down affected engine. Refer to ENGINE SHOUTDOWN IN FLIGHT in this section.

[END]

Engine Oil Quantity Increase

NOTE: Slight increase/decrease in oil quantity may be normal. Use this procedure when continuous oil quantity increase is observed, oil quantity increase is accompanied by secondary indications, or oil quantity exceeds 21 units of fuel/oil fumes are detected.

Maintain normal thrust settings.

FUEL/FUMES DETECTED

NO

AIR SYSTEM SELECT Switch . . . . MANUAL

Associated BLEED AIR Switch . . . . OFF

Associated PACK Switch . . . . OFF

Associated ISOL Switch . . . . ON

NOTE: When in icing with only one bleed air source, exit icing area and maintain ice protection until clear of icing.

Log malfunction.

[END]

Engine Oil Quantity Lo/Decreasing

Continue engine operation.

If oil pressure/temperature become abnormal, shut down affected engine. Refer to Abnormal Non-Alert procedure - ENGIINE SHUTDOWN IN FLIGHT.

[END]

Engine Primary Instrument Loss

NOTE: If engine parameters are lost (indicated by amber X's over N1, 2, EGT, and fuel flow), use this procedure to determine the status of the engine.

AIRCRAFT ON GROUND

NO

Call maintenance.

[END]

Observe EAD.

"FUEL OFF" DISPLAYED ABOVE FUEL FLOW ON AFFECTED ENGINE

NO

Shut down affected engine.

Refer to Abnormal Non-Alert procedure - ENGINE SHUTDOWN IN FLIGHT.

NOTE: If "FUEL OFF" alert is displayed, it indicates a FADEC power failure has occurred and the engine has been shut down.

Engine shutdown can be confirmed by checking the electrical system status.

[END]

Operate the affected engine throttle by continually aligning it with other throttles. Do not allow affected throttle to lead others.

NOTE: If "FUEL OFF" alert is not displayed, it indicates a FADEC data failure has occurred. The engine will continue to operate and respond to throttle movement.

Continue flight and log malfunction.

[END]

Engine Restart In Flight

NOTE: Do not attempt to restart an engine if it has been shut down because of engine fire or if there are indications of engine damage.

Throttle . . . . VERIFY IDLE

FUEL Switch . . . . VERIFY OFF

HYD SYSTEM IN MANUAL MODE

NO

Associated HYD SYS L and R PUMP Switches . . . . OFF

FUEL SYSTEM IN MANUAL MODE

NO

Associated TANK PUMPS Switch. ON

Air starts may be attempted at any altitude and airspeed.

Recommended altitude and airspeed for air starts are as follows:

- Above 10,000 feet, greater than 220 KIAS
- Below 10,000 feet, greater than 250 KIAS

ENG IGN OVRD Switch . . . . OVRD ON

NOTE: If cyan lightning strike does not appear on EGT display (ENG IGN OVRD switch inoperative), select engine ignition A and B. Additionally, place engine anti-ice switch to ON for the appropriate engine, as this action also activates the engine ignition system. If a restart is not completed within 60 seconds, the engine anti-ice can be selected again.

N2 RPM LESS THAN 15%

NO

AIR SYSTEM IN MANUAL MODE

NO

Associated BLEED AIR Switch. . . . . .VERIGFY OFF
Associated PACK Switch . . . . VERIFY OFF
BLEED AIR Switch
(Engine Supplying Bleed for Start) . . . . . VERIFY ON
Appropriate ISOL Switch . . . . VERIFY ON

ENG START Switch. . . . . PULL

When N2 rpm is 15% or greater,

FUEL Switch. . . . . .ON

ABNORMAL START

NO

FUEL Switch . . . . OFF
ENG IGN OVRD Switch . . . . OFF

[END]

Unless thrust is required for safety of flight, observe 1-minute warm-up at idle and gradually resume normal operation.

ENG IGN OVRD Switch. . . . . OFF

Verify fuel, hydraulic, air and electrical systems are operating in the desired mode.

[END]

Engine Shutdown In Flight

Throttle. . . . . .IDLE
FUEL Switch . . . . OFF

AIR SYSTEM MANUAL

NO

Associated BLEED AIR MANUAL. . . . . VERIFY OFF
Associated PACK Switch . . . . OFF
Associated ISOL Switch . . . . ON

Transponder/TCAS Selector . . . . .TA

Consider landing at nearest suitable airport.

[END]

Evacuation

Couriers . . . . ALERT

After aircraft has stopped,

Outflow Valve . . . . VERIFY OPEN

PARK BRAKE Handle . . . . PARK

FUEL Switches . . . . OFF

EVACUATION Command . . . . INITIATE

ENG FIRE Handles . . . . DOWN/DISXHARGE

APU FIRE Handle. . . . . .PULL/ROTATE

EMER PWR Selector . . . . OFF

BAT Switch . . . . OFF

[END]

Fuel Dump

DUMP Switch . . . . ON

NOTE: When fuel dump is terminated at the FMS DUMP TO GW value, “DUMP VLV L DISAG” and “DUMP VLV R DISAG” alerts will be displayed.

If fuel dump does not terminate at the FMS DUMP TO GW value, “FMS DUMP DISABLED” alert will be displayed. If fuel dumps below the low level dump shutoff (approximately 11,500 pounds per tank), “FUEL DUMP LEVEL” alert will be displayed

When desired fuel level is reached or calculated dump time is reached, DUMP Switch . . . . OFF

FURTHER FUEL DUMP DESIRED

NO

DUMP Switch . . . . ON

When desired fuel level is reached or calculated dump time is reached,

DUMP Switch . . . . OFF

DUMP SWITCH ON LIGHT FAILS TO EXTINGUISH

NO

FUEL DUMP EMER STOP Switch . . . . STOP

[END]

No further crew action required.

[END]

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Introduction

This section lists and describes all level 1 and 0 alerts. The level 1 alerts are listed alphabetically, along with their consequences, action/awareness code, and a description of the alert. Some alerts apply only to some aircraft based on configuration (e.g., GE or PW engines, passenger, combi, or freighter), or may be a customer-selectable option. These alerts are identified as "optional," "combi," etc.

Flight crew response to a level 1 alert may differ based on how the alert is presented. There are no written Volume 1 procedure for level 1 alerts except for the "No Takeoff" list. If a level 1 alert appears on the ground prior to takeoff, this lists should be consulted. Level 1 alerts can be displayed in the following ways:

Level 1 Alerts

Displayed on EAD

Level 1 alerts that appear on the EAD with or without accompanying MASTER CAUTION lights are caused by a condition requiring crew response. The nature of the response is contained in the title of the alert, in the associated consequence statements, or is intuitive by the nature of the alert. When an alert appears on the EAD, the PNF should announce the alert condition and push the illuminated cue switch to reset the MASTER CAUTION lights and display the synoptic. In some instances, the alert will be removed from the EAD and be replaced by a reminder message in the lower right-hand corner of the EAD.

Displayed on the Synoptic with Flashing Reminder Message on EAD:

Alerts that appear only on the synoptic are annunciated by a flashing reminder message in the lower right-hand corner of the EAD and illumination of the associated systems display control panel cue switch. There is no accompanying MASTER CAUTION light. These alerts indicate a condition that requires crew awareness, and is usually a result of the automatic system controller performing an action in response to a fault, or system degradation not requiring a flight crew procedure. When a flashing reminder message appears on the EAD, the PNF should push the illuminated systems display cue switch when time and condition permit. This will display the synoptic and reset the flashing reminder message.

Displayed on Synoptic only, with No Flashing Reminder Message on EAD:

These alerts indicate system conditions that may be a result of a deliberate flight crew action, an abnormal switch position or an automatic system controller normal action. There are no MASTER CAUTION lights or flashing reminder messages associated with these alerts. Some of these level 1 alerts may be accompanied by a steady reminder message on the EAD. These alerts are advisory only and require no flight crew response.

Level 0 Alerts

The level 0 alerts are listed alphabetically after the level 1 alerts. Since level 0 alerts generally display system status information and are not caused by abnormal conditions, there are no action codes or consequences associated with these alerts. There are no Volume 1 procedures associated with level 0 alerts.

The following sections list all the level 1 and 0 alerts alphabetically by level. This list is all inclusive; therefore, some alerts may not be applicable for all customers. These particular alerts are identified by parentheses next to the title of the alert (for example: freighter, GE, optional).

Level 1 alerts are accompanied by an action code which is one of the following:

NO T/O	Do not take off unless MEL relief for the related system discrepancy is documented in the aircraft's maintenance log. If in flight, review Consequence message(s). Continue to an appropriate destination considering Consequence message(s) and maintenance/MEL relief requirements for subsequent departures. Make an appropriate maintenance log book entry.
MAINT	Consult maintenance prior to takeoff for appropriate disposition. MEL procedures and limitations may apply. In flight, if not restricted by the consequence message, continue to destination and make appropriate log book entry.
N/A	No specific flight crew action is required. These alerts generally appear to inform the crew of an automatic system controller normal action, a result of a maintenance action taken to comply with the MEL, or alerts that appear only in flight as a result of an associated problem.
SW	This alert is the result of flight crew inaction or a deliberate flight crew action and reflects an abnormal switch or control position. The flight crew should confirm the desired configuration.

Some level 1 alerts have associated consequence statements on the system synoptic display. These consequences are listed when they apply.

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Level 1 Alerts

ALERT	CODE	CONSEQUENCE(S)/DESCRIPTION
AC TIE FAULT	NO T/O	Consequences: DO NOT CONNECT EXTERNAL POWER LEAVE AC TIE BUS ISOLATED APU MAY BE USED IF AVAILABLE The AC TIE bus is inoperative and all bus tie relays are locked out.
AC TIE__OFF (1,2,3)	NO T/O SW	Consequences: NONE The respective AC TIE has been manually selected OFF by the crew, or automatically selected OFF by the electrical system due to a fault.
ADG ELEC SW ON	SW	Consequences: NONE The ADG ELEC switch on the electrical panel has been selected ON.
AFSC FAULT	MAINT	Consequences: NONE There is an internal fault detected by the ancillary fuel system controller. System operation may be affected.
A-ICE SENSOR FAIL	MAINT	Consequences: DEPART ICING AREA Anti-ice may be inoperative.

A-ICE SYS MANUAL (Optional)	MAINTSW	Consequences: NONE The automatic anti-ice system has reverted to MANUAL because of fault or has been selected to MANUAL by the flight crew. The auto anti-ice system will revert MANUAL if the AIR system is selected to MANUAL.
A-ICE TEST FAIL (Optional)	MAINT	Consequences: NONE The flight crew initiated airfoil anti-ice test has failed. Wing or tail surface anti-icing may be inoperative.
AIL DEFLECT INOP (Effective with Service Bulletin 27-27 or production equivalent and Service Bulletin 31-69 (DEU 909 and subs) or production equivalent).	MAINT	Consequences: NONE Aileron deflection system command signals are inoperative.
AIR COND DOOR	MAINT	Consequences: NONE One or more of the air conditioning pack access doors is not closed and latched.
AIR DATA HTR ON	MAINT	Consequences: NONE An air data probe heater is on when it should be off.

AIR__ISOL DISAG (1-2, 1-3)	MAINT	Consequences: DO NOT CONNECT ACTIVE BLEEDS The respective pneumatic isolation valve is not in the commanded position. If the valve is open, the crew should not allow two active bleed sources to be interconnected.
AIR LRU INOP	N/A	Consequences: NONE Maintenance action has been taken to declare an air conditioning pack, pneumatic, or manifold sensor inoperative. The system can be operated in auto mode and will not use the affected component.
AIR MANF TST FAIL	NO T/O	Consequences: NONE The automatic test of the air manifold failure detection system has failed.

AIR SYS 1 OFF	MAINTSW	Consequences: IF MANF FAILED DO NOT REPRESSURIZE WING ANTI-ICE NOT AVAILABLE NO FWD GALLEY VENT DEGRADED AFT CARGO VENTILATION Air system 1 is OFF. This could occur automatically as a result of a manifold failure (main manifold, anti-ice manifold, or pack manifold), or as a result of an airfoil anti-ice valve open on the ground. It will also occur as a result of the engine fire handle being pulled (AIR system auto only) or flight crew manually selecting the AIR system to OFF. If the MANF light remains illuminated for an extended period of time, but the “AIR MANF__FAIL” alert is not displayed, the system is depressurized.

AIR SYS 2 OFF	MAINT SW	Consequences: IF MANF FAILED DO NOT REPRESSUREZE TAIL ANTI-ICE NOT AVAILABLE FLAP 35 FOR LDG IF ICE SUSPECTED NO AFT/CTR CRAGO HEAT NO AFT GALLEY VENT Air system 2 is OFF. This could occur automatically as a result of a manifold failure (main manifold, anti-ice manifold, or pack manifold), or as a result of an airfoil anti-ice valve open on the ground. It will also occur as a result of number 2 engine or APU fire handle being pulled (AIR system only) or flight crew manually selecting the AIR system to OFF. If the MANF light remains illuminated for an extended period of time, but the “AIR MANF__FAIL” alert is not displayed, the system is depressurized.

AIR SYS 3 OFF	MAINTSW	Consequences: NONE IF MANF FAILED DO NOT REPRESSURIZE WING ANTI-ICE NOT AVAILABLE NO FWD CARGO HEAT Air system 3 is OFF. This could occur automatically as a result of a manifold failure (main manifold, anti-ice manifold, or pack manifold), or as a result of an airfoil anti-ice valve open on the ground. It will also occur as a result of the engine fire handle being pulled (AIR system auto only) or flight crew manually selecting the AIR system to OFF. If the MANF light remains illuminated for an extended period of time, but the “AIR MANF__FAIL” alert is not displayed, the system is depressurized.
AIR SYS MANUAL	SA	Consequences: NONE The AIR system is MANUAL mode.
AIR SYS TEST FAIL	NO T/O	Consequences: NONE The automatic test of the AIR system has failed. A second test may be performed. If alert is displayed again, call maintenance.
ANTI-SKID FAULT	MAINT	Consequences: NONE There is a fault in the anti-skid system. Anti-skid will function normally.
ANTI-SKID OFF	SW	Consequences: NONE the ANTI-SKID switch is OFF.

AOA HEAT__FAIL (L,R)	MAINT	Consequences: NONE The respective angle of attack probe heater has failed.
APU AUTO SHUTDOWN	MAINT	Consequences: DO NOT ATTEMPT RESTART The APU has automatically shut down. An attempt may be made to restart the APU from the APU panel.
APU DOOR DISAG	MAINT	Consequences: NONE The APU inlet/exhaust door is not in the commanded position.
APU FAIL	MAINT	Consequences: NONE The APU has automatically shut down due to a failure. A restart should not be attempted.
APU FAULT	MAINT	Consequences: NONE There is a fault in the APU control circuit. APU operation may not be affected.
APU FIRE AGENT LO (Effective for aircraft with an APU dedicated fire bottle installed). (DEU 909 and subs)	MAINT	Consequences: NONE The APU dedicated fire extinguisher container has low pressure.
APU FSO NOT CLSD	NO T/O	Consequences: NONE The APU fuel shutoff valve did not close following a normal or emergency shutdown.

APU FUEL PRES LO	MAINT SW	Consequences: ALTERNATE FUEL SOURCE MAY BE REQD Fuel pressure to the APU may be too low for APU operation. When the FUEL system is in manual mode, fuel pressure may be supplied by an alternate source.
APU MAINT DOOR	MAINT	Consequences: NONE The APU DOOR switch on the upper maintenance panel is in the OPEN position and the APU inlet door is open.
APU STARTER FAULT	MAINT	Consequences: NONE An APU starting system fault exists and the APU should not be started. If the APU is already running, operation may be continued.
ATC XPDR__FAIL (1,2)	MAINT	Consequences: NONE The respective Air Traffic Control transponder has failed. This alert may also appear during the transponder and TCAS test
AUTO BRAKE OFF	SW	Consequences: NONE The AUTO BRAKE selector is in the OFF position and the landing gear handle is down.
AUTOPILOT SINGLE	MAINT	Consequences: NONE Only one autopilot is available.
AUTO SLAT FAIL	NO T/O	Consequences: NONE The auto slat extension is inoperative.

AUTO TRIM FAIL	NO T/O	Consequences: NONE The automatic pitch trim is inoperative. Manual trim is operative.
AUX LWR PUMPS LO	MAINT	Consequences: FUEL IN LWR AUX TANK IS UNUSABLE Both fuel pumps in the lower auxiliary tank have low pressure.
AUX LWR__PMP LO (L, R)	MAINT	Consequences: NONE With the FUEL system in manual mode, the respective fuel pump outlet pressure is low and the pump should be considered inoperative. The rate of fuel transfer from the lower auxiliary fuel tank will be slower.
AUX LWR__PMP OFF (L, R)	MAINT	Consequences: NONE With the FUEL system in auto mode, the fuel system controller has detected low pressure in the respective pump and turned the pump off. The rate of fuel transfer from the lower auxiliary fuel tank will be slower.
AUX UPR PUMPS LO	MAINT	Consequences: FUEL IN TANK IS UNUSABLE Both fuel pumps in the upper auxiliary fuel tank have low pressure.
AUX UPR__PUMP LO (L, R)	MAINT	Consequences: NONE With the FUEL system in manual mode, the respective fuel pump outlet pressure is low and the pump should be considered inoperative. The rate of fuel transfer from the upper auxiliary fuel tank will be slower.

AUX UPR__PUMP OFF (L, R)	MAINT	Consequences: NONE With fuel system in auto mode, the fuel system controller has detected low pressure in the respective pump and turned the pump off. The rate of fuel transfer from the upper auxiliary fuel tank will be slower.
AVNCS EXT ACC DR	MAINT	Consequences: NONE The external avionics access door is not closed and latched.
AVNCS FAN OVRD	MAINT SW	Consequences: NONE The avionics exhaust fan is operating in flight. In normal operation, this fan is off in flight. It is automatically turned on if cooling flow goes below normal or if manually selected ON by the flight crew.
AVNCS NOSE WHL DR	MAINT	Consequences: NONE The external avionics nose wheel access door is not closed and latched.
BALST SW/ FMS XCHK	MAINTSW	Consequences: NONE The tail tank ballast switches on the maintenance panel are not in agreement with the declared ballast in the FMS.
BAT CHARGER INOP	NO T/O	Consequences: NONE The battery charger is inoperative. This alert is inhibited in flight.
BAT CHARGING	NO T/O	Consequences: NONE The battery is being charged. This alert is normally displayed for a short time after an APU start or emergency power test.

BAT DISCHARGIN G	NO T/O	Consequences: LAND AT NEAREST SUITABLE AIRPORT BATTERY DIRECT BUS MAY FAIL Abnormal battery discharge is indicated.
BAT LOW	NO T/O	Consequences: LAND AT NEAREST SUITABLE AIRPORT Battery voltage is below limit.
BAT SWITCH OFF	NO T/O SW	Consequences: NONE The battery switch has been manually selected to the OFF position.
BLEED AIR__OFF (1, 2, 3)	MAINT SW	Consequences: NONE The respective engine bleed valve is closed, but the associated air system can be pressurized by another source.
BLEEDS NOT OFF	SW	Consequences: NONE This alert appears if a PACKS OFF takeoff is selected (packs and anti-ice off) and the bleeds were not selected OFF prior to advancing the throttles for takeoff.
BRAKE DIFF TEMP	MAINT	Consequences: NONE There is a significant difference in the brake temperatures.

BUS AC 1 OFF (DEU 909 and subs)	NO T/O	Consequences: GPWS INOPERATIVE AUTO GROUND SPOILERS INOPERATIVE AC BUS 1 is unpowered or associated sensing circuit has failed.
BUS AC 2 OFF (DEU 909 and subs)	NO T/O	Consequences: NONE AC BUS 2 is unpowered or the associated sensing circuit has failed.
BUS AC 3 OFF (DEU 909 and subs)	NO T/O	Consequences: AUTO EXTENSION INOPERATIVE AC BUS 3 is unpowered or the associated sensing circuit has failed.
BUS AC GND OFF (DEU 909 and subs)	NO T/O	Consequences: NONE AC ground service bus is unpowered or the associated sensing circuit has failed.

BUS DC 1 OFF (DEU 909 and subs)	NO T/O	Consequences: WING ANTI-ICE INOPERATIVE ALTITUDE ALERT AURAL WARNING INOP HYD 1 PRESSURE INDICATION INVALID AUTO GROUND SPOILERS INOPERATIVE ENG 1 REVERSE INOPERATIVE ENG 3 REVERSE INOPERATIVE DC BUS 1 is unpowered or the associated sensing circuit has failed.
BUS DC 2 OFF (DEU 909 and subs)	NO T/O	Consequences: ENG 2 REVERSE INOPERATIVE HYD 2 PRESSURE INDICATION INVALID DC BUS 2 is unpowered or the associated sensing circuit has failed.

BUS DC 3 OFF (DEU 909 and subs)	NO T/O	Consequences: TAIL ANTI-ICE INOPERATIVE AUTO SLAT EXTENSION INOPERATIVE HYD 3 PRESSURE INDICATION INVALID CABIN ALT ALERT & AURAL WARNING INOP LANDING GEAR AURAL WARNING INOP AUTO BRAKE INOP DC BUS 3 is unpowered or associated sensing circuit has failed.
BUS DC CABIN OFF (DEU 909 and subs)	NO T/O	Consequences: NONE DC CABIN BUS is unpowered or the associated sensing circuit has failed.
BUS DC GND OFF (DEU 909 and subs)	NO T/O	Consequences: NONE DC GROUND SERVICE BUS is unpowered or the associated sensing circuit has failed.
BUS R EMER AC OFF (DEU 909 and subs)	NO T/O	Consequences: NONE RIGHT EMERGENCY AC BUS is unpowered or the associated sensing circuit has failed.
BUS R EMER DC OFF (DEU 909 and subs)	NO T/O	Consequences: NONE RIGHT EMERGENCY DC BUS is unpowered or the associated sensing circuit has failed.

CAB AIR NOT OFF (Freighter)	MAINT	Consequences: NONE The cabin air shutoff valve has been commanded closed as a result of an upper deck cargo fire, but has not closed. (refer to Emergency Alerts- CABIN SMOKE.)
CAB DOOR OVWING__ (L, R)	MAINT SW	Consequences: NONE The respective main cabin passenger door is not closed and armed.
CAB PRES SYS MAN	SW	Consequences: MAX CABIN DP FOR LANDING 0.5 PSI The cabin pressurization system is in manual mode.
CABIN AIR OFF (Freighter)	SW	Consequences: NONE The cabin air to the cargo compartment is selected OFF.
CABIN BUS SW OFF	SW	Consequences: NONE The CAB BUS switch has been manually selected OFF. This removes power from the cabin buses.
CABIN CRG FLO OFF (Combi)	MAINT	Consequences: NONE The cabin cargo compartment airflow has been turned off.
CABIN CRG TEMP HI (Combi)	N/A	Consequences: NONE The temperature in the upper deck cargo area exceeds 104ºF/140ºC. This alert is only displayed after the aircraft has been in flight for more than 30 minutes.

CABIN CRG TEMP LO (Combi)	N/A	Consequences: NONE The temperature in the upper deck cargo area exceeds 34ºF/1ºC. This alert is only displayed after the aircraft has been in flight for more than 30 minutes.
CABIN DOOR__ (AFT L, AFT R, FWD L, FWD R, MID L, MID R)	MAINT SW	Consequences: NONE The respective main cabin passenger door is not closed and armed.
CABIN INFLO LO	N/A	Consequences: MONITOR CABIN ALTITUDE Cabin altitude is climbing, outflow valve is closed and one or more packs are commanded ON. If AIR SYSTEM SELECT switch is in AUTO, the AVNCS FAN switch will revert to OVRD and remain in override until aircraft is on the ground.
CABIN PRES RELIEF	MAINT	Consequences: MAINTAIN DP<9.1 PSI USE MANUAL SYSTEM ONLY IF REQD Cabin differential pressure has exceeded 8.76 psi and pressure relief valve(s) is open.
CABIN RATE	N/A	Consequences: NONE The cabin rate of climb or descent exceed limits (approximately 1500-fpm climb or 750-fpm descent).

CAC AIR FLO OFF	MAINT	Consequences: POSSIBLE AVIONIC FAILURE ON GND All CAC fans are inoperative.
CAC DOOR	MAINT	Consequences: NONE The center accessory compartment external access door is not closed and latched.
CAC MANF DECAY CK	N/A	Consequences: NONE A manifold failure condition has been detected in the CAC and a decay check is being performed to isolate the affected air system. This alert will be displayed for the duration of the check.
CARGO FIRE AGT LO	MAINT	Consequences: NONE The pressure in one or more of the cargo fire agent bottles is low
CARGO FLOW AFT OFF	SW	Consequences: NONE The CARGO FIRE AFT FLOW switch has been manually selected OFF.
CARGO FLO FWD OFF	SW	Consequences: NONE The CARGO FIRE FWD FLOW switch has been manually selected OFF.
CAWS FAULT	MAINT	Consequences: NONE Some functions of the central aural warning system may be inoperative.

CG DISAG	SW	Consequences: NONE There is a disagreement between the aircraft center of gravity (CG) displayed on the system display and the CG entered in the flight management system. Confirm fuel load and enter data.
COLD FUEL RECIRC	N/A	Consequences: NONE The fuel system controller is automatically circulating fuel in tanks 1 and 3 or the tail tank to increase the fuel temperature. If the fuel temperature continues to drop to within 3ºC of the freeze point, the “FUEL TEMP LO” alert will be displayed.
COMBI EXH FAIL (Combi)	MAINT	Consequences: NONE The combi exhaust system has failed, or the automatic system test did not execute.
COMBI EXH FAULT (Combi)	MAINT	Consequences: NONE A non-critical component of the combi exhaust system has failed.
CPC FAULT	MAINT	Consequences: NONE One of the two cabin pressure controllers is inoperative.
CREW REST OPEN (Optional)	SW MAINT	Consequences: NONE The expandable crew rest module is not properly stowed and latched. This alert is not displayed when the aircraft is above 17,750 feet.
CRG DOOR TST FAIL	MAINT	Consequences: NONE The cargo door test has failed.

CRG DR__DISAG (FWD, AFT, CTR, UPR)	MAINT	Consequences: NONE A disagree condition exists between systems A and B of the respective cargo door warning system.
CRG FIRE TST FAIL	MAINT	Consequences: NONE The cargo fire test has failed.
CRG FLO AFT DISAG	MAINT	Consequences: NONE The aft compartment ventilation flow is in disagreement with the commanded position of the switch on the cargo fire panel.
CRG FLO FWD DISAG	MAINT	Consequences: NONE The forward compartment ventilation flow is in disagreement with the commanded position of the switch on the cargo fire panel.
CRG TEMP CTL OFF	SW	Consequences: NONE One or more of the CARGO TEMPERATURE control selectors are set in the OFF position. I the cargo temperature control was turned off in response to a “SEL__ TEMP OFF” alert, one attempt may be made to restore the system after the cargo temperature returns to normal.
DC TIE__OFF (1,3)	NO T/O SW	Consequences: NONE The respective DC TIE relay has been manually selected OFF by the flight crew or automatically opened by the ELECTRICAL system due to a fault.

DEU OP DISAG	NO T/O	Consequences: NONE The option codes which determine the DEU configuration are different between operative DEUs.
DEU__OP DISAG (1, 2, AUX)	NO T/O	Consequences: NONE The option code in the respective DEU, which determines the DEU configuration, is different from the other two DEUs.
DEU P/N DISAG	NO T/O	Consequences: NONE The P/Ns which determine the DEU configuration are different between operative DEUs.
DEU__P/N DISAG (1, 2, AUX)	NO T/O	Consequences: NONE The P/N in the respective DEU, which determines the DEU configuration, is different from the other two DEUs.
DFAU FAULT	MAINT	Consequences: NONE Some or all DFDR parameters are not being recorded.
DFDR OFF	MINT N/A	Consequences: NONE The flight data recorder is not operating. On the ground, the DFDR requires engines operating and parking brakes released to operate.
DISARM SPOILERS	SW	Consequences: NONE Auto spoilers are inoperative.

DISCH CARGO AGENT	MAINT	Consequences: NONE Approximately 90 minutes have elapsed since the first CRG FIRE AGENT was discharged. The flashing CRG FIRE AGENT DISCH switch should be pushed. If “CRG FIRE LWR__” alert was not displayed, discharging the extinguishing agent may cause the “CRG FIRE LWR__” alert to display for a few seconds.
DOOR OPEN	N/A	Consequences: NONE One or more aircraft cabin doors are not closed and armed, or one or more cargo or external access doors are not closed and latched.
ECON OFF	SW	Consequences: NONE The air conditioning ECON switch has been selected OFF. The packs command maximum available flow and the cabin recirculation fans will not operate.
ELEC SYS MANUAL	SW	Consequences: NONE The ELECTRICAL system is in manual mode.
ELEV FEEL MANUAL	SW	Consequences: NONE The ELEV FEEL (elevator load feel) selector is out of the AUTO position.
EMER LT BAT__LO (1, 2, 3, 4, 5, 6)	NO T/O (Passenger & Combi) MAINT (Freighter)	Consequences: NONE This alert is displayed during the emergency lights test when the emergency lights battery voltage is low. Takeoff is permitted per MEL.

EMER LTS DISARM	SW	Consequences: NONE The EMER LT switch is not in the ARM position. This alert is displayed if the switch is in the OFF or ON position.
EMER PWR ON	NO T/O SW	Consequences: NONE The emergency electrical power has been automatically or manually selected ON.
EMER PWR SW OFF	SW	Consequences: NONE The EMER PWR selector has been selected OFF.
EMER PWR TST FAIL	NO T/O	Consequences: NONE The emergency electrical power preflight test has failed. (Aircraft battery must be sufficiently charged for a successful test.)
ENG__A-ICE DISAG (1, 2, 3)	MAINT	Consequences: MAY HAVE TO DEPART ICING AREA The affected engine cowl anti-ice valve is in disagreement with the commanded position
ENG 2 A-ICE DUCT (Effective for aircraft fuselage 574 and previous, burst anti-ice duct detection not installed)	MAINT	Consequences: NONE This alert indicates a leak in the number 2 engine anti-ice duct. A secondary shroud allows continued use of ice protection.

ENG 2 A-ICE OFF (Effective for aircraft 575 and subs, burst anti-ice duct detection installed)	NO T/O	Consequences: DEPART ICING AREA ENGINE 2 A-ICE DUCT HAS FAILED A leak in the engine 2 anti-ice duct was detected and the engine anti-ice valve automatically closed and latched. If ENG 2 ANTI-ICE switch is selected OFF, “ICE DETECTED” alert (option) will be displayed until clear of icing.
ENG DUCT TST FAIL (Effective for aircraft fuselage 575 and subs, burst anti-ice duct detection installed)	NO T/O	Consequences: NONE The engine 2 anti-ice duct test has failed.
ENG__FADEC ALTN (1, 2, 3)	sw	Consequences: NONE The respective ENG FADEC MODE switch is in the ALTN position, or the throttle has been pushed through the overboost bar. The FADEC is operating in a degraded mode and care should be taken to avoid exceeding thrust limits. If reset is desired, refer to Abnormal Alert procedure (Level 2) SELECT FADEC ALTN.
ENG__FADEC MAINT (1, 2, 3)	NO T/O	Consequences: NONE The FADEC has detected an engine fault or combination of faults that could affect engine operation.

ENG FIRE AGENT LO	NO T/O	Consequences: NONE One or more of the engine fire extinguisher containers has low pressure. Observing the overhead panel AGT LOW lights will indicate the affected container.
ENG__FSO CLOSED (1, 3)	NO T/O	Consequences: NONE The respective engine fire fuel shutoff valve is closed (fuel off) with the engine fire handle in the NORM (up) position.
ENG__FSO NOT CLSD (1, 3)	NO T/O	Consequences: NONE The respective engine fire fuel shutoff valve is not closed with the engine fire handle in the FUEL & HYD OFF (down) position.
ENG__FUEL FILTER (1, 2, 3)	NO T/O	Consequences: NONE the respective fuel filter is clogged and engine fuel may be bypassing the filter. If this alert condition occurs when aircraft is in flight, monitor engine operation.
ENGINE IGN MANUAL	MAINT	Consequences: USE MANUAL IGNITION PROCEDURES Automatic control of the engine ignition system is inoperative. Manual operation of ignition is required.
ENG IGN NOT ARMED	NO T/O SW	Consequences: NONE SELECT IGNITION AS REQUIRED The automatic ignition is not armed. IGN A or B has been deselected due to power interruption or deselected by the crew. Select IGN A or B as required.

ENG__NAC TEMP HI (1, 2, 3) (Optional)	MAINT	Consequences: NONE The respective engine nacelle temperature is significantly higher than that of the other two engines.
ENG__OIL BYPASS (1, 2, 3)(Optional) (DEU 908 and subs) (PW)	NO T/O	Consequences: NONE The primary engine oil filter is clogged. Oil is being routed through the secondary bypass filter.
ENG__SUCT FEED (1, 3)	NO T/O	Consequences: NONE The respective engine is on suction feed only. This alert will only appear with the FSC in AUTO, when all boost pumps and crossfeeds for the engine are off. Monitor engine operation.
ENG__VIB HI (1, 2, 3)(Optional) (DEU 908 and subs) (PW)	MAINT	Consequences: NONE An engine surge has been detected. This alert will only appear during flight.
ENGINE__VIB HI (1, 2, 3) (Optional)	MAINT	Consequences: NONE Engine vibration exceeds 4.0 units. Other engine parameters should be monitored, but no action is required if other engine parameters are normal.

EPGS FAULT	MAINT	Consequences: NONE A fault exists in the smoke switch circuit, an APU generator failure exists, or a generator (engine or APU) auto reset has been used.
FADEC__B/U PWR (1, 2, 3) (Optional)	NO T/O	Consequences: NONE The respective FADEC is operating on backup aircraft power. In flight, engine operation is unaffected.
FADEC GND PWR ON	SW	Consequences: NONE One or more of the FADEC GND PWR switches on the maintenance panel are on. The switches should be selected OFF prior to engine start.
FD G/A ONLY	N/A	Consequences: NONE The go-around mode of the autopilot is not available.
FIRE DET__FAIL (1, 2, 3)	NO T/O	Consequences: NONE Both loops of the respective engine fire detector system failed. Fire detection is inoperative.
FIRE DET APU FAIL	MAINT	Consequences: NONE Both loops of the APU fire detector system have failed. Fire detection is inoperative.
FIRE DET APU FAULT (DEU 909 and subs)	MAINT	Consequences: NONE One of the two fire detector loops on the respective engine is inoperative. Fire detection capability is not affected.

FIRE DET__FAULT (1, 2, 3) (DEU 909 and subs)	MAINT	Consequences: NONE One of the two fire detector loops on the respective engine is inoperative. Fire detection capability is not affected.
FIRE DET FAULT (DEU 908 and previous)	MAINT	Consequences: NONE One of the two fire detector loops on either an engine or the APU is inoperative. Fire detection capability is not affected.
FLAP LIMIT DISAG	MAINT	Consequences: FLAP EXTENSION MAY BE LIMITED With the FLAP LIM selector in either override position, the flap limit actuator did not attain the override position within 20 seconds. The other flap limit override position should be selected.
FLAP LIMIT OVRD	SW	Consequences: NONE The FLAP LIMIT selector is out of the AUTO position.
FMS DUMP DISABLED	N/A	Consequences: DUMPING TO LOW LEVEL SHUTOFF Fuel dump termination at the FMS dump to gross weight value is disabled.
FSC CONFIG (DEU 908 and subs)	NO T/O	Consequences: NONE The FSC and DEU are not in agreement on the aircraft fuel system configuration.
FSC FAULT	MAINT	Consequences: NONE The FSC has detected an internal fault. The FUEL system will continue to operate in the auto mode.

FSC MODE FAULT	NO T/O	Consequences: NONE The FSC has detected an operating mode or mode selection (AUTO/ MANUAL) disagreement between processors.
FUEL CONTAMINAT ED	NO T/O	Consequences: LAND AT NEAREST SUITABLE AIRPORT Two or more fuel filters are clogged, fuel may be contaminated.
FUEL DUMP ON	SW	Consequences: NONE The fuel DUMP switch is in the ON position.
FUEL LRU INOP	N/A	Consequences: NONE Maintenance has taken action to declare a fuel system component inoperative. The auto controller will reconfigure around the inoperative component in auto mode.
FUEL MANF DRAIN	NO T/O SW	Consequences: DO NOT USE FUEL XFEED MANIFOLD Fuel manifold drain has been commanded, either automatically by FSC, or manually by the crew pushing the MANF DRAIN switch.
FUEL QTY 2 DISAG	MAINT	Consequences: NONE There is a discrepancy in the tank 2 fuel quantity indication. This alert comes on if the fuel quantity measurement disagrees with the position of the 10,000-pound float in tank.

FUEL QTY TST FAIL	MAINT	Consequences: NONE The fuel quantity system test has failed.
FUEL SYS MANUAL	SW	Consequences: NONE The fuel system is manual mode.
FUEL SYS TST FAIL	NO T/O	Consequences: NONE The automatic fuel system preflight test has failed.
FUEL TEMP FAIL	MAINT	Consequences: NONE The wing or tail fuel tank temperature sensor is inoperative.
FUEL TEMP LO	NO T/O	Consequences: DESCEND TO WARMER ALTITUDE The fuel temperature in tank 1, 3 or the tail is within 3ºC of the fuel freeze temperature.
FUEL VALVE FAULT	MAINT	Consequences: NONE Either the tail fill isolation valve, the aux fill isolation valve, or the left or right outboard fill/manifold drain valve is inoperative. The FSC may be operated in auto mode; however, tail fuel management may be affected.
FUEL XFEED__DISAG (1, 2, 3)	MAINT	Consequences: NONE The respective fuel crossfeed valve has failed open or closed.
FWD AUX XFER REQD (Optional) DEU 909 and subs)	SW	Consequences: NONE Reminds crew to start transferring fuel from the fwd aux tank(s) to the upper aux tank. Alert is inhibited below 17,750 ft baro altitude.

FWD AUX__PMP LO (1L, 1R, 2L, 2R) (Optional)	MAINT	Consequences: NONE The respective fuel pump outlet pressure is low and the pump should be considered inoperative. The rate of fuel transfer from the forward auxiliary fuel tank will be slower.
FWD AUX__PUMP LO (L, R) (Optional) (DEU 908 and previous)	MAINT	Consequences: NONE The respective fuel pump outlet pressure is low and the pump should be considered inoperative. The rate of fuel transfer from the forward auxiliary fuel tank will be slower.
GALLEY BUS OFF (Passenger, Combi)	MAINT SW	Consequences: NONE One or more galley buses are not powered. To select galley bus power, ELECTRICAL system must be in manual mode.
GEN APU OFF	MAINT	Consequences: NONE The APU generator has been automatically turned OFF by the ELECTRICAL system due to a fault, or the APU FIRE handle has been pulled.
GEN DRIVE DISC	MAINT SW	Consequences: NONE One or more of the electrical generators have been disconnected.

GEN__OFF (1, 2, 3)	MAINT SW	Consequences: NONE The respective generator is OFF. In auto mode, a protective trip and one auto reset attempt has occurred, or the generator has been commanded on but the generator relay has not closed or the generator is failed. In manual mode, the respective generator has been turned OFF by the flight crew.
GPWS FAIL (Without terrain awareness functions installed)	MAINT	Consequences: NONE The ground proximity warning system has failed. This alert normally appears during GPWS test or if the DITCHING switch is selected ON.
GPWS FAIL (DEU 911 and subs with terrain awareness functions installed but PWS not installed)	MAINT	Consequences: NONE The ground proximity and terrain awareness functions have failed.
GPWS FAIL (DEU 911 and subs with terrain awareness functions and PWS installed)	MAINT	Consequences: SELECT ANY ND TO WXR The ground proximity and terrain awareness functions have failed. Select WXR on either ND.
GPWS FAULT (DEU 911 and subs) (Optional)	MAINT	Consequences: NONE One or more of the GPWS modes (except terrain) is inoperative.

HYD 3 ELEV OFF	NO T/O	Consequences: 3-2 NRMP INOPERATIVE The elevator shutoff valve in hydraulic system 3 is closed. Hydraulic system 3 pressure is not powering the elevators.
HYD LRU INOP	N/A	Consequences: NONE Maintenance has been taken action to declare a hydraulic system component inoperative. The auto controller will reconfigure around the inoperative component in the auto mode.
HYD__OFF (1, 2, 3)	NO T/O	Consequences: HYD SYS MAY BE USED FOR APPR & LDG AP1 TRIM INOP, USE AP2 (sys 3 only) the respective hydraulic system has been turned off. In auto, the HSC will attempt to restore the system when the flaps, slats or gear are extended. If system does not repressurize for approach and landing, refer to Abnormal Alert procedure HYD__FAIL.
HYD__PRES LO (1, 2, 3)	NO T/O	Consequences: NONE The pressure in the respective hydraulic system is less than 2,400 psi with the hydraulic system controller in auto mode. The HSC will turn off the affected system when the aircraft is in clean configuration or above 17,750 ft. If system does not repressurize for approach and landing, refer to Abnormal Alert procedure HYD__FAIL.

HYD PRES TST FAIL	NO T/O	Consequences: NONE The flight crew initiated hydraulic pressure test has failed. A second test may be performed. If alert is displayed again, call maintenance.
HYD PUMP__<2800 (1L, 1R, 2L, 2R, 3L, 3R)	MAINT	Consequences: NONE The respective hydraulic pump pressure is less than 2800 psi during the engine-driven pump preflight test. The test is accomplished by the HSC during each engine start. This alert will be displayed in conjunction with a “HYD PUMP TST FAIL” alert.
HYD PUMP__ FAULT (1L, 1R, 2L, 2R, 3L, 3R)	MAINT SW	Consequences: NONE The respective engine-driven hydraulic pump pressure or temperature is out of limits. The HSC will turn off the affected pump when the aircraft is in cruise.
HYD PUMP__OFF (1L, 1R, 2L, 2R, 3L, 3R)	MAINT SW	Consequences: NONE the respective engine-driven hydraulic pump is OFF.
HYD PUMP TST FAIL	NO T/O	Consequences: NONE The engine-driven hydraulic pump pressure test during engine start has failed. A manual pump test is required for takeoff. Operate the hydraulic system in AUTO if the manual pump test passes.

HYD__QTY LO (1, 2, 3)	NO T/O	Consequences: NONE the respective hydraulic system fluid quantity is low. This alert is displayed if there is less than 4.75 gallons (systems 1 and 2) or 6.0 (system 3) on the ground prior to engine start, or less than 2.5 gallons after engine start.
HYS__RMP DISAG (1, 2, 3)	NO T/O	Consequences: NONE The respective hydraulic reversible motor pump valve is not in the commanded position.
HYD SYS MANUAL	SW	Consequences: NONE The hydraulic system controller is in manual mode.
HYD SYS 3 ISOL	NO T/O	Consequences: NONE The flight control bypass valve is closed. Hydraulic system 3 pressure is not available to the flight controls.
HYD__TEMP HI (1, 2, 3)	NO T/O	Consequences: NONE The temperature in the respective hydraulic system reservoir has exceeded normal limits.
ICE DETECTED (Optional)	SW	Consequences: NONE This alert is displayed only for aircraft equipped with ice detectors or with automatic anti-icing system if the system is operating in manual. The ice detector system has detected ice formation. Engine and airfoil anti-ice should be turned ON.

ICE DETECTED (Optional)	MAINT	Consequences: A-ICE SYSTEM INOPERATIVE DEPART ICING AREA. This alert is displayed only for aircraft equipped with automatic anti-icing system if the system is operating in the automatic mode. The alert indicates ice has been detected but the anti-ice is not on. The anti-ice system should be considered inoperative.
ICE DETECTOR FAIL (Optional)	MAINT	Consequences: USE VISUAL CUES FOR ICE CONDITIONS Both channels of the dual ice detection system are inoperative. Automatic anti-ice (if installed) is inoperative. The crew is required to use visual means of detecting ice.
ICE DET SIGNLE (Optional)	MAINT	Consequences: USE VISUAL CUES FOR ICE CONDITIONS One channel of the dual ice detection system is inoperative. The ice detection system is no longer the primary means of ice detection, and the flight crew is responsible for determining icing conditions.
IRU BAT LO	MAINT	Consequences: NONE One or more of the inertial reference unit backup batteries is not fully charged.

IRU__NAV FAIL (1, 2, AUX)	MAINT	Consequences: ATTITUDE DATA REMIANS USABLE. The navigation function of the respective inertial reference unit has failed.
IRU__NO ALIGN (1, 2, AUX)	MAINT SW	Consequences: NONE The respective inertial reference unit did not align. The crew should confirm present position coordinates are entered.
IRU OFF	SW	Consequences: NONE One or more of the inertial reference unit mode selector are OFF in flight.
IRU__ON BAT (1, 2, AUX)	MAINT N/A	Consequences: NONE The respective inertial reference unit is operating on backup battery power. The battery will provide approximately 15 minutes of power.
LAVATORY SMOKE (Optional)	MAINT	Consequences: COORDINATE WITH CABIN CREW A smoke detector is activated in one or more lavatories. Refer to Abnormal Non-Alert procedure-SMOKE REPORTED BY CABIN CREW.
LDG ALTITUDE	SW	Consequences: NONE The landing field elevation may be set by turning the MANUAL LDG ALT knob on the cabin pressure control panel. Automatic operation may be restored by selecting the cabin pressure controller to MANUAL and back to AUTO.

LSAS ALL OFF	SW	Consequences: AUTOPILOT NOT AVAILABLE All four LSAS switches are OFF.
LSAS__OFF (L INBD, L OUTBD, R INBD, R OUTBD)	SW	Consequences: NONE The respective LSAS switch is OFF.
LWR CARGO TEMP LO	N/A	Consequences: NONE The lower cargo compartment temperature is low. This alert is inhibited until 30 minutes after takeoff.
MANUAL G/A ONLY	MAINT	Consequences: NONE Autopilot and flight director go-around modes are not available.
NO AUTOLAND	MAINT	Consequences: NONE The autoland mode is not available.
NO ICE DETECT (Optional)	SW	Consequences: NONE The ice detection system indicates icing conditions do not exist. Anti-ice systems may be turned off.
OPEN OUTFLO VALVE	MAINT	Consequences: CABIN PRESSURIZED CABIN DOORS MAY NOT OPEN Cabin pressure exceed allowable limits to open doors while aircraft is on ground.

PACK__FLO DISAG (1, 2, 3)	MAINT	Consequences: NONE The respective air conditioning pack flow is in disagreement with the commanded position.
PACKS NOT OFF	SW	Consequences: NONE During a packs off (bleeds on) takeoff, one or more packs are not off. The crew should select all packs off.
PACK__OFF (1, 2, 3)	MAINT SW	Consequences: NONE The respective air conditioning pack is OFF, either selected manually by the crew, or automatically by the ESC due to a fault or configuration requirement.
PARTITION DR OPEN (Combi)	SW	Consequences: NONE The door that provides access to the upper deck cargo area is not closed.
PAX AIR FLO LO (Passenger & Combi)	N/A	Consequences: NONE The cabin air inflow from the air conditioning packs is below desired limit based on the number of passengers. This alert is only displayed in flight and only if all packs are operating.
PITOT HEAT AUX	NO T/O	Consequences: STBY AIRSPEED MAY BE UNRELIABLE The aux pitot tube heater is inoperative.
PITOT HEAT__ (CAPT, FO)	NO T/O	Consequences: SELECT ALTERNATE CADC Captain's or first officer's pitot tube heater is inoperative.

PITOT HEAT OFF	MAINT	Consequences: NONE The PITOT HEAT switch on the upper maintenance panel is in the OVRD OFF position.
PRED WSHEAR FAIL (DEU 909 and subs) (Optional)	MAINT	Consequences: NONE The weather radar predictive windshear function has failed, or data from the weather radar is not valid.
PRED WSHEAR FAULT (DEU 911 and subs) (Optional)	MAINT	Consequences: SELECT ANY ND TO WXR The predictive windshear system may not be fully operative. Select WXR on either ND.
RETRACT SPD BRK	SW	Consequences: NONE Speedbrakes and flaps extended in flight.
REV__FAULT (1,2, 3)	MAINT	Consequences: NONE The respective thrust reverser pressure indication system has failed.
REV__PRESS FAULT (1, 2, 3)	NO T/O	Consequences: NONE Either the thrust reverser system is pressurized or the pressure switch has failed to the closed position. One additional associated reverser system failure could cause an uncommanded reverser deployment.
ROLL CWS FAIL (Optional)	MAINT	Consequences: NONE Roll control wheel steering is inoperative.

RUDDER BOTH INOP	NO T/O	Consequences: AILERON/THRUST FOR YAW CONTROL NO GO-AROUND WITH WING ENG INOP there is no hydraulic power available to the rudders.
RUDDER LWR INOP	NO T/O	Consequences: VMCA 180 KIAS CROSSWIND LIMIT REDUCED There is no hydraulic power available to the lower rudder. Recommended maximum crosswind component is 12 knots.
RUDDER UPR INOP	NO T/O	Consequences: Vmca 160 kIAS CROSSWIND LIMIT REDUCED There is no hydraulic power available to the upper rudder. Recommended maximum crosswind component is 12 knots.
RUD STBY LWR OFF	NO T/O	Consequences: NONE The 3-2 non-reversible motor pump is inoperative. Standby hydraulic power to the lower rudder is not available.
RUD STBY UPR OFF	NO T/O	Consequences: NONE The 2-1 non-reversible motor pump is inoperative. Standby hydraulic power to the upper rudder and stabilizer trim motor is not available.

SEL AIR SYS MAN	MAINT	Consequences: USE MANUAL SYSTEM PROCEDURES The AIR system has reverted to manual mode. the SELECT/MANUAL switch should be pushed to lock the AIR system in the manual mode. This alert will then be replaced by “AIR SYS MANUAL” alert.
SEL APU AIR OFF	SW	Consequences: USE ENGINE AIR APU air switch is ON and cabin is pressurized.
SEL CAB PRES MAN	MAINT	USE MANUAL SYSTEM PROCEDURES The cabin pressure system has reverted to manual mode. The SELECT/MANUAL switch should be pushed to lock the cabin pressure control system in manual mode/ This alert will then be replaced by “CAB PRES SYS” alert.
SEL ELEC SYS MAN	MAINT	Consequences: NONE The ELECTRICAL system has reverted to manual mode. The SELECT/ MANUAL switch should be pushed to lock the ELECTRICAL system in manual mode. This alert will then be replaced by “ELEC SYS MAN” alert.
SEL ELEV FEEL LO	SW	Consequences: NONE IAS is less than 200 knots and ELF speed indicator is more than 200 knots with ELF selector in MANUAL position.

SEL FUEL SYS MAN	MAINT	Consequences: USE MANUAL SYSTEM PROCEDURES The FUEL system has reverted to manual mode. The SELECT/MANUAL switch should be pushed to lock the FUEL system in manual mode. This alert will then be replaced by “FUEL SYS MAN” alert.
SEL FWD AUX OFF (Optional) (DEU 909 and subs)	SW	Consequences: NONE Both the left and right forward aux pumps are commanded on and low pressure is sensed in both pumps with no fuel remaining in tank(s).
SEL HYD PMP__OFF (1L, 1R, 2L, 2R, 3L, 3R)	NO T/O	Consequences: HYD PUMP FAULT The respective pump pressure is low or the temperature is high.
SEL HYD SYSMAN	MAINT	Consequences: USE MANUAL SYSTEMS PROCEDURES The HYDRAULIC system has reverted to manual mode. The SELECT/MANUAL switch should be pushed to lock the HYDRAULIC system in manual mode. This alert will then be replaced by “HYD SYS MAN” alert.
SEL LSAS__OFF (LOB, ROB, LIB, RIB)	MAINT	Consequences: LSAS CHAN FAILED The respective LSAS channel has failed.

SEL PACK__OFF (1, 2, 3)	MAINT	Consequences: PACK OVERHEATING The respective pack discharge temperature has exceeded its limits.
SEL__TEMP OFF (AFT, FWD)	MAINT	Consequences: LOWER CARGO TEMP HI Temperature in the respective lower cargo compartment exceeds limits. When the associated cargo temperature returns to normal, one attempt may be made to restore the system.
SEL YAW__OFF (UPR A, UPR B, LWR A, LWR B)	MAINT	Consequences: YAW DAMP CHAN FAIL The respective yaw damp channel has failed.
SET LDG ALTITUDE	MAINT	Consequences: NONE The cabin pressure controller is not receiving landing field elevation data from the FMS. The landing field elevation should be set manually. Automatic operation may be restored by selecting the cabin pressure controller to MANUAL and back to AUTO.
SINGLE LAND	MAINT	Consequences: NONE The autoland availability is reduced from DUAL LAND to SINGLE LAND.
SLATS INHIBITED (DEU 908 and subs)	NO T/O	Consequences: NONE The SLAT MACH INHIBIT relay is preventing slats from extending (electrically controlled slats).

SLAT STOW (DEU 908 and subs)	NO T/O SW	Consequences: NONE The SLAT STOW switch is activated (electrically controlled slats).
SMOKE SW IN USES	SW	Consequences: NONE The SMOKE switch on the electrical panel is out of the NORM position.
STALL WARN FAIL	NO T/O	Consequences: NONE The stall warning function is inoperative.
START AIR PRES LO	N/A	Consequences: NONE Air pressure is low and may cause an abnormal engine start.
TAIL ALT PUMP LO	MAINT	Consequences: NONE The tail tank ALT PUMP pressure is low. Additional pumps should be turned on to prevent a possible engine 2 flameout.
TAIL ALT PUMP OFF	MAINT	Consequences: NONE With the FUEL system in auto mode, the fuel system controller has detected low pressure from the tail ALT PUMP and turned the pump off. If there is fuel in the tail tank, it may be trapped.
TAIL FUEL FWD (DEU 908 and subs)	MAINT	Consequences: CRUISE PREFORMANCE MAY BE AFFECTED Control of aircraft CG by tail fuel management has been terminated. The FSC will transfer all fuel out of the tail tank. If required, refer to Supplemental procedure- TAIL FUEL FWD.

TAIL__PUMP LO (L, R)	MAINT	Consequences: NONE The respective tail tank fuel transfer pump pressure is low. The rate of fuel transfer from the tail tank will be slower.
TAIL__PUMP OFF (L, R)	MAINT	Consequences: NONE With the FUEL system in auto mode, the fuel system controller has detected a fault in the respective tail tank transfer pump and turned the pump off.
TANK__PUMP S LO (1, 2, 3)	NO T/O	Consequences: NONE All the boost pumps in the respective main fuel tank have low pressure.
TANK__ PUMPS OFF (1, 2, 3)	NO T/O SW	Consequences: NONE All the boost pumps in the respective main fuel tank have been selected OFF.
TAT PROBE HEAT	MAINT	Consequences: NONE The total air temperature probe heater is inoperative.
TERRIAN FAIL (DEU 911 and subs) (Optional)	MAINT	Consequences: NONE The terrain awareness functions of the GPWS have failed.
TERRAIN NOT AVAIL (DEU 911 and subs) (Optional)	N/A	Consequences: NONE The terrain awareness functions are disabled automatically due to an inadequate navigation sensor position.
TIRE DIFF PRESS	NO T/O	Consequences: NONE The tires on one axle have significantly different tire pressure.

TIRE PRS LO	NO T/O	Consequences: NONE One or more tire pressures are below normal.
TNK__AFT PMP LO (1, 2L, 2R, 3)	MAINT	Consequences: NONE The respective fuel pump pressure is low.
TNK__AFT PMP OFF (1, 2L, 2R, 3)	MAINT	Consequences: NONE With the FUEL system in auto mode, the FSC has detected a fault in the respective fuel tank pump and has turned the pump off.
TNK__FUEL QTY LO (1, 2, 3)	NO T/O	Consequences: NONE The fuel quantity in tank 1 or 3 inboard compartment, or tank 2, is less than approximately 3,500 pounds.
TNK__FWD PMP LO (1, 2, 3)	MAINT	Consequences: NONE The respective fuel pump pressure is low.
TNK__FWD PMP OFF (1, 2, 3)	MAINT	Consequences: NONE With the FUEL system in auto mode, the FSC has detected a fault in the respective fuel tank pump and has turned the pump off.
TNK__TIP FUEL LO (1, 3)	MAINT	Consequences: NONE tank 1 or 3 tip compartment is not full when there is more than 6,000 pounds of fuel in the inboard compartment. This alert (level 1) appears in the auto mode only and the FSC will take corrective action once the engines are started.

TNK__TIP TRAPPED (1, 3)	MAINT N/A	Consequences: FUEL IN TIP TANK IS UNUSABLE Fuel in the tip tank is not transferring to the inboard compartment.
TNK__XFER PMP LO (1, 2, 3)	MAINT	Consequences: NONE The respective tank transfer pump pressure is low.
TNK__XFER PMP OFF (1, 2, 3)	MAINT	Consequences: NONE With the FUEL system in auto mode, the FSC has detected a fault in the respective transfer pump and turned the pump off.
TR__FAIL (1, 2A, 2B, 3)	MAINT	Consequences: NONE The respective transformer/rectifier has failed. A nuisance “TR__FAIL” alert may be displayed during engine start or shutdown when the generator buses are powered from different unparalleled sources such as external power and engine driven generator(s) or APU generator and engine driven generator(s). The alert should be considered valid when all generator buses are paralleled or when only the APU generator or external power is powering the generator buses.
UNABLE RNP (FMS-911 and subs and DEU-909 and subs)	MAINT SW	Consequences: NONE The required navigation performance (RNP) cannot presently be met. ATC may need to be informed.
WBS FAULT (Optional)	MAINT	Consequences: NONE The weight and balance computer is not receiving valid gross weight or CG.

WSHEAR DET FAIL	MAINT	Consequences: NONE The windshear detection system is inoperative.
WSHLD DEFOG OFF	SW	Consequences: NONE The WINDSHIELD DEFOG switch is OFF.
WSHLD HEAT__FAIL (L, R)	MAINT	Consequences: NONE The respective windshield heater is inoperative.
YAW DAMP ALL OFF	SW	Consequences: AUTOPILOT AVAILABLE ONLY IN CRUISE All four YAW DAMP switches are OFF.
YAW DMP__OFF (LWR A, LWR B, UPR A, UPR B)	SW	Consequences: NONE The respective YAW DAMP switch is OFF.
ZONE TEMP SEL MAN	SW	Consequences: NONE One or more of the zone temperature control selectors have been selected to OFF.

Level 0 Alerts

ALERT	CONSEQUENCE(S)/DESCRIPTION
ACARS MESSAGE (Optional)	The ACARS system has received a message.
ACARS NO COM (Optional)	The ACARS system has no available communications link.
A-ICE ALL ON	The engine and airfoil anti-ice switches are ON.
A-ICE SYS TEST (Optional)	This alert is displayed on the ground when the flight crew selects airfoil anti-ice ON. This initiates an automatic test, which will last for 15 seconds.
AIRFOIL A-ICE ON	The WING and/or TQAIL ANTI-ICE has been commanded ON.
AIR ISOL_ON (1-2, 1-3)	The respective pneumatic system isolation valve has been commanded ON (valve open).
APU SYS TEST	The automatic air system preflight test is in progress.
APU AIR/ELEC ON	The APU is providing air and electrical power.
APU ON	The APU is running.
APU POWER AVAIL	APU electrical power is available, but not powering any buses.
APU POWER ON	APU electrical power is connected to at least one of the three buses.
AUTO BRAKE_ (MAX, MED, MIN, T.O.)	The AUTO BRAKE selector is in the indicated position.
BLEEDS ALL OFF	All three bleeds have been turned OFF for a bleeds off takeoff.
CABIN DOORS OPEN	All of the cabin doors are disarmed.
CARGO DOOR TEST	The cargo door test is in progress.

ALERT	CONSEQUENCE(S)/DESCRIPTION
CARGO FIRE TEST (DEU 908 and subs)	The cargo fire test is in progress.
CDU_MENU REQUEST (1,2)	A message is displayed on the MENU page of the MCDU.
COMBI EXH TEST (Combi)	The automatic combi exhaust control system preflight test is in progress.
EMER LTS TST PASS	The cockpit and cabin emergency lights test is successful.
ENG_A-ICE ON (1,2,3)	The respective engine anti-ice switch is ON.
ENGINE A-ICE ON	All three engine anti-ice switches are ON.
ENGINE COOL (Optional)	This alert indicates the engines have adequately cooled for shutdown after landing. The alert is displayed 90 seconds after the reversers are stowed, and removed when the first engine is shut down.
ENGINE IGN ON	Automatic control of the engine ignition system is inoperative and ignition is ON.
ENG IGN OVRD ON	The engine ignition override function has been selected ON.
EXT POWER AVAIL	External power is connected and available for use.
EXT POWER ON	External electrical power is powering the AC TIE bus.
FUEL SYS TEST	The automatic preflight fuel system test is in progress. The FUEL system should not be selected to MANUAL, or engines started during the test.
FUEL XFEED_ON (1,2,3)	The respective fuel crossfeed switch is ON.
GLY EXT POWER ON (Passenger & Combi)	External power is connected to the galley buses.

ALERT	CONSEQUENCE(S)/DESCRIPTION
GLY EXT PWR AVAIL (Passenger & Combi)	Galley external electrical power is connected and available for use.
GPWS FLAP OVRD	The ground proximity warning system (GPWS) switch is in the FLAP OVRD position. This will prevent ground proximity warnings when flaps are less than landing flap on approach.
HYD AUX PUMP ON	One or both of the hydraulic system aux pumps are ON.
HYD PRESS TEST	The automatic preflight hydraulic pressure test is in progress.
HYD_RMP ON (1-2, 2-3)	The respective hydraulic system reversible motor pump is ON.
IRU IN ALIGN	One or more of the inertial reference units are in alignment mode. The aircraft should not be moved during alignment.
NO SMOKING	The NO SMOKING signs in the cabin are ON.
PACKS ALL OFF	All three air conditioning packs are OFF for a packs off takeoff.
PARK BRAKE ON	The parking brake lever is set and the parking brake engaged.
PRED WSHEAR OFF (DEU 909 and subs) (Optional)	The weather radar is OFF when it should be ON. Predictive windshear alerting capability is not available.
REFUELING	The refueling panel is armed. Aircraft should not be dispatches in the refueling mode.
SEAT BELTS	The SEAT BELTS signs in the cabin are ON.
TERRAIN OVRD (DEU 911 and subs) (Optional)	Terrain override has been selected.
VHF-3VOICE (Optional)	This alert is displayed when the ACARS is in voice mode.

ALERT	CONSEQUENCE(S)/DESCRIPTION
WHEEL BRAKE INOP	A wheel brake has been rendered inoperative by maintenance. Aircraft performance must be adjusted accordingly.
WHLD HEAT HI	The left and/or right windshield heat is ON and in HIGH mode.
WSHLD HEAT ON	The left and/or right windshield hear is ON and in NORM mode.

Ground Operations

Towing (Pushback) Procedures

General

Normally, flight crew personnel will only be involved with pushback operation from the gate. Certain safety and operating precautions apply to all types of towing procedures and should be strictly adhered to. These precautions include the following:

- Prior to any movement, verify cabin is properly prepared, all cargo doors and main landing gear doors are closed and wheel chocks are removed.
- Ensure IRU alignment is complete.
- Establish positive contact with towing personnel and ramp control.

NOTE: *Prior to pushback or tow, Captain will establish communication with the towing vehicle operator (aircraft interphone system or hand signals) and they will agree on an emergency signal to be used in the event an immediate stop is required and the primary means of communications fails.*

- Verify hydraulic power is available.
- Verify anti-collision lights are on.
- Release or set parking brakes only when so directed by towing personnel.
- Ensure a signal person directs movement of aircraft, and in congested areas, request wing walkers to check clearance between aircraft and adjacent aircraft, equipment or buildings, if considered appropriate.

NOTE: *Standard ramp signals should be used and all personnel involved with towing operation should have the signals in mind at all times.*
The relative lateral outward movement of the wing tip

of swept-wing aircraft during initial stages of turn should be foremost in mind.

- Ensure towing speed is not excessive.
- Be alert for any situation which may require cockpit crew intervention with towing operations.
- Ensure last few feet of any towing operation are in a straight line to align gear and relieve tire and tow bar twisting stresses.
- Ensure all towing personnel are well clear of aircraft, pins removed, and a positive all clear signal has been received prior to any taxi operation.

Taxi Procedures

General

Taxiing the MD-11 is basically the same as any other heavy jet transport. Some special considerations are required because of the high-velocity exhaust potential of this type engine, the landing gear location, the nosewheel steering and judgment of correct taxi speed.

Use Of Thrust

To break away at the ramp, release the brakes and smoothly increase thrust and let the aircraft roll forward. When adding power to start moving (approximately 40% N1), wait for the aircraft to respond before adding additional power. At high gross weights the aircraft will react slowly and require more power. A common tendency is to continually increase power until the aircraft moves. This will provide more power than is necessary or desired. If obstructions are located behind the aircraft, it is important to limit the use of thrust as much as possible. All three engines should be used together to reduce required thrust for any one engine.At low or medium gross weights, idle thrust will be more than sufficient to maintain normal taxi speeds and may even cause the aircraft to accelerate. At high gross weights, thrust in excess of idle may be briefly required.

For operation on narrow and/or contaminated runways and taxiways, reduced power setting for wing-mounted engines should be used when possible.

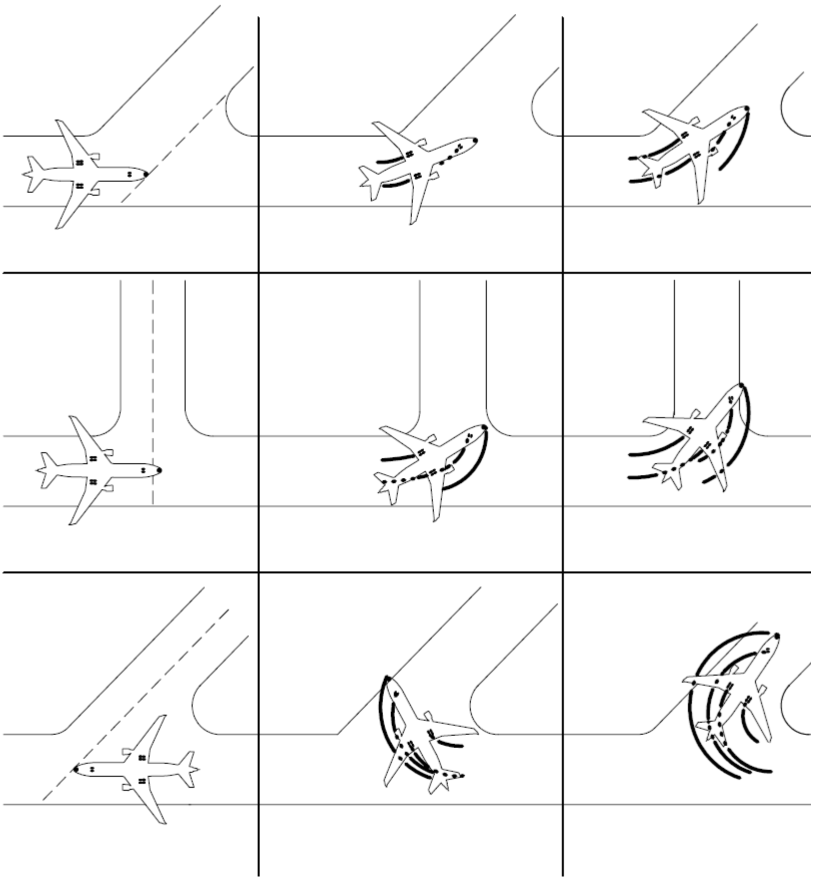
Use Of Braking

Do not ride the brakes. Overheated brakes reduce braking efficiency and could seriously affect the capability of a rejected takeoff. Use of reverse thrust is prohibited during taxi or pushback operations.

Maneuvering

To start moving in a turn requires a considerably higher thrust level. When a turn is required immediately following the brake release, advance power to obtain sufficient speed to carry the aircraft throughout the turn. Brakes are not normally required during turns. If braking in a gentle turn is required, use brakes symmetrically; otherwise use the outboard brake to slow the aircraft. Minimum radius turns require asymmetric thrust and differential braking and should be avoided whenever possible.

TYPICAL TAXI TURNING PATH



NOTE: *Overshoot the centerline of the taxiway or runway to compensate for the aft position of the main gear. The sharper the turn, the more overshoot required.*

Ground Operations

Plan views for three typical turns are depicted on the previous page.The first plan view in each turning sequence depicts the proper position to initiate the turn. The remaining two plan views show the travel of the Captain's eye position, nose wheel and main gear tracking. Pay particular attention to the Captain's eye position as turn is executed.

Whenever space is available, turns should be made with less than full wheel throw. See Turning Radius diagram for clearances. The centerline gear has no appreciable effect on taxi characteristics.

For small changes of direction during taxi, steering should be accomplished with the rudder pedals. Nosewheel movement to 10° each side of center is possible by this method. Rudder pedal steering can be overridden by the nose steering wheel. Force should be applied to the steering wheel with a constant and smooth application and returned to center gently, while keeping firm control of the steering wheel.

The steering wheel is heavily spring-loaded to center. If pressure is rapidly relaxed, or the application is erratic, the turn will be uncomfortable for the passengers/couriers.

Abrupt nosewheel movement should be avoided. In a rapid turn or with excessive taxi speeds the nosewheel will react but the aircraft will not be able to follow the movement and scrubbing of the nose tires will result. If the nosewheels are on painted or wet surfaces, the possibility of nose tire skidding is increased.

When entering turns, do not start the turn until the extended centerline of the intersecting taxiway is under the pilot's seat position to compensate for the aft position of the nose gear. To make turns of 90° or more, apply full nose wheel steering as soon as the turn is started. Fillets are required between taxiways when the turn exceeds 90°. Before stopping, center the nosewheel.

During taxi, the pilot eye level is approximately 20 feet above the surface. Because of the cockpit height, the aircraft appears to be moving slower than it is, resulting in a tendency to taxi too fast. The flat windshield, lack of distortion and excellent visibility makes the transition easy. Taxi speed is best determined on the taxi speed readout on the PFDs. Looking out the side windows is also recommended, particularly when stopping.

Pilot Eye References

Visibility from the flight deck is excellent. Each pilot can view a full 135° without moving his head outboard or leaning forward. To see the wing tips, the clearview window must be opened. Taxiing with the clearview open is not objectionable from a noise standpoint. Slant vision over the nose intercepts the taxiing surface approximately 48 feet in front of the aircraft. The long wheel base and position of the pilot in relation to the nose gear must be considered. The nose gear is approximately 21 feet aft and the main gear is 102 feet aft of the pilot.

Left Seat Visual Clues

The visual cues shown on the Pilot's Visual References During Taxi illustration will aid during straight ahead taxi operations. Since recommended seat positioning places every pilot's eyes in about the same location, these references are valid for everyone.

1. Looking to the and sighting along the second screw from the bottom on the vertical frame dividing the pilot's clearview windows gives a good reference for left wing tip tracking.
2. The bottom left corner of the pilot's windscreen indicates engine 1 ground track.
3. The small bracket resembling an "H" on the pilot's windshield wiper shows the track of the left main gear (this cue is not available with vertically parked wipers).
4. The light sensor on the pilot's side glareshield can be used for the centerline of the nose gear. Also, the inside of the pilot's right knee (FO left knee) can be used.

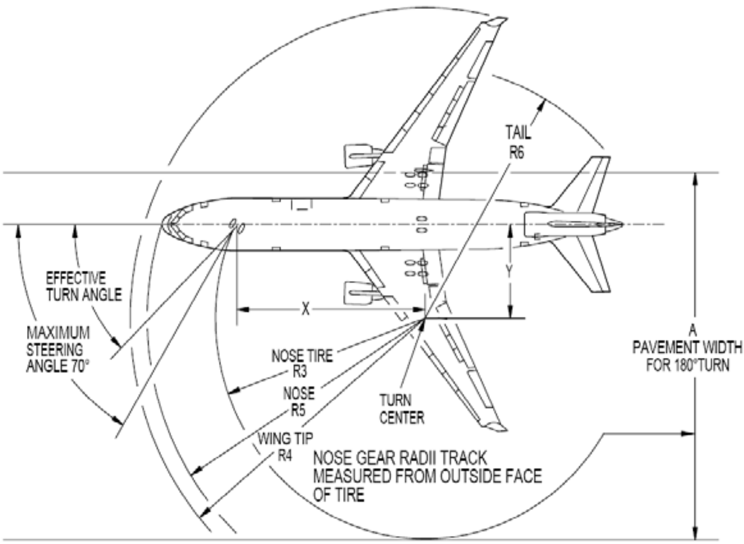
5. The elbow bend of the pipe supporting the pilot's wiper indicates the right main strut track; allow a margin for the outboard wheels (this cue is not available with vertically parked wipers).

6. The bottom right corner of the pilot's windscreen indicates engine 3 ground track.

7. Looking to the right and sighting along the first screw from the bottom on the vertical frame dividing the copilot's clearview windows, gives a good reference for right wing tip tracking. If the "H" on the copilot's wiper (7a) is visible, it may also be used to sight the right wing tip tracking (this cue is not available with vertically parked wipers).

The copilot should use the same references, starting on the right side of the aircraft, to indicate ground tracking of various parts of the aircraft.

Minimum Turn Radii

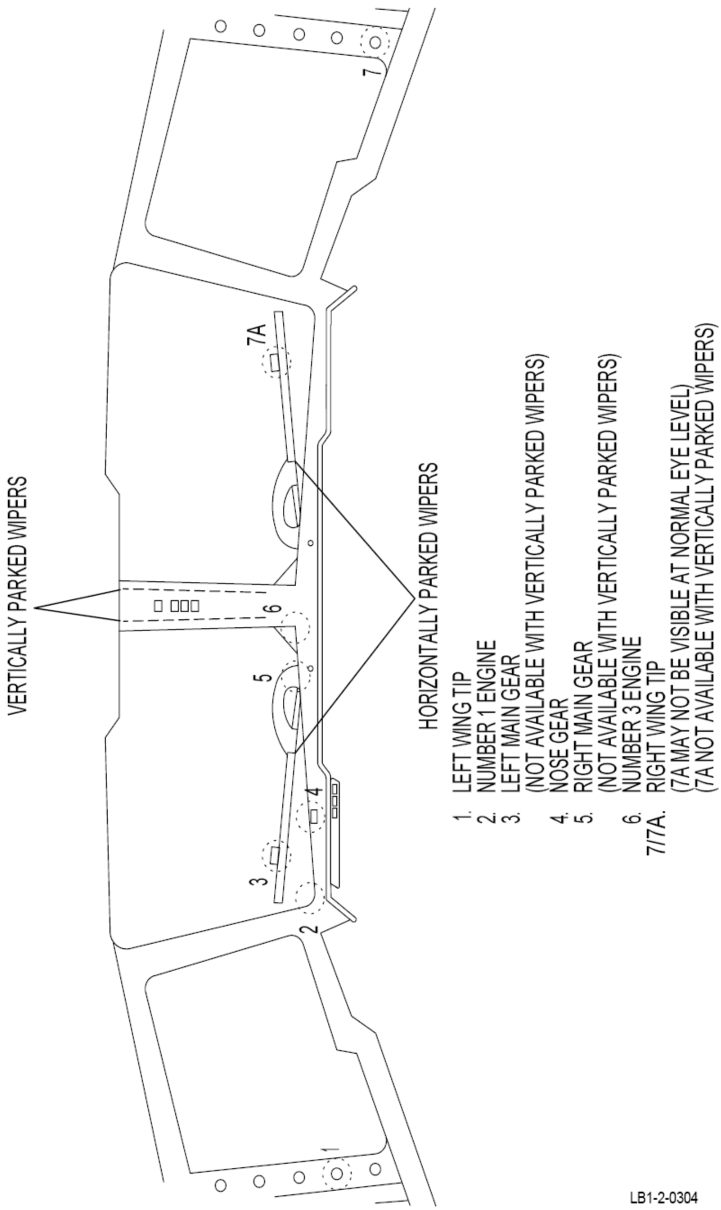


1 NORMAL TURNS
- SYMMETRIC THRUST
- NO DIFFERENTIAL BRAKING
- SLOW CONTINUOUS TURN
- AFT CENTER OF GRAVITY
- MAX GROSS WEIGHT

2 MINIMUM RADIUS TO AVOID EXCESSIVE TIRE WEAR. USE VARIOUS COMBINATIONS OF :
- STEERING
- ASYMMETRIC THRUST
- LIGHT DIFFERENTIAL BRAKING

3 MINIMUM RADIUS
- ASYMMETRIC THRUST
- LIGHT DIFFERENTIAL BRAKING
- SLOW CONTINUOUS TURN
- AFT CENTER OF GRAVITY
- MAX GROSS WEIGHT

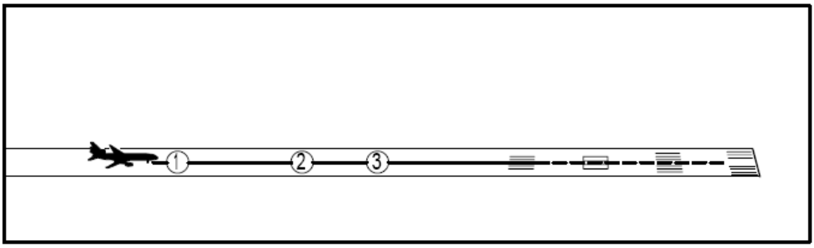
TYPE TURN	EFFECTIVE TURN ANGLE	TIRE SLIP ANGLE	X (Ft/M)	Y (Ft/M)	A (Ft/M)	R3 (Ft/M)	R4 (Ft/M)	R5 (Ft/M)	R6 (Ft/M)
1	60.8°	9.2°	81.2 / 24.7	45.3 / 13.8	160.6 / 49.0	94.7 / 28.9	136.4 / 41.6	118.1 / 36.0	111.9 / 34.1
2			81.2 / 24.7	42.1 / 12.8	155.8 / 47.5	93.1 / 28.4	133.4 / 40.6	116.9 / 35.6	109.8 / 33.5
3	72.0°	- 2.0°	81.6 / 24.9	26.5 / 8.1	134.6 / 41.0	87.5 / 26.7	118.5 / 36.1	112.6 / 34.3	100.0 / 30.5


VERTICALLY PARKED WIPERS
HORIZONTALLY PARKED WIPERS
1. LEFT WING TIP
2. NUMBER 1 ENGINE
3. LEFT MAIN GEAR
(NOT AVAILABLE WITH VERTICALLY PARKED WIPERS)
4. NOSE GEAR
5. RIGHT MAIN GEAR
(NOT AVAILABLE WITH VERTICALLY PARKED WIPERS)
6. NUMBER 3 ENGINE
7/7A. RIGHT WING TIP
(7A MAY NOT BE VISIBLE AT NORMAL EYE LEVEL)
(7A NOT AVAILABLE WITH VERTICALLY PARKED WIPERS)
1
2
3
4
5
6
7
7A
LB1-2-0304

Intentionally Left Blank

Takeoff

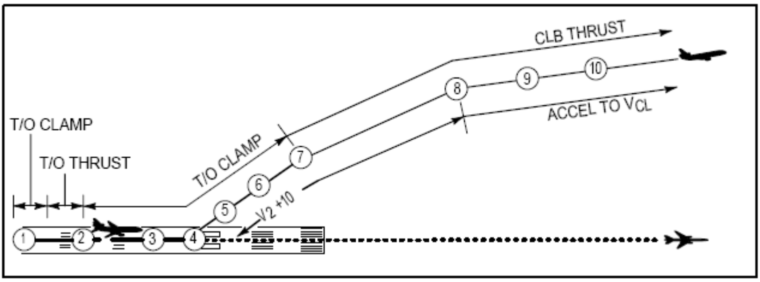
Rejected Takeoff



1. PIC commands: "Reject."
2. PF retards throttles to idle, simultaneously applies maximum manual anti-skid braking, verifies ground spoiler deployment and applies full reverse thrust. Maintain braking, ground spoiler deployment and reverse thrust until a safe stop is assured.
3. PNF verifies spoiler deployment and reverse thrust, and monitors engine instruments while applying slight forward pressure on the control column.

CAUTION: Should directional control become a problem while in reverse thrust, reduce thrust to reverse idle (or forward idle thrust, if required), regain directional control, and reapply reverse thrust as necessary.

Normal Takeoff



1. When aircraft is aligned on runway and cleared for takeoff. PF advances throttles to approximately 70% N1 and confirms symmetrical thrust. PF commands: "Auto Flight, check thrust." PNF pushes AUTO FLIGHT switch, observes ATS OFF disappears from FMA ALT window, and T/O Thrust replaces T/O CLAMP. PNF observes the throttles advance to proper N1 setting and responds: "Thrust set." PF maintains directional control with rudder pedals. PF keeps one hand on throttles.
2. At 80 KIAS, PNF verifies T/O CLAMP in PFD altitude window and calls "80 knots." PF verifies airspeed and T/O CLAMP annunciated.
3. PNF calls "V1." PF verifies airspeed and places both hands on control wheel.
4. PNF calls "Vr." PF verifies airspeed and smoothly rotates at approximately 2.5°/second to attain V2 + 10 at 35 feet AGL.

   NOTE: Tail strikes may occur at rotation rates of 3.8°/second or greater or pitch angles in excess of 12° below 35 feet AGL.

5. At positive rate of climb and V2, PF calls "Gear up." PNF verifies positive rate of climb and moves gear handle to UP and calls "Gear up." PF maintains a minimum of V2 + 10.

   NOTE: FD and AFS pitch limit is 25° nose up.

6. At or above 200 feet AGL, (400 feet AGL if NAV is armed), PF calls "Auto flight," PNF pushes the AUTO FLIGHT switch to engage the autopilot and calls "Auto flight."

NOTE: If PROF had been armed on the ground (pin option), FMS speed and PROF will auto-engage at 400 feet AGL. If PROF was not armed on the ground, it may be selected at or above 400 feet AGL.
Engaging PROF will cause thrust reduction and acceleration to automatically occur on FMS schedule. In this event do not accomplish steps 7 and 8.

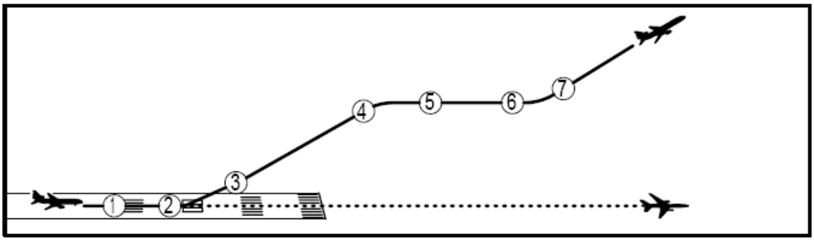
7. At 1,500 feet AGL, select LEVEL CHANGE by pulling the altitude select knob on the FCP. Confirm throttles reduce to climb thrust.

   NOTE: Selecting LEVEL CHANGE below CLB THRUST altitude will change T/O CLAMP to T/O THRUST and enable thrust reduction CLB THRUST altitude. If above CLB THRUST altitude, LEVEL CHANGE will cause thrust to reduce to CLB THRUST when selected.

8. At acceleration altitude (default 3,000 feet above airport elevation or initial level off), pull the airspeed select knob or select FMS speed to initiate acceleration to VCL (this value can be obtained from the MCDU T/O page).
9. At acceleration altitude and Vfr, PF calls "Flaps up." PNF verifies aircraft is at or above flap retract speed and moves FLAP/SLAT handle to 0/EXT.
10. At Vsr, PF calls "Slat retract." PNF verifies aircraft is at or above slat retract speed and moves FLAP/SLAT handle to UP/RET.

    NOTE: Maintain VCL for holding patterns during climb. Request ATC speed deviation if required.

Engine Fire/Failure During Takeoff



NOTE: EO ACCEL defaults to 800 feet AGL (customer pin option) and must be edited if local procedures dictate.

1. If engine fire/failure occurs after V1, maintain directional control and continue the takeoff.
2. At Vr, rotate smoothly at approximately 2.5°/second to attain V2 at 35 feet AGL. Use rudder to maintain directional control with wings level and adjust pitch to maintain bug speed.

   NOTE: If engine failure occurs prior to attaining V2, accelerate to and maintain V2. If engine failure occurs between V2 and V2 + 10, maintain that airspeed. If airspeed is above V2 + 10, reduce to V2 + 10 and maintain airspeed until reaching acceleration height.

   Tail strikes may occur at rotation rates of 3.8°/second or greater or pitch angles in excess of 12° below 35 feet AGL.

3. At positive rate of climb and V2, retract gear.

   NOTE: AUTO FLIGHT may be engaged above 200 feet AGL (400 feet AGL if NAV is armed). If NAV mode is not armed, parallel rudder will be engaged in the T/O mode. Parallel will revert to series rudder with a change in the roll mode. PF should be prepared to maintain rudder before disengaging parallel rudders. If PROF has been armed on the ground (pin option), FMS speed and PROF will auto-engage at 400 feet

AGL. If PROF was not armed on the ground, it may be selected at or above 400 feet AGL.

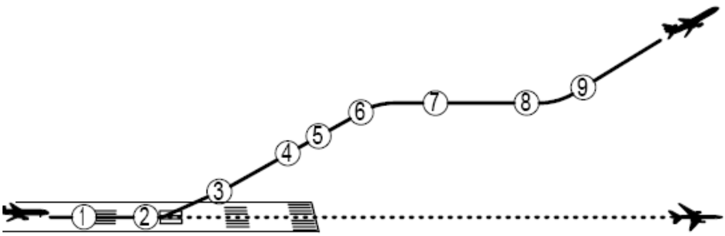
Engaging PROF will result in vertical profile guidance and speed schedule occurring automatically on FMS schedule. In this event, do not accomplish steps 4 and 7.

4. At EO ACCEL altitude, pull the airspeed select knob and select V3 in the PFD speed window to initiate a pitch reduction and acceleration.

   NOTE: Pulling the airspeed select knob will initiate a pitch reduction. Do not pull the airspeed select knob below EO ACCEL altitude.
   With no loss of thrust (i.e. engine fire), pulling the airspeed select knob will initiate a smaller pitch reduction and acceleration to the speed shown in the FCP airspeed window. Retarding the affected throttle to idle will further reduce the pitch to an engine out profile.

5. At Vfr, retract flaps.
6. At Vsr/V3, retract slats. Follow pitch guidance to continue climb to a safe operating altitude.
7. Select LEVEL CHANGE to enable MCT thrust at 3-engine acceleration altitude.

Engine Fire/Failure on Takeoff
FMS PROF and FMS SPEED Engaged



NOTE: EO ACCEL defaults to 800 feet AGL (customer pin option) and must be edited if local procedures dictate.

1. If engine fire/failure occurs after V1, maintain directional control and continue the takeoff.
2. At Vr, rotate smoothly at approximately 2.5°/second to attain V2 at 35 feet AGL. Use rudder to maintain directional control with wings level and adjust pitch to maintain bug speed.

NOTE: If engine failure occurs prior to attaining V2, accelerate to and maintain V2. If engine failure occurs between V2 and V2 + 10, maintain that airspeed. If airspeed is above V2 + 10, reduce to V2 + 10 and maintain airspeed until reaching acceleration height.
Tail strikes may occur at rotation rates of 3.8°/second or greater or pitch angles in excess of 12° below 35 feet AGL.

At positive rate of climb and V2, retract gear.

NOTE: AUTO FLIGHT may be engaged above 200 feet AGL (400 feet AGL if NAV is armed). If NAV mode is not armed, parallel rudder will be engaged in the T/O mode. Parallel will revert to series rudder with a change in the roll mode. PF should be prepared to maintain rudder before disengaging parallel rudders.

If PROF has been armed on the ground (pin option), FMS speed and PROF will auto-engage at 400 feet AGL. If PROF was not armed on the ground, it may be selected at or above 400 feet AGL.
Engaging PROF will result in vertical profile guidance and speed schedule occurring automatically on FMS schedule. In this event, do not accomplish steps 4 and 7.

3. If PROF had been armed on the ground, FMS speed and PROF will auto-engage at 400 feet AGL. If PROF was not armed on the ground, it may be selected at or above 400 feet AGL.
4. When an engine failure occurs, both MCDUs will revert to the PERF page with *CONFIRM ENG OUT and CLEAR* prompts. FMS engine out computations and guidance will not become active until *CONFIRM prompt has been selected. Once *CONFIRM has been selected, the FMS will level off at the EO ACCEL altitude; or if the aircraft is already above the EO ACCEL altitude (but below the ALL ENG ACCEL ALT), the FMS will command a new level off altitude.
   FMS guidance with the autopilot engaged will automatically follow the FMS engine out profile.
5. When the aircraft levels off at the EO ACCEL ALT, V3 (final segment climb speed) becomes the active FMS speed target. The aircraft will remain in ALT HOLD until V3 speed is reached.
6. Retract flaps on schedule.
7. Retract slats on schedule. Once V3 speed is reached, the aircraft will automatically resume a climb to the FCP altitude.
8. As the aircraft climbs through the ALL ENG ACCEL ALT, the speed target becomes climb speed. Thrust will reduce from takeoff thrust to MCT thrust when the aircraft is above the ALL ENG ACCEL ALT and in clean configuration.

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Approach and Landing

Landing Characteristics and Techniques

Visual Approach

Aircraft should be stabilized in the final landing configuration, on descent flight path, and on speed with appropriate wind and gust corrections applied to Vref by 1,000 feet AGL. If aircraft is not stabilized by 500 feet AGL, a missed approach should be executed. Rate of descent should not exceed 1,000 feet/minute below 1,000 feet AGL. Visual aim-point to provide a threshold clearance height of 47 feet on a 3.0° glideslope should be approximately 1,700 feet past the threshold. This will provide a no-flare touchdown point approximately 900 feet from threshold. Aircraft should not deviate from visual glidepath in an attempt to touch down early.

Flight Path Angle Approach

When an approach utilizing constant flight path angle (FPA) descent is desired:

1. Set desired minimums and timer as necessary prior to commencing approach. Approaching the final approach fix (FAF), verify V/S-FPA display window indicates FPA.

   NOTE: Pushing the V/S-FPA changeover button permits alternate selection of vertical speed or flight path angle.

2. Preselect next desired altitude.

3. At final approach fix, rotate pitch wheel on flight control panel until desired flight path angle is displayed in adjacent window.

   NOTE: Rotation of the pitch wheel will select the displayed flight path angle and cause the preselected altitude bug to become a solid selected bowtie bug indicating the auto flight system will capture the preselected altitude.

4. Verify FMA altitude control window displays FPA.

5. Verify correct autopilot and/or flight director response.

Approach at 140 Knots or Less

If Vapp is 140 knots or less and RA or DH is selected to 50 feet or less, the aural warning "MINIMUMS" is inhibited. If it is desired to set RA or DH to less than 50 feet, manually select a Vapp sufficiently high to keep airspeed above 140 knots during flare. Flare

Flare

Autothrottles may be used for all landings and will begin to retard after passing 50 feet AGL. A slight flare should be initiated between 30 and 40 feet (approximately 2°). Do not trim stabilizer during flare. Aircraft should touch down in touchdown zone. This technique will result in a touchdown slightly below Vref. Do not hold aircraft off in an attempt to achieve a smooth landing this could result in a long touchdown, unusually heavy braking, a higher pitch attitude and reduced tail clearance.

CAUTION: The aft fuselage will contact runway at approximately 10° pitch attitude with struts compressed.

NOTE: Below 10 feet with the aircraft fully flared (sink rate approximately 2 to 4 feet/second), the basic technique is to maintain attitude by applying the required control wheel pressures. A more advanced technique is to actually begin lowering the nose (approximately 1°) prior to main gear touchdown.

Bounced Landing Recovery

If the aircraft should bounce, hold or re-establish a normal landing attitude and add thrust as necessary to control the rate of descent. Avoid rapid pitch rates in establishing a normal landing attitude.

CAUTION: Tail strikes or nosewheel structural damage can occur if large forward or aft control

column movements are made prior to touchdown.

When a bounced landing occurs, consider initiating a go-around by use of normal go-around procedures. Do not retract the landing gear until a positive rate of climb is established because a second touchdown may occur during the go-around.

Touchdown

After touchdown, monitor ground spoiler deployment and be prepared to counter any pitch-up tendency as spoilers extend. Fly nosewheel to runway, and if auto ground spoilers do not fully deploy upon nosewheel touchdown, manually deploy spoilers. Pitch-up tendency is more pronounced at aft CG. Use of auto brakes will help counter any pitch-up tendency. With FCC 908 installed, LSAS will assist the pilot in avoiding nose pitch-up after touchdown, and in lowering nose to the runway.

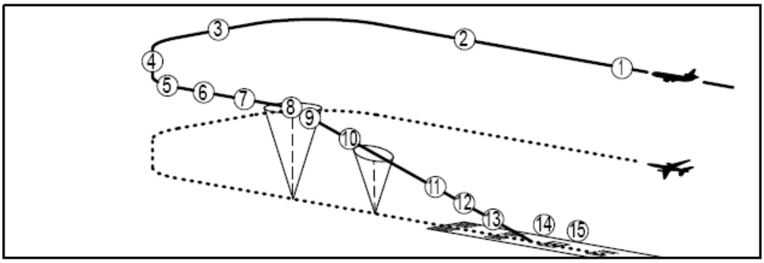
Rollout

As nosewheel is lowered to the runway, deploy reversers on all three engines simultaneously. A momentary pause will be encountered at interlock stop on engines 1 and 3, and then reverse thrust may be selected to desired level. Engine 2 will provide only idle reverse thrust until nosewheel strut compression. For a normal landing, at 80 KIAS, smoothly move reverse levers to achieve reverse idle by 60 KIAS. Move reverse levers to forward idle position by turnoff speed.

WARNING: After reverse thrust is initiated, a full stop landing must be made.

NOTE: Maximum reverse thrust may be selected without delay and may occur prior to nosewheel touchdown. However, there should be no effort to delay lowering the nosewheel to the runway; aerodynamic braking is ineffective and not a recommended deceleration technique.

ILS Approach (FD Only or Auto Flight Engaged) With or Without FMS NAV/PROF



NOTE: *During approach, both NDs may be selected to MAP (minimum range) or one ND be selected to MAP (minimum range) and one ND selected to APPR.*

1. Flight directors ON, AUTO FLIGHT engaged. Complete appropriate checklists. FLAPS/SLATS UP/RET, airspeed at or above Vmin + 5. VOR or NDB bearing pointers should be selected as appropriate.
2. Entering downwind, extend SLATS and set speed at or above Vmin + 5.

   NOTE: *Flap may be selected as desired to reduce airspeed and/or lower deck angle.*

3. On base leg, extend flaps to FLAPS 28 and set speed at or above Vmin + 5.
4. On intercept heading and cleared for approach, push APPR/ LAND button on FCP to arm approach. Observe LAND ARMED (white) in upper portion of FMA roll window.

   NOTE: *Localizer interception close to ILS facility should be accomplished with airspeed as near to final approach speed as practical, as well as with intercept angle as shallow as practical. High IAS and intercept angles greater than 3Q° may result in overshooting LOC.*

5. After LOC (white) appears in FMA roll window, preselect missed approach heading. LAND ARM will transfer to upper portion of FMA altitude window.

6. At 1-1/2 to 2 dots below glideslope, move gear handle to DOWN.

   NOTE: *The glideslope indication may have a transient deflection up to ± 1 dot as nose gear is locked down. This transient deflection has no affect on autoland/flight director system operation or performance.*

7. At 1 dot below glideslope, select landing flaps and slow to Vapp for configuration. Complete Before Landing checklist. After Vapp is captured, desired G/A level-off speed may be preselected.

8. Upon crossing the final approach fix (FAF), PNF will call "Final fix XXXX feet," and note any deviation from published minimums. PF call "Altitude checked."

9. When G/S (white) appears in FMA altitude window, preselect missed approach altitude. LAND ARMED will remain in upper portion of FMA altitude window. PROF will disengage at glideslope capture.

10. After passing 1,500 feet AGL + 10 seconds and successful completion of the dual land test, the altitude window will change to GS DUAL LAND (green) and the roll window will be LOC (green).

    NOTE: *Depending on equipment status, SINGLE LAND (white) or APPR ONLY (white) may appear in the altitude window. Continue approach observing appropriate restrictions.*

    After DUAL LAND, SINGLE LAND, or APPROACH ONLY is displayed on the FMA, the GCP controls are disabled to protect the autoland. Exit from those modes is possible by use of the go around button.

11. At 150 feet AGL in autoland, verify ALIGN (green) annunciates in the FMA roll window, and a runway alignment maneuver occurs to remove existing crab angle. If in approach only, the AP will disconnect at 100 feet AGL.

NOTE: At decision height, continue autoland/manual landing procedure or execute missed approach as required.

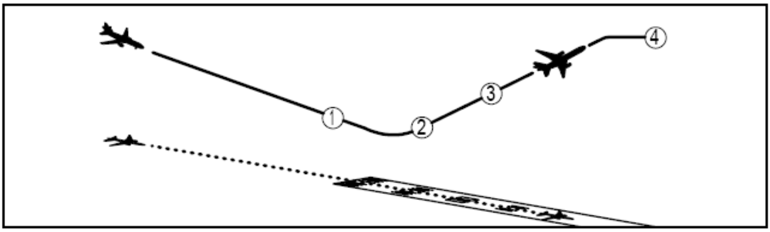
12. In autoland modes at 50 feet AGL, RETARD (white) and FLARE (green) will appear in the FMA speed and altitude windows.
13. At main gear touchdown, ROLLOUT (green) will appear in the FMA roll and altitude windows.
14. Apply reverse thrust and ensure adequate braking is applied. Application of reverse thrust will disconnect the ATS.

    NOTE: Maximum reverse thrust may be selected without delay and may occur prior to nosewheel touchdown. However, there should be no effort to delay lowering the nosewheel to the runway; aerodynamic braking is ineffective and not a recommended deceleration technique.

15. Allow the autopilot and autobrakes to remain engaged until a safe stop is assured and adequate visibility exists for pilot control.

    NOTE: Procedures for a two-engine ILS approach are the same, except landing flaps are limited to FLAPS 35. Use of the FMS PROF mode is prohibited in descent/ approach below final approach fix (FAF) altitude. FMS NAV, if engaged for lateral navigation before the final approach course, will disengage at LOC capture. FMS PROF, if engaged, will disengage at glideslope capture.

Go Around (Manual or Auto Flight Engaged) Two or Three Engines Operating



WARNING: **If reverse thrust is initiated, a full stop landing must be made.**

NOTE: Tail strikes may occur at rotation rates of 3.8°/second or greater or pitch angles in excess of 12° below 35 feet AGL.

1. Push GA button and advance throttles to GA thrust. Simultaneously increase pitch to FD pitch command or monitor autopilot pitch command to establish climb and airspeed (22° ANU maximum) and select FLAPS 28.

   NOTE: If ground spoilers are deployed as a result of main wheel spin-up, ATS will not advance number 2 throttle. Manually advance throttles to GA thrust.

2. At positive climb rate, move GEAR handle to UP and verify appropriate missed approach altitude, heading and airspeed have been preselected.
3. Use heading select or NAV to follow missed approach instructions.

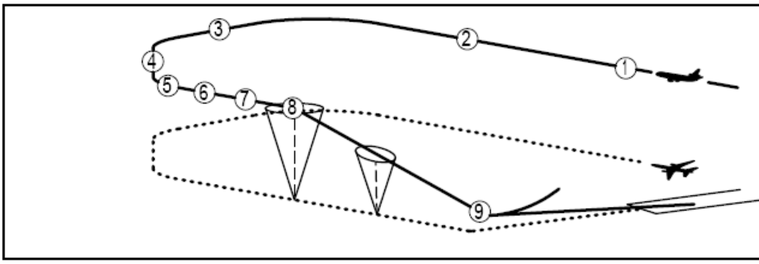
   NOTE: Commanded airspeed during climb will be Vmin + 5 for 28° flaps or indicated airspeed when GA button was pushed, whichever is higher.

   Altitude capture will automatically cancel GA pitch mode.

   If in a bank when GA button is pushed, AFS will roll *wings level. As bank angle comes through 3°, AFS will hold heading that exists at that time.*

Maintain commanded airspeed until reaching clearance altitude. Flaps/Slats may be left extended if required.

ILS/IGS Precision Approach
FD Only or Auto Flight Engaged
With or Without FMS NAV/PROF



NOTE: IGS uses ILS components. The attention of pilots is drawn to the fact that the IGS is offset from the landing direction and no instrument guidance is available below the decision altitude (DA). This approach type is excluded in all FMS data bases prior to FMS-909.

During approach, both NDs may be selected to MAP (minimum range) or one ND be selected to MAP (minimum range) and one ND selected to APPR.

1. Flight directors ON, AUTO FLIGHT engaged. Complete appropriate checklists. FLAPS/SLATS UP/RET, airspeed at or above Vmin + 5. VOR or NDB bearing pointers should be selected, as appropriate.
2. Entering downwind, extend SLATS and set speed at or above Vmin + 5.

   NOTE: Flaps may be selected as desired to reduce airspeed and/or lower deck angle.

3. On base leg, extend flaps to FLAPS 28 and set speed at or above Vmin + 5. Navigation to the final approach course can be by NAV, HDG, or TRK mode.

   NOTE: In order to allow the flight director and autopilot to disengage from LOC/GLIDESLOPE guidance when the visual turn and descent to the runway begin, set *the FCP to the BAROSET DA immediately after glideslope capture. This action will limit the AFS to approach only. Autopilot is not usable below 100 feet AGL in approach only.*

4. On intercept heading and cleared for approach, push APPR/ LAND button on FCP to arm approach. Observe LAND ARMED (white) in upper portion of FMA roll window.

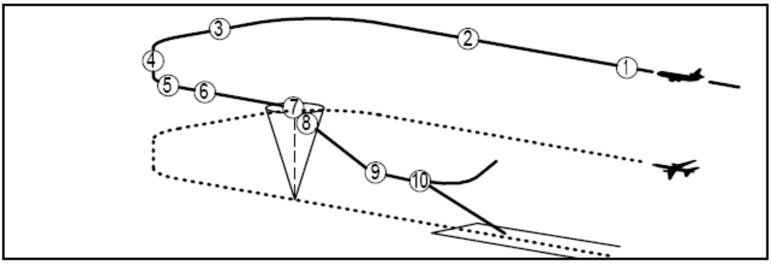
   NOTE: Localizer interception close to IGS facility should be accomplished with airspeed as near to final approach speed as practical, as well as with intercept angle as shallow as practical. High IAS and intercept angles greater than 30° may result in overshooting LOC.

5. After LOC (white) appears in FMA roll window, preselect missed approach heading. LAND ARM will transfer to upper portion of FMA altitude window.
6. At 1-1/2 to 2 dots below glideslope, move gear handle to DOWN.
7. At 1 dot below glideslope, select landing flaps and slow to Vapp for configuration. Complete Before Landing checklist. After Vapp is captured, desired G/A level-off speed may be preselected. At glideslope capture, set the FCP to the DA.
8. Upon crossing the final approach fix (FAF), PNF will call "Final fix XXXX feet," and note any deviation from published minimums. PF call "Altitude checked."
9. At the DA, with runway in sight, disconnect autopilot and use heading select/vertical speed or FPA, as desired, for alignment and descent to the runway. Do not use level change.

At the DA, without the runway in sight, set the FCP to the missed approach altitude and perform the missed approach.

NOTE: FMS NAV, if engaged for lateral navigation before the final approach, will disengage at LOC capture. FMS PROF, if engaged for VNAV, will disengage at glideslope capture.
Procedures for a two-engine IGS approach are the same, except landing flaps are limited to FLAPS 35.

Localizer Approach
FD Only or Auto Flight Engaged
With or Without FMS NAV/PROF



NOTE: *The localizer approach is a nonprecision approach that uses a localizer for lateral guidance. This approach type is excluded from all FMS data bases prior to FMS-909. In order to insert the LOC approach in the FMS flight plan, it is required to set a minimum profile (MIN PROF) altitude in the field adjacent to line select key 2R of the STAR page, and push the *INSERT key. Do not use vertical deviation indicator (VDI) information below MIN PROF altitude. During approach, both NDs may be selected to MAP (minimum range), or one DN may be selected to MAP (minimum range) and one ND selected to APPR.*

The PROF mode will automatically revert to altitude hold upon capturing the MIN PROF altitude selected above.

1. Flight directors ON, AUTO FLIGHT engaged. Complete appropriate checklists. FLAPS/SLATS UP/RET, airspeed at or above Vmin + 5. VOR or NDB bearing pointers should be selected as appropriate.
2. Entering downwind, extend SLATS and set speed at or above Vmin + 5.

   NOTE: *Flaps may be selected as desired to reduce airspeed and/or lower deck angle.*

3. On base leg, extend flaps to FLAPS 28 and set speed at or above Vmin + 5.

4. On intercept heading and cleared for approach, select the LOC ONLY prompt on the NAV/RAD page, if installed, and observe LOC ARMED (white) in upper portion of FMA roll window. If not installed, intercept and maintain the localizer course using NAV heading or track.

   NOTE: Localizer interception close to ILS facility should be accomplished with airspeed as near to final approach speed as practical, as well as with intercept angle as shallow as practical. High IAS and intercept angles greater than 3Q° may result in overshooting LOC.

5. After LOC (white) appears in FMA roll window, preselect missed approach heading.

6. Lower the FCP to the MDA before the final approach fix and extend the landing gear. Select landing flaps and slow to Vapp for configuration.

7. Upon crossing the final approach fix (FAF), PNF will call "Final fix XXXX feet," and note any deviation from published minimums. PF call "Altitude checked."

8. Depart the FAF at Vapp, and initiate descent.

   NOTE: Descents to MDA may be accomplished with vertical speed (V/S), flight path angle (FPA), or profile (PROF).

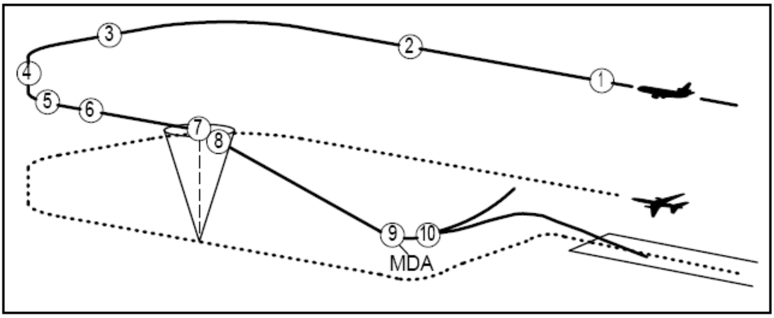
   - For V/S descents, start timing and rotate pitch wheel to select appropriate descent rate to reach the MDA prior to the missed approach point.
   - For FPA descents, start timing and rotate pitch wheel to the appropriate flight path angle for the approach.
   - For PROF descents, start timing and verify that the GCP altitude is set to the MDA. Engage PROF if not previously engaged.

9. After arriving at the MDA, preselect the missed approach altitude.

10. When runway is visually acquired, disengage autopilot and continue to landing. If runway is not in sight at missed approach point or a safe landing cannot be accomplished, execute a go-around.

    NOTE: Procedures for a two-engine LOC approach are the same, except landing flaps are limited to FLAPS 35.

LDA Approach
FD Only or Auto Flight Engaged
With or Without FMS NAV/PROF



*NOTE: The LDA is a non-precision approach that uses a localizer to guide the aircraft to a missed approach point not on the extended runway centerline. This approach type is excluded in all FMS data bases prior to FMS-909. In order to insert the LDA approach in the FMS flight plan, it is required to set a minimum profile (MIN PROF) altitude in the field adjacent to line select key 2R of the STAR page, and then push *INSERT key. Do not use vertical deviation indicator (VDI) information below MIN PROF altitude.*

During approach, both NDs may be selected to MAP (minimum range) or one ND be selected to MAP (minimum range) and one ND selected to APPR.

1. Flight directors ON, AUTO FLIGHT engaged. Complete appropriate checklists. FLAPS/SLATS UP/RET, airspeed at or above Vmin + 5. VOR or NDB bearing pointers should be selected as appropriate.
2. Entering downwind, extend SLATS and set speed at or above Vmin + 5.

NOTE: Flaps may be selected as desired to reduce airspeed and/or lower deck angle.

3. On base leg, extend flaps to FLAPS 28 and set speed at or above Vmin + 5.
4. On intercept heading and cleared for approach, select the LOC ONLY prompt on the NAV/RAD page, if installed, or push APPR/LAND button on FCP to arm LOC. Observe LOC ARMED (white) in upper portion of FMA roll window.

   NOTE: Localizer interception close to ILS facility should be accomplished with airspeed as near to final approach speed as practical, as well as with intercept angle as shallow as practical. High IAS and intercept angles greater than 3Q° may result in overshooting LOC.

5. After LOC (white) appears in FMA roll window, preselect missed approach heading.
6. Lower the FCP to the MDA before the final approach fix and extend the landing gear. Select approach flaps and final approach speed.
7. Upon crossing the final approach fix (FAF), PNF will call "Final fix XXXX feet," and note any deviation from published minimums. PF call "Altitude checked."
8. Depart the FAF at Vapp, and initiate descent.

   NOTE: Descents to MDA may be accomplished with vertical speed (V/S), flight path angle (FPA) or profile (PROF).

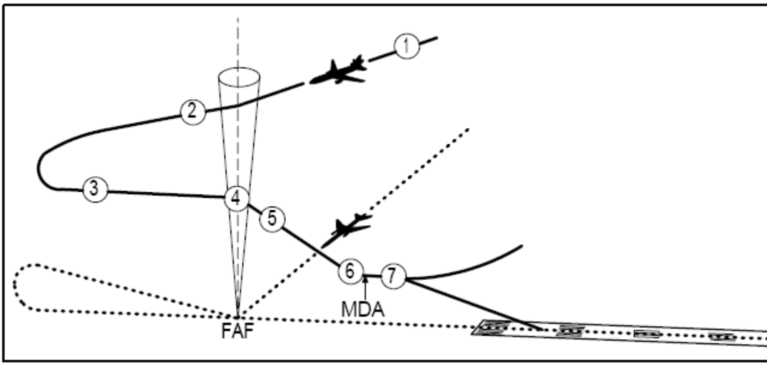
   - For V/S descents, start timing and rotate pitch wheel to select appropriate descent rate to reach the MDA prior to the missed approach point.
   - For FPA descents, start timing and rotate the pitch wheel to the appropriate flight path angle for the approach.
   - For PROF descents, start timing and verify that the GCP altitude is set to the MDA. Engage PROF if not previously engaged.

9. After arriving at the MDA, preselect the missed approach altitude.

10. When runway is visually acquired, disengage autopilot and continue to landing. If runway is not in sight at missed approach point or a safe landing cannot be accomplished, execute a go-around.

    NOTE: Procedures for a two-engine LDA approach are the same, except landing flaps are limited to FLAPS 35.

VOR or RNAV Approach
With or Without FMS NAV/PROF



NOTE: *In order to insert the VOR or RNAV approach in the FMS flight plan, it is required to set a minimum profile (MIN PROF) altitude in the field adjacent to line select key 2R of the STAR page and push the *INSERT key. Do not use vertical deviation indicator (VDI) information below MIN PROF altitude.*

During VOR approach, it is required that one ND be selected to the VOR display with the appropriate VOR bearing pointer selected. One ND may be selected to MAP mode (minimum range). When using GPS updating during the use of NAV mode for VOR/DME or VOR approaches, including GPS overlay approaches, it is recommended that the reference NA VA ID be displayed with the VOR page selected on at least one ND.

If FMS NAV is used, either the flight director must be on or the autopilot must be engaged or both.

If the "UNABLE RMP" alert is displayed or FMS/ autopilot or FMS/flight director disengagement occurs prior to MDA(H) or DA(H), and suitable visual reference is available, the pilot may continue the approach. If suitable visual reference has not been *established, discontinue the approach and perform a go-around. An "UNABLE RNP" alert does not preclude the pilot selection of another approved means of navigation to continue the approach.*

The PROF mode will automatically revert to altitude hold upon capturing the MIN PROF altitude selected above.

1. Complete appropriate checklists inbound to the IAF. Extend slats and maintain at or above Vmin + 5 for configuration. Use HDG, TRK, NAV or VOR TRACK to follow the appropriate radial or course.
2. Depart the IAF (or enter base leg) with FLAPS 28 and speed at or above Vmin + 5. For descending procedure turns, FLAPS 28 may be delayed until on extended final approach.
3. Prior to the FAF, extend landing gear, select landing flaps, and slow to Vapp. After level-off, preselect MDA in the FCP altitude window.
4. Upon crossing the FAF, PNF will call "FINAL FIX XXX FEET," and note any deviation from published minimums. PF call "ALTITUDE CHECKED."
5. Depart the FAF at Vapp, and initiate descent.

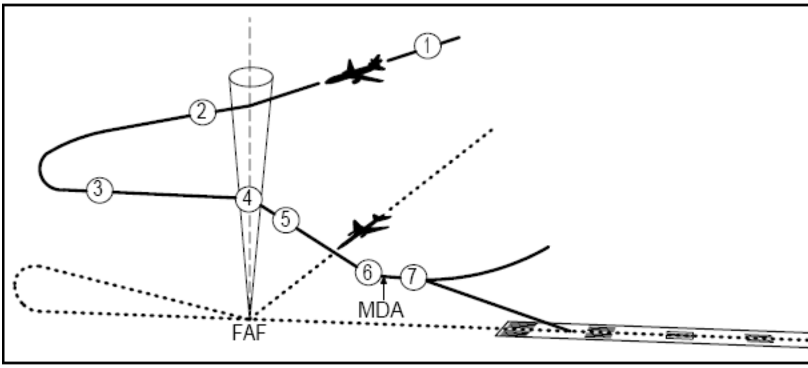
NOTE: Descents to MDA may be accomplished with vertical speed (V/S), flight path angle (FPA), or profile (PROF).

- For V/S descents, start timing and rotate pitch wheel to select appropriate descent rate to reach the MDA prior to the missed approach point.
- For FPA descents, start timing and rotate the pitch wheel to the appropriate flight path angle for the approach.
- For PROF descents, start timing and verify that the GCP altitude is set to the MDA. Engage PROF if not previously engaged.

6. After arriving at the MDA, preselect the missed approach altitude.
7. When runway is visually acquired, disengage autopilot and continue to landing. If runway is not in sight at missed approach point or a safe landing cannot be accomplished, execute a go-around.

   NOTE: Procedures for a two-engine VOR or RNAV approach are the same as those for a three-engine VOR or RNAV approach, except landing flaps are limited to FLAPS 35.

GPS Overlay or RNAV Approach



NOTE: GPS overlay and RNAV approaches are flown in the FMS NAV mode. Approaches must be selected from the FMS data base. Either the flight director must be on, or the autopilot must be engaged, or both.

*In order to insert the VOR or RNAV approach in the FMS flight plan, it is required to set a minimum profile (MIN PROF) altitude in the field adjacent to line select key 2R of the STAR page, and push the *INSERT key. Do not use vertical deviation indicator (VDI) information below MIN PROF altitude.*

If the "UNABLE RNP" alert is displayed prior to MDA(H), and suitable visual reference is available, the pilot may continue the approach. If suitable visual reference has not been established, discontinue the approach and perform a go-around. An "UNABLE RNP" alert does not preclude pilot selection of another approved means of navigation to continue the approach.

PROF mode will automatically revert to altitude hold upon capturing the MIN PROF altitude selected above.

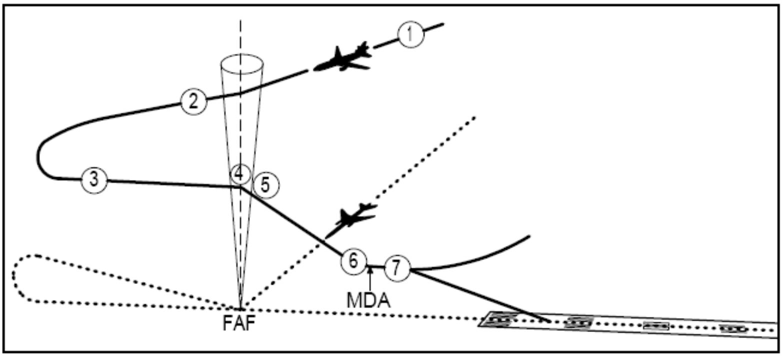
1. Complete appropriate checklists inbound to the IAF. Extend slats and maintain at or above Vmin + 5 for configuration. Engage FMS NAV mode.
2. Depart the IAF (or enter base leg) with FLAPS 28 and speed at or above Vmin + 5. For descending procedure turns, FLAPS 28 may be delayed until on extended final approach.
3. Prior to the FAF, extend landing gear, select landing flaps, and slow to Vapp. After level-off, preselect MDA in the FCP altitude window.
4. Upon crossing the FAF, PNF will call "FINAL FIX XXX FEET," and note any deviation from published altitude. PF call "ALTITUDE CHECKED."
5. Depart the FAF at Vapp, and initiate descent.

   NOTE: Descents to MDA may be accomplished with vertical speed (V/S), flight path angle (FPA), or profile (PROF).

   - For V/S descents, start timing (if necessary), and rotate pitch wheel to select appropriate descent rate to reach the MDA prior to the missed approach point.
   - For FPA descents, start timing (if necessary), and rotate the pitch wheel to the appropriate FPA for the approach.
   - For PROF descents, start timing (if necessary), and verify that the GCP altitude is set to the MDA. Engage PROF if not previously engaged.
6. After arriving at the MDA, preselect the missed approach altitude.
7. When runway is visually acquired, disengage autopilot and continue to landing. If runway is not in sight at missed approach point, or a safe landing cannot be accomplished, execute a go-around.

   NOTE: Procedures for a two-engine GPS or RNAV approach are the same as those for a three-engine GPS or RNAV approach, except landing flaps are limited to FLAPS 35.

NDB Non-Precision Approach With or Without FMS NAV/PROF



NOTE: *In order to insert the NDB approach in the FMS flight plan, it is required to set a minimum profile (MIN PROF) altitude in the field adjacent to select key 2R of the STAR page. This approach type is excluded in all FMS data bases prior to FMS-909. Do not use vertical deviation indicator (VDI) information below MIN PROF altitude.*

During NDB approach without GPS update, it is required that one ND be selected to the APPR or VOR display with the appropriate NDB bearing pointer selected. One ND may be selected to MAP mode (minimum range). When using GPS updating during the use of NAV mode for NDB (ADF) approaches, including GPS overlay approaches, it is recommended that the reference NA VA ID be displayed with the APPR page selected on at least one ND. For any NDB approach, it is recommended that both ADF bearing pointers be displayed on an APPR page.

If FMS NAV is used, either the flight director must be on or the autopilot must be engaged or both.

If the "UNABLE RNP" alert is displayed or FMS/

autopilot or FMS/flight director disengagement occurs prior to MDA (H) or DA (H), and suitable visual reference is available, the pilot may continue the approach. If suitable visual reference has not been established, discontinue the approach and perform a go-around. An "UNABLE RNP" alert does not preclude the pilot selection of another approved means of navigation to continue the approach.

The PROF mode will automatically revert to altitude hold upon capturing the MIN PROF altitude selected above.

1. Complete appropriate checklists inbound to the IAF. Extend slats and maintain at or above Vmin + 5 for configuration. Use HDG, TRK, or NAV mode to track appropriate bearing.
2. Depart the IAF (or enter base leg) with FLAPS 28 and speed at or above Vmin + 5. For descending procedure turns, FLAPS 28 may be delayed until on extended final approach.
3. Prior to the FAF, extend landing gear, select landing flaps, and slow to Vapp. After level-off, preselect MDA in the FCP altitude window.
4. Upon crossing the final approach fix (FAF), PNF will call "FINAL FIX XXX FEET," and note any deviation from published minimums. PF call "ALTITUDE CHECKED."
5. Depart the FAF at Vapp, and initiate descent.

   NOTE: Descents to MDA may be accomplished with vertical speed (V/S), flight path angle (FPA), of profile (PROF).

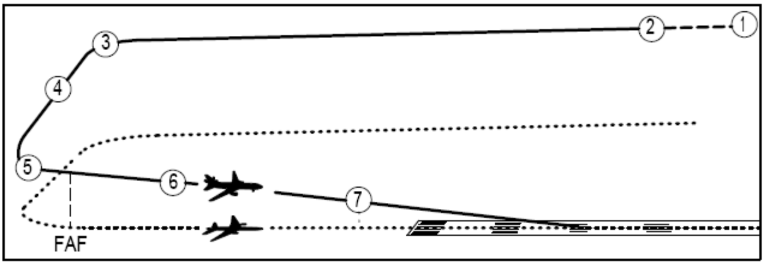
   - For V/S descents, start timing and rotate pitch wheel to select appropriate descent rate to reach the MDA prior to the missed approach point.
   - For FPA descents, start timing and rotate pitch wheel to the appropriate flight path angle for the approach.

- For PROF descents, start timing and verify that the GCP altitude is set to the MDA. Engage PROF if not previously engaged.

6. After arriving at the MDA, preselect the missed approach altitude.
7. When runway is visually acquired, disengage autopilot and continue to landing. If runway is not in sight at missed approach point or a safe landing cannot be accomplished, execute a go around.

NOTE: Procedures for a two-engine NDB approach are the same, except landing flaps are limited to FLAPS 35.

FMS - VFR Approach and Landing
FMS NAV and FMS PROF



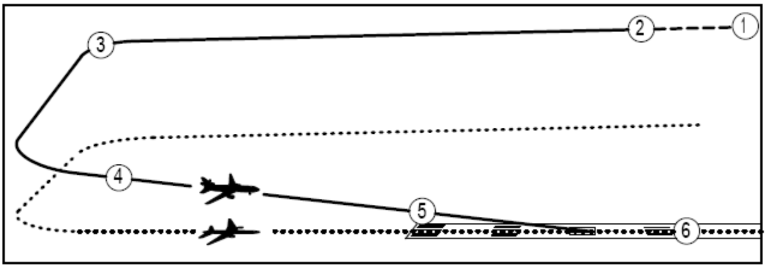
1. Complete appropriate checklists. Extend slats. Select the VFR approach from the FMS data base.
2. Enter downwind at traffic pattern altitude with FLAPS 28 and speed at least Vmin + 5.

   NOTE: Set the FCP altitude to the altitude where the decision to land will be made.

3. Select DIRECT-TO the final approach fix indicated in the flight plan as "FAxx" where "xx" is the runway number of the landing runway. Ensure there is an altitude constraint at the fix at a minimum of 1,500 ft above the airport.
4. Engage NAV.
5. Prior to the FAF, extend the landing gear, select landing flaps, and slow to Vapp.
6. Depart the FAF at Vapp. The vertical deviation indicator (VDI) will refer to a level segment from the FAF until the aircraft intercepts a 3° glidepath. Disengage the PROF mode prior to departing the FAF altitude by use of vertical speed or flight path angle to fly the 3° path. The VDI will be centered when on the 3° path.
7. At the FCP altitude, make the decision to land. If landing is desired, disconnect the autopilot. If a go-around is desired, set the FCP to the desired traffic pattern altitude and initiate a go-around.

   NOTE: Procedures for a two-engine FMS VFR approach are the same, except landing will be with FLAPS 35.

No Flap and No Slat Approach



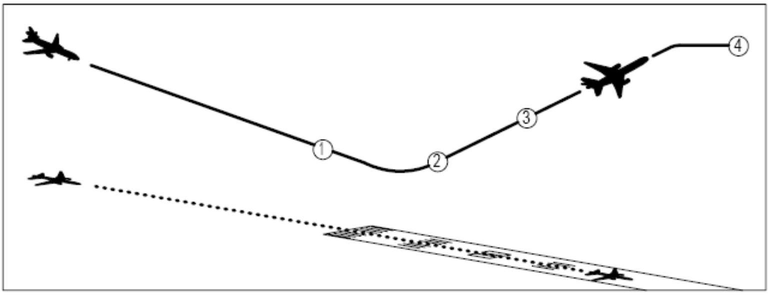
1. Complete appropriate checklists, flaps/slats at UP/RET and Vmin + 5for configuration. Flight director, autopilot and autothrottles may be engaged if available. Autothrottles must be disconnected prior to landing.
2. Fly wider than normal downwind at traffic pattern altitude. Extend the landing gear and maintain Vmin + 5 for UP/RET.

   NOTE: With hydraulic system 3 inoperative or if hydraulic system 3 is the only available system, use alternate gear extension.
   Autobrakes are not available for landing and should be selected off.

3. Delay base turn to provide longer than normal final.
4. Establish the aircraft on final. Fly a normal glideslope. Maintain Vapp for UP/RET.
5. Approaching the threshold, retard throttles to idle. Cross threshold no lower than 50 feet AGL. Use a slight flare. Do not hold aircraft off. Excessive flare will result in float and decreased available stopping distance.
6. Positively lower nose to runway, use reverse thrust and smoothly apply maximum manual anti-skid braking. Confirm spoiler deployment at nosewheel touchdown. Full reverse thrust may be used to a complete stop, if required.

   NOTE: Autothrottles will not retard at 50 feet with flaps less than the landing range and must be disconnected prior to landing.

No Flap and No Slat Go-Around (Manual)

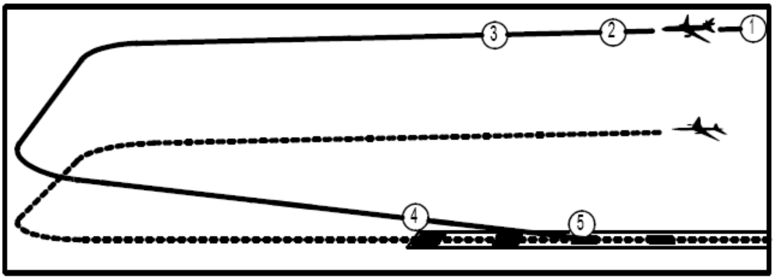


NOTE: During a NO FLAP/ NO SLAT approach with autopilot and autothrottles either ON or OFF, pushing the GA switch only selects the GA thrust limit. Flight guidance is not activated and autothrottles, if engaged, will not automatically advance to the GA thrust limit.

Tail strikes may occur at rotation rates of 3.8°/second or greater or pitch angles in excess of 12° below 35 feet AGL.

1. Disconnect autothrottles and autopilot, push GA switch and manually advance throttles to GA limit. Simultaneously increase pitch to establish climb and maintain go-around airspeed of Vmin+ 5 UP/RET.
2. At positive climb rate, move gear handle to UP, and verify appropriate missed approach altitude, heading and airspeed have been preselected.
3. Select level change. This will command pitch guidance to maintain selected airspeed. Engage auto flight, if desired. Select desired roll mode to comply with missed approach procedure. Maintain commanded airspeed until reaching clearance altitude.
4. At clearance altitude pull SPEED SELECT knob to accelerate to desired airspeed.

Flap with No Slat Approach



1. Complete appropriate checklists. Flaps/slats UP/RET with airspeed at or above Vmin + 5 for UP/RET.
2. Downwind select FLAPS 28. Maintain airspeed at or above Vmin + 5 for UP/RET (referenced from the amber foot and Volume I speed chart).

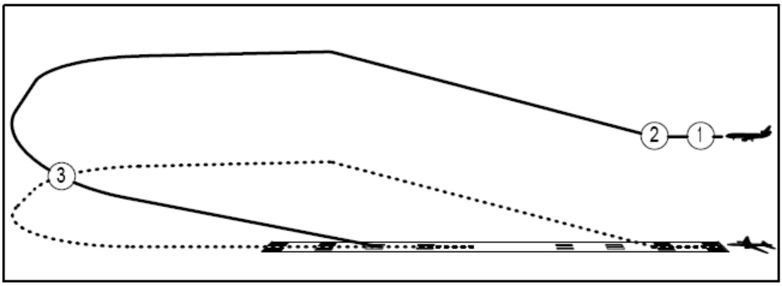
   CAUTION: The Vmin FLAPS 28 speed on the FMS APPROACH page is for slats extended configuration.

3. Abeam the approach end of the runway or appropriate point during an instrument approach; extend the landing gear. Maintain Vapp FLAPS 28.
4. Cross threshold at Vapp and use a slight flare to diminish the sink rate and raise the nose of the aircraft to at least a level attitude. Disconnect autothrottles. Retard throttles to idle. Do not hold aircraft off. Excessive flare will result in float and excessive use of runway.

   CAUTION: Tail strike may occur at deck angle greater than 10°.

5. Continue normal landing rollout. Autospoilers will not deploy until nose wheel touchdown.

Circling Approach (All Engine)



1. Fly the appropriate approach procedure to the MDA with gear down and FLAPS 35 and Vmin + 5. AUTO FLIGHT may be used as desired with heading select to maneuver. Use of autopilot and autothrottles will greatly reduce pilot workload.

   NOTE: When flying an ILS approach and circling to land, set either or both BARO minimums to the CIRCLE-TO-LAND MDA. When established on the ILS localizer and prior to DUAL/SINGLE LAND annunciation, preselect the FCP altitude to the same MDA value. After glideslope capture, the aircraft will descend to the MDA and the FMA will read APPR ONLY. At the MDA, the FMA will change to heading and altitude hold. Maneuvering can be accomplished with heading or track select mode.

2. Commence the appropriate circling maneuver maintaining Vmin + 5 KIAS for FLAPS 35.

3. Turning to final, maintain Vapp for desired landing configuration. Establish normal final approach path for landing.

   NOTE: Procedures for a two-engine circling approach are the same, except landing flaps are limited to FLAPS 35.

   During a two-engine approach, if a second engine fails on final and the gear is down, add power as required, set flaps to FLAPS 28, maintain Vref + 5 for FLAPS 28 and continue approach. GPWS switch should be moved to FLAP OVRD, conditions permitting.

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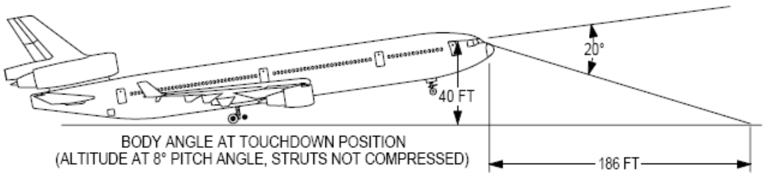
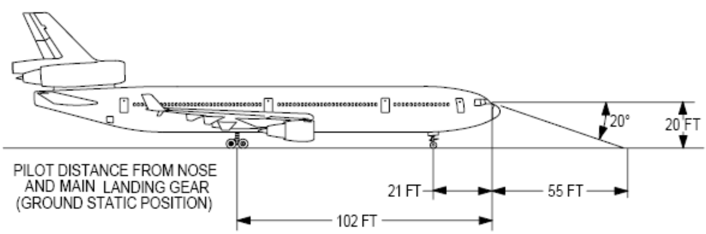
Pilot Eye Orientation

General

PILOT EYE ORIENTATION AIRCRAFT ON GROUND

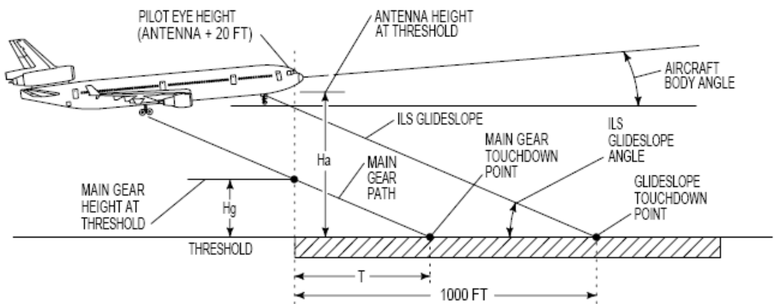




ILS Approach and Landing Flaps 35 (1.3Vs)

ILS APPROACH

ESTIMATED TOUCHDOWN POINT (NO FLARE) ASSUMING G/S TRANSMITTER AT 1000 FT

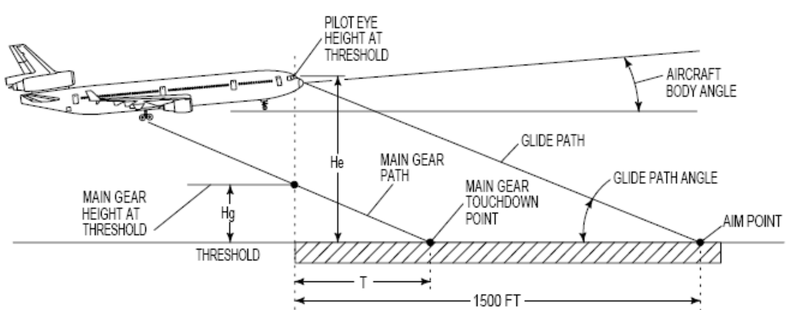


GLIDE PATH ANGLE (DEGREES)	ESTIMATED BODY ANGLE (DEGREES) ①	ESTIMATED BODY ANGLE (DEGREES) ②	ANTENNA HEIGHT Ha AT THRESHOLD (FEET)	MAIN GEAR HEIGHT Hg AT THRESHOLD (FEET) ①	MAIN GEAR HEIGHT Hg AT THRESHOLD (FEET) ②	MAIN GEAR TOUCH-DOWN POINT, T (FEET) ①	MAIN GEAR TOUCH-DOWN POINT, T (FEET) ②
2.5	6.1	4.7	44	26	28	540	636
3.0	5.6	4.2	52	34	37	658	697
3.5	5.1	3.9	61	43	35	707	740

① C.G. @ 12% MAC ② C.G. @ 34% MAC

VISUAL APPROACH

ESTIMATED TOUCHDOWN POINT (NO FLARE) ASSUMING AN AIM OF 1500 FT



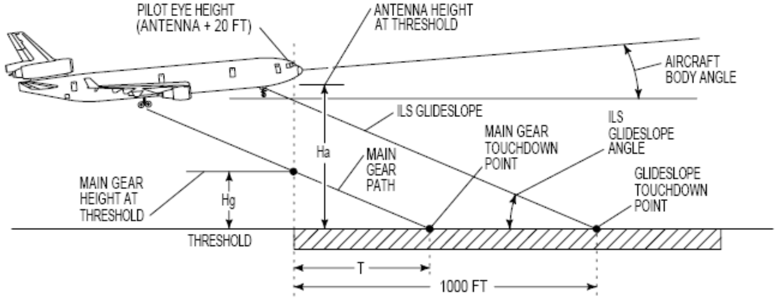
GLIDE PATH ANGLE (DEGREES)	ESTIMATED BODY ANGLE (DEGREES) ①	ESTIMATED BODY ANGLE (DEGREES) ②	PILOT EYE HT He AT THRESHOLD (FEET)	MAIN GEAR HEIGHT Hg AT THRESHOLD (FEET) ①	MAIN GEAR HEIGHT Hg AT THRESHOLD (FEET) ②	MAIN GEAR TOUCH-DOWN POINT, T (FEET) ①	MAIN GEAR TOUCH-DOWN POINT, T (FEET) ②
2.5	6.1	4.7	66	28	30	630	687
3.0	5.6	4.2	79	41	43	775	822
3.5	5.1	3.9	92	54	56	879	919

① C.G. @ 12% MAC ② C.G. @ 34% MAC

ILS Approach and Landing Flaps 50 (1.3Vs)

ILS APPROACH

ESTIMATED TOUCHDOWN POINT (NO FLARE) ASSUMING G/S TRANSMITTER AT 1000 FT

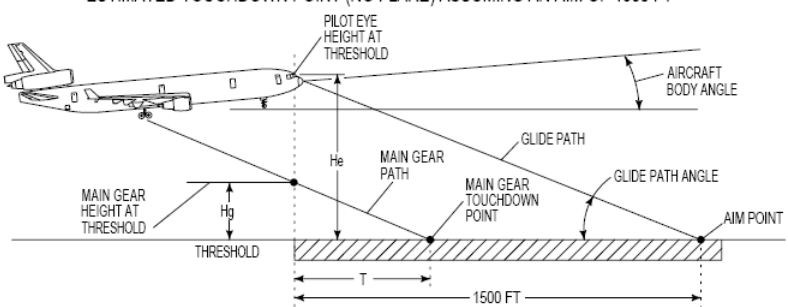


GLIDE PATH ANGLE (DEGREES)	ESTIMATED BODY ANGLE (DEGREES) ①	②	ANTENNA HEIGHT Ha AT THRESHOLD (FEET)	MAIN GEAR HEIGHT Hg AT THRESHOLD (FEET) ①	②	MAIN GEAR TOUCH-DOWN POINT, T (FEET) ①	②
2.5	4.9	3.5	44	27	30	630	676
3.0	4.4	3.0	52	36	38	691	730
3.5	3.9	2.5	61	45	47	735	762

① C.G. @ 12% MAC ② C.G. @ 34% MAC

VISUAL APPROACH

ESTIMATED TOUCHDOWN POINT (NO FLARE) ASSUMING AN AIM OF 1500 FT



GLIDE PATH ANGLE (DEGREES)	ESTIMATED BODY ANGLE (DEGREES) ①	②	PILOT EYE HT He AT THRESHOLD (FEET)	MAIN GEAR HEIGHT Hg AT THRESHOLD (FEET) ①	②	MAIN GEAR TOUCH-DOWN POINT, T (FEET) ①	②
2.5	4.9	3.5	66	30	32	679	738
3.0	4.4	3.0	79	43	45	815	863
3.5	3.9	2.5	92	56	58	913	954

① C.G. @ 12% MAC ② C.G. @ 34% MAC

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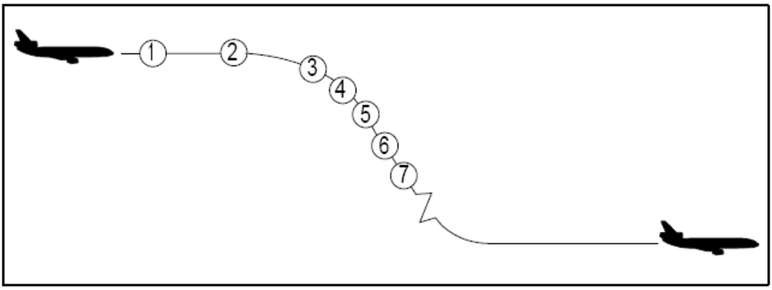
Miscellaneous

Emergency Descent



1. Complete the Emergency Alert procedure CABIN ALTITUDE, if required.
2. Simultaneously pull the altitude select knob and select a lower altitude to initiate a descent in the PITCH mode. Descend to 10,000 feet or minimum safe altitude, whichever is higher.
3. Deploy the speed brakes to the full flight position.
4. On the IAS/MACH select knob, .85 MACH or select 320 to 350 KIAS. Descend straight ahead or maximum 30° bank and limit pitch to 10° nose down.

   WARNING: If structural damage is suspected or turbulence present, do not exceed .82 Mach or 305 KIAS.

   NOTE: If descent was initiated in the MACH mode, an automatic changeover will occur at the equivalent MACH/IA S changeover point or FL 270, whichever occurs first.

5. Unless otherwise required, set code 7700 in the transponder.
6. Move the NO SMOKE/SEAT BELTS switches to ON.
7. Verify descent to 10,000 feet or minimum safe altitude, whichever is higher.

Recovery From Approach To Stall

At first indication of approach to stall, simultaneously apply maximum available thrust, level wings and adjust pitch as required to minimize altitude loss. In an emergency situation (i.e., encountering a downdraft or decreased performance windshear condition), positive climb performance and limited maneuver margins still exist at or near stick shaker actuation speed. The pitch limit indicator (PLI) can be expected at a high pitch angle; however, pitch attitude should not be increased so rapidly that airspeed decreases below stick shaker actuation speed.

First indication of approach to stall may be one or any combination of the following:

- Rapid decrease below selected airspeed or digital airspeed turns amber.
- Throttles advance with autothrottles off and speed FMA flashes.
- Airspeed decay below the Vmin indicator toward the Vs indicator on the airspeed tape.
- Pitch attitudes approaching the PLI (PLI turns amber or red).
- Aircraft pitches down due to LSAS input (increase force as necessary to maintain flight path).
- Rapid decrease of climb rate during takeoff or go-around.
- Rapid increase of sink rate during approach.
- Stick shaker or initial stall buffet (light wing rock may be present).

If ground contact is imminent, apply maximum available thrust (up to throttle mechanical stops) for the time required to recover from the situation. Additional force will be required to override the overboost stop providing maximum available thrust.

At first indication of a stall with autoflight engaged immediately disconnect auto flight and initiate stall recovery. Be alert to counteract excessive nose-up trim condition.

NOTE: After a maximum thrust application (overboost), those engine parameters which exceeded the limits *and the duration will require a log entry.*

Stall recoveries are initiated at the first indication of approach to stall. This is particularly important with flaps 28 and slats retracted (28/RET).

Heavy/extensive stall-related buffeting at high altitudes may cause damage to outboard elevator skin panels. A maintenance log entry should be made and surfaces inspected after landing if these conditions are encountered.

Recover From Approach to Stall

CLEAN CONFIGURATION

FIRST INDICATION OF APPROACH TO STALL

APPLY MAX AVAILABLE THRUST.

LEVEL WINGS.

ADJUST PITCH AS REQUIRED TO MINIMIZE ALTITUDE LOSS.

EXTEND SLATS (BELOW IAS/MACH SLAT LIMIT).

ACCELERATE TO APPROPRIATE AIRSPEED.

AT ALTITUDES WHERE PERFORMANCE IS LIMITED

ACCEPT AN ALTITUDE LOSS WHILE ACCELERATING TO CLEAN MINIMUM MANEUVERING SPEED.

ADJUST CONFIGURATION AS APPROPRIATE, THEN RETURN TO DESIRED ALTITUDE AND AIRSPEED.

NOTE

PREMATURE RECOVERY MAY RESULT IN A SECONDARY STALL OR INABILITY TO ACCELERATE TO CRUISE MACH WITH THRUST AVAILABLE.

TAKEOFF, APPROACH, LANDING OR GO-AROUND CONFIGURATION

FIRST INDICATION OF APPROACH TO STALL

APPLY MAX AVAILABLE THRUST.

LEVEL WINGS.

ADJUST PITCH AS REQUIRED TO MINIMIZE ALTITUDE LOSS OR TO PROVIDE OBSTACLE CLEARANCE.

MAINTAIN EXISTING FLAP/SLAT AND GEAR CONFIGURATION.

IF GROUND CONTACT IS IMMINENT, APPLY MAX THRUST (UP TO THROTTLE MECHANICAL STOPS).

ACCELERATE TO MINIMUM MANEUVERING SPEED FOR EXISTING CONFIGURATION, THEN ADJUST CONFIGURATION AS DESIRED.

Upset Recovery

An upset can generally be defined as unintentionally exceeding the following conditions:

- Pitch attitude greater than 25 degrees nose up, or
- Pitch attitude greater than 10 degrees nose down, or
- Bank angle greater than 45 degrees, or
- Within above parameters, but flying at airspeeds inappropriate for the conditions.

The following techniques represent a logical progression for recovering the aircraft. The sequence of actions is for guidance only and represents a series of options to be considered and used depending on the situation. Not all the actions may be necessary once recovery is underway. If needed, use pitch trim sparingly. Careful use of rudder to aid roll control should be considered only if roll control is ineffective and the aircraft is not stalled.

These techniques assume that the aircraft is not stalled. A stalled condition can exist at any attitude and may be recognized by continuous stick shaker activation accompanied by one or more of the following:

- Buffeting, which could be heavy at times
- Lack of pitch authority and/or roll control
- Inability to arrest descent rate

If the aircraft is stalled, recovery from the stall must be accomplished first by applying and maintaining nose down elevator until stall recovery is complete and stick shaker activation ceases.

Nose High Recovery Technique

<u>WARNING:</u> **Excessive use of pitch trim or rudder may aggravate an upset situation or may result in loss of control and/or high structural loads.**

- Recognize and confirm the situation.

- Disconnect autopilot and autothrottles.
- Apply as much as full nose down elevator.
- Apply appropriate nose down stabilizer trim.
- Thrust, as appropriate.
- Roll (adjust bank angle to as much as 60 degrees) to obtain a nose down pitch rate.
- Complete the recovery:
    - check airspeed and adjust thrust
    - when approaching the horizon, roll to wings level
    - establish pitch attitude

Nose Low Recovery Technique

WARNING: Excessive use of pitch trim or rudder may aggravate an upset situation or may result in loss of control and/or high structural loads.

- Recognize and confirm the situation.
- Disconnect autopilot and autothrottles.
- Roll in the shortest direction to wings level (unload and roll if bank angle is more than 90 degrees).
- Recover to level flight:
    - apply nose up elevator
    - apply nose up trim, if required
    - adjust thrust and drag as required

[END]

GPWS Warning Procedures

General

Under certain conditions of flight where immediate visual reference to the surrounding terrain is not available, prompt and decisive action is required for a GPWS warning.

CAUTION: Do not ignore short duration warnings. Take immediate action.

The GPWS system provides notification to the crew at two levels depending on the urgency of the situation. The more critical cases provide warnings. The less critical cases provide cautions.

GPWS Warning

Any of the following conditions is regarded as a GPWS warning:

- Activation of the GPWS "TERRAIN TERRAIN, PULL UP," "TERRAIN AHEAD, PULL UP," or "PULL UP" aural annunciations.
- A solid red warning area displayed on the navigation displays (ND).
- Red GROUND PROX message in the flight mode annunciator (FMA).

Activation of GPWS Warning

The flight crew should be familiar with the following sequence of actions and use them immediately upon activation of an aural or visual GPWS warning:

- Immediately apply go-around power.
- Disengage the autopilot.
- Immediately rotate the aircraft at a rate of 3 degrees per second (similar to a normal takeoff rotation rate) to a 20 degree pitch attitude.

Trade airspeed for climb performance. If necessary (to prevent ground contact), continue to increase pitch attitude until stick shaker actuates. In this situation, consider use of engine boost by moving throttles to their mechanical limits (through the overboost stop).

NOTE: If engine emergency overboost is used, enter the event into the log.

Although there are no pitch limitations in emergency conditions, caution must be exercised to keep from maintaining pitch attitudes that result in continuous actuation of stick shaker.

- Retract speed brakes (if extended).
- Turn flight director off or disregard commands.
- Level the wings to assure maximum aircraft performance.
- Do not change gear or flap configuration until terrain separation is assured.
- Monitor radio altimeter for sustained or increasing terrain separation.
- After the GPWS warning ceases, continue climb to published minimum safe altitude.

GPWS Caution

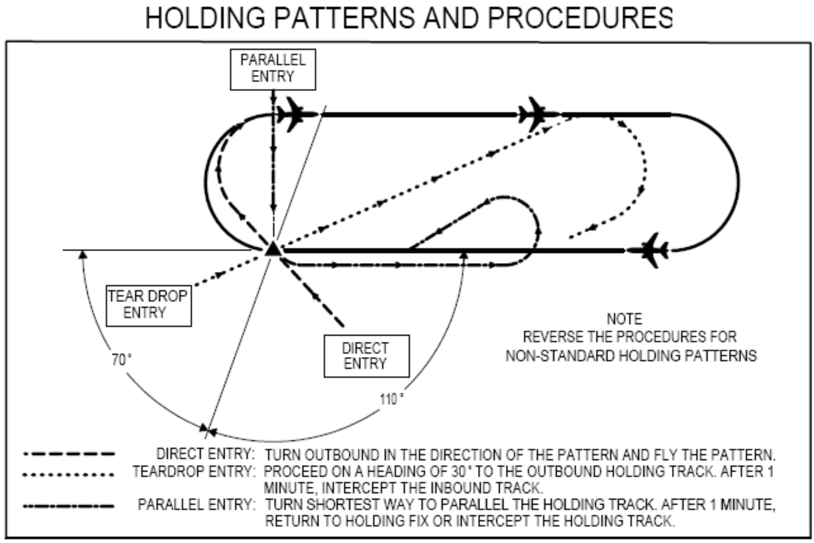
Any of the following conditions is regarded as a GPWS caution:

- Activation of the GPWS "TERRAIN AHEAD," "CAUTION TERRAIN," "TERRAIN TERRAIN," "TOO LOW TERRAIN," "SINK RATE," "DON'T SINK," "GLIDESLOPE," "TOO LOW FLAPS," or "TOO LOW GEAR" aural annunciations.
- A solid yellow caution area displayed on the ND.
- Amber GROUND PROX message in the FMA.

Activation of the GPWS Caution

The flight crew should immediately correct the aircraft flight path or configuration. If safe terrain clearance is in doubt, perform the terrain avoidance maneuver immediately until flight deck indications show clear of terrain.

Holding Patterns and Procedures



Enroute to a holding fix, the appropriate radios should be properly tuned and identified.

Reduce speed to the appropriate maximum holding speed or less within 3 minutes prior to ETA at the holding fix. Make all turns during entry and while holding with a 30 degree bank angle or flight director computer bank angle.

14,000 feet and below: 1-minute pattern

Above 14,000 feet: 1.5-minute pattern

Maximum Holding Pattern Airspeeds

ALTITUDES OR FLIGHT LEVELS	MAXIMUM KIAS		STILL AIR OUTBOUND TIMING
	ICAO	US	
Above FL 340	Mach .83	265*	1.5 Minutes
Above FL 200 to FL 340	265		
Above 14,000 ft to FL 200	240		
Above 6,000 ft to 14,000 ft	230	230*	1 Minute
MHA to and including 6,000 ft			

* Unless restricted to a lower speed

For maximum fuel economy, hold clean. If chart speed exceeds maximum holding pattern airspeed, obtain ATC approval for the higher airspeed or use the minimum flap setting which meets the speed restriction.

Compensate for known effect of wind except when turning. Once established in the holding pattern, the drift correction angle can be determined along the inbound course. On the outbound leg of 1-minute patterns, the inbound drift correction should be tripled and applied to the outbound course. In 1.5-minute patterns, the inbound drift correction should be multiplied by 2.5 and applied to the outbound course. The size of the pattern is governed by inbound times.

Outbound timing begins over or abeam the fix, whichever is later. If the abeam position cannot be determined, start timing when the turn to the outbound heading is completed.

Hydraulic System 1 and 2 Failure With "HYD 3 ELEV OFF" Alert

A catastrophic failure of number 2 engine in flight or other severe abnormality could conceivably result in a total loss of hydraulic power. Unlikely as this may be, it did happen to a DC-10 and as a result, certain modifications were made to the MD-11 hydraulic system 3. An "enhancement" to system 3 consists of an electrically operated shutoff valve in the supply line, a check valve in the return line, a sensor switch in the reservoir, and an EAD level 1 alert in the cockpit. The shutoff valve is aft of the rear fuselage pressure bulkhead. For whatever reason, if a break should occur in hydraulic system 3 aft of the rear bulkhead, the shutoff valve will close, preserving hydraulic fluid and pressure forward of the bulkhead and the alert "HYD 3 ELEV OFF" will be displayed. The results of this alert, combined with dual failure of hydraulic systems 1 and 2 may be countered with the following:

1. **Flight Controls**

   What is Lost

   - Upper and lower rudder
   - All elevators
   - All spoilers (except number 3 L and R)
   - Flaps
   - Number 1 stabilizer trim motor
   - Autopilots 1 and 2
   - 3-2 non-reversible motor pump

   What Remains

   - Normal aileron control (hydraulic system 3)
   - Aileron trim
   - Number 3 spoilers (hydraulic system 3)
   - Slats
   - Stabilizer trim (reduced rate)
   - Pitch control (by thrust control)

2. **Aircraft Stabilization**

   Roll

Attempt to gain/recover aircraft control using conventional aileron input for lateral control and, a combination of power and stabilizer trim for pitch control. It is recommended that the autothrottles be disengaged and a wings-level attitude be held with aileron control. Aileron trim may now be used to trim out the aileron control wheel forces due to the rolling moment (if any) due to aircraft damage. It should be noted that without rudder control (i.e., no fluid in hydraulic system 2 for the 3-2 non-reversible motor pump), there will be a slight, unbalanced side force that may be easily controlled by a very small bank angle.

Pitch

The relative ease of establishing roll control, and the use of symmetric throttles now allows full attention to pitch control. The aircraft will naturally tend to oscillate in the pitch axis. The nature of the oscillations must be understood before discussing aircraft control. If the pitch attitude is upset with the aircraft stable in roll and yaw, the aircraft speed will change depending on the direction of the pitch change. As the aircraft pitch attitude increases (aircraft nose up), the airspeed will decrease resulting in less lift on the wing and horizontal stabilizer. At the point where there is insufficient lift on the wing/stabilizer combination to maintain the pitch attitude, the nose begins to fall. As it does, the airspeed increases causing lift to increase to the point where the pitch begins to increase again. This cycle repeats itself over a period of time. This long period pitch oscillation is called the "phugoid mode," a characteristic inherent in all aircraft designs. The degree of "damping," or the time it takes for the pitch oscillations to subside, varies with aircraft design.

Because the wing engines are mounted below the center of gravity of the aircraft, a net increase in thrust will tend to pitch the nose up and a decrease in thrust will pitch the nose down. Consequently, to control pitch oscillations with wing engine thrust changes, it is necessary to apply power just as the nose is coming down and to retard power as soon as the nose is rising. (If asymmetric thrust is necessary to maintain wings level, power changes must be made while maintaining the power asymmetry). Judicious and aggressive use of power changes (i.e., jam accelerations followed by rapid throttle chops) are instrumental in helping to dampen the phugoid oscillations. However, care must be taken to avoid aggravating the situation by applying power out-of-phase thereby increasing the amplitude of the pitch oscillations.

3. Assess the Situation

Damage

Assess the aircraft damage by whatever means possible. Weather and other operational considerations permitting, such as day VFR conditions, consider calling for a chase aircraft to advise of the extent of damage. Visual examination from inside the aircraft may afford some degree of damage assessment.

Control

Continually assess the controllability of the aircraft and remain alert for any further degradation of control. Attempt small turns and climb or descend to learn the aircraft response to power inputs.

Landing Site

As the aircraft returns to some degree of control using the above techniques, consideration should be given to a landing site. Many factors need to be taken into consideration, such as runway length and width, navigation aids, meteorological conditions, terrain, populated areas, crash-fire-rescue capabilities, and most important, the degree of aircraft control. Given some confidence in the structural integrity of the aircraft and the degree of aircraft control, consideration should be given to remaining airborne to reach a more desirable landing site versus a hasty landing in the immediate vicinity. If a distant landing site is selected, determine the aircraft's capability to maintain altitude enroute to the landing area. Consider the fuel remaining and its distribution before dumping fuel to reduce the gross weight.

Fuel Transfer

The fuel distribution may enable the transfer of fuel both fore and aft for CG control and laterally for roll control. Lateral fuel transfer to level wings is desirable because it allows both wing engines to be at the same throttle setting if asymmetric power was required to maintain constant heading. Matched throttles allow full concentration on pitch and facilitates heading changes simply by changing the left and right engine power simultaneously with one hand on both throttles. Longitudinal fuel transfer from the number 2 tank (or aux tanks) to tanks 1 and 3 moves the center of gravity aft which effectively reduces the trim speed without changing the configuration. A reduction in trim speed is very important because it tends to reduce the landing speed, thus enhancing stopping capability.

4. **Descen**t

The most ideal situation for controllability should be radar vectors, making gentle turns to a much extended final approach. Keep in mind the rule of 3 (30 miles out, 10,000 feet).

When trimming the stabilizer to make pitch changes, either the wheel trim switches or the suitcase handles may be used. The wheel trim switches must be held momentarily to assure stabilizer movement in either direction. When approaching the desired pitch attitude, it may be necessary to reverse the trim input to stop the motion at the required level. After the first few attempts at trimming, it may become apparent that some anticipation and input reversal is required. The suitcase handles may also be used to trim the stabilizer by placing both handles firmly to at least the first soft detent position (or beyond if necessary). However, this may be distracting because it requires the pilot to alternate his right hand between the throttles and the suitcase handles.

5. **Approach**

During maneuvering in the terminal area, the slats may be extended to allow a reduction in airspeed. Slat extension may require airspeed to be reduced because the slats are now powered by a single hydraulic system. The airspeed should be reduced to the UP/RET minimum maneuvering speed and the slat handle moved to 0/EXT. If slats do not extend in the normal time of about 10 seconds, it may be necessary to slow to the 1.3 Vs speed for UP/RET. Slowly decelerate to the 1.3 Vs speed and observe slat extension. There will be a slight nose down

pitching moment as the slats extend. This is easily controlled by stabilizer trim. The speed may be reduced to the 0/EXT maneuvering speed once the slats are extended.

The landing gear should be extended when approaching the outer marker (or equivalent distance). Allow sufficient time to accomplish the procedure as outlined in the HYD 1 & 2 FAIL procedure. The alternate gear extension lever should be raised and the gear monitored for normal free fall indications. Free fall of the center gear on should be accomplished. There will be a pitch up tendency as the gear extends and a noticeable drag increase. The nose-up pitching moment is easily controlled by the stabilizer trim and the drag increases are controlled by thrust application. When all required gear have been extended, the normal landing gear lever should be moved down and the alternate gear handle stowed.

When preparing for the approach, note the capability to maintain altitude during the initial approach. To maintain as low a rate of descent as possible, plan for a long, flat approach. The initial part of the approach should incorporate the use of all visual aids available at the landing site, as well as heavy reliance on visual cues. If the runway has no ILS, the VOR or ADF guidance may aid in alignment at the initial stage of the approach. Radar vectors may also be helpful at the early state, particularly in cases of reduced visibility. Attempt to reach the vicinity of the outer marker (or 5 to 7 miles from touchdown) at approach altitude with the gear extended, aligned with the runway and with the pitch controlled as much as possible. Keep in mind that there is more thrust available at lower altitudes. Jam accelerations followed by rapid throttle chops may be necessary to control pitch without generating additional pitch oscillations as a sustained thrust input would do. If asymmetric thrust is required to keep the wings level, a rolling tendency will occur if both throttles are retarded to idle without maintaining the thrust asymmetry. Also, be aware of any tendency for the engines to accelerate asymmetrically. This is likely to occur when the throttles are moved from idle than from approach power settings.

6. Landing

Adjust the touchdown aim point toward the far end of the runway and continue to fly the thrust for speed control and stabilizer trim to maintain the desired attitude/flight path angle. Smooth, deliberate throttle adjustments for speed control while far out on the approach will make the task of trimming the stabilizer easier due to the slower than normal rate-of-trim. Begin the transition from stabilizer trim to thrust for flight path angle on the final part of the approach (about 500 feet AGL). Aggressive power application (i.e., rapid accelerations followed by immediate throttle chops), will allow the small changes in pitch attitude necessary to maintain the touchdown aiming point without significantly changing the speed, assuming the approach is stable in the pitch axis. Throttle adjustments may need to be more aggressive as the aircraft enters ground effect. There should be no attempt to accomplish a smooth landing but simply reduce the sink rate as much as practical without ballooning or skipping.

Upon touchdown, apply full brake pedal deflection and, as the nose comes to the runway, initiate reverse thrust on the wing engines. Continue to hold full brake deflection and monitor brake system 2 pressure (powered by hydraulic system 3) noting anti-skid operation. With the enhanced hydraulics, spoiler panel 3 on each wing will be powered and should be deployed at nose gear touchdown. Restricted nose wheel steering is available and should be used for directional control until the aircraft slows to taxi speed.

7. Go-Around

If the final approach is not stable nearing touchdown, a go-around may be attempted by advancing the power and allowing the aircraft to pitch up. Remember that the power is not controlling speed so only enough thrust should be used to initiate a climb at moderate pitch attitude. Too much pitch could cause the stick shaker to activate and/or the aircraft may stall. Keep in mind that adding power if a power differential was required to keep wings level, will necessitate that the power differential be maintained to avoid the initiation of roll or a heading change during the go-around. Attempt to level off at a safe altitude and reinitiate the approach as before. If the approach is unstable and insufficient fuel exists for another attempted landing, or for other operational reasons a landing is necessary, it may be advisable to continue the approach and trade the original aiming point on the runway for a more stable and controlled touchdown in close proximity to the runway.

Loss of Engine Thrust Control

General

All turbojet and turbofan engines are susceptible to the loss of engine thrust control. Various failures can include signals to the metering devices being lost, or even mechanical failure within the fuel metering component.

With any failure of this type the engine manufacturers' programming or design failure may cause the engine to accelerate, go to idle thrust, maintain the current power setting, or in a few cases the engine may shutdown.

Procedure

If loss of engine thrust control is recognized:

- During engine start or ground operations, shut down the engine using the fuel switch immediately.
- During takeoff, and the engine remains at high thrust, continue the takeoff and climb to a safe altitude; if the takeoff is rejected, monitor engine thrust output and if directional control becomes a problem, immediately shut down the affected engine.

- During climb, cruise or descent, maintain a safe altitude and stabilize the aircraft. Manage the available thrust as required for the flight conditions.

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Performance Data

Normal and Abnormal Configuration Reference Speeds (VREF)

LDG WT (1000 LB)	NORM CONF VREF		ABNORMAL CONFIG VREF									
	FLAP/SLAT		FLAP/SLAT									
	35/ EXT (1,4)	50/ EXT(1)	UP/ RET (2)	0/EXT (3)	10/ EXT (1)	15/ EXT (1)	20/ EXT (1)	25/ EXT (1)	28/ EXT (1,4)	15/ RET	25/ RET	28/ RET (1)
300	131	129	173	140	136	134	132	130	130	162	157	156
320	132	129	178	145	140	138	136	135	134	168	162	161
340	136	132	184	149	145	142	140	139	138	173	168	166
360	140	135	189	154	149	146	144	143	142	178	173	172
380	144	139	194	158	153	151	148	147	146	183	177	176
400	147	143	199	162	157	154	152	151	150	187	182	180
420	150	146	204	166	161	159	156	154	153	192	186	185
440	154	150	209	170	165	162	159	158	157	197	190	189
460	157	153	214	174	169	166	163	161	160	201	195	193
480	161	156	219	178	172	169	166	165	164	206	199	198
500	165	159	223	181	176	172	170	168	167	210	204	202
520	168	163	227	185	179	176	173	172	171	214	208	206
540	171	166	232	188	183	179	177	175	174	218	212	210
560	174	169	236	192	186	183	179	178	177	222	215	*
580	177	172	242	195	190	186	183	181	180	226	219	*
600	181	175	244	199	192	189	186	184	183	230	*	*
620	183	178	248	202	196	192	190	187	186	234	*	*

1. Vapp is the greater of Vref + 5 or Vref +wind additive (see 5).
2. Vapp is Vref + 5. DO NOT ADD WIND.
3. Vapp is the greater of Vref + 15 or Vref + wind additive (see 5).
4. If HDY 2 & 3 failure, Vapp is the greater of Vref + 8 or Vref + wind additive (see 5).
5. Wind additive is 1/2 of the steady state wind greater then 20 knots or full gust, whichever is greater (max 20 knots)

* Exceeds flap placard.

Dry Runway Estimated Landing Distance

FLAPS 50/EXT

WEIGHT (1000 LB)	360	380	400	420	440	460	480	500
S.L. STD= 15ºC	3670	3820	3970	4110	4250	4410	1550	4720
2000 FT STD= 11ºC	3850	4020	4180	4330	4480	4650	4800	4980
4000 FT STD= 7ºC	4060	4230	4410	4570	4720	4910	5070	5260
6000 FT STD= 3ºC	4270	4460	4650	4820	4990	5190	5370	5580
8000 FT STD= -1ºC	4510	4710	4910	5100	5280	5500	5690	5920
10000 FT STD= -5ºC	4760	4980	5200	5410	5620	5890	6110	6380
NOTE: No Reverse Thrust, Standard Day, No Wind, Zero Slope (Includes Air Run Distance).								

CORRECTIONS	
TEMPERATURE: VALID FROM STD -20ºC TO STD +40ºC	
FEET PER ºC	
BELOW Standard Day	-10
ABOVE Standard Day	+24

SLOPE: VALID FROM -2% DOWNHILL +2% UPHILL	
FEET PER 1% SLOPE	
Uphill	-64
Downhill	+199

WIND: VALID FROM -10 KNOT TAILWIND +20 KNOT HEADWIND	
FEET PER KNOT	
Headwind	-27
Tailwind	+80

35/EXT

WEIGHT (1000 LB)	360	380	400	420	440	460	480	500
S.L. STD= 15ºC	3940	4090	4250	4420	4590	4730	4910	5070
2000 FT STD= 11ºC	4140	4310	4480	4660	4840	5000	4190	5360
4000 FT STD= 7ºC	4360	4540	4720	4920	5110	5280	5490	5670
6000 FT STD= 3ºC	4600	4800	4990	5200	5410	5600	5820	6020
8000 FT STD= -1ºC	4860	5070	5280	5510	5740	5940	6180	6450
10000 FT STD= -5ºC	5150	5370	5600	5850	6110	6400	6670	6960

NOTE: No Reverse Thrust, Standard Day, No Wind, Zero Slope (Includes Air Run Distance).

CORRECTIONS	
TEMPERATURE: VALID FROM STD -20ºC TO STD +40ºC	
FEET PER ºC	
BELOW Standard Day	-11
ABOVE Standard Day	+28

SLOPE: VALID FROM -2% DOWNHILL +2% UPHILL	
FEET PER 1% SLOPE	
Uphill	-71
Downhill	+238

WIND: VALID FROM -10 KNOT TAILWIND +20 KNOT HEADWIND	
FEET PER KNOT	
Headwind	-29
Tailwind	+92

Wet Runaway Landing Distances

50/EXT

WEIGHT (1000 LB)	360	380	400	420	440	460	480	500
S.L. STD= 15ºC	4850	5020	5210	420	5600	5830	6020	6250
2000 FT STD= 11ºC	5120	5320	5520	5740	5950	6190	6390	6640
4000 FT STD= 7ºC	5410	5620	5860	6090	6310	6580	6800	7070
6000 FT STD= 3ºC	5730	5960	6240	6480	6720	7010	7250	7550
8000 FT STD= -1ºC	6080	6360	6640	6910	7160	7480	7750	8070
10000 FT STD= -5ºC	6460	6870	7090	7390	7690	8050	8380	8750

NOTE: Full Reverse Thrust, Standard Day, No Wind, Zero Slope, 3 engines at max reverse thrust to 80 KIAS, then reverse idle to 60 KIAS, then 3 engines at forward idle to stop (Includes Air Run Distances.)

CORRECTIONS	
TEMPERATURE: VALID FROM STD -20ºC TO STD +40ºC	
FEET PER ºC	
BELOW Standard Day	-14
ABOVE Standard Day	+35

SLOPE: VALID FROM -2% DOWNHILL +2% UPHILL	
FEET PER 1% SLOPE	
Uphill	-126
Downhill	+432

WIND: VALID FROM -10 KNOT TAILWIND +20 KNOT HEADWIND	
FEET PER KNOT	
Headwind	-45
Tailwind	+131

35/EXT

WEIGHT (1000 LB)	360	380	400	420	440	460	480	500
S.L. STD= 15ºC	5210	5420	5630	5860	6100	6300	6550	6760
2000 FT STD= 11ºC	5500	5750	5970	6230	6480	6700	6970	7210
4000 FT STD= 7ºC	5850	6110	6360	6620	6890	7130	7420	7680
6000 FT STD= 3ºC	6220	6490	6770	7060	7360	7620	7920	8210
8000 FT STD= -1ºC	6630	6920	7220	7540	7850	8150	8480	8840
10000 FT STD= -5ºC	7080	7390	7710	8070	8420	8820	9200	9590

NOTE: Full Reverse Thrust, Standard Day, No Wind, Zero Slope, 3 engines at max reverse thrust to 80 KIAS, then reverse idle to 60 KIAS, then 3 engines at forward idle to stop (Includes Air Run Distances.)

CORRECTIONS	
TEMPERATURE: VALID FROM STD -20ºC TO STD +40ºC	
FEET PER ºC	
BELOW Standard Day	-14
ABOVE Standard Day	+39

SLOPE: VALID FROM -2% DOWNHILL +2% UPHILL	
FEET PER 1% SLOPE	
Uphill	-133
Downhill	+500

WIND: VALID FROM -10 KNOT TAILWIND +20 KNOT HEADWIND	
FEET PER KNOT	
Headwind	-47
Tailwind	+142

Contaminated Runway Estimated Landing Distances Slush/Loose Snow/Standing Water Depth = 0.50 IN/ 12.7 MM

50/EXT

WEIGHT (1000 LB)	360	380	400	420	440	460	480	500
S.L. STD= 15ºC	5920	6160	6440	6690	6950	7240	7510	7820
2000 FT STD= 11ºC	6260	6530	6830	7110	7380	7700	7990	8330
4000 FT STD= 7ºC	6600	6930	7260	7560	7870	8210	8530	8910
6000 FT STD= 3ºC	7020	7380	7740	8070	8400	8790	9130	9530
8000 FT STD= -1ºC	7510	7870	8270	8630	8990	9410	9800	10220
10000 FT STD= -5ºC	8020	8430	8840	9250	9670	10180	10610	11090

NOTE: Full Reverse Thrust, Standard Day, No Wind, Zero Slope, 3 engines at max reverse thrust to 80 KIAS, then reverse idle to 60 KIAS, then 3 engines at forward idle to stop (Includes Air Run Distances.)

CORRECTIONS	
TEMPERATURE: VALID FROM STD -20ºC TO STD +40ºC	
FEET PER ºC	
BELOW Standard Day	-15
ABOVE Standard Day	+44

SLOPE: VALID FROM -2% DOWNHILL +2% UPHILL	
FEET PER 1% SLOPE	
Uphill	-238
Downhill	+834

WIND: VALID FROM -10 KNOT TAILWIND +20 KNOT HEADWIND	
FEET PER KNOT	
Headwind	-59
Tailwind	+187

35/EXT

WEIGHT (1000 LB)	360	380	400	420	440	460	480	500
S.L. STD= 15ºC	6450	6730	7020	7300	7640	7910	8230	8540
2000 FT STD= 11ºC	6830	7140	7450	7780	8120	8430	8790	9120
4000 FT STD= 7ºC	7260	7600	7940	8300	8680	9000	9390	9760
6000 FT STD= 3ºC	7740	8110	8480	8880	9290	9640	10060	10460
8000 FT STD= -1ºC	8270	8660	9070	9510	9950	10340	10810	11280
10000 FT STD= -5ºC	8850	9290	9730	10210	10710	11230	11720	12250

NOTE: Full Reverse Thrust, Standard Day, No Wind, Zero Slope, 3 engines at max reverse thrust to 80 KIAS, then reverse idle to 60 KIAS, then 3 engines at forward idle to stop (Includes Air Run Distances.)

CORRECTIONS	
TEMPERATURE: VALID FROM STD -20ºC TO STD +40ºC	
FEET PER ºC	
BELOW Standard Day	-17
ABOVE Standard Day	+47

SLOPE: VALID FROM -2% DOWNHILL +2% UPHILL	
FEET PER 1% SLOPE	
Uphill	-243
Downhill	+943

WIND: VALID FROM -10 KNOT TAILWIND +20 KNOT HEADWIND	
FEET PER KNOT	
Headwind	-64
Tailwind	+204

Contaminated Runway Estimated Landing Distances
Slush/Loose Snow/Standing Water = 1.00IN/25.4MM

50/EXT

WEIGHT (1000 LB)	360	380	400	420	440	460	480	500
S.L. STD= 15ºC	5400	5640	5870	6080	6350	6630	6890	7190
2000 FT STD= 11ºC	5690	5940	6190	6460	6740	7040	7330	7680
4000 FT STD= 7ºC	6010	6280	6560	6870	7160	7520	7820	8200
6000 FT STD= 3ºC	6360	6640	7000	7330	7660	8050	8390	8790
8000 FT STD= -1ºC	6740	7070	7460	7830	8200	7620	8990	9430
10000 FT STD= -5ºC	7150	7570	8000	8410	8830	9330	9770	10250

NOTE: Full Reverse Thrust, Standard Day, No Wind, Zero Slope, 3 engines at max reverse thrust to 80 KIAS, then reverse idle to 60 KIAS, then 3 engines at forward idle to stop (Includes Air Run Distances.)

CORRECTIONS	
TEMPERATURE: VALID FROM STD -20ºC TO STD +40ºC	
FEET PER ºC	
BELOW Standard Day	-15
ABOVE Standard Day	+41

SLOPE: VALID FROM -2% DOWNHILL +2% UPHILL	
FEET PER 1% SLOPE	
Uphill	-209
Downhill	+683

WIND: VALID FROM -10 KNOT TAILWIND +20 KNOT HEADWIND	
FEET PER KNOT	
Headwind	-47
Tailwind	+162

Wet Ice Runway Estimated Landing Distances

50/EXT

WEIGHT (1000 LB)	360	380	400	420	440	460	480	500
S.L. STD= 15ºC	9470	9760	10080	10380	10670	11000	11330	11680
2000 FT STD= 11ºC	10040	10370	10700	11030	11340	11710	12020	12410
4000 FT STD= 7ºC	10610	10970	11370	11710	12050	12420	12770	13190
6000 FT STD= 3ºC	11350	11730	12120	12510	12860	13290	13660	14080
8000 FT STD= -1ºC	12110	12500	12940	13340	13730	14190	14580	15050
10000 FT STD= -5ºC	12920	13360	13820	14240	14700	15240	15690	16220
NOTE: Full Reverse Thrust, Standard Day, No Wind, Zero Slope, 3 engines at max reverse thrust to 80 KIAS, then reverse idle to 60 KIAS, then 3 engines at forward idle to stop (Includes Air Run Distances.)								

CORRECTIONS	
TEMPERATURE: VALID FROM STD -20ºC TO STD +40ºC	
FEET PER ºC	
BELOW Standard Day	-14
ABOVE Standard Day	+55

SLOPE: VALID FROM -2% DOWNHILL +2% UPHILL	
FEET PER 1% SLOPE	
Uphill	-616
NOTE: Landing on downhill slope is not recommended due to excessive required distance.	

WIND: VALID FROM -10 KNOT TAILWIND +20 KNOT HEADWIND	
FEET PER KNOT	
Headwind	-109
Tailwind	+249

35/EXT

WEIGHT (1000 LB)	360	380	400	420	440	460	480	500
S.L. STD= 15ºC	10340	10670	10980	11310	11670	11970	12320	12660
2000 FT STD= 11ºC	10970	11310	11670	12020	12390	12750	13110	13490
4000 FT STD= 7ºC	11640	12010	12400	12780	13160	13550	13970	14330
6000 FT STD= 3ºC	12440	12840	13230	13640	14080	14480	14910	15330
8000 FT STD= -1ºC	13290	13710	14140	14590	15070	15490	15940	16470
10000 FT STD= -5ºC	14240	14680	15130	15630	16140	16680	17210	17760
NOTE: Full Reverse Thrust, Standard Day, No Wind, Zero Slope, 3 engines at max reverse thrust to 80 KIAS, then reverse idle to 60 KIAS, then 3 engines at forward idle to stop (Includes Air Run Distances.)								

CORRECTIONS	
TEMPERATURE: VALID FROM STD -20ºC TO STD +40ºC	
FEET PER ºC	
BELOW Standard Day	-16
ABOVE Standard Day	+61

SLOPE: VALID FROM -2% DOWNHILL +2% UPHILL	
FEET PER 1% SLOPE	
Uphill	-989
NOTE: Landing on downhill slope is not recommended due to excessive required distance.	

WIND: VALID FROM -10 KNOT TAILWIND +20 KNOT HEADWIND	
FEET PER KNOT	
Headwind	-114
Tailwind	+263

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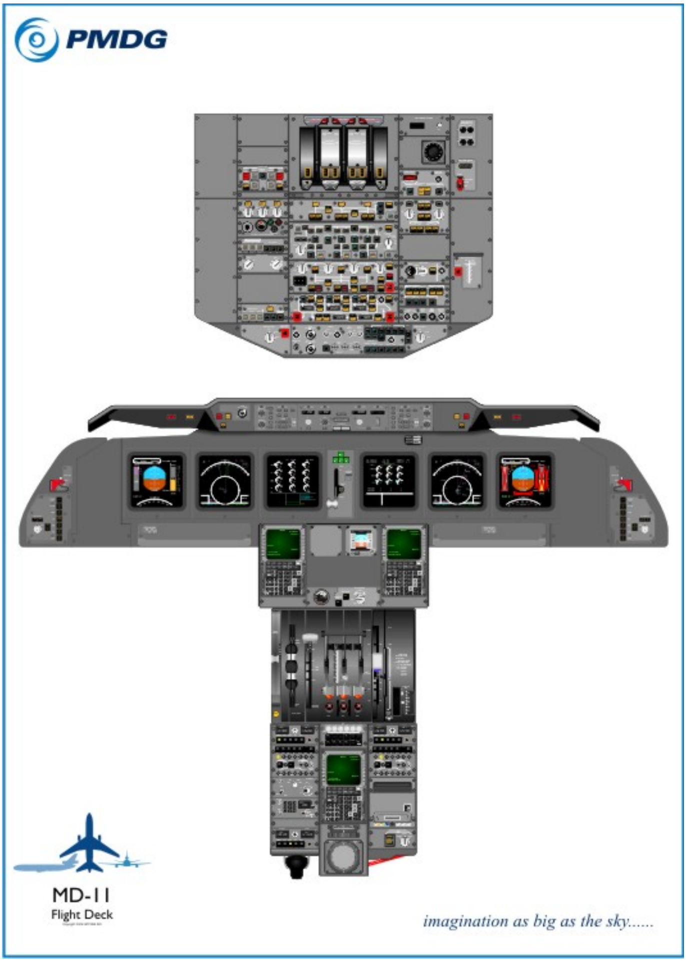

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