MD-11

Flight Crew Operations Manual

Volume II – Operating Procedures

Saudi Arabian Airlines

Revision Number: 65

Revision Date: February 15, 2013

Intentionally
Blank

Preface — Chapter 0

Chapter Table of Contents — Section 0

Intentionally
Blank

Preface — Chapter 0

Manual Effectivity — Section 1

General

The airplanes listed in the table below are covered in the Flight Crew Operations Manual (FCOM). The table information is used to distinguish data peculiar to one or more, but not all of the airplanes. Where data applies to all airplanes listed, no reference is made to individual airplanes.

Registry number is supplied by the national regulatory agency. Airplane, serial and tabulation numbers are supplied by Boeing.

Airplane Number	Registry Number	Serial Number	Tabulation Number
609	HZ-ANA	48773	1FA504
616	HZ-ANB	48775	1FA505
617	HZ-ANC	48776	1FA506
618	HZ-AND	48777	1FA507

Intentionally
Blank

Revision Transmittal Letter

This revision reflects the most current information available to The Boeing Company through the subject revision date. The following revision highlights explain changes in this revision.

Revision Record

No.	Revision Date	Date Filed	No.	Revision Date	Date Filed
26	January 15, 1997		27	April 15, 1997	
28	July 15, 1997		29	October 15, 1997	
30	January 15, 1998		31	April 15, 1998	
32	August 15, 1998		33	December 15, 1998	
34	April 15, 1999		35	August 15, 1999	
36	December 15, 1999		37	June 15, 2000	
38	October 15, 2000		39	February 15, 2001	
40	June 15, 2001		41	October 15, 2001	
42	March 15, 2002		43	July 15, 2002	
44	November 15, 2002		45	March 15, 2003	
46	August 15, 2003		47	February 15, 2004	
48	August 15, 2004		49	February 15, 2005	
50	August 15, 2005		51	February 15, 2006	
52	August 15, 2006		53	February 15, 2007	
54	August 15, 2007		55	February 15, 2008	
56	August 15, 2008		57	February 15, 2009	
58	August 15, 2009		59	February 15, 2010	
60	August 15, 2010		61	February 15, 2011	
62	August 15, 2011		63	February 15, 2012	
64	August 15, 2012		65	February 15, 2013	

General

The Boeing Company issues Flight Crew Operations Manual revisions to provide new or revised procedures and information. Formal revisions also incorporate appropriate information from previously issued Temporary Revisions and Interim Operating Procedures.

The revision date is the approximate date the manual is mailed to the customer.

Formal revisions include a Transmittal Letter, a new Revision Record, Revision Highlights, and a current List of Effective Pages (LEP).

The Revision Record should be completed by the person incorporating the revision into the manual.

Filing Instructions

Keep applicable Temporary Revisions unless instructed to remove them by the highlights. This manual is revised by pages. To file a revision package, use the LEP to verify the correct content of the manual. On the LEP, pages identified with an asterisk (*) are replacement, new (original) issue or deleted pages. Use the pages provided in the package to add new pages or replace the corresponding pages in the manual. Remove pages that are marked Deleted on the LEP; there are no replacement pages for deleted pages.

Revision Highlights

Throughout the manual, airplane effectivity may be updated to reflect coverage as listed on the Preface - Manual Effectivity page. Registry or tabulation numbers are used as available at the time of printing. Highlights are not supplied.

Highlights and revision bars are provided for technical changes. In some sections, text may be rewritten or reformatted for clarity or other editorial purposes; these changes will have revision bars, but may not have highlights. Pages may also be republished without revision bars due to slight changes to the flow of the document generated by the publishing system.

Chapter 0 - Preface

Section 7 - Temporary Revision Summary Record

0.7.1 - Updated Temporary Revision Summary Record.

Section 8 - Interim Operating Procedure Summary Record

0.8.1 - Removed IOP 2-11 from Interim Operating Procedure Summary Record. IOP incorporated into Flight Controls Jammed or Restricted procedure in Abnormal Procedures - Non-Alerts Section.

0.8.1 - Removed IOP 2-215A from Interim Operating Procedure Summary Record. IOP incorporated into Fuel Quantity Abnormal Indication (All Main Tanks) procedure in Abnormal Procedures - Non-Alerts Section.

0.8.1 - Removed IOP 2-225A from Interim Operating Procedure Summary Record. IOP incorporated into Abnormal Cabin/Cockpit Airflow Fluctuation procedure in Abnormal Procedures - Non-Alerts Section.

0.8.1 - Removed IOP 2-230 from Interim Operating Procedure Summary Record. IOP incorporated into FMC Loss of Predictions procedure in Abnormal Procedures - Non-Alerts Section.

Section 9 - FCOM Advisory Bulletin Summary Record

0.9.1 - Added FAB 2-08 to FCOM Advisory Bulletin Summary Record.

Chapter NP - Normal Procedures

Section 30 - Cockpit Preparation

FO’S COCKPIT PREPARATION PROCEDURE

NP.30.4 - Revised Caution statement to add requirement to pause approximately 10 seconds between pulling and resetting of CB if recommended by procedure. This action permits the digital system to "reboot", possibly restoring the intended function of the component.

NP.30.5 - Clarified caution about use of the parking brake and chocks on CLG. Standardizes for all models with CLG.

Chapter EP - Emergency Procedures

Section 00 - Introduction

General

EP.00.2 - Revised Caution statement to add requirement to pause approximately 10 seconds between pulling and resetting of CB if recommended by procedure. This action permits the digital system to "reboot", possibly restoring the intended function of the component.

Chapter AP - Abnormal Procedures

Section 00 - Introduction

General

AP.00.2 - Revised Caution statement to add requirement to pause approximately 10 seconds between pulling and resetting of CB if recommended by procedure. This action permits the digital system to "reboot", possibly restoring the intended function of the component.

Section 10 - Air

AVNCS AIR FLO OFF

AP.10.5 - Added a decision block and procedure for AVNCS FAN switch OVRD light illuminated or AVNCS FAN OVRD level 1 alert displayed.

AP.10.6-7 - Added a decision block and procedure for AIR SYSTEM SELECT switch MANUAL light illuminated and/or AIR SYS MANUAL level 1 alert displayed.

AP.10.6 - Added a decision block for AVNCS FAN switch OVRD light illuminated or AVNCS FAN OVRD level 1 alert displayed.

AP.10.7 - Added Circuit Breaker Guidance to be referred to if more than 90 minutes from landing at nearest suitable airport.

AP.10.7 - Corrected typograhical error.

Section 20 - Config

SLAT DISAG

AP.20.18 - Revised procedure for use whether the SLAT DISAG alert is displayed with the flap/slat handle in the extended or retracted position.

Section 30 - Elec

GEN ALL OFF

AP.30.9-10 - Revised procedure title and note to include possible loss of all AC generators non-alert condition.

GEN___OFF

AP.30.29 - Revised procedure to add step to GEN__OFF procedure that disconnects IDG if a reset was unsuccessful.

Section 40 - Eng/APU

ENG__RPM LO

AP.40.6 - Revised to incorporate Temporary Revisions 1-584 and 2-1038. Please remove Temporary Revisions 1-584 and 2-1038 from your manual. Corrected procedure cross references.

Section 50 - Fuel

TNK__OVERFILL

AP.50.29 - Expanded TNK WING OVERFILL section of the procedure to provide more details on depressurizing the crossfeed manifold.

TNK__XFER PMP LO

AP.50.32 - Editorial correction. "Switch" added to description of XFEED control.

Section 80 - Non-Alerts

ABNORMAL CABIN/COCKPIT AIRFLOW FLUCTUATION

AP.80.1 - Replaced IOPs 1-104A and 2-225A regarding abnormal cabin/cockpit airflow fluctuaion on MD-11F airplanes. Assists crews with an interim procedure that will eliminate airflow fluctuations while a resolution to this nuisance anomaly is being pursued. Please remove IOPs 1-104A and 2-225A from your manual.

DITCHING

AP.80.9-10 - Corrected typographical error.

FLIGHT CONTROLS JAMMED OR RESTRICTED

AP.80.25 - Replaced IOPs 1-102 and 2-211 regarding unresponsive rudder pedal input due to rudder torque tube failure. Provides guidance to flight crews in such a circumstance. Please remove IOPs 1-102 and 2-211 from your manual.

FMC LOSS OF PREDICTIONS

AP.80.30 - Replaced IOPs 1-105, 1-106, 2-229 and 2-230 regarding loss of FMC performance predictions for FMS-921 Pegasus operators. Provides crews with an interim procedure that will restore normal predictions while a permanent solution is being pursued. Please remove IOPs 1-105, 1-106, 2-229 and 2-230 from your manual.

FUEL QUANTITY ABNORMAL INDICATION (ALL MAIN TANKS)

AP.80.39 - Replaced IOPs 1-103A and 2-215A regarding an abnormal fuel quantity indication. Provides crews with an interim procedure should they encounter a fuel system anomaly that causes indications of an abnormal fuel quantity decrease in all main tanks. Please remove IOPs 1-103A and 2-215A from your manual.

Chapter A - Level 1/0 Alerts

Section 10 - Level 1 Alerts

LEVEL 1 ALERTS

A.10.1 - Revised A-ICE SENSOR FAIL level 1 alert description. Expands previous version which was not comprehensive per customer comment.

Chapter PT - Procedures & Techniques

Section 20 - Takeoff

Rejected Takeoff

PT.20.1-2 - Added note to show conditions for which a takeoff should be rejected prior to V1 and prior to 80 knots. Also includes instruction during takeoff for crewmember to clearly callout an abnormal situation when observed.

Section 30 - Approach and Landing Profiles

Wind Additives and Approach Speeds

PT.30.1 - Incorporated Temporary Revision 2-1039. Please remove Temporary Revision 2-1039 from your manual. Revised application rules to account for the Autothrottle System's (ATS) gust integration capability. If ATS will be engaged for approach and landing, wind additives are not needed, though they may be applied at Captain's discretion. Additionally, calculation examples were added.

Touchdown

PT.30.5 - Added new guidance to Touchdown and Bounced Landing procedures. New note and text adds spoiler knockdown information.

Bounced Landing Recovery

PT.30.6 - Added new guidance to Touchdown and Bounced Landing procedures. New note and text adds spoiler knockdown information.

Chapter PD - Performance Data

Section 10 - Performance Data

PD.10.1 - Revised application rules to account for the Autothrottle System's (ATS) gust integration capability. If ATS will be engaged for approach and landing, wind additives are not needed, though they may be applied at Captain's discretion.

Page	Date
Operating Procedures	
* Title Page	February 15, 2013
* Blank	February 15, 2013
0.TOC.0.1-2	August 15, 2012
0.1.1-2	August 15, 2012
* 0.2.1-6	February 15, 2013
* 0.2.7-8	Deleted
* 0.3.1-4	February 15, 2013
* 0.3.5-6	Deleted
0.4.1-2	February 15, 2009
0.5.1-2	February 15, 2009
0.6.1-2	February 15, 2009
* 0.7.1	February 15, 2013
0.7.2	February 15, 2009
* 0.8.1-2	February 15, 2013
* 0.9.1	February 15, 2013
0.9.2	February 15, 2009
0.10.1	August 15, 2009
0.10.2	February 15, 2009
0.11.1	February 15, 2010
0.11.2-5	February 15, 2009
0.11.6	February 15, 2011
Normal Procedures (tab)	
NP.TOC.0.1-2	August 15, 2012
NP.00.1	February 15, 2009
NP.00.2-5	February 15, 2010
NP.00.6-8	February 15, 2009
NP.10.1-6	February 15, 2009
NP.30.1-3	February 15, 2009

Page	Date
Normal Procedures (cont)	
* NP.30.4-6	February 15, 2013
NP.30.7	August 15, 2012
NP.30.8-19	February 15, 2012
NP.30.20-21	August 15, 2012
NP.30.22	February 15, 2012
NP.40.1-2	February 15, 2009
NP.40.3-4	August 15, 2011
NP.40.5-6	February 15, 2009
NP.50.1-2	August 15, 2010
NP.50.3	August 15, 2012
NP.50.4	February 15, 2010
NP.60.1	August 15, 2012
NP.60.2-3	February 15, 2009
NP.60.4	February 15, 2012
NP.60.5-6	February 15, 2009
NP.70.1-6	August 15, 2012
NP.80.1-2	August 15, 2011
NP.80.3-6	February 15, 2011
NP.90.1	August 15, 2012
NP.90.2-4	February 15, 2009
NP.200.1	February 15, 2009
NP.200.2	August 15, 2009
NP.200.3-6	August 15, 2012
Supplemental Procedures (tab)	
SP.TOC.0.1-2	February 15, 2010
SP.TOC.00.1-2	February 15, 2010
SP.00.1-2	February 15, 2009
SP.TOC.10.1-2	February 15, 2010

* = Revised, Added, or Deleted

Page	Date
Supplemental Procedures (cont)	
SP.10.1	August 15, 2011
SP.10.2	February 15, 2009
SP.TOC.20.1-2	February 15, 2011
SP.20.1-6	February 15, 2009
SP.20.7	August 15, 2011
SP.20.8	February 15, 2009
SP.TOC.30.1-2	February 15, 2010
SP.30.1	February 15, 2009
SP.30.2-3	August 15, 2009
SP.30.4	February 15, 2009
SP.30.5	August 15, 2012
SP.30.6	August 15, 2009
SP.30.7	February 15, 2012
SP.30.8-11	August 15, 2012
SP.30.12	August 15, 2011
SP.30.13-15	August 15, 2012
SP.30.16-22	February 15, 2010
SP.30.23	August 15, 2011
SP.30.24-25	February 15, 2010
SP.30.26	August 15, 2011
SP.30.27-28	February 15, 2010
SP.30.29-31	August 15, 2011
SP.30.32-38	February 15, 2010
SP.TOC.40.1-2	February 15, 2010
SP.40.1-8	February 15, 2009
SP.TOC.50.1-2	February 15, 2010
SP.50.1-2	February 15, 2009
SP.TOC.60.1-2	February 15, 2011
SP.60.1-3	February 15, 2009
SP.60.4-5	February 15, 2011

Page	Date
Supplemental Procedures (cont)	
SP.60.6	February 15, 2009
SP.60.7-8	February 15, 2011
SP.60.9	February 15, 2009
SP.60.10	August 15, 2011
SP.60.11-14	February 15, 2009
SP.TOC.70.1-2	February 15, 2010
SP.70.1-2	February 15, 2009
SP.TOC.80.1-2	August 15, 2012
SP.80.1-2	February 15, 2009
SP.80.3-4	August 15, 2010
SP.80.5-6	August 15, 2011
SP.80.7-10	August 15, 2012
SP.TOC.90.1-2	February 15, 2010
SP.90.1-2	February 15, 2009
SP.TOC.100.1-2	February 15, 2011
SP.100.1-3	February 15, 2009
SP.100.4	August 15, 2011
SP.100.5-6	February 15, 2011
SP.TOC.110.1-2	February 15, 2010
SP.110.1-2	February 15, 2009
SP.TOC.120.1-2	February 15, 2010
SP.120.1-2	February 15, 2009
Emergency Procedures (tab)	
EP.TOC.0.1-2	February 15, 2010
EP.TOC.00.1-2	February 15, 2010
EP.00.1	August 15, 2010
* EP.00.2	February 15, 2013
EP.00.3	August 15, 2011
EP.00.4	August 15, 2010
EP.TOC.10.1-2	August 15, 2012

* = Revised, Added, or Deleted

Page	Date
Emergency Procedures (cont)	
EP.10.1	February 15, 2009
EP.10.2	August 15, 2012
EP.10.3	August 15, 2011
EP.10.4	February 15, 2011
EP.10.5-7	February 15, 2009
EP.10.8-36	August 15, 2012
EP.TOC.20.1-2	August 15, 2012
EP.20.1-11	February 15, 2009
EP.20.12	February 15, 2010
EP.20.13-32	August 15, 2012
Abnormal Procedures (tab)	
AP.TOC.0.1-2	February 15, 2010
AP.TOC.00.1-2	February 15, 2010
AP.00.1	February 15, 2012
* AP.00.2	February 15, 2013
AP.00.3	August 15, 2010
AP.00.4	February 15, 2010
* AP.TOC.10.1-2	February 15, 2013
AP.10.1-4	February 15, 2009
* AP.10.5-20	February 15, 2013
* AP.TOC.20.1-2	February 15, 2013
AP.20.1	August 15, 2012
AP.20.2	February 15, 2012
AP.20.3-5	February 15, 2011
AP.20.6-17	February 15, 2009
* AP.20.18-30	February 15, 2013
* AP.TOC.30.1-2	February 15, 2013
AP.30.1-5	February 15, 2011
AP.30.6-8	February 15, 2009
* AP.30.9-13	February 15, 2013

Page	Date
Abnormal Procedures (cont)	
AP.30.14-16	February 15, 2009
AP.30.17-20	February 15, 2010
AP.30.21	February 15, 2009
AP.30.22-23	February 15, 2011
AP.30.24-26	February 15, 2009
AP.30.27	August 15, 2012
* AP.30.28-30	February 15, 2013
AP.TOC.40.1-2	February 15, 2011
AP.40.1	February 15, 2009
AP.40.2	August 15, 2009
AP.40.3-4	February 15, 2009
AP.40.5	February 15, 2010
* AP.40.6	February 15, 2013
AP.40.7	August 15, 2012
AP.40.8-10	February 15, 2009
* AP.TOC.50.1-2	February 15, 2013
AP.50.1-13	February 15, 2009
AP.50.14-16	February 15, 2011
AP.50.17	February 15, 2009
AP.50.18-28	February 15, 2011
* AP.50.29-32	February 15, 2013
AP.TOC.60.1-2	February 15, 2010
AP.60.1-2	February 15, 2009
AP.60.3-4	February 15, 2012
AP.60.5	February 15, 2009
AP.60.6-7	February 15, 2012
AP.60.8	August 15, 2010
AP.60.9-12	February 15, 2009
AP.TOC.70.1-2	February 15, 2010
AP.70.1-8	February 15, 2009

* = Revised, Added, or Deleted

Page	Date
Abnormal Procedures (cont)	
* AP.TOC.80.1-2	February 15, 2013
* AP.80.1-82	February 15, 2013
Level 1/0 Alerts (tab)	
A.TOC.0.1-2	February 15, 2010
A.00.1	February 15, 2012
A.00.2	February 15, 2009
A.00.3	August 15, 2011
A.00.4	February 15, 2009
* A.10.1-30	February 15, 2013
A.20.1-3	February 15, 2012
A.20.4	February 15, 2009
Limitations (tab)	
L.TOC.0.1-4	August 15, 2012
L.10.1-15	August 15, 2011
L.10.16	August 15, 2012
L.10.17	August 15, 2011
L.10.18-20	February 15, 2012
L.10.21-24	August 15, 2011
Procedures & Techniques (tab)	
* PT.TOC.0.1-2	February 15, 2013
PT.00.1-2	February 15, 2009
PT.10.1-10	February 15, 2009
* PT.20.1-8	February 15, 2013
* PT.30.1-38	February 15, 2013
PT.40.1	February 15, 2009
PT.40.2-3	August 15, 2009
PT.40.4	February 15, 2009
PT.50.1	February 15, 2009
PT.50.2-5	August 15, 2012
PT.50.6-23	February 15, 2009

Page	Date
Procedures & Techniques (cont)	
PT.50.24	August 15, 2012
PT.50.25-26	February 15, 2009
PT.50.27	August 15, 2012
PT.50.28	February 15, 2009
Reference Data (tab)	
RD.TOC.0.1-2	February 15, 2010
RD.10.1-6	February 15, 2009
Performance Data (tab)	
PD.TOC.0.1-2	August 15, 2012
* PD.10.1-20	February 15, 2013

* = Revised, Added, or Deleted

Preface — Chapter 0

Temporary Revision Record — Section 4

TR Number	Date Inserted	TR Number	Date Inserted

Intentionally
Blank

Preface — Chapter 0

Interim Operating Procedure Record — Section 5

IOP Number	Date Inserted	IOP Number	Date Inserted

Intentionally
Blank

FAB Number	Date Inserted	FAB Number	Date Inserted

Intentionally
Blank

Preface — Chapter 0

Temporary Revision Summary Record — Section 7

NOTE: Remove Temporary Revision(s) cancelled or incorporated.

TEMPORARY REVISION NUMBER	ISSUE DATE	REVISION DATE INCORPORATED
2-001 thru 2-1037	Various	Not Applicable, Cancelled or Previously Incorporated
2-1038	Oct 12, 2012	Feb 15, 2013
2-1039 thru 2-1040	Dec 17, 2012	Feb 15, 2013

Intentionally
Blank

IOP NUMBER	SUBJECT	ISSUE DATE
2-50B	PACK_FLO DISAG Alert Displayed During APU Operation	Jun 15/00
2-136D	Fuel Flow Spike During Engine Start (applicable to GE CF6-80C2)	Jun 15/00
2-143B	Control Wheel Movement Nuisance	Jun 15/00
2-186A	Emergency Power Test After APU Start	Jun 15/00
2-195A	Fuel Pump Level 2 Fuel Alerts	Mar 16/07
2-196B	Fuel Pump Level 1/0 Fuel Alerts	Mar 16/07
2-210	FMS PROF MODE	Oct 9/04
2-216	Ballast Fuel Anomaly	Nov 27/06
2-217	Ballast Fuel Anomaly	Nov 27/06
2-218	DIR TO with ABEAM POINTS	Aug 14/06
2-219	Double Stringing of STAR Waypoints	Aug 14/06
2-220	FIX INFO Page with Runway Entry	Aug 28/06
2-221	Pegasus “FROM” Waypoint Anomaly	Oct 27/06
2-222B	Pegasus FMS - ATC LOG Data (FANS Enabled)	Feb 7/11
2-223	MAX Autobrakes	Nov 16/07
2-224	MAX Autobrakes	Nov 16/07
2-226	Pegasus FMC - Altitude Constraint	Oct 12/08
2-227	Pegasus FMC - Magnetic Variation Anomaly	Oct 12/08

ALL OTHER INTERIM OPERATING PROCEDURES NOT LISTED ABOVE ARE CANCELLED OR NOT APPLICABLE

Intentionally
Blank

Preface — Chapter 0

FCOM Advisory Bulletin Summary Record — Section 9

FAB NUMBER	SUBJECT	ISSUE DATE
2-01 thru 2-05B		Cancelled
2-05C	Fuel Pump Housing Electrical Connector Failure	Feb 25, 2010
2-06	Pegasus FMC - Altitude Constraint	July 31, 2008
2-07	Pegasus FMC - Magnetic Variation Anomaly	July 31, 2008
2-08	Pegasus FMC - Alternate Cruise Altitude Anomaly	Oct 12, 2012

Intentionally
Blank

Foreword

The MD-11 Flight Crew Operations Manual provides descriptive information and operational procedures to be used as a guide for operation of the MD-11 aircraft. The data in this manual are based upon engineering information and calculations. Operating instructions were derived from an in-depth study of the tasks which must be performed by the flight crew to properly complete a normal flight. The descriptive text has been prepared by experienced, publications-oriented pilots and technical specialists working in accord with the team that developed the operating instructions.

The MD-11 Flight Crew Operations Manual reflects the aircraft description and operating recommendations approved by The Boeing Company, Long Beach Division. This does not mean that individual airlines may not publish manuals reflecting their own operating philosophies.

The style and format of this manual were developed by The Boeing Company, Long Beach Division after a review of the requirements of a cross section of domestic and international operators. Due to inherent delays in research, compilation, preparation, and printing of technical manuals, this publication may not include the most recent changes to the aircraft. Every effort has been made to ensure the currency of the data contained herein. However, all data is subject to change without notice.

Comments or inquiries concerning this manual should be addressed to:

Boeing Commercial Airplanes

Commercial Aviation Services

Attn: MD-11 Manager, Flight Technical Data

P. O. Box 3707, M/C 20-89

Seattle, Washington 98124-2207 USA

E-mail: flighttraining@boeing.com

Telephone: (206) 662-4000

Fax: (206) 662-4743

Intentionally
Blank

Applicability

If there is any conflict between the data contained in the Flight Crew Operations Manual and the FAA Approved Airplane Flight Manual, the FAA Approved Airplane Flight Manual shall govern.

FCOM General

The Flight Crew Operations Manual consists of four volumes which contain the information required for operation of the aircraft.

Volume I, Quick Reference Handbook (QRH), contains Emergency and Abnormal procedures extracted from Volume II but presented in abbreviated format for quick reference. Line items in Volumes I and II are identical. The Volume I procedures, however, are abbreviated by deleting explanatory material contained in the amplified Volume II procedures. In addition, Volume I contains a list of Level 1 alerts that must be addressed by maintenance prior to takeoff.

Volume II, Operating Procedures, contains Normal Procedures, Supplemental Procedures, Expanded Emergency and Abnormal Procedures, Level 1 and Level 0 Alerts, Limitations, Procedures & Techniques, Reference Data and Performance Sections.

Volume III, Systems Description, contains descriptive aircraft systems information. The volume is divided into 18 chapters listed alphabetically.

Performance volume numbers vary depending upon engine type and data type (english/metric).

Temporary Revisions

Temporary Revisions are issued for the purpose of ensuring continued safety of flight for customers. Temporary Revisions are printed on yellow paper and are filed in the FCOM facing the procedure or topic to which they apply. They are to be retained in the FCOM until operators are notified to remove them.

Interim Operating Procedures

Interim Operating Procedures are issued for the purpose of notifying operators of interim procedures to be followed until such time as an upcoming “fix” (usually provided by Service Bulletin) is accomplished either by The Boeing Company, Long Beach Division, or by the individual operators. They are printed on pink paper and filed in the FCOM facing the procedure or topic to which they apply. They are to be retained in the FCOM until operators are notified to remove them.

FCOM Advisory Bulletins

FCOM Advisory Bulletins are not considered safety of flight items, but consist of data deemed of enough significance and/or scope that operators are given advance notification of the impending change prior to their next scheduled FCOM revision. FCOM Advisory Bulletins are filed at the front of the appropriate FCOM volume. They are to be retained in the FCOM until operators are notified to remove them.

Format

Pagination

The pages in Volume I and Volume II are numbered in sequence within each section of the volume. The pages in Volume III are numbered sequentially in each chapter. The pages in the performance volumes are numbered sequentially by section and subsection.

Emergency/Abnormal Procedures

In the Emergency procedures, certain line items may be shown enclosed in a rectangular box. These are “recall” items and are to be performed from memory. Line items not enclosed in a box are “reference” items which are to be accomplished when time permits.

Within the Emergency and Abnormal procedures, an elongated, four-sided box with open ends is used to denote a “decision point” where a crew member must observe an indication or condition and make a decision that will determine proper subsequent action. Each box contains a statement which should be read as a question that can be answered by either “YES” or “NO.” If the answer is “NO,” an arrow will point to the next appropriate item. If the answer is “YES,” the item(s) listed immediately under the decision box will provide additional information and/or detail a procedure.

The vertical “NO” arrows descending from the decision points and the horizontal arrows that return to “NO” will alternate between solid and dashed lines relative to the level they are indented from the margin. This will aid the user to distinguish between progressive decision points, especially when a procedure is several pages in length.

EXAMPLE OF DECISION POINT

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.

Example of a Level 2 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).

Consequences: NONE - indicates that no electronic consequence is presented with the associated alert. However, crew action may still be required.

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 synoptics 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 reaccomplished either automatically or manually.

Flight Crew Operations Manual Configuration

Customer airplane configuration determines the data provided in this manual. The Boeing Company keeps a list of each airplane configuration as it is built and modified through the service bulletin process. The FCOM does not reflect customer originated modifications without special contract provisions.

Saudi Arabian Airlines Customer Originated Data

This FCOM contains information which has been included at the request of Saudi Arabian Airlines for airplanes covered by this manual. This information may differ from Boeing recommended information. By including this information in the manual, Boeing is providing a publishing service only and such inclusion does not imply that The Boeing Company in any way endorses or approves such information. The technical accuracy and validity of all such airline originated information, and its effect, if any, on other portions of this manual, is the sole responsibility of Saudi Arabian Airlines.

Saudi Arabian Airlines originated information is identified by revision dots as shown in the margin of this paragraph.

Normal Procedures — Chapter NP

Table of Contents — Section 0

Normal Procedures — Chapter NP
Introduction — Section 00

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.

All checklists should be initiated at the Captain's or Pilot Flying's (PF) command. All checklists, except the After Takeoff Checklist, are challenge and response. The After Takeoff Checklist is a silent checklist accomplished by the Pilot Not Flying (PNF).

On the ground the First Officer will read all checklists. During flight the PNF will read all checklists. The responses will be made by the crewmember having responsibility for that item as identified by the AREAS OF PRIMARY RESPONSIBILITY illustration. Both crewmembers will respond to line items affecting aircraft configuration.

When practical, it is the reader's responsibility to visually check that the action taken agrees with the response. When a crewmember reading the checklist has ascertained that all items have been completed, he/she will announce that the appropriate checklist has been completed by stating "__________ checklist complete."

It is recommended that the Descent/Approach Checklist be completed as early as possible to permit all crewmembers to monitor navigational aids and aircraft performance during the approach and landing phase of flight.

The Before Landing Checklist will be initiated following the command for landing flaps. This procedure is not intended to delay initiation of the checklist until final flap selection when using 50° flaps. In this case the checklist should be initiated after the selection of FLAPS 35, but is not completed until FLAPS 50 is confirmed.

The After Landing Checklist should be accomplished when clear of the runway unless a taxi-back maneuver is required. In the latter case the checklist should be delayed until completion of the 180° turn.

Normal, Abnormal and Emergency checklists are designed to assist crews in completing those actions necessary for the safe conduct and completion of their flight. They are intended to be followed in the sequence in which they are presented. This philosophy applies to the individual phase-of-flight checklists themselves (i.e., Cockpit Preparation, Before Start, After Start, etc.), as well as the individual items listed within each specific checklist. Any disruption to the flow of either the specific checklists or the line items within those checklists, demands careful crew attention to ensure re-establishing the proper sequence of, and completion of, required checklists and/or associated line items.

If the sequence of checklists is interrupted (e.g., a ground turnback to the gate following taxi out), the appropriate phase-of-flight checklist should be called for and completed. In the above example, as the aircraft is taxied back to the gate or ramp area, the After Landing Checklist should be accomplished followed by the Parking Checklist once at the gate. Prior to resuming operations, all pertinent checklists should be re-accomplished. In effect, the crew would view subsequent dispatch as a new flight requiring the accomplishment of all checklists applicable to a new flight.

First Flight of the Day

First flight of the day means the first flight of a particular airplane by the same cockpit flight crew. Consecutive flights by the same cockpit flight crew are not considered to be the first flights if they meet the definition of a through flight. Airplane changes for a cockpit flight crew or cockpit flight crew changes on a specific airplane are considered to meet "First Flight of the Day" status and require all checklist items be accomplished.

Through Flight Checks

Through flights are defined as flights that are continuations of a consecutive sequence of flights by the same crew on the same aircraft. Ground times are typically a short duration usually no greater than three hours. Through flight status requires the following conditions to be met:

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

Only those items denoted with an asterisk (*) on the Cockpit Preparation Checklist are required to be accomplished on through flights. All items on all other checklists must be accomplished on every flight.

Exterior Inspection

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

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.

Area of Responsibility

In the MD-11, an area of responsibility concept is used. Each crewmember is assigned a cockpit area of responsibility where he/she can initiate action in accordance with normal procedures. Supplemental, Emergency, and Abnormal procedures are initiated at the direction of the Captain. Actions falling outside a crewmember's area of responsibility are also initiated at the direction of the Captain. Controls that are common to both areas, such as flight controls, throttles, flight guidance and trim, are usually positioned by the PF. The Areas of Primary Responsibility illustration describes PF and PNF primary areas of responsibility. These areas are in addition to areas normally monitored by each pilot. For example, each pilot would normally monitor his/her respective flight instruments and the engine and alert display (EAD).

Use the following guidelines for the operation of the multifunctional control and display units (MCDUs) and flight control panel:

1. Action requiring an input on one of the MCDUs for the flight management system (FMS) are normally accomplished by the PNF. Any inputs which alter the aircraft flight profile should be coordinated by both crewmembers before execution.
2. When the auto flight mode is engaged the controls that affect the flight profile are positioned by the PF. If the aircraft is being flown manually, inputs to the flight control panel should be made by the PNF at the direction of the PF. PF should verify all directed inputs.

Crew Coordination

Crewmembers will normally adhere to their specific duties, as outlined. The greatest safety and proper crew coordination can only be achieved when each crewmember performs the duties and functions for which he/she is responsible.

When the First Officer is flying, the Captain will be prepared to assume immediate control of the aircraft during critical phases of flight. At the direction of the Captain, when control of the aircraft is transferred, the pilot taking control will announce "I have the aircraft," when he/she has the controls. The other pilot will then relinquish the controls and assume PNF duties.

The PNF will repeat the PF's commands to indicate understanding and compliance with the command.

After receipt and confirmation of any ATC clearance, the PF will repeat aloud his/her understanding of the clearance to assure the he/she is aware of the altitude and clearance limit to which the flight is cleared.

CAUTION: All data entered into the FMS is advisory only and must be confirmed to be accurate and current by comparison to published and approved flight navigation charts and approach plates.

The flight crew is responsible for assuring the accuracy of the FMS flight plan. All entries and edits to the FMS flight plan must be confirmed to be in compliance with ATC clearance, both laterally and vertically. If FMS NAV or FMS PROF guidance does not appear to be complying with the desired flight profile, the crew must intervene and ensure that the aircraft flight profile conforms to clearance requirements.

Crew Communications

Communications between the cockpit and the courier compartment can be accomplished using the COURIER CALL button located in the cockpit or at the courier seats.

Events Requiring Maintenance Inspections

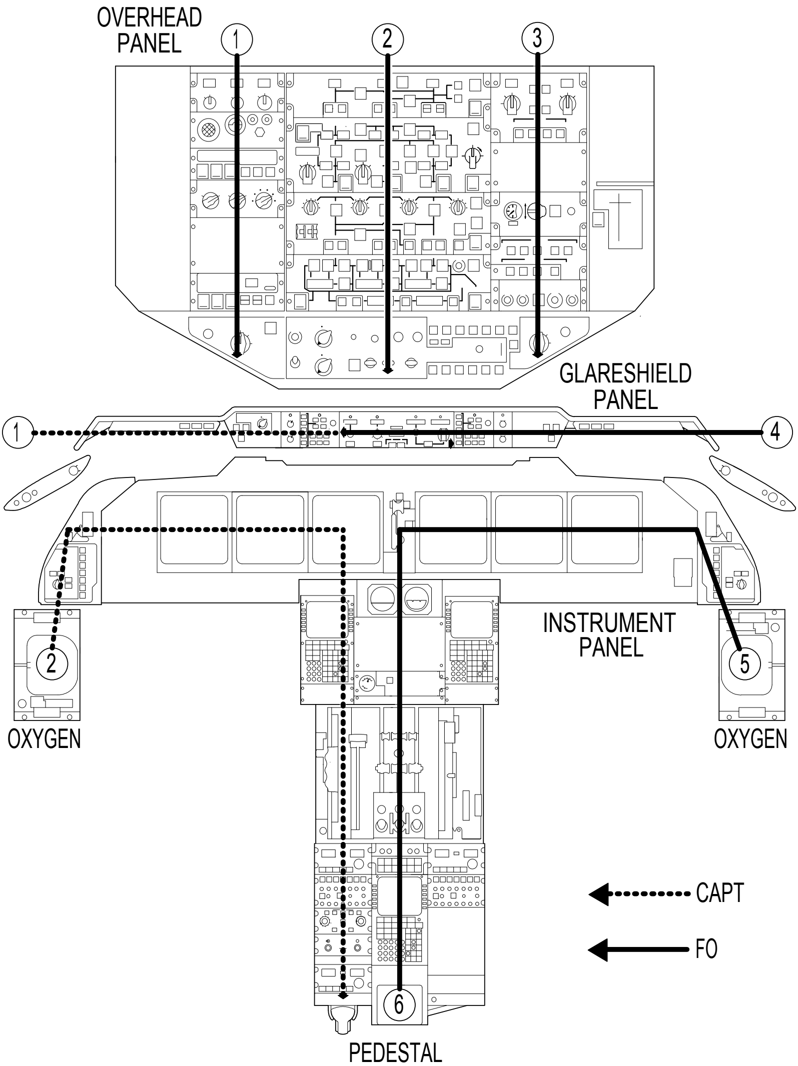
During ground and flight operations, events may occur which require a maintenance inspection before the next flight. Most operators have established a procedure/policy to ensure that crews document these events so that proper maintenance can take place.

Chapter 5 of the Airplanes Maintenance Manual refers to such events as “Conditional Inspections”. These include, but are not limited to:

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

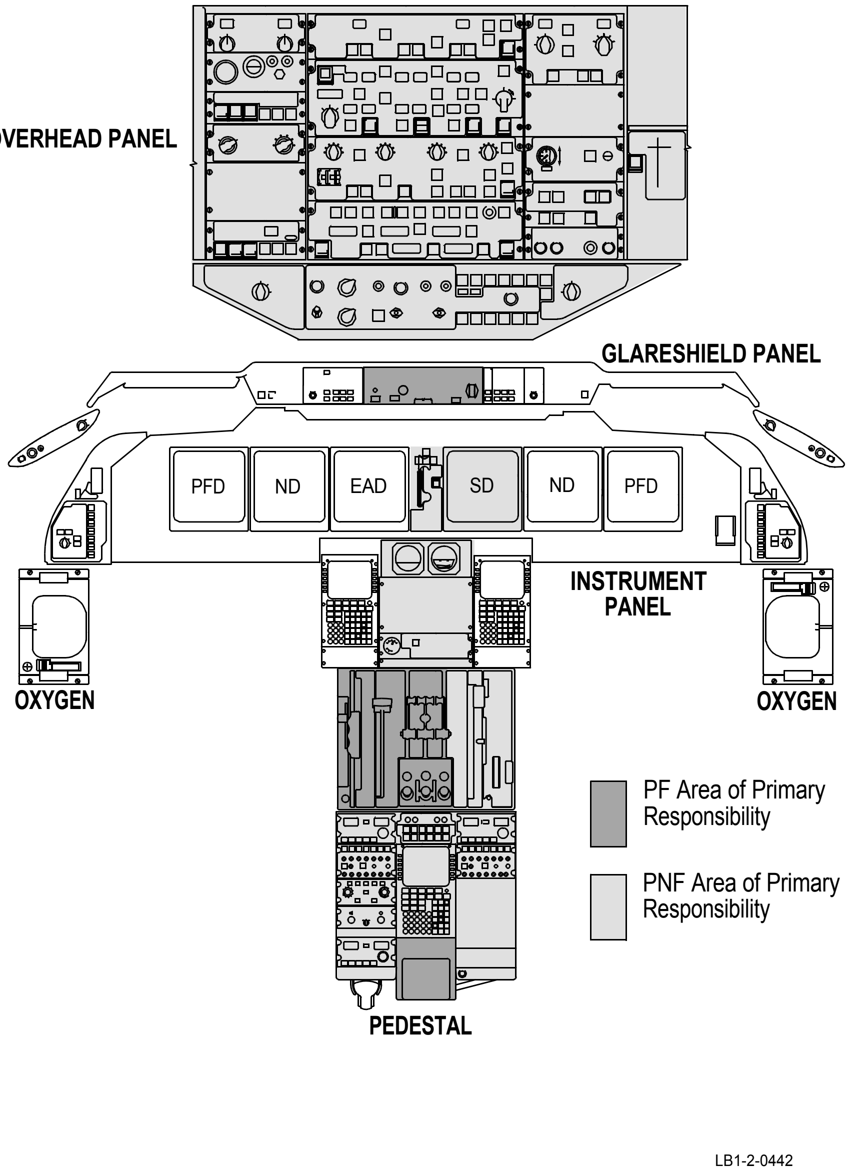
Additional events that are not listed in chapter 5 may require inspection and should also be reported. Examples of such events would be operating outside Flight Crew Operations Manual limitations, an overly aggressive pitch up during a TCAS event, a terrain avoidance maneuver or stick shaker activation accompanied by buffeting. Any one of these occurrences could cause structural damage. If in doubt, the best course of action for any event is to report it.

Preflight Panel Scan

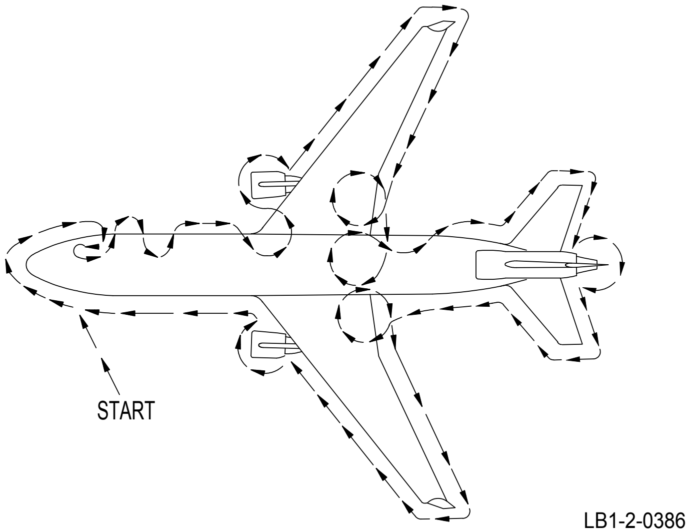


LB1-2-0301

Areas of Primary Responsibility



Intentionally
Blank



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.

(CONTINUED)

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.

(CONTINUED)

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.

(CONTINUED)

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.

(CONTINUED)

Left Forward Fuselage – same as right side.

Cabin pressurization outflow valve.

Potable water service panel secured.

Intentionally
Blank

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.

(CONTINUED)

CAPTAIN'S COCKPIT PREPARATION PROCEDURE

(Continued)

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.

(CONTINUED)

CAPTAIN’S COCKPIT PREPARATION PROCEDURE

(Continued)

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.

[END]

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 or placarded, notify maintenance.

WARNING: ***Do not reset any tripped fuel pump or hydraulic auxiliary pump circuit breakers.***

CAUTION: Resetting of a tripped circuit breaker by the flight crew is not recommended. If an Abnormal or Emergency procedure specifies a circuit breaker reset or if the Captain considers a system to be essential for safe completion of the flight, a one-time reset per flight of the circuit breaker may be made after allowing approximately a two minute cooling period. If the circuit breaker trips again, do not attempt another reset.

If a procedure recommends or directs the pulling and resetting of a circuit breaker, allow a pause of approximately 10 seconds between pulling and resetting.

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

(CONTINUED)

FO’S COCKPIT PREPARATION PROCEDURE (Continued)

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, unloaded, refueled or defueled.

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

Verify DUMP, FUEL DUMP EMER STOP and MANF DRAIN switches are guarded.

Emergency Power Selector

Verify EMER PWR selector is in the OFF position.

(CONTINUED)

FO’S COCKPIT PREPARATION PROCEDURE (Continued)

Battery Switch

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

NOTE: 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.

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.

NOTES: 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.

(CONTINUED)

FO’S COCKPIT PREPARATION PROCEDURE (Continued)

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.

CAUTION: If the APU fails to start, do not attempt another start until at least 30 seconds has elapsed after the APU data is no longer displayed on the Secondary Engine Display (SD). This will allow time for excess fuel to drain from the APU combustion chamber.

NOTES: If APU start sequence fails to take place, 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.

NOTES: 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 “AIR SYS TEST FAIL” or “AIR MANF TST FAIL” and “ENG DUCT TST FAIL” alerts displayed on the EAD.

(CONTINUED)

FO'S COCKPIT PREPARATION PROCEDURE (Continued)

Certain indicator lights associated with more critical systems or components are equipped with dual bulb modules intended to provide redundancy should one bulb burn out. If the light of an indicator is noted as dim and/or shaded on one side, this may indicate that one bulb is inoperative. If an inoperative bulb is suspected, contact maintenance and have bulb(s) replaced as required.

Air Conditioning

NOTES: 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

Crew Rest Some Detection Test

Push the CREW REST SMOKE DET MANUAL TEST switch and observe MASTER CAUTION lights illuminate and "CREW REST SMOKE" alert is displayed on the EAD and SD. The HORN OFF light, three smoke detection lights (SMOKE 1, SMOKE 2 and SMOKE 3) and MANUAL TEST switch light illuminate on the CREW REST SMOKE DET panel. Push the MANUAL TEST switch a second time. All indications return to normal. If the CREW REST SMOKE DET TEST FAIL light illuminates, call maintenance.

(CONTINUED)

FO’S COCKPIT PREPARATION PROCEDURE (Continued)

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.

NOTES: 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*.

NOTES: If the “INITIALIZE IRS” prompt is not selected within 10 minutes of selecting NAV, the NAV/OFF lights will begin flashing.

The UNABLE RNP message may appear until the GPS has had time to enter the NAV mode.

Voice Recorder

Push and test button and observe STATUS indicator illuminates for approximately 1 second.

NOTE: A test tone can be heard from the HEADPHONE jack for two seconds during test pass. There will be no tones if the test fails.

GEN BUS FAULT RESET

Observe BUS FAULT lights are extinguished.

(CONTINUED)

FO'S COCKPIT PREPARATION PROCEDURE (Continued)

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:

(CONTINUED)

FO'S COCKPIT PREPARATION PROCEDURE (Continued)

HYDRAULICS MANUAL

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 and 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 in 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.

(CONTINUED)

FO'S COCKPIT PREPARATION PROCEDURE (Continued)

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.

NOTES: 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:

(CONTINUED)

FO'S COCKPIT PREPARATION PROCEDURE (Continued)

FUEL MANUAL

Select FUEL on system display.

Push each tank pump switch and observe OFF lights extinguish. On FUEL synoptic, observe each pump indicates on and no pump indicates low pressure. Push each tank pump 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 light 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.

(CONTINUED)

FO'S COCKPIT PREPARATION PROCEDURE (Continued)

FUEL MANUAL

NOTE: Tank 2 fill valve will not remain armed without an auxiliary transfer pump on.

Push AUX TANKS 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 off and fill valve spigot for tank 2 is no longer displayed.

If tail tank contains usable fuel, push TAIL TANK TRANS and ALT PUMP switches to ON. 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.

(CONTINUED)

FO'S COCKPIT PREPARATION PROCEDURE (Continued)

BCN and HI-INT switch OFF lights are illuminated.

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.

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.

(CONTINUED)

FO’S COCKPIT PREPARATION PROCEDURE (Continued)

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.

(CONTINUED)

FO'S COCKPIT PREPARATION PROCEDURE (Continued)

Clock

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

NOTES: 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 SD 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.

(CONTINUED)

FO'S COCKPIT PREPARATION PROCEDURE (Continued)

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.

Weather Radar

Test weather radar system. On the ECP, push and rotate the WX BRT knob to full bright position. On the weather radar control panel, rotate GAIN control to AUTO, select system 1 or 2, then rotate the mode selector to TEST. On the ND, observe 3 concentric test pattern rings with colors, from top to bottom, being red, yellow and green, with a magenta center. On the upper left portion of each PFD observe “WINDSHEAR AHEAD” flash three times in amber followed by “WINDSHEAR AHEAD” flashing three times in red. Also observe that the aural warnings “MONITOR RADAR DISPLAY,” “GO AROUND, WINDSHEAR AHEAD,” and “WINDSHEAR AHEAD, WINDSHEAR AHEAD” will be heard on cockpit speakers. Repeat the test for the other system. Turn weather radar off.

Transponder/TCAS

Select 1 or 2 with XPDR switch and verify ALT RPT switch is in ALT RPT. Verify mode select switch is in STBY. Push TEST and observe proper PFD/ND display and aural message. The PFD will show RA recommended vertical speed, while the ND shows the four threat level symbols/data tags. A satisfactory test will be verified by an aural message.

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.

(CONTINUED)

FO'S COCKPIT PREPARATION PROCEDURE (Continued)

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.

[END]

FINAL COCKPIT PREPARATION PROCEDURE

Fuel Quantity . . . . C/FO

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

NOTES: The FQGS may not provide an accurate FOB quantity until a minimum of 20 minutes after fueling has been completed. If accuracy of the total FOB is then questionable, maintenance action may be required.

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

For short flights, it is recommended to have a minimum of 5000 kilograms of fuel in each tank. At lower quantities during climb, fuel transfer from tank 1 and/or 3 tip compartments may not keep up with engine fuel usage at climb thrust. If the TNK 1 or 3 FUEL QTY LO alerts are displayed, reduce pitch attitude or level off and allow transfer system time to recover.

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.

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

(CONTINUED)

FINAL COCKPIT PREPARATION PROCEDURE (Continued)

Rotate AUTO BRAKE selector without delay to the desired position. Slow movement of the selector may cause the AUTO BRAKE FAIL alert to be displayed.

Cockpit Preparation Checklist . . . . C/FO

Perform Cockpit Preparation challenge and response checklist.

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

[END]

Intentionally
Blank

BEFORE START/PUSHBACK PROCEDURE

NOTE: Prior to pushback or taxi operations, ensure all couriers and crew members not performing required duties are seated.

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.

Park 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.

(CONTINUED)

BEFORE START/PUSHBACK PROCEDURE (Continued)

FUEL MANUAL
Push tank 1, 2, and 3 PUMPS switches and observe tank 1, 2, and 3 PUMPS OFF and LOW lights 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.

[END]

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.” Confirm the FUEL switch is firmly latched in the ON position by jiggling the switch and pushing down.	Start clock
	Observe normal fuel flow indication and EGT indicates an increase within 25 seconds. *NOTE: If fuel flow exceeds 320kgh before light-off, a hot start may result. Be prepared to abort start if a rapid EGT rise approaches starting limit.*	
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 switch pops in and switch light extinguishes.	
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.***	

NOTES: 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 warmup purposes.

(CONTINUED)

ENGINE START PROCEDURE (Continued)

When making starts at low ambient temperatures (below –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% (30% maximum), 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 Supplementals 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.

[END]

AFTER START PROCEDURE

Engine Anti-Ice and Airfoil Anti-Ice . . . . FO

Verify anti-ice system is in automatic mode. If anti-ice system is in MANUAL, refer to Supplementals 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:

(CONTINUED)

AFTER START PROCEDURE (Continued)

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.

Transponder. . . . . FO

At airports where ground tracking is not available, select STBY. At airports equipped for ground tracking, select an active transponder setting. Do not select a TCAS mode.

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.

[END]

TAXI PROCEDURE

NOTE: At the Captain's discretion, and when clear of ground equipment and personnel, the Taxi Procedure may be accomplished in sequence prior to taxiing.

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. Each pilot will independently conduct the aileron rollout check by rotating the control wheel to full left and full right. Observe green aileron and spoiler boxes indicate full deflection. Rotate wheel to neutral position.

Captain or F/O will move control column full forward and full aft, then neutral while observing corresponding green indication of ELEV boxes.

Captain will 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.

NOTES: If the appropriate display of a green box is not achieved while performing the individual aileron rollout, it is permissible for the assisting pilot to simultaneously rotate his control wheel (approximately 135°) to achieve the aileron green box indication.

(CONTINUED)

TAXI PROCEDURE (Continued)

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 control wheel through approximately the final one-third of travel. This increased force is evidence that one or both of the downward moving ailerons have reached full 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.

[END]

BEFORE TAKEOFF PROCEDURE

Takeoff Clearance / Runway / Entry Point. . . . . C/FO

FO obtain takeoff clearance from ATC when ready for departure. Prior to taxiing past the hold short line, both pilots must verbally verify runway identification and entry point are correct.

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-INT 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.

(CONTINUED)

BEFORE TAKEOFF PROCEDURE (Continued)

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.

NOTES: Power should be advanced within 20 seconds of selecting BLEEDS 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 Supplementals 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."

[END]

TAKEOFF PROCEDURE

CONDITION	PILOT FLYING	PILOT NOT FLYING
Cleared for takeoff	Align aircraft on runway. Both pilots must verify that aircraft heading agrees with clearance runway heading.	
Power advance	When aircraft is aligned with runway, set throttles to approximately 70% N1. Verify symmetrical thrust. Call “Auto flight.” Push throttles up as necessary to ensure autothrottles advance to T/O thrust. Call “Check thrust.” Keep hand on throttles until reaching V1.	Select and call “Auto flight”. Verify T/O THRUST appears in FMA altitude window. Adjust takeoff thrust by 80 knots. Call “Thrust set” when throttles are at T/O thrust setting. As airspeed becomes active, verify V-speeds are displayed.
NOTES: 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 warmup 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.*		
Verify airspeed is active prior to 80 knots and monitor airspeed indications for abnormalities.		

(CONTINUED)

TAKEOFF PROCEDURE (Continued)

CONDITION	PILOT FLYING	PILOT NOT FLYING
80 KIAS	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.*	Verify T/O CLAMP in PFD altitude window and call “80 knots.” *NOTE: If throttles fail to clamp, call “No clamp.”*
V1 speed	Verify airspeed at V1 and place both hands on the control wheel.	Call “V1.”
Vr speed	Rotate at 2.5°/second to attain V2 + 10 at 35 feet AGL with three engines operating or V2 at 35 feet AGL with one engine inoperative. Tail strikes may occur at rotation rates of 3.8°/second or greater or pitch angles in excess of 12° 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

PILOT FLYING	PILOT NOT FLYING
Continue acceleration to and maintain V2 + 10 or maximum pitch (25°).	
At or above 200 feet (400 feet if NAV armed), call "Auto Flight."	Push AUTO FLIGHT switch and call "Auto flight" when engaged.
NOTE: Autoflight will engage in the existing speed, roll and pitch mode.	
Below CLB THRUST altitude, select PROF or LEVEL CHANGE as desired.	
NOTES: 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 thrust reduction at CLB THRUST altitude. *Selecting PROF engages FMS speed mode and automatic acceleration on FMS schedule.* *Selecting LEVEL CHANGE requires speed to be selected at acceleration altitude unless altitude is captured.*	
At or above acceleration altitude and flap retract speed, call "Flaps up."	Confirm flap retract speed, move the FLAP/SLAT handle to 0/EXT position and call "Flaps up."
When the aircraft is at or above Vsr and accelerating call "Slats retract."	Confirm slat retract speed, move FLAP/SLAT handle to UP/RET, and call "Slats retract."
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.	
	Disarm spoiler handle; select AUTO BRAKE OFF.

(CONTINUED)

INITIAL CLIMB PROCEDURE (Continued)

<table>
<tr><th>PILOT FLYING</th><th>PILOT NOT FLYING</th></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>
<tr><td colspan="2">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.</td></tr>
<tr><td colspan="2">If fuel system is operating in manual mode, use the following procedure.
FUEL MANUAL
If there is fuel in the AUX or TAIL tanks, in order to utilize that fuel, it is necessary to select L TRANS, R TRANS and TAIL TANK TRANS (as appropriate) pump switches to ON and push FILL valve switches to ARM.
When the respective “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 if TANK 2 quantity is greater than 1 and 3. If tank 1 and 3 FILL valve switches are not armed, push the 1 and 3 FILL valve switches to ARM. When TANK 2 quantity equals TANKS 1 and 3, push TANK 2 TRANS pump switch to OFF</td></tr>
<tr><td></td><td>Check EAD for alerts and status.
Accomplish After Takeoff checklist down to the dashed line.</td></tr>
</table>

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.”

Intentionally
Blank

PREPARATION FOR DESCENT PROCEDURE

NOTES: Prior to reducing thrust for descent when icing conditions (defined by visible moisture in the air and TAT is 6°C or below) are present, or anticipated, the ENG IGN OVRD switch and ENG, WING and TAIL ANTI-ICE switches must be placed in the ON position. When icing conditions are no longer present or anticipated, place the ENG IGN OVRD switch and the ENG, WING and TAIL ANTI-ICE switches in the OFF position.

Thrust reduction at top of descent may cause temporary thermal instability, which can result in momentary N2 EVM peaks. N2 EVM peak values equal to or exceeding 4.0 units will cause the EVM numerical values to be presented in amber within an amber box. The optional "ENGINE___VIB HI" Level 1 alerts will also be displayed (if installed). Minor throttle movements may improve or remove these momentary peak vibrations.

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.

(CONTINUED)

PREPARATION FOR DESCENT PROCEDURE (Continued)

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-INT 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.

(CONTINUED)

APPROACH PROCEDURE (Continued)

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

<table>
<tr><th>PILOT FLYING</th><th>PILOT NOT FLYING</th></tr>
<tr><td>Call “Landing gear down.”</td><td>Verify below limiting airspeed and place GEAR handle to DOWN position.</td></tr>
<tr><td></td><td>When landing gear indicates 4 green, raise SPOILER handle to ARM position.</td></tr>
<tr><td>Request “Auto brake OFF, MIN, MED, or MAX” as desired.</td><td>Select OFF, MIN, MED, or MAX on AUTO BRAKE selector and verify proper annunciation on EAD.</td></tr>
<tr><td colspan="2">NOTE: Rotate AUTO BRAKE selector without delay to the desired position. Slow movement of the selector may cause the AUTO BRAKE FAIL alert to be displayed.</td></tr>
<tr><td>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.</td><td>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.</td></tr>
<tr><td colspan="2">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.</td></tr>
<tr><td colspan="2">Both pilots cross check altimeter settings including the standby altimeter and adjust if necessary. Check EAD for alerts and reminder messages.</td></tr>
<tr><td>Call for “Before Landing Checklist.”</td><td>Perform Before Landing checklist and announce “Before Landing Checklist complete.”

Assure landing clearance received from ATC.</td></tr>
</table>

PILOT FLYING	PILOT NOT FLYING
NOTE: The Before Landing Checklist should be completed prior to FAF/OM. The Landing Essentials Items list should be displayed as a "Green Box", shortly after descending through 1500 feet above Airport Reference Point altitude. If the landing gear, flaps, or spoilers are not configured properly for landing, the Landing Essential Items list will appear as a White Box with the highest priority, improperly configured, item annunciated inside the box in the following order: "LANDING GEAR", "FLAPS", "SPOILERS".	

LANDING ROLL PROCEDURE

PILOT FLYING	PILOT NOT FLYING
Verify autothrottles start to retard to idle at approximately 50 feet RA. Adjust, thrust as required. Touchdown with thrust at idle Manual control of thrust should follow this same profile. After touchdown, fly nosewheel to the runway while raising reverser levers to reverse idle, apply reverse thrust and verify ground spoiler deployment.	Verify autothrottles start to retard to idle at approximately 50 feet RA. Monitor spoiler operation. Call “SPOILERS DEPLOYED” or “NO SPOILERS.” Observe green REV indications and call “REVERSE THRUST AVAILABLE” or “NO REVERSE ENG(S)____.”

(CONTINUED)

LANDING ROLL PROCEDURE (Continued)

<table>
<tr><th>PILOT FLYING</th><th>PILOT NOT FLYING</th></tr>
<tr><td colspan="2"><u>WARNING:</u> After reverse thrust is initiated, a full stop landing must be made.

NOTES: Below 10 feet with aircraft fully flared (typical sink rate approximately 200 to 300 feet per minute), the basic technique is to maintain attitude by applying the required control column pressures. An alternate technique is to reduce back pressure slightly, allowing the nose to drop 1 degree 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 throttle 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.</td></tr>
<tr><td>Apply reverse thrust as runway and conditions dictate.

Verify autobrake application; apply manual braking if required.</td><td></td></tr>
<tr><td colspan="2">NOTES: 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.</td></tr>
</table>

(CONTINUED)

LANDING ROLL PROCEDURE (Continued)

PILOT FLYING	PILOT NOT FLYING
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."
CAUTION: If a U/L or REV indication remains illuminated after throttles are in the forward idle position, do not cycle the associated reverser. Cycling the reverser may cause damage to the reverser actuation system and/or reverser structure. Allow the reverser to remain in the unstowed position for maintenance action. Continue to taxi on unaffected engines and consider shutting down affected engine. A normal engine shutdown may be made with the reverser deployed.	
Terminate autobrakes by retracting spoilers or depressing brake pedals.	

[END]

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 the transponder mode selector as required. At airports where ground tracking is not available, select STBY. At airports equipped for ground tracking, select an active transponder setting. Do not select a TCAS mode.

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. Move 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.

CAUTION: If the APU fails to start, do not attempt another start until at least 30 seconds has elapsed after the APU data is no longer displayed on the Secondary Engine Display (SD). This will allow time for excess fuel to drain from the APU combustion chamber.

(CONTINUED)

AFTER LANDING PROCEDURE (Continued)

Engine 2 FUEL Switch . . . . FO

NOTE: 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.

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.

Accomplish After Landing challenge and response checklist.

[END]

Intentionally
Blank

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.

Engine Ignition. . . . . FO

Verify OVRD ON switchlight is extinguished and ENG IGN OFF light is illuminated.

Seat Belts Sign . . . . FO

Move SEAT BELTS switch to OFF.

(CONTINUED)

PARKING PROCEDURE (Continued)

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 Supplementals 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.

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.

[END]

Intentionally
Blank

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
	5.	Oxygen System/Masks	CKD/SET 100%	C/ FO
	6.	T/O Warning System	CKD	FO
*	7.	FUEL Switches	OFF	C
*	8.	Rudder/AIL Trim	CKD	C
*	9.	FMS	SET/CKD	C/ FO
*	10.	FLAP T.O. SEL	SET__	C/ FO
*	11.	FCP	SET	C/ FO

* Items must be accomplished for through flight check.

COCKPIT PREPARATION (Continued)

*	12.	IRS	TAXI	C/ FO
*	13.	AUTO BRAKE	T.O.	C/ FO

* Items must be accomplished for through flight check.

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	

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.	Transponder	AS REQUIRED	FO
7.	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	CONFIRM/SET	C/ FO

BEFORE TAKEOFF

1.	Runway/Entry Point	RWY___/ENTRYPOINT___	C/ FO
2.	EAD	CKD	C/ FO
3.	HI-INT/LDG LTs	ON	C/ FO
4.	HYD Panel	AUTO OR MAN SET	FO
	[MANUAL] 1-3, 2-3 RMPs	ON	
5.	AIR Panel	AUTO OR MAN SET	FO

BEFORE TAKEOFF (Continued)

[MANUAL] PACKs . . . . .AS REQD

BLEEDS. . . . . AS REQD

6. WX Radar/Transponder. . . . . .ON/AS REQD FO

AFTER TAKEOFF

1. GEAR/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, 2-3 RMPs . . . . OFF

7. FUEL Panel. . . . . AUTO OR MAN SET PNF

   [MANUAL] **Usable fuel in AUX or TAIL tanks:**

   L & R AUX TRANS Pumps . . . ON

   TAIL TANK TRANS Pumps . . . ON

   FILL Valves . . . . ARM

   When respective PUMPS LO alert appears:

   Associated TRANS Pump . . . OFF

   TANK 2 quantity greater than 1 & 3:

   TANK 2 TRANS Pump. . . . . . . ON

   1 & 3 FILL Valves. . . . . ARM

   When all main tanks have equal quantities:

   TANK 2 TRANS Pump. . . . . . OFF

AFTER TAKEOFF (Continued)

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

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

AFTER LANDING (Continued)

3.	WX RADAR/Transponder	OFF/AS REQD	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.	ENG IGN	OFF	FO
5.	SEAT BELTS	OFF	FO
6.	FUEL Panel	AUTO OR MAN SET	FO
	[MANUAL] 1, 2, & 3 Pumps	OFF	
7.	EMER PWR	OFF	FO
8.	Exterior Lights	OFF	FO
9.	PARK BRAKE (Chocks In)	REL	C/ FO
10.	IRS	AS REQD	C/ FO
11.	SD STATUS Page	REVIEWED	C/ FO

LEAVING AIRCRAFT

1.	EMER LT	OFF	FO
2.	APU (If Not Required)	OFF	FO
3.	BAT	OFF	FO

[END]

Supplemental Procedures — Chapter SP

Section Table of Contents — Section 0

Intentionally
Blank

Supplemental Procedures Chapter SP

Table of Contents Section 00

Intentionally
Blank

Supplemental Procedures — Chapter SP

Introduction — Section 00

General

This section contains normal operating procedures which are not, in most cases, related to a specific phase of flight or are not performed at all in a routine flight.

Intentionally
Blank

Supplemental Procedures — Chapter SP

Table of Contents — Section 10

Intentionally
Blank

EXIT COCKPIT VIA ESCAPE ROPE

Raise pilots' inboard armrests to vertical stowed position and verify seat back is in the vertical position. Push and hold the aft side of the horizontal control switch until seat movement stops.

NOTE: If seat electrical power or control capability fails, pull and hold the horizontal control lever (H) aft, then push seat fully aft to the mechanical stop, and then outboard.

Raise outboard armrests to vertical position and unfasten seat belt and shoulder harness. Verify sun visor is forward of clearview window, and in stowed position. Unlock window by depressing lever and moving it aft, push and crank window to full open position. Open escape rope compartment door and remove coiled escape rope. After verifying rope is attached to aircraft, drop rope on seat or floor. Position body on window sill, facing inboard, with upper torso in window and legs on seat. Grasp rope with one hand and with free hand throw rope out of window. While still grasping rope, maneuver body out of window using rope and aircraft structure for support. When favorably positioned outside of aircraft, slowly lower self to the ground.

[END]

Intentionally
Blank

Supplemental Procedures — Chapter SP
Table of Contents — Section 20

Intentionally
Blank

AIR CONDITIONING CONDENSATION CONTROL – ON THE GROUND

NOTE: The appearance of water both as condensation and fog in the cockpit and cabin during stops in a humid environment may occur when operating with cockpit windows and/or cabin doors open. Humid ambient air causes condensation on those surfaces that have a temperature below the dewpoint caused by air-conditioned air. Fog may appear in the mixing region of air-conditioned air and humid ambient air. It is therefore desirable to prevent the humid air from entering occupied areas and to deliver to all areas air with humidity as low as possible.

ECON Switch . . . . OFF

Cabin Doors and Cockpit Windows . . . . .CLOSE

Close all cabin doors and cockpit windows if compatible with aircraft servicing and/or loading.

Cabin/courier zone with door(s) closed,

Associated Temperature Selector . . . . FULL COLD

Select a zone that has doors closed and rotate associated temperature selector to full COLD.

NOTE: Selecting full COLD on a selector will drive all three packs to a full cold position and result in a lower humidity air discharge.

Cabin/courier zone with door(s) open,

Associated Temperature Selector(s) . . . . FULL HOT

NOTE: Changing temperature selector from a cold position to a hot position will add trim air and reduce condensation in the area of the outlet.

All other zones,

Associated Temperature Selector(s) . . . . AS REQUIRED

[END]

AIR CONDITIONING OPERATION WHEN PLANNING A DELAYED ENGINE 2 START

Use this procedure when it is desired to minimize the introduction of engine or APU exhaust odors into the air conditioning system when planning a delayed start of engine 2.

NOTE: Exhaust from engine 1, 3 or APU could be ingested by the APU and enter the cockpit and cabin via any pack that is being supplied by the APU.

After starting engines 1 and 3,

AIR APU Switch . . . . OFF

Push AIR APU switch and observe ON light extinguishes.

NOTE: By continuing to supply generator bus 2 with electrical power from the APU, the APU will not shut down.

AIR SYSTEM AUTO

NO

NOTE: Pack 2 will operate when engine start mode is terminated 2 minutes after the start of the second engine.

When ready to start engine 2,

APU AIR DESIRED FOR ENGINE START

NO

AIR APU Switch . . . . ON

Push AIR APU switch and observe ON light illuminates.

Start engine 2 using normal start procedures.

[END]

Refer to Supplemental procedures – CROSSBLEED START.

[END]

(CONTINUED)

AIR CONDITIONING OPERATION WHEN PLANNING A DELAYED ENGINE 2 START (Continued)

1-3 ISOL Switch . . . . OFF

Push 1-3 ISOL switch and observe ON lights extinguish.

BLEED AIR 1 and 3 Switches . . . . ON

Push BLEED AIR 1 and 3 switches and observe OFF lights extinguish.

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

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

When ready to start engine 2,

PACK 2 Switch . . . . OFF

Push PACK 2 switch and observe OFF and FLOW lights illuminate.

1-2 ISOL Switch . . . . OFF

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

AIR APU Switch . . . . ON

Push AIR APU switch and observe ON light illuminates.

Start engine 2 using normal start procedures.

After starting engine 2,

AIR APU Switch . . . . OFF

Push AIR APU switch and observe ON light extinguishes.

BLEED AIR 2 Switch . . . . ON

Push BLEED AIR 2 switch and observe OFF light extinguishes.

PACK 2 Switch . . . . ON

Push PACK 2 switch and observe OFF and FLOW light extinguish.

Complete After Start procedures.

[END]

AIR CONDITIONING USING EXTERNAL CONDITIONED 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 illuminate.

Request ground crew to connect external air conditioning air source.

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

NOTES: 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 MANUAL light illuminates.

Outflow VALVE
Indicator. . . . . SET BETWEEN THE 9:00 AND 10:00 POSITION

Rotate CABIN PRESS manual rate selector to set outflow VALVE indicator between the 9:00 and 10:00 position (1/2 to 2/3 valve open 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.

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]

Supplemental Procedures — Chapter SP

Table of Contents — Section 30

Intentionally
Blank

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.

NOTES: 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.*

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 through knowledge of existing and forecast weather conditions, to exercise extreme caution, and to adhere to standard operating procedures.

(CONTINUED)

COLD WEATHER OPERATIONS (Continued)

Cold weather protection and servicing of the aircraft, including de-icing, 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.

(CONTINUED)

COLD WEATHER OPERATIONS (Continued)

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.

Refer to GROUND DE-ICING procedure in this section for specific procedural steps.

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. Engines should be operated at idle during de-icing, with inlet cowl anti-ice on, and all aircraft air systems that supply bleed air into the cabin turned off.

(CONTINUED)

COLD WEATHER OPERATIONS (Continued)

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, in the automatic mode, engine and airfoil anti-ice will be on during ground operations when ice is detected. Engine anti-ice will activate on the ground. Airfoil anti-ice will be armed on the ground and activate following nose-strut extension during takeoff.

NOTES: 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.

(CONTINUED)

COLD WEATHER OPERATIONS (Continued)

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 CONFIG 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.

(CONTINUED)

COLD WEATHER OPERATIONS (Continued)

- 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.

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 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.

If it is not practical to perform the recommended periodic engine run-up, the takeoff should be preceded by a static run-up to 60% N1 for 30 seconds. If airport surface conditions or congestion do not permit the engines to be advanced to 60% N1, thrust should be set as high as practical for 30 seconds, or as long as conditions permit. Observe all engine displays for proper indications prior to brake release.

(CONTINUED)

COLD WEATHER OPERATIONS (Continued)

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 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.

NOTES: 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.

(CONTINUED)

COLD WEATHER OPERATIONS (Continued)

Inflight

NOTE: Prior to reducing thrust for descent when icing conditions (defined by visible moisture in the air and TAT is 6°C or below) are present, or anticipated, the ENG IGN OVRD switch and ENG, WING and TAIL ANTI-ICE switches must be placed in the ON position. When icing conditions are no longer present or anticipated, place the ENG IGN OVRD switch and the ENG, WING and TAIL ANTI-ICE switches in the OFF position.

In automatic mode, engine and airfoil anti-ice will be on when ice is detected.

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" may be displayed on the MCDU line 6L, and "CLEAR*" may be displayed on line 6R.*

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.

(CONTINUED)

COLD WEATHER OPERATIONS (Continued)

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 exist. 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.

(CONTINUED)

COLD WEATHER OPERATIONS (Continued)

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, as appropriate to the braking action and runway length available to ensure a safe stop. On contaminated or slippery runways, immediately after nose gear touchdown, maximize anti-skid braking operation by applying full brake pressure smoothly and symmetrically until a safe stop is assured. If autobrakes are used, the MAX position should be selected. 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.

(CONTINUED)

COLD WEATHER OPERATIONS (Continued)

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.

[END]

ENGINE AND AIRFOIL ANTI-ICE

NOTES: The "ICE DETECTED" alert will be displayed when the automatic anti-ice system has failed. The alert will also be displayed if the automatic anti-ice system is in the manual mode, icing conditions exist and any engine or airfoil anti-ice system is not on.

When aircraft is above 17,750 ft, the "NO ICE DETECTED" alert will be displayed when the automatic anti-ice system is in the manual mode, any engine or airfoil anti-ice system is on, and icing conditions no longer exist.

The "ICE DET SINGLE" alert will be displayed if one ice detection system is inoperative. Ice detection system is downgraded to advisory only status; however, automatic anti-ice system is functional. Use total air temperature and visual methods as means of ice detection.

The "ICE DETECTOR FAIL" alert will be displayed if both ice detection systems have failed. Automatic anti-ice system is not functional; however, anti-ice system is available in manual mode. Use total air temperature and visual methods as means of ice detection.

The following general rules may be used to assist in determining icing conditions.

- *Icing conditions can exist when TAT is below 6°C and there is visible moisture in the air.*
- *The higher the temperature (up to 6°C) the higher the cloud liquid water content and the more severe the icing conditions.*
- *At temperatures below –20°C, icing conditions encountered would be less severe.*
- *In addition to TAT at or below 6°C and visible moisture in the air, be alert for ice buildup on the unheated portions of the aircraft visible from the cockpit.*
- *The above apply in general, however, heavy icing has on occasion been reported at temperatures as low as –60°C.*

(CONTINUED)

ENGINE AND AIRFOIL ANTI-ICE (Continued)

AIRCRAFT ON GROUND BEFORE TAKEOFF

NO

ANTI-ICE SYSTEM MANUAL

NO

After engine start, when “ICE DETECTED” alert is displayed or icing conditions exist or are expected,

ENG IGN OVRD Switch . . . . ON

Push ENG IGN OVRD switch and observe OVRD ON light illuminates.

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]

ANTI-ICE SYSTEM MANUAL

NO

When “ICE DETECTED” alert is displayed or icing conditions exist or are expected,

(CONTINUED)

ENGINE AND AIRFOIL ANTI-ICE (Continued)

ANTI-ICE SYSTEM MANUAL

NO

(CONTINUED)

ENG IGN OVRD Switch . . . . ON

Push ENG IGN OVRD switch and observe OVRD ON light illuminates.

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 ENG 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 to 30 seconds. When anti-ice is no longer required, push ENG IGN OVRD switch to OFF.

*NOTE: During this procedure, "*CONFIRM ENG OUT" may be displayed on the MCDU line 6L and "CLEAR*" may be displayed on line 6R.*

When "NO ICE DETECTED" alert is displayed and/or anti-ice is no longer required,

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

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

(CONTINUED)

ENGINE AND AIRFOIL ANTI-ICE (Continued)

ANTI-ICE SYSTEM MANUAL

NO

(CONTINUED)

ENG IGN OVRD Switch . . . . OFF

Push ENG IGN OVRD switch and observe OVRD ON light extinguishes.

[END]

"ICE DETECTED" ALERT DISPLAYED

NO

Depart icing area and leave anti-ice system in automatic mode.

NOTE: Anti-ice system is inoperative.

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 ENG 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 to 30 seconds. When anti-ice is no longer required, push ENG IGN OVRD switch to OFF.

*NOTE: During this procedure, "*CONFIRM ENG OUT" may be displayed on the MCDU line 6L and "CLEAR*" may be displayed on line 6R.*

No further crew action required.

[END]

GROUND DE-ICING

NO SMOKE Switch . . . . .AUTO

Just prior to start of de-icing,

APU (Engine or Ground Service Electrical Power) . . . . . . VERIFY OFF

AIR SYSTEM SELECT Switch . . . . MANUAL

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

BLEED AIR Switches. . . . . ALL OFF

Stabilizer Trim . . . . .SET/3° ANU

FLAP/SLAT Handle . . . . UP/RET

NOTE: Preferred flap/slat configuration is UP/RET, unless specific problems are presented, such as snow or slush in the flap/slat area, which may require additional spraying.

Parking Brake . . . . AS REQD

Ground Crew Communications (If Required). . . . . ESTABLISH

WARNING: ***Once the de-icing 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 de-icing to reduce fluid ingestion.

When de-icing is complete,

APU (If Required) . . . . .START

APU BLEED Switch (APU Running) . . . . ON

Prior to takeoff,

AIR SYSTEM SELECT Switch . . . . .AUTO

Flap/Slat. . . . . CYCLE 50/EXT, SET T/O FLAPS

STAB TRIM . . . . SET/___°

Flight Controls . . . . CHECK

Complete normal checklists as required.

[END]

WINDSHEAR PROCEDURES

General

The most important policy for the flight crew in coping with a windshear is to avoid areas of known windshear.

Definition

Severe windshear may be defined as a rapid change in wind direction and/or velocity that results in airspeed changes greater than 15 knots or vertical speed changes greater than 500 fpm.

Flight Crew Actions

Overview and Model of Flight Crew Actions

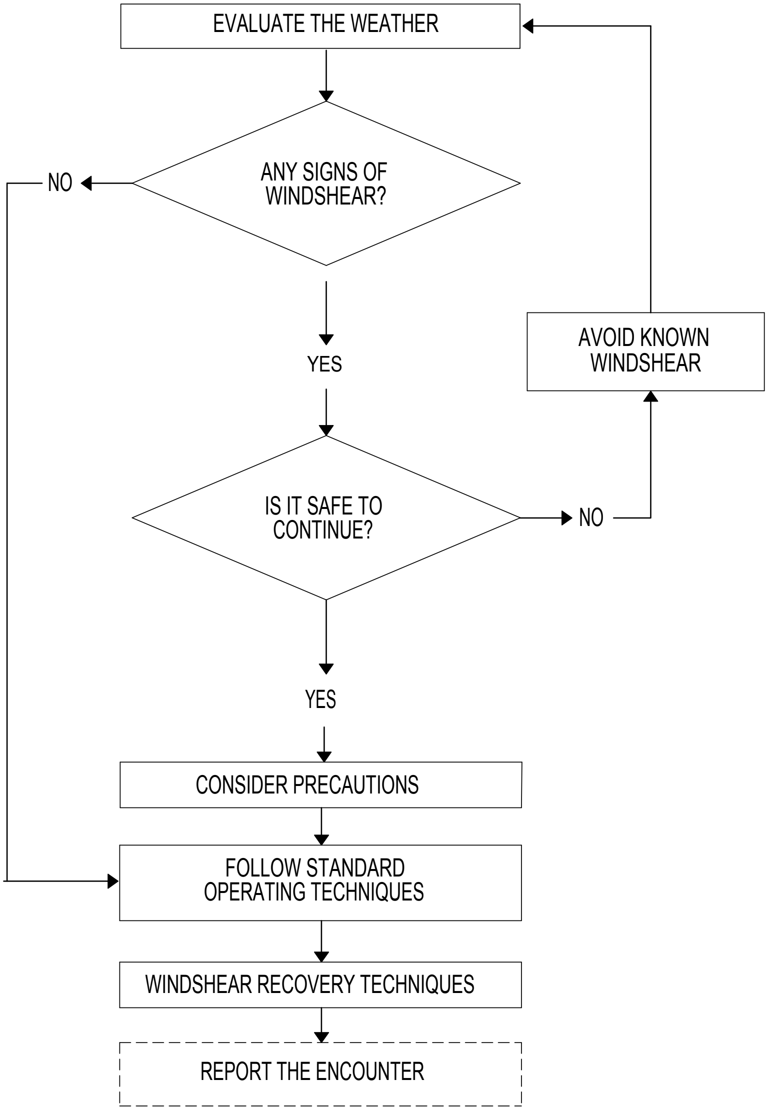
Flight crew actions preparatory to encountering possible windshear events are divided into five areas listed below. In order to simplify operational windshear decisions, these five areas have also been incorporated into a model (see following page) for use in every day operation.

1. Evaluate the weather.
2. Avoid known windshear.
3. Consider precautions.
4. Follow standard operating techniques.
5. Windshear recovery technique.

(CONTINUED)

WINDSHEAR PROCEDURES (Continued)

Model Of Flight Crew Actions



LB1-2-0076

(CONTINUED)

WINDSHEAR PROCEDURES (Continued)

Evaluate The Weather

Detection of windshear is difficult with today's technology. Develop an awareness of the causes and danger signals of windshear to successfully avoid windshear.

The most dangerous form of windshear is a convective weather microburst of either the dry or wet type. As shown in the table below, convective weather conditions have produced the majority of known windshear accidents.

Cause of Windshear	Approximate Percentage of Windshear Accidents
Convective conditions (thunderstorms, rain, and snow showers)	65
Frontal systems	15
Low altitude jet streams	5
Strong or gusty surface winds	5
All other causes (temperature inversions, mountain waves, sea breeze circulations, unknown causes)	10

(CONTINUED)

WINDSHEAR PROCEDURES (Continued)

Danger Signals Of Dry Microbursts

PIREP	Caution – Due to the rapid intensification of microbursts, actual windshear may be up to twice as severe as the PIREP.
LLWAS	Caution – LLWAS in its present state of development is not completely accurate in detecting microbursts and is prone to false alarms.
Virga	Rain falling from high based convective clouds evaporating before it reaches the ground.
Temperature/Dewpoint	Watch for the spread of 30°F to 50°F (17°C to 28°C).
Localized Strong Winds	Blowing dust, rings of dust, dust devils, other tornado-like features and other evidence of strong local outflow near the surface.
Turbulence	Moderate or greater turbulence may be associated with the outflow from a microburst.
Airborne Weather Radar	Indications of weak (green) cells with bases from 5,000 to 15,000 ft AGL which indicate weak precipitation, usually virga. In addition, in doppler mode, areas of red (doppler turbulence) surrounding weak precipitation may indicate microburst windshear conditions in their formative stages aloft.
Weather Forecast	The potential for a mircroburst is indicated by mid-level moisture, very dry surface conditions and a 30°F to 50°F (17°C to 28°C) temperature/dewpoint spread.

(CONTINUED)

WINDSHEAR PROCEDURES (Continued)

Danger Signals Of Wet Thunderstorm Microbursts

PIREP	Caution – Due to the rapid intensification of microbursts, actual windshear may be up to twice as severe as the PIREP.
LLWAS	Caution – LLWAS in its present state of development is not completely accurate in detecting microbursts and is prone to false alarms.
Thunderstorms	In addition to the well known hazards of thunderstorms, an estimated 5% of thunderstorms accompanied by heavy rain and/or lighting contain embedded microbursts.
Localized strong wind	Blowing dust, rings of dust, dust devils, other tornado-like features and other evidence of strong local outflow. (Caution – Visual clues may be obscured by low visibilities in wet thunder storm microburst situations.)
Turbulence	Moderate or greater turbulence may be associated with the outflow from a microburst.
Airborne weather radar	Search the area above and along the takeoff and approach paths for heavy precipitation.
Weather forecast	Although no techniques currently exist to forecast wet microbursts, crews should consider the thunderstorm forecasts contained in the terminal forecasts and severe weather advisories as a possible indication of the presence of wet microbursts.

(CONTINUED)

WINDSHEAR PROCEDURES (Continued)

The following table (designed specifically for convective weather conditions) provides a subjective evaluation of various observational clues to aid in making appropriate real time avoidance decisions. Although encountering weather conditions described in the table above 1000 feet AGL may be less critical in terms of flight path, such encounters may present other significant weather related risks. Windshear clues should be considered cumulative. The probability of each single observation is given. However, if more than one windshear clue is observed, the probability rating may be increased to reflect the total set of observations. Use of the table should not replace sound judgment in making avoidance decisions. Crewmembers are urged to exercise caution when determining a course of action.

(CONTINUED)

WINDSHEAR PROCEDURES (Continued)

MICROBURST WINDSHEAR PROBABILITY GUIDELINES

OBSERVATION	PROBABILITY OF WINDSHEAR
PRESENCE OF CONVECTIVE WEATHER NEAR INTENDED FLIGHT PATH:	
With localized strong winds (tower reports or observed blowing dust, rings of dust, tornado-like features, etc.)	HIGH
With heavy precipitation (observed or radar indications of contour, red or attenuation shadow)	HIGH
With rain shower	MEDIUM
With lightning	MEDIUM
With virga	MEDIUM
With moderate or greater turbulence (reported or radar indications)	MEDIUM
With temperature/dew point spread of 30°F to 50°F (17°C to 28°C)	MEDIUM
ONBOARD WINDSHEAR DETECTION SYSTEM ALERT:	
Reported or observed	HIGH
PIREP OR AIRSPEED LOSS OR GAIN:	
20 KIAS or greater	HIGH
Less than 20 KIAS	MEDIUM
FORECAST OF CONVECTIVE WEATHER:	LOW

HIGH	Critical attention needs to be given to this classification. A decision to avoid (e.g. divert or delay) is appropriate.
MEDIUM	Consideration should be given to avoiding. Precautions are appropriate.
LOW	Consideration should be given but a decision to avoid is not generally indicated.

NOTE: These guidelines apply to operations in the airport vicinity (within 3 miles of the point of takeoff or landing along the intended flight path and below 1,000 feet AGL). The hazard increases with proximity to the convective weather. Weather assessment should be continuous.

CAUTION: Currently no quantitative means exists for determining the presence or intensity of microburst windshear. Crew members are urged to exercise caution in determining a course of action.

(CONTINUED)

WINDSHEAR PROCEDURES (Continued)

Avoid Known Windshear

The policy is to avoid areas of known windshear. Consider one or more of the following actions as appropriate:

- Delay takeoff until conditions improve.
- In flight, divert around the area of known windshear.
- If windshear is indicated during approach, initiate a go-around or hold until conditions improve.

Consider Precautions

Precautions are recommended whenever possibility of windshear exists.

Takeoff Precautions

- Use maximum takeoff thrust instead of reduced thrust.
- Use the longest suitable runway away from potential windshear.
- Consider using the lowest practical recommended flap setting consistent with runway and obstacle clearance requirements.
- Consider using increased Vr speed. The recommended technique for scheduling and using increased rotation airspeeds is as follows:

1. Determine the V1, Vr, and V2 speeds for the actual aircraft gross weight and flap setting. Set the airspeed reference bugs to these values.
2. Determine the field length limit maximum takeoff weight for the selected runway and flap setting and the corresponding Vr.
3. If the field limit Vr is greater than the actual gross weight Vr, use the higher Vr (up to 20 knots in excess of the actual gross weight Vr) for takeoff. The airspeed reference bugs should not be reset.
4. Rotate to the normal initial climb attitude at the increased Vr. Continue to maintain the normal initial climb attitude until safely clear of ground and obstacles.

WARNING: ***If windshear is encountered at or beyond the actual gross weight Vr (reference bug Vr), do not attempt to accelerate to the increased Vr, but rotate without hesitation. In no case should rotation be delayed beyond 2000 feet from the end of the usable runway surface.***

(CONTINUED)

WINDSHEAR PROCEDURES (Continued)

Do not use any pitch mode of a speed referenced flight director for takeoff unless a windshear detection and guidance system is incorporated and operational.

Approach Precautions

- Achieve a stabilized approach no later than 1,000 feet AGL.
- Avoid large thrust reductions or trim changes in response to sudden airspeed increases as these may be followed by airspeed decreases.
- Use the longest suitable runway away from potential windshear.
- Consider using the recommended flap setting (recommended landing flap setting is minimum flap setting authorized for normal landing configuration).
- Consider using increased approach speed (correction applied in the same manner as gusts) up to a maximum of 20 knots.
- Use the autopilot and autothrottles for the approach to provide more monitoring and recognition time. If using the autothrottles, manually back-up the throttles to prevent excessive power reduction during an increasing performance shear.

Follow Standard Operating Techniques

Certain procedures and techniques can prevent a dangerous flight path situation from developing if windshear is inadvertently encountered. These procedures and techniques are of such importance that they should be incorporated into each crewmember’s personal standard operating techniques and practiced on every takeoff and landing whether or not windshear is anticipated. Develop a cockpit atmosphere which encourages awareness and effective crew coordination, particularly at night and during marginal weather conditions.

Takeoff Standard Operating Techniques

- Be alert for any airspeed fluctuations during takeoff and initial climb.
- Know the all-engine climb pitch attitude.
- Make a continuous rotation at the normal rotation rate to the all-engine climb pitch attitude for non-engine failure takeoffs.

(CONTINUED)

WINDSHEAR PROCEDURES (Continued)

- Minimize reductions from the initial climb pitch attitude until terrain and obstruction clearance is assured.
- Develop an awareness of normal values of airspeed, attitude, vertical speed and airspeed build up.
- The pilot not flying closely monitors the vertical flight path instruments such as vertical speed and altimeters and calls out any deviations from normal.

Approach Standard Operating Techniques

- Develop an awareness of normal values of vertical speed, thrust and pitch.
- Cross-check flight director commands using the vertical flight path instruments.
- Know the go-around decision criteria and be prepared to execute an immediate go-around if the parameters are exceeded.
- The pilot not flying closely monitors the vertical flight path instruments such as vertical speed, altimeters and glideslope displacement and calls out any deviations from normal.

Windshear Recovery Techniques

The following actions are recommended whenever flight path control becomes marginal below 1,000 feet AGL on takeoff or approach. As guidelines, marginal flight path control may be indicated by deviations from target conditions in excess of:

- ± 15 KIAS.
- ± 500 feet/minute vertical speed.
- ± 5° pitch attitude.
- ± One dot displacement from the glideslope.
- Unusual throttle position for a significant period of time.

(CONTINUED)

WINDSHEAR PROCEDURES (Continued)

Windshear Alert and Guidance System Not Available

General

If the on-board windshear detection system is not operative or is suspect and flight path control becomes marginal at low altitudes, initiate recommended windshear recovery technique without delay. Accomplish the first three steps simultaneously.

Windshear Recovery Technique

Accomplish the first three steps simultaneously:

Thrust

Disconnect the autothrottles and aggressively apply maximum thrust to insure adequate aircraft performance. Avoid engine overboost unless necessary to avoid ground contact. If ground contact is imminent, apply maximum available thrust for the time required to recover from the situation. Additional force will be required to override the overboost stop providing maximum available thrust. When aircraft safety has been insured, adjust thrust to maintain engine parameters within specified limits and reset the FADECs.

NOTE: After a maximum thrust application (overboost), those engine parameters which exceeded the limits and the duration will require a log entry.

Disconnect the Autopilot

Pitch

For a windshear encounter after lift-off or on approach, increase or decrease pitch attitude as necessary (at normal pitch rate) toward an initial target attitude of 15°. On takeoff where a normal all engine pitch attitude has been established before a windshear is encountered, it is not necessary to decrease pitch to 15°. The all engine pitch attitude may be maintained until either the shear has been exited or stick shaker is encountered. The stick shaker may be expected to activate when pitch attitude reaches the pitch limit indicator (PLI). Use intermittent stick shaker as the upper limit for pitch.

(CONTINUED)

WINDSHEAR PROCEDURES (Continued)

Rapidly changing vertical winds can also cause momentary stick shaker at any altitude. If attitude has been limited to less the 15° to stop stick shaker, increase attitude toward 15° as soon as stick shaker stops.

If the vertical flight path or altitude loss is still unacceptable after reaching 15°, further increase pitch attitude smoothly in small increments not to exceed stick shaker angle of attack.

Rapidly changing winds may cause rapid excursions in pitch and roll with little or no pilot input. Control pitch in a smooth, steady manner (in approximately 2° increments) to avoid excessive overshoot/undershoot of the desired attitude. Once the aircraft is climbing and ground contact is no longer an immediate concern, airspeed should be increased by cautious reductions in pitch attitude.

Flight Director

Turn flight director off or disregard commands.

If windshear is encountered on runway during takeoff and an abort is not practical, rotate toward 15° at normal rate of rotation but no later than 2,000 feet of usable runway remaining. After becoming airborne, follow after lift off/on approach recovery technique.

Configuration

Do not change flap, gear or trim position until terrain contact is no longer a factor.

NOTE: It is recognized that a change in flap position may improve windshear recovery. However, this procedure is not recommended since the risk of moving the flaps in the wrong direction or amount is considered to be greater than the risk of encountering a shear so great that a flap change is needed for recovery.

Report the Encounter

Report the airspeed change, shear encountered location and altitude and aircraft type to ATC as quickly as possible. Use the term PIREP in making the report in order to encourage rebroadcast to other aircraft.

(CONTINUED)

WINDSHEAR PROCEDURES (Continued)

Windshear Alert and Guidance System Available

General

The windshear alert and guidance system (WAGS) provides detection, alerting and guidance through hazardous windshear conditions. The WAGS is enabled for detection and guidance from 80 knots on takeoff roll to 1,500 feet AGL.

On approach, the WAGS is enabled from 1,500 feet AGL down to 50 feet AGL. The system is part of the autoflight system (AFS) and it receives information from the central air data computer (CADC), inertial reference system (IRS), flight management system (FMS), and other components of the AFS. When the WAGS determines that a hazardous windshear condition exists, it provides windshear alerting on the electronic instrument system (EIS) and through the central aural warning system (CAWS). Flight director (FD) and autopilot functions are provided through the AFS. TCAS functions and, under specific conditions, GPWS are inhibited when in windshear guidance.

WARNING: ***In the WAGS, the windshear detection and alerting functions operate only between the surface and 1,500 feet AGL. The guidance function, however, continues to operate in climbs above 1,500 feet AGL if the aircraft was already in windshear guidance when passing 1,500 feet and the exit criteria are still not met. For any atmospheric disturbance encountered above 1,500 feet AGL, the WAGS is not involved. However, the FD/AFS will continue to guide to its active pitch mode. The standard mode reversions due to speed protection will continue to operate as usual. In several upsets outside the WAGS altitude envelope, the pilot should take positive action to ensure that both the required attitude and the required power are established.***

(CONTINUED)

WINDSHEAR PROCEDURES (Continued)

Detection

When the WAGS detects a windshear condition, it provides both aural and visual cockpit annunciations. A red windshear warning (decreasing performance windshear) or an amber windshear caution (increasing performance windshear) will be displayed in the EIS primary flight display (PFD) top left corner under the speed mode window when the WAGS detects the appropriate windshear condition. CAWS will be enabled to generate an alert tone followed by the aural message “TAILWIND SHEAR” or “HEADWIND SHEAR” annunciated three times. The flight mode annunciators will annunciate appropriate windshear modes.

The WAGS provides pitch guidance commands for windshear encounters during takeoff and go-around operations. Using data provided by the IRS, CADC, and other AFS components, the WAGS provides guidance commands for the F/D and A/P through the AFS and will be displayed in the PFD.

A visual indication of the relationship between the aircraft angle of attack and stick shaker angle of attack is provided by the pitch limit indicator (PLI). The PLI is intended as an information indicator and is not to be used as a guidance command.

The PLI provides pitch margin relative to aircraft stick shaker angle of attack. During a windshear, this is very useful information to the pilot when following windshear guidance commands. The PLI is normally cyan. When the aircraft approaches stick shaker angle of attack, the PLI turns amber, and at stick shaker angle of attack or greater, it turns red. It should be noted that the red zipper or underspeed warning indicator will often not coincide with PLI indications during windshear. The PLI is an angle of attack based presentation which is valid during windshear guidance conditions. The red zipper is an FMS airspeed based presentation and may not be accurate during windshear guidance.

(CONTINUED)

WINDSHEAR PROCEDURES (Continued)

Guidance

The WAGS provides guidance to achieve an energy conserving flight path during a windshear. When a decreasing performance windshear is detected and guidance is activated, and provided sufficient energy is available, the WAGS provides F/D and/or A/P pitch guidance to achieve and maintain a +1° flight path angle. This flight path angle provides a near optimal energy conservation flight path through the windshear field while also providing a positive flight path relative to the ground until aircraft performance is degraded to the point where stick shaker angle of attack is attained. The system will then provide pitch commands which will, if necessary, sacrifice altitude to maintain stick shaker angle of attack.

When above 450-feet radio altitude, even when an energy margin is available, the system will allow a zero or even slightly decreasing flight path in the presence of a strong downdraft to be more energy efficient when proximity to the ground is not a factor.

When below 450-feet of radio altitude, and degradation of kinetic energy no longer makes maintaining a positive flight angle of +1° possible, the windshear system will guide to stick shaker angle of attack and loss of altitude will occur as necessary to prevent a stall.

When an increasing performance windshear is detected and guidance is active, the WAGS provides energy gaining FD and/or AP guidance during takeoff and go-around. The windshear system will command an initial flight path angle of +1° until appropriate airspeed is achieved. The WAGS will then command pitch guidance to maintain this speed. In this case, inertial flight path angle is no longer limited to +1°. During takeoff, this is a speed of V2 + 30 knots. For go-around, the speed is 1.3 Vs + 20 knots, or higher, as limited by flap placard speed.

Windshear System Operation

Takeoff Roll

The windshear system is enabled above 80 knots to detect and provide alerting to the presence of windshear. When windshear is detected, the WAGS will cause the alerts to be displayed in the PFD, in the FMA, and aurally through the CAWS.

(CONTINUED)

WINDSHEAR PROCEDURES (Continued)

Decreasing performance windshear always have annunciation priority over increasing performance windshear. When either an increasing or decreasing performance windshear is detected on takeoff, the autothrottles will remain clamped, except for a flex, derate or alternate takeoff when the autothrottles will unclamp, set maximum takeoff thrust and reclamp.

The FMA speed, roll, and altitude windows will reflect the changes in WAGS system modes. For a decreasing performance windshear, the bank angle limit indication will go to 5° and the system will go to heading hold; the roll and altitude windows will flash “HDG XXX” and “WINDSHEAR” respectively five times. For increasing performance windshear, the roll window will remain unchanged and the altitude window will flash “WINDSHEAR” five times.

Transition to windshear guidance is automatic as long as the system is in takeoff mode. If takeoff mode is not engaged, pushing GA or advancing the throttles to at least 95% of go-around thrust will activate windshear guidance when windshear is detected.

When a windshear is detected, the windshear warning or caution annunciations will flash three times, then remain steady. The CAWS activates an aural alert tone followed by three cycles of “TAILWIND SHEAR” or “HEADWIND SHEAR.”

During a windshear encounter on takeoff roll, the system does not initiate rotational guidance but does provide increasing or decreasing windshear guidance after nose strut extension.

If the takeoff is rejected by the pilot, retarding the throttles to idle will cancel all windshear functions except for the FMA annunciations which remain until speed drops below 30 KIAS.

When either an increasing or decreasing performance windshear is detected during the takeoff roll prior to V1, the takeoff should be aborted.

Takeoff

Detection of windshear after V1requires continuing the takeoff. During a decreasing performance windshear, if Vr has not been reached prior to 2,000 feet from the end of the runway, rotation should be initiated. Advancing the throttles beyond the overboost stop is recommended in this situation.

(CONTINUED)

WINDSHEAR PROCEDURES (Continued)

Initial Climb

After rotation, when a windshear is detected, either increasing performance or decreasing performance guidance will be automatically provided as appropriate. When the windshear condition is exited, the WAGS will transition to reversionary guidance.

Approach and Go-Around

During approach and go-around, the windshear aural and visual alerts are the same as during takeoff. The thrust rating mode will automatically be switched to go-around if not already in go-around and “WINDSHEAR” will be displayed in the FMA speed window. The WAGS is equally effective on all types of approaches. If a windshear is detected with the F/D turned off, the F/D will automatically come into view and provide windshear guidance when the pilot pushes the GA button or thrust reaches 95% of go-around thrust.

On approach, when either an increasing or decreasing performance windshear is detected, as indicated by the CAWS and appropriate indications on the PFD, the speed bug will move to indicate 1.3 Vs + 20 knots if selected lower. The autothrottles will reference to a minimum of 1.3 Vs + 20 knots or the pilot selected approach speed, whichever is higher. If the detected windshear dissipates before guidance is initiated, the throttles will reference back to the pilot selected speed (if lower than 1.3 Vs + 20 knots) at a rate of approximately 1 knot per second.

When a windshear is detected on approach, the F/D and/or A/P windshear guidance can be engaged in three ways:

1. Pushing the GA button manually.
2. Advancing the throttles to at least 95% of GA thrust manually.
3. The ATS system automatically advances the throttles to at least 95% of GA thrust.

In all cases, initiation of windshear guidance will cause the autothrottle system to advance to GA thrust and clamp.

Once windshear guidance is activated, the FMA will annunciate the same as a windshear encounter on takeoff. The autothrottles will set go-around thrust. Windshear guidance continues until the windshear is no longer present and reversion criteria have been met. The AFS will then revert to normal go-around.

(CONTINUED)

WINDSHEAR PROCEDURES (Continued)

If a windshear is detected after a go-around has been initiated, the aural and visual alerts will be activated and windshear guidance will be initiated automatically as during takeoff. AFS reversion is as previously described.

On approach, whenever an increasing or decreasing performance windshear is detected, the pilot should discontinue the approach by pushing the GA button, thereby engaging the windshear guidance. Once the go-around is completed, the pilot should then carefully reassess the weather situation using all means at his disposal, then proceed to the alternate airport or make another approach as appropriate.

Windshear Reversionary Guidance

When windshear conditions no longer exist, all windshear detection annunciations cease. Windshear pitch and roll guidance will continue until safe conditions are achieved. Safe conditions are defined as a minimum rate of climb of 750 feet per minute and a speed of V2 + 10 knots on takeoff, or go-around reference speed on go-around. These conditions must be satisfied for at least 15 seconds and the aircraft must have reached 1,000 feet AGL. At that time, the guidance system will revert to normal AFS modes. Although reversion to takeoff or go-around modes will occur automatically, other pitch modes and HDG HOLD occur when the pilot deselects windshear guidance manually. The pilot can exit windshear guidance manually at any time by selecting any other pitch mode; however, this is not recommended when a decreasing performance windshear is being detected. If the pilot has manually exited windshear guidance while windshear is being detected, windshear guidance can be regained by pushing the GA button.

General Information and Recommendations

Configuration

Whenever windshear guidance is activated, aircraft configuration should be maintained until safe flight conditions are achieved.

(CONTINUED)

WINDSHEAR PROCEDURES (Continued)

Pop Up F/D and Autothrottles

If the WAGS detects a windshear and the F/D and ATS are turned off, windshear pitch guidance and automatic maximum power functions are still available. If the engine N1/EPR is above 95% of the go-around thrust rating, the FD will come into view and the ATS will engage to set maximum thrust. If engine N1/EPR is not above 95% of go-around thrust rating, the pilot is required to either push the GA button or move the throttles to above 95% of the GA rating to acquire FD and/or autothrottle functions. The FD and ATS will remain engaged throughout the windshear maneuver and after reversion to takeoff, go-around or other pilot selected AFS modes.

Windshear Guidance

The most demanding windshear is an encounter with a strong microburst which typically has lateral, horizontal and vertical wind components, often with rapid reversal of direction. It is difficult to comply with FD windshear guidance commands when the aircraft still has a significant amount of surplus kinetic energy, and is much more difficult when flying at stick shaker angle of attack. Here, PLI information is very useful. The information presented to the pilot is the pitch margin to stick shaker angle of attack between the aircraft symbol and the PLI. When the aircraft symbol and the PLI coincide, the aircraft is at stick shaker angle of attack and the PLI will turn red and the stick shaker will activate. During a steady and/or rapid increase or decrease in aircraft kinetic energy, pitch margin to PLI will be displayed accordingly and should be monitored while following FD pitch commands. When the aircraft is at low energy level flying at or near stick shaker angle of attack and has encountered the roll vortices of a microburst or gust front, rapid and strong reversal of lateral, vertical and horizontal wind components will require immediate response by the pilot to FD commands.

Further, he/she should not be dismayed to observe the PLI's rapid movements both above and below the aircraft symbol. Observing a change in direction of PLI movement relative to the aircraft symbol helps the pilot anticipate a change or reversal of control force in order to properly follow guidance commands which, in this regime of flight, will often require much greater and much more rapid control inputs than normal. These control inputs also often require a greater or lesser force with attendant slower aircraft response than is normally the case.

(CONTINUED)

WINDSHEAR PROCEDURES (Continued)

Windshear guidance will not command the pilot to fly above stick shaker angle of attack; however, strong vertical wind components may cause the PFD to display this condition to the pilot. The FD command in this situation will be to pitch down and the rate may be rapid but not abrupt. The pilot should also be aware that commands will be attenuated when the system senses a reversal of wind direction. This helps prevent what might otherwise become a pilot induced oscillation (PIO) maneuver with the pilot out of phase with the commands of the FD.

Detection and Escape Maneuver

When a pilot chooses to, or must, attempt a takeoff or landing in questionable weather, he/she will normally be alert for signs of windshear. In this situation, it is very possible that he/she will recognize the onset of a windshear before the windshear detection system functions. Even though WAGS cannot provide windshear encounter guidance unless detection has taken place, it is not recommended that the pilot delay initiation of an escape maneuver until detection occurs. Upon recognition of a windshear condition, the pilot should immediately apply full rated thrust and follow the recommendations for a manual escape maneuver, i.e., increase or decrease pitch as necessary toward a 15° pitch, at a normal rate, and continue following the technique set forth for the manual maneuver. It is more than likely that detection by the system will occur in short order and programmed windshear encounter guidance will automatically follow with appropriate aural and visual annunciations. Pilots should be aware that WAGS has a design feature which may delay windshear warning during sustained banks greater that 15° or while the flaps are moving, depending on the severity of the windshear. The stronger the windshear, the less the delay.

Thrust

The windshear system will advance to and clamp the autothrottles at maximum rated thrust during windshear guidance.

This amount of thrust will be sufficient for the MD-11 to survive most windshear encounters. However, if aircraft performance is such that the pilot judges that ground contact will occur, the throttles should be advanced beyond the overboost stop as recommended previously.

(CONTINUED)

WINDSHEAR PROCEDURES (Continued)

GPWS and TCAS

The GPWS is inhibited during windshear guidance when F/D commands are being followed within ±5°. The TCAS system functions are inhibited during windshear guidance.

Aircraft With Predictive Windshear System Installed and Operating

Takeoff

If a predictive windshear warning "WINDSHEAR AHEAD, WINDSHEAR AHEAD" is generated,

- Abort takeoff, or
- Do not start takeoff roll.
- Report the windshear location to air traffic control.

NOTE: All predictive windshear alerts are inhibited after 100 KIAS and until the aircraft has reached 50-feet radio altitude.

If a predictive windshear caution "MONITOR RADAR DISPLAY" and an advisory ICON are generated,

- Consider location of the windshear relative to the flight path and plan to deviate to avoid, or
- Delay takeoff until conditions improve.
- Report the windshear location to air traffic control.

If a predictive windshear event is detected after takeoff, treat as an approach event as follows:

Approach

If a predictive windshear warning "GO AROUND WINDSHEAR AHEAD" is generated,

- Perform an immediate go-around.
- Report the windshear location to air traffic control.

If a predictive windshear caution "MONITOR RADAR DISPLAY" and advisory ICON are generated.

(CONTINUED)

WINDSHEAR PROCEDURES (Continued)

- Consider location of the windshear relative to the flight path and deviate to avoid windshear, continue landing, or go-around and divert to alternate. Continue to monitor the windshear ICON.
- Report the windshear location to air traffic control.

Reactive and Predictive Windshear System Interaction

If a predictive windshear warning (red) is generated and a subsequent reactive windshear event occurs, the reactive system will issue a red warning. If the reactive system first detects a windshear caution without a predictive system alert, the reactive system will issue “HEADWIND SHEAR” or “TAILWIND SHEAR” alerts as appropriate, in any order.

[END]

Supplemental Procedures — Chapter SP

Table of Contents — Section 40

Intentionally
Blank

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 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.

(CONTINUED)

AUTOMATIC FLIGHT SYSTEM (AFS) (Continued)

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, retrim 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.***

(CONTINUED)

AUTOMATIC FLIGHT SYSTEM (AFS) (Continued)

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.

(CONTINUED)

AUTOMATIC FLIGHT SYSTEM (AFS) (Continued)

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 due to its fail passive capability, weather minimums are restricted to Category II. The APPR ONLY mode means that no autoland mode is available and the AP will automatically disconnect at 100 feet AGL. The pilot must complete the 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.

(CONTINUED)

AUTOMATIC FLIGHT SYSTEM (AFS) (Continued)

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.

NOTES: 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.

(CONTINUED)

AUTOMATIC FLIGHT SYSTEM (AFS) (Continued)

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.

(CONTINUED)

AUTOMATIC FLIGHT SYSTEM (AFS) (Continued)

VOR and NDB Approaches

VOR approaches may be flown as follows:

1. FMS data base approach flown in NAV mode.
2. With reference to raw data using HEADING/TRACK.
3. With reference to raw data using TRACK mode.
4. VOR TRACK mode.

NDB approaches may be flown as follows:

1. FMS NDB approach in NAV mode.
2. 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]

Intentionally
Blank

Supplemental Procedures — Chapter SP

Table of Contents — Section 50

Intentionally
Blank

Supplemental Procedures — Chapter SP

Config — Section 50

THIS SECTION INTENTIONALLY BLANK

Presently there are no procedures required for this section.

Intentionally
Blank

Supplemental Procedures — Chapter SP
Table of Contents — Section 60

Intentionally
Blank

EXTERIOR CABIN DOOR OPERATION

Normal Operation

Pull door control handle outward from recessed receptacle. Observe emergency override lever has moved to SAFE. Use electrical power for normal operation.

NOTE: Pulling the door control handle outward disarms the automatic slide raft deployment feature.

To open door,

Move and hold door control switch to OPEN. When door is fully open, release door control switch.

To close door,

NOTE: Remove and stow barrier strap prior to closing door.

Move and hold door control switch to CLOSE. When door is fully closed, release door control switch.

To arm door slide/raft,

Push door control handle inward until flush. Observe emergency override lever moves to EMERGENCY.

NOTE: If emergency override lever remains in SAFE, call maintenance.

Air Bottle – No Slide Deployment Operation

To open a cabin door using EMERGENCY position of exterior door handle,

Pull door control handle outward from recessed receptacle. Observe emergency override lever has moved to SAFE.

With free hand, move emergency override lever upward to EMERGENCY and hold. Rotate door control handle to EMERGENCY. Release door control handle and emergency override lever.

NOTES: The door control mechanism must be reset to reinstate the electrical controls.

The air bottle must be reserviced for subsequent use.

[END]

INADVERTENT PNEUMATIC DISCHARGE INFLIGHT

NOTE: Immediately following inadvertent discharge of a cabin door pneumatic bottle, reset door controls to ensure door remains in the closed and locked position until ready for subsequent use.

Hold door control handle in emergency EXIT OPEN position and rotate locking pawl reset lever upward.

While holding locking pawl reset lever up, return handle to neutral position.

Release locking pawl reset lever.

Make certain slide arming lever is in the SLIDE ARMED position.

SLIDE DEPLOYMENT REQUIRED

NO

Move door control handle to emergency OPEN position.

Using manual lift bar, manually raise door to full open position. As door moves upward slide will drop out of container and automatically deploy.

CAUTION: Doors weigh 158 Kgs each. Care must be used in lifting door with manual lift bar.

[END]

After landing use normal operating procedures to open door.

[END]

INTERIOR CABIN DOOR OPERATION

Normal Operation

To open door,

Verify slide arming lever is in SLIDE DISARMED and the DOOR DISARM light is illuminated.

NOTES: If DOOR DISARM light is not illuminated, call maintenance.

The lever may be latched in SLIDE DISARMED by moving the sliding mechanical safety latch into the latched position.

Move door control switch to OPEN and hold. The door will move inward and then up as it moves. When door is fully open, release switch.

If boarding ramp or stairs are not available, install barrier strap.

To close door,

NOTE: Remove and stow barrier strap before closing door.

Move door control switch to CLOSE and hold. Observe door closes and moves outward. When door is fully closed, release switch. Move sliding mechanical safety latch to the unlatched position.

To arm door slide/raft,

Move slide arming lever to SLIDE ARMED. Observe DOOR DISARM light extinguishes.

NOTE: If DOOR DISARM light remains illuminated, move the slide arming lever to SLIDE DISARM and call maintenance.

CAUTION: Operation of the door control switch (open) with DOOR DISARM Light illuminated will deploy the slide/raft if aircraft is depressurized.

[END]

Air Bottle – No Slide Deployment Operation

To open door,

CAUTION: Stand clear of the door since it will move rapidly to the full open position.

(CONTINUED)

INTERIOR CABIN DOOR OPERATION (Continued)

Pull slide arming lever downward from SLIDE ARMED through the SLIDE DISARMED position to the OVERRIDE position and hold.

With free hand, move door emergency control handle upward to EMERGENCY.

Release emergency door control handle and slide arm/disarm lever when door starts to open.

Reset door mechanism to reinstate electrical controls (normal operation).

NOTES: Inadvertent actuation of a door control handle to EMERGENCY (pneumatic) open position in flight will discharge the corresponding door air bottle.

Discharging the air bottle will not open the door in flight unless cabin differential pressure is less than approximately 0.55 psi.

Immediately following inadvertent discharge of a cabin door air bottle, reset door control handle from EMERGENCY (pneumatic) to neutral position.

To reset door control handle in flight,

Hold door control handle in EMERGENCY DOOR OPEN position, and rotate reset lever upward.

While holding reset lever up, return handle to neutral position.

Release reset lever.

Verify slide arming lever is in SLIDE ARM position.

After landing, use normal operating procedures to open door.

[END]

Emergency – Air Bottle With Slide Deployment Operation

Verify slide arming lever is in SLIDE ARMED.

CAUTION: Stand clear of the door since it will move rapidly to the full open position.

(CONTINUED)

INTERIOR CABIN DOOR OPERATION (Continued)

Move door control handle to EXIT OPEN and observe door opens. Release door control handle.

NOTES: When released, the door control handle will remain in EXIT OPEN. Once door travel is initiated, it cannot be interrupted.

If door does not operate, pull inward and lift, using lift bar at bottom of door. Due to weight, two people are required to lift the door.

[END]

INTERIOR CABIN DOOR OPERATION

Normal Operation

Forward Door

To open door,

Verify slide arming lever is in SLIDE DISARMED and the DOOR DISARM light is illuminated.

NOTES: If DOOR DISARM light is not illuminated, call maintenance.

The lever may be latched in SLIDE DISARMED by moving the sliding mechanical safety latch into the latched position.

Move door control switch to OPEN and hold. The door will move inward and then up as it moves. When door is fully open, release switch.

If boarding ramp or stairs are not available, install barrier strap.

To close door,

NOTE: Remove and stow barrier strap before closing door.

Move door control switch to CLOSE and hold. Observe door closes and moves outward. When door is fully closed, release switch. Move sliding mechanical safety latch to the unlatched position.

To arm door slide/raft,

Move slide arming lever to SLIDE ARMED. Observe DOOR DISARM light extinguishes.

NOTE: If DOOR DISARM light remains illuminated, move the slide arming lever to “SLIDE DISARM” and call maintenance.

CAUTION: Operation of door control switch (open) with the DOOR DISARM light illuminated will deploy the slide/raft if aircraft is depressurized.

[END]

Air Bottle – No Slide Deployment Operation

To open door,

CAUTION: Stand clear of the door since it will move rapidly to the full open position.

(CONTINUED)

INTERIOR CABIN DOOR OPERATION (Continued)

Pull slide arming lever downward from SLIDE ARMED through the SLIDE DISARMED position to the OVERRIDE position and hold.

With free hand, move door emergency control handle upward to EMERGENCY.

Release emergency door control handle and slide arm/disarm lever when door starts to open.

Reset door mechanism to reinstate electrical controls (normal operation).

NOTES: Inadvertent actuation of a door control handle to EMERGENCY (pneumatic) open position in flight will discharge the corresponding door air bottle.

Discharging the air bottle will not open the door in flight unless cabin differential pressure is less than approximately 0.55 psi.

Immediately following inadvertent discharge of a cabin door air bottle, reset door control handle from EMERGENCY (pneumatic) to neutral position.

To reset door control handle in flight,

Hold door control handle in EMERGENCY DOOR OPEN position, and rotate reset lever upward.

While holding reset lever up, return handle to neutral position.

Release reset lever.

Verify slide arming lever is in SLIDE ARM position.

After landing, use normal operating procedures to open door.

[END]

Emergency – Air Bottle With Slide Deployment Operation

Verify slide arming lever is in SLIDE ARMED.

CAUTION: Stand clear of the door since it will move rapidly to the full open position.

(CONTINUED)

INTERIOR CABIN DOOR OPERATION (Continued)

Move door control handle to EXIT OPEN and observe door opens. Release door control handle.

NOTES: When released, the door control handle will remain in EXIT OPEN. Once door travel is initiated, it cannot be interrupted.

If door does not operate, pull inward and lift, using lift bar at bottom of door. Due to weight, two people are required to lift the door.

Left Aft Door

CAUTION: The door has no escape slide, girt bar, or pneumatic power. It is not equipped for use as an emergency exit.

To open door,

Move POWER switch to ON.

Move door control switch to OPEN and hold. The door will move inward and then up as it opens. When door is fully open, release switch.

If desired, move POWER switch to OFF.

To close door,

Verify POWER switch is ON.

Move door control switch to CLOSE and hold. The door will move down and then outward as it closes. When the door is fully closed, release switch.

Move POWER switch to OFF.

[END]

LOWER CARGO DOOR OPERATION/INSPECTION

Forward Door

To open door,

Open cargo door control panel access door (forward of cargo door) by pushing on fasteners and pulling door open. Raise switch guard and move power and lights switch to ON. Observe white power indicator light illuminates. Push vent door handle trigger, releasing vent door handle from stowed (flush) position. Raise handle and observe vent door moves inward. Observe cargo door area is clear of obstructions and stand clear.

NOTE: Verify all ground equipment is removed to a minimum of 27 inches below door opening before proceeding.

Move and hold door switch to OPEN until door reaches a position providing optimum view of locking mechanism, then release door switch.

NOTE: Do not operate door if wind velocity exceeds 40 knots. Maximum velocity is 52 knots when door is fully open.

To inspect door,

Inspect cargo door area for no foreign matter in exposed locking mechanism. Observe locking mechanism is in proper position and all latch hooks are open.

To close door,

Observe cargo door is clear of obstructions and stand clear. Move and hold door switch to CLOSE until door is fully closed and green ready to lock light illuminates, then release switch. Observe green ready to lock light remains illuminated.

NOTE: If green ready to lock light does not illuminate or if it illuminates and extinguishes, call maintenance.

(CONTINUED)

LOWER CARGO DOOR OPERATION/INSPECTION

(Continued)

Move power and lights switch to OFF and close switch guard. Observe white power indicator light and area light extinguish and green ready to lock light remains illuminated. Move vent door handle to the closed (flush) position. Observe vent door is fully closed and vent door handle remains flush.

CAUTION: Do not use unreasonable force to close vent door handle.

NOTE: If vent door handle does not remain flush, or if vent door is not fully closed, call maintenance.

Verify the green ready to lock light extinguishes, then close and fasten control panel.

Verify, through viewing port at bottom of door, cargo door lock pins are fully engaged.

NOTE: If lock pins are not engaged or are only partially engaged, call maintenance.

Observe amber CARGO DOOR FWD A and B lights are extinguished.

NOTE: If CARGO DOOR FWD A or B light is illuminated, call maintenance.

Center Door

To open door,

Open cargo door control panel access door (forward of cargo door) by pushing on fasteners and pulling door open. Raise switch guard and move power and lights switch to ON. Observe white power indicator light illuminates. Open vent door handle access door. Push vent door handle trigger, releasing vent door handle from stowed (flush) position. Raise handle. Observe cargo door area is clear of obstructions and stand clear.

NOTE: Verify all ground equipment is removed to a minimum of 27 inches below door opening before proceeding.

Move and hold door switch to OPEN until door reaches a position providing optimum view of locking mechanism, then release door switch.

NOTE: Do not operate door if wind velocity exceeds 40 knots. Maximum velocity is 52 knots when door is fully open.

(CONTINUED)

LOWER CARGO DOOR OPERATION/INSPECTION

(Continued)

To inspect door,

Inspect cargo door area for no foreign matter in exposed lock mechanism. Observe locking mechanism is in proper position and all latch hooks are open.

To close door,

Observe cargo door is clear of obstructions. Move and hold door switch to CLOSE until door is fully closed and green ready to lock light illuminates, then release switch. Observe green ready to lock light remains illuminated.

> *NOTE: If green ready to lock light does not illuminate or if it illuminates and extinguishes, call maintenance.*

Move power and lights switch to OFF and close switch guard. Observe white power indicator light and area light extinguish and green ready to lock light illuminates. Move vent door handle to the closed (flush) position.

> ***CAUTION: Do not use unreasonable force to close vent door handle.***

> *NOTE: If vent door handle does not remain flush, call maintenance.*

Close and fasten vent door handle access door.

> *NOTE: If vent door handle access door cannot be closed, call maintenance.*

Verify the green ready to lock light extinguishes, then close and fasten control panel door.

Verify, through viewing port at bottom of door, cargo door lock pins are fully engaged.

> *NOTE: If lock pins are not engaged or are only partially engaged, call maintenance.*

Observe CARGO DOOR CTR A and B alerts are extinguished.

> *NOTE: If CARGO DOOR CTR A or B alert is displayed call maintenance.*

(CONTINUED)

LOWER CARGO DOOR OPERATION/INSPECTION

(Continued)

Aft Bulk Door

To open door,

Open cargo door control panel access door (forward of cargo door) by pushing on fasteners and pulling door open. Raise switch guard and move power and lights switch to ON. Observe white power indicator light illuminates. Push vent door handle trigger, releasing vent door handle from stowed (flush) position. Raise handle and observe vent door moves inward. Observe cargo door area is clear of obstructions and stand clear.

NOTE: Verify all ground equipment is removed to a minimum of 27 inches below door opening before proceeding.

Move and hold door switch to OPEN until door reaches a position providing optimum view of locking mechanism, then release door switch.

NOTE: Do not operate door if wind velocity exceeds 40 knots. Maximum velocity is 52 knots when door is fully open.

To inspect door,

Inspect cargo door area for no foreign matter in exposed locking mechanism. Observe cargo restraint curtain is in proper position. Observe locking mechanism is in proper position and all latch hooks are open.

To close door,

Observe cargo door is clear of obstructions. Move and hold door switch to CLOSE until door is fully closed and green ready to lock light illuminates, then release switch. Observe green ready to lock light remains illuminated.

NOTE: If green ready to lock light does not illuminate or if it illuminates and extinguishes, call maintenance.

Move power and lights switch to OFF and close switch guard. Observe white power indicator light remains illuminated. Move vent door handle to the closed (flush) position. Observe vent door is fully closed and vent door handle remains flush.

CAUTION: Do not use unreasonable force to close vent door handle.

NOTE: If vent door handle does not remain flush, or if vent door is not fully closed, call maintenance.

(CONTINUED)

LOWER CARGO DOOR OPERATION/INSPECTION

(Continued)

Verify green ready to lock light extinguishes, then close and fasten control panel door.

Verify, through viewing ports at bottom of door, cargo door lock pins are fully engaged.

NOTE: If lock pins are not engaged or are only partially engaged, call maintenance.

Observe amber CARGO DOOR AFT A and B alerts are extinguished.

NOTE: If CARGO DOOR AFT A or B alert is displayed, call maintenance.

[END]

Intentionally
Blank

Intentionally
Blank

Supplemental Procedures — Chapter SP

Elec — Section 70

THIS SECTION INTENTIONALLY BLANK

Presently there are no procedures required for this section.

Intentionally
Blank

Supplemental Procedures — Chapter SP

Table of Contents — Section 80

Intentionally
Blank

APU INFLIGHT OPERATION

CAUTION: If the APU fails to start, do not attempt another start until at least 30 seconds has elapsed after the APU data is no longer displayed on the Secondary Engine Display (SD). This will allow time for excess fuel to drain from the APU combustion chamber.

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

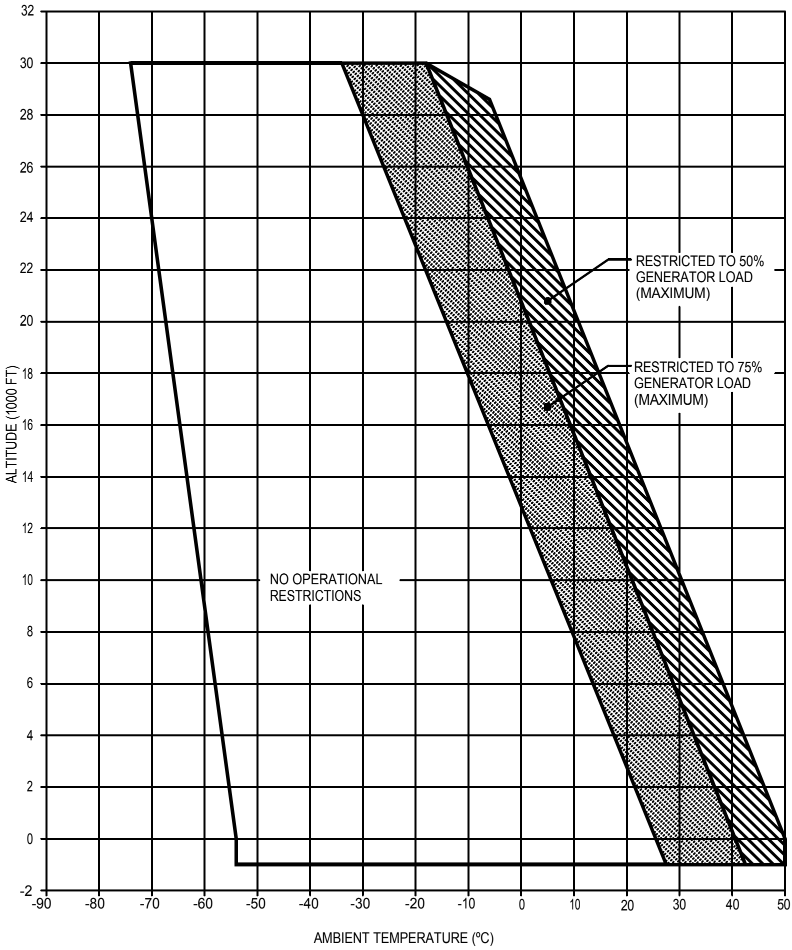
NOTE: An inflight start may take as long as 3 minutes and be characterized by fluctuations of N1, EGT, and N2 during acceleration to operating speed.

Observe APU INFLIGHT OPERATING ENVELOPE chart on following page.

(CONTINUED)

APU INFLIGHT OPERATION (Continued)

APU INFLIGHT OPERATING ENVELOPE



LB1-2-0387A

[END]

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, FUEL DUMP EMER STOP and MANF DRAIN switches are guarded.

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.

NOTES: 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

(CONTINUED)

BATTERY START (Continued)

Ground Communications . . . . ESTABLISH

NOTES: 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

For aircraft with Service Bulletin 24-72 incorporated,

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.

(CONTINUED)

BATTERY START (Continued)

ENG IGN System . . . . A

Push ENG IGN A switch and observe ENG IGN A light illuminates and the ENG IGN 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

NOTES: 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 Supplying 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,

(CONTINUED)

CROSS BLEED START (Continued)

AIR SYSTEM MANUAL

NO

(CONTINUED)

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

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

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

Prior to reducing thrust for descent when icing conditions (defined by visible moisture in the air and TAT is 6°C or below) are present or anticipated, the ENG IGN OVRD switch must be placed in the ON position. When icing conditions are no longer present or anticipated, place the ENG IGN OVRD switch to the OFF position.

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

When Icing Conditions are Anticipated . . . ENG IGN A OR B MANUAL

When Clear Of Icing Conditions . . . . 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, INFLIGHT, 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]

STARTER VALVE MANUAL OPERATION

When ready to start,

ENG START Switch . . . . PULL

Pull the ENG START switch.

Command ground crew,

Engine Starter Valve . . . . MANUALLY OPEN

Observe appropriate engine starter switch light illuminates or there is ground crew notification that starter valve is opened. Continue start using normal engine start procedures.

When engine reaches 45% N2, command ground crew,

Engine Starter Valve . . . . MANUALLY CLOSE

Verify associated engine starter switch light extinguishes or confirm through ground crew that starter valve is closed.

Continue normal start procedures.

[END]

Supplemental Procedures — Chapter SP

Table of Contents — Section 90

Intentionally
Blank

Supplemental Procedures — Chapter SP
FMS — Section 90

THIS SECTION INTENTIONALLY BLANK

Presently there are no procedures required for this section.

Intentionally
Blank

Supplemental Procedures — Chapter SP

Table of Contents — Section 100

Intentionally
Blank

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.

NOTES: 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.

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

NOTE: Below approximately 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.

When fuel quantity reaches desired level,

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

Push appropriate Tanks PUMPS switch and observe OFF light extinguishes.

(CONTINUED)

FUEL CROSSFEED (Continued)

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 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 900 kilograms,

All Tank TRANS Switches. . . . . OFF

Push all tank TRANS switches and observe ON lights extinguish.

All Tank XFEED Switches . . . . OFF

Push all tank XFEED switches and observe ON light extinguish.

(CONTINUED)

MINIMUM FUEL APPROACH AND MANIFOLD DRAIN OPERATION (Continued)

FUEL SYSTEM MANUAL

NO

(CONTINUED)

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 180 kilograms to drain into tank 2 when fuel quantity in tank 2 is less than approximately 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 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]

(CONTINUED)

TAIL FUEL FWD (Continued)

FUEL SYSTEM SELECT Switch. . . . . MANUAL

Push FUEL SYSTEM SELECT switch and observe MANUAL light illuminates.

NOTES: 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 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 –35°C.

CG ≥32% MAC

NO

TAIL TANK TRANS Switch. . . . . ON

Push TAIL TANK TRANS switch and observe ON light illuminates.

When CG decreases to 30% MAC,

TAIL TANK TRANS Switch. . . . . OFF

Push TAIL TANK TRANS switch and observe ON light extinguishes.

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

(CONTINUED)

TAIL FUEL FWD (Continued)

CG ≥32% MAC

NO

(CONTINUED)

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.

[END]

TAIL FUEL TEMP –35°C OR COLDER,
OR TAIL FUEL QUANTITY ≤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 be displayed, and fuel will transfer forward or normal tail fuel management will occur.

[END]

Monitor center of gravity.

[END]

Supplemental Procedures — Chapter SP

Table of Contents — Section 110

Intentionally
Blank

Supplemental Procedures — Chapter SP

Hyd — Section 110

THIS SECTION INTENTIONALLY BLANK

Presently there are no procedures required for this section.

Intentionally
Blank

Supplemental Procedures — Chapter SP

Table of Contents — Section 120

Intentionally
Blank

COMMUNICATIONS

Flight Deck Communications System (Datalink)

The following procedures are applicable to the noted datalink functions from the company pages.

Pre-Departure Clearance

The flight crew shall compare the filed flight plan versus the digital pre-departure clearance and initiate voice contact with Air Traffic Control if any questions/confusion exists between the filed flight plan and the digital pre-departure clearance.

Digital-Automatic Information Service (D-ATIS)

The flight crew shall verify that the D-ATIS altimeter setting numeric value and alpha value are identical (e.g. 29.92 IN or 1013 MB). If the D-ATIS altimeter setting numeric value and/or alpha value are different, the flight crew must not accept the D-ATIS altimeter setting.

Oceanic Clearances

The flight crew shall compare the filed flight plan versus the datalink oceanic clearance and initiate voice contact with Air Traffic Control if any questions/confusion exists between the filed flight plan and the digital oceanic clearance.

[END]

Intentionally
Blank

Emergency Procedures — Chapter EP

Section Table of Contents — Section 0

Intentionally
Blank

Emergency Procedures — Chapter EP

Table of Contents — Section 00

Intentionally
Blank

General

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

Troubleshooting beyond checklist directed actions is rarely helpful and has caused further loss of system function or failure. In some cases, accidents and incidents have resulted. The crew should consider additional actions beyond the checklist only when completion of the published checklists steps clearly results in an unacceptable situation. In the case of aircraft controllability problems when a safe landing is considered uncertain, aircraft handling evaluations with gear, flaps or speedbrakes extended may be appropriate. Do not attempt troubleshooting to free jammed flight controls beyond actions directed in the appropriate published procedure unless the aircraft cannot be safely landed with the existing condition.

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.

***WARNING:* Do not reset any tripped fuel pump or hydraulic auxiliary pump circuit breakers.**

CAUTION: Resetting of a tripped circuit breaker by the flight crew is not recommended. If any Abnormal or Emergency procedure specifies a circuit breaker reset or if the Captain considers a system to be essential for safe completion of the flight, a one-time reset per flight of the circuit breaker may be made after allowing approximately a two minute cooling period. If the circuit breaker trips again, do not attempt another reset.

If a procedure recommends or directs the pulling and resetting of a circuit breaker, allow a pause of approximately 10 seconds between pulling and resetting.

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

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 Volume I Checklist Philosophy

A crewmember recognizing an emergency condition shall identify and call out the condition, and, when applicable, reset the alerting system.

NOTES: 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. The RED alert message will remain on the EAD and the associated cue light will remain illuminated and can be pushed to select the system display when time permits.

In the accomplishment of in-flight Emergency procedures which result in irreversible system configurations or which may substantially affect aircraft performance capability, verbal confirmation by both pilots is required prior to execution of the recall and non-recall line items listed below:

- THROTTLE
- FUEL Switch
- ENG FIRE Handle
- FIRE BOTTLE Discharge
- DRIVE Switch
- IRS Mode Selector

The Pilot Flying's (PF's) attention will be dedicated to aircraft control. After the emergency has been positively identified, the Pilot In Command (PIC) will call for the appropriate recall items, if applicable, and the Volume I checklist. The Pilot Not Flying (PNF) will state the word "CONFIRM" followed by the recall item and the action required. The PF will reply "CONFIRMED" and repeat the associated line item. The PNF will then accomplish the line item. Upon completion of the recall item(s), the PNF will state the name of the appropriate checklist and refer to the Volume I procedure. The PF will confirm selection of the appropriate checklist and command that it should be accomplished. The PNF, using the "Challenge-Do-Verify" method, will accomplish each item in the procedure if it is in the PNF's 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. The PNF will also read the consequences and assure verbal confirmation by the PF.

NOTE: For those line items that require confirmation that are not recall items, the confirmation will be accomplished at the appropriate place in the checklist for that line item. The confirmation method used is the same as that for recall items.

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

Normal, Abnormal and Emergency checklists are designed to assist crews in completing those actions necessary for the safe conduct and completion of their flight. They are intended to be followed in the sequence in which they are presented. This philosophy applies to the individual phase-of-flight checklists themselves (i.e., Cockpit Preparation, Before Start, After Start, etc.), as well as the individual items listed within each specific checklist. Any disruption to the flow of either the specific checklists or the line items within those checklists, demands careful crew attention to ensure re-establishing the proper sequence of, and completion of, required checklists and/or associated line items.

If the sequence of checklists is interrupted (e.g., a ground turnback to the gate following taxi out), the appropriate phase-of-flight checklist should be called for and completed. In the above example, as the aircraft is taxied back to the gate or ramp area, the After Landing Checklist should be accomplished followed by the Parking Checklist once at the gate. Prior to resuming operations, all pertinent checklists should be re-accomplished. In effect, the crew would view subsequent dispatch as a new flight requiring the accomplishment of all checklists applicable to a new flight.

Emergency Procedures — Chapter EP

Table of Contents — Section 10

Intentionally
Blank

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

For Aircraft With 3 Fire Agent Bottles

NOTES: When the "APU FIRE" alert is displayed, an 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 . . . . PULL

Pull APU FIRE handle; do not rotate handle at this time.

NOTE: Pulling APU FIRE handle deenergizes APU generator field, arms APU fire extinguishing system and illuminates DISCH light.

APU FIRE AGENT 3 LOW Light . . . . CHECK

Verify the APU FIRE AGENT 3 LOW light is illuminated.

NOTE: If the APU FIRE AGENT 3 LOW light did not illuminate, push the APU FIRE AGENT 3 switch to manually discharge APU FIRE AGENT 3.

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.

(CONTINUED)

APU FIRE (Continued)

AIR SYSTEM MANUAL

NO

BLEED AIR 2 Switch . . . . OFF

Push BLEED AIR 2 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

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: Ensure fire handle is pulled to fullest extent before rotating it to discharge agent.

(CONTINUED)

APU FIRE (Continued)

FIRE WARNING CONTINUES

NO

(CONTINUED)

FIRE WARNING CONTINUES

NO

Remaining Agent . . . . DISCH/CHECK

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

NOTES: 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 . . . . VERIFY CLOSED

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

AVNCS 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 an emergency descent.

NOTE: If crew rest module is occupied, occupants should remain in position until the flight deck crew informs them to come forward.

Altitude Select Knob . . . . REDUCE/PULL

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

(CONTINUED)

CABIN ALTITUDE (Continued)

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

NOTE: If the intermediate minimum safe cabin altitude is higher than 10,000 feet but less than 25,000 feet and the flight deck crew determines it is safe for one occupant of the crew rest module to come forward that person may do so by using the crew module PBE as a source of hypoxia protection while proceeding to the cockpit. Upon arrival at the cockpit it is recommended that this person switch to a standard crew oxygen mask if available. The remaining crew rest module occupants should stay in their positions until the required 15-minute descent to 10,000 feet is completed.

***WARNING:* PBEs have not been demonstrated to provide protection against hypoxia above 25,000-feet cabin altitude.**

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 10°/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.

To reactivate boom mike when O2 mask is no longer required,

Eros O2 Mask Doors . . . . CLOSE

PRESS TO TEST AND RESET Lever . . . . PUSH

[END]

CABIN SMOKE

Consequences:

LAND AT NEAREST SUITABLE AIRPORT

WARNING: ***Consider an immediate landing if smoke, fire or fumes become uncontrollable.***

Consider the following:

- ***Overweight landing.***
- ***Tailwind landing.***
- ***Off-airport landing.***
- ***Ditching.***

Do not delay landing in order to accomplish Emergency or Abnormal procedures.

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

Oxygen Masks ON/100%

Don smoke goggles as required.

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

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

NOTE: If crew rest module is occupied, notify occupants to proceed to seats in the cockpit or courier station.

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.

(CONTINUED)

CABIN SMOKE (Continued)

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.

Outflow VALVE Indicator . . . . SET 9:00 POSITION

Position outflow VALVE indicator at 9:00 position. Adjust as necessary to maintain cabin altitude at 25,000 feet (or maintain 9:00 position if below 25,000 feet).

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 a negative pressure in the aircraft. This will 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 usable oxygen time.

Land at nearest suitable airport.

After landing and prior to opening door,

(CONTINUED)

CABIN SMOKE (Continued)

“CAB AIR NOT OFF” ALERT DISPLAYED

NO

(CONTINUED)

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 cabin altitude at 25,000 feet as long as possible. After the descent has been started, do not delay the approach and landing.

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.

(CONTINUED)

CABIN SMOKE (Continued)

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.

All PACK Switches . . . . OFF

Push all PACK switches and observe OFF lights illuminate.

AVNCS FAN Switch . . . . OVRD

Push AVNCS FAN switch and observe OVRD light is illuminated.

WING and TAIL ANTI-ICE Switches . . . . VERIFY OFF

If required, push WING and TAIL ANTI-ICE switches and observe ON lights are extinguished.

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.

(CONTINUED)

CAC MANF FAIL (Continued)

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

WARNING: ***Notify ground personnel not to open any cargo door until all passengers/couriers and crew have exited the aircraft and fire fighting equipment is available at the aircraft.***

NOTE: In addition to the “CRG FIRE LWR___” alert displayed, an aural warning will sound.

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

NOTES: 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.

(CONTINUED)

CRG FIRE LWR___ (Continued)

"CRG FLO AFT DISAG" ALERT DISPLAYED

NO

(CONTINUED)

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,

(CONTINUED)

CRG FIRE LWR___ (Continued)

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

OR SEVERE DAMAGE

Consequences:

LAND AT NEAREST SUITABLE AIRPORT
2 TO ENG, NO ENGINE AGENTS FOR APU

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

When autothrottle system is engaged, the affected engine throttle must be held at idle until engine fuel switch is selected to OFF or either of the ATS disconnect switches are pushed to disconnect the autothrottle system.

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 OR SEVERE DAMAGE IS SUSPECTED

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.

(CONTINUED)

ENGINE__FIRE OR SEVERE DAMAGE (Continued)

"ENGINE__FIRE" ALERT REMAINS DISPLAYED OR "FIRE DET__FAIL" DISPLAYED OR SEVERE DAMAGE IS SUSPECTED

NO

(CONTINUED)

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

NOTES: 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.

The "LSAS ALL FAIL" Level 2 alert will be displayed and LSAS channels cannot be restored.

"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.

(CONTINUED)

HYD 1 & 2 FAIL (Continued)

"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.

(CONTINUED)

HYD 1 & 2 FAIL (Continued)

- 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 will 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.
- NOSEWHEEL 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,

(CONTINUED)

HYD 1 & 2 FAIL (Continued)

FLAPS RETRACTED

NO

0/EXT APPROACH SPEEDS
HYDRAULIC SYSTEMS 1 & 2 FAIL

WEIGHT (1000 KG)	160	170	180	190	200	210	220	230
Vapp (Vref + 15)	167	172	176	181	185	189	193	197

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

General Electric CF6-80C2 Engines

WEIGHT (1000 KG)		160	170	180	190	200	210	220	230
S.L.	**DRY**	1810	1910	2010	2120	2240	2350	2480	2610
STD=15°C	**WET**	2260	2370	2490	2610	2740	2860	2990	3130
2000 FT	**DRY**	1930	2030	2140	2270	2390	2520	2650	2800
STD=11°C	**WET**	2400	2530	2660	2790	2930	3060	3200	3350
4000 FT	**DRY**	2060	2170	2290	2430	2570	2700	2850	3010
STD=7°C	**WET**	2570	2700	2840	2990	3140	3280	3440	3600
6000 FT	**DRY**	2200	2330	2460	2610	2760	2910	3080	3250
STD=3°C	**WET**	2750	2890	3050	3210	3370	3530	3700	3880
8000 FT	**DRY**	2370	2500	2650	2810	2980	3150	3330	3530
STD=–1°C	**WET**	2950	3110	3280	3450	3630	3810	4000	4190
10000 FT	**DRY**	2550	2700	2860	3040	3230	3450	3690	3950
STD=–5°C	**WET**	3180	3350	3540	3730	3930	4160	4400	4650

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 –20°C to STD +40°C		
METERS PER °C	**DRY**	**WET**
BELOW standard day	–6	–7
ABOVE standard day	+20	+21

(CONTINUED)

HYD 1 & 2 FAIL (Continued)

FLAPS RETRACTED

NO

(CONTINUED)

Slope: Valid from –2% downhill +2% uphill		
METERS PER 1% SLOPE	**DRY**	**WET**
UPHILL	–34	–59
DOWNHILL	+201	+276

Wind: Valid from –10-knot tailwind +20-knot headwind		
METERS PER KNOT	**DRY**	**WET**
HEADWIND	–15	–20
TAILWIND	+65	+69

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°.

(CONTINUED)

HYD 1 & 2 FAIL (Continued)

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

NOTES: 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.

(CONTINUED)

HYD 1 & 3 FAIL (Continued)

- 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 approach,

SLATS RETRACTED

NO

SLAT STOW Switch . . . . SLAT STOW

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

Vmca is 140 KIAS.

“RUDDER UPR INOP” ALERT DISPLAYED

NO

Vmca is 160 KIAS.

Recommended maximum crosswind component is 12 knots.

Stabilizer is inoperative.

(CONTINUED)

HYD 1 & 3 FAIL (Continued)

"RUDDER UPR INOP" ALERT DISPLAYED

NO

(CONTINUED)

Complete Abnormal Non-Alert procedure – STABILIZER INOPERATIVE, then continue with this procedure.

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

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

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 KG)	160	170	180	190	200	210	220	230
Vapp (Vref + 5)	175	180	185	190	195	200	205	209

(CONTINUED)

HYD 1 & 3 FAIL (Continued)

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

General Electric CF6-80C2 Engines

WEIGHT (1000 KG)		160	170	180	190	200	210	220	230
S.L.	**DRY**	2300	2420	2520	2640	2740	2850	2960	3080
STD=15°C	**WET**	2990	3130	3270	3420	3550	3710	3860	4010
2000 FT	**DRY**	2440	2560	2670	2790	2900	3020	3140	3260
STD=11°C	**WET**	3180	3330	3480	3640	3790	3950	4100	4270
4000 FT	**DRY**	2590	2710	2830	2960	3080	3210	3330	3460
STD=7°C	**WET**	3390	3560	3710	3880	4040	4210	4380	4560
6000 FT	**DRY**	2750	2880	3010	3150	3270	3410	3540	3680
STD=3°C	**WET**	3630	3810	3970	4150	4320	4510	4680	4870
8000 FT	**DRY**	2920	3070	3200	3350	3480	3630	3760	3910
STD=–1°C	**WET**	3880	4070	4250	4450	4630	4820	5010	5220
10000 FT	**DRY**	3110	3270	3410	3570	3710	3910	4110	4310
STD=–5°C	**WET**	4160	4370	4560	4770	4960	5230	5490	5750

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 –20°C to STD +40°C		
METERS PER °C	**DRY**	**WET**
BELOW standard day	–6	–9
ABOVE standard day	+15	+21

Slope: Valid from –2% downhill +2% uphill		
METERS PER 1% SLOPE	**DRY**	**WET**
UPHILL	–60	–119
DOWNHILL	+171	+394

(CONTINUED)

HYD 1 & 3 FAIL (Continued)

Wind: Valid from –10-knot tailwind +20-knot headwind		
METERS PER KNOT	**DRY**	**WET**
HEADWIND	–17	–26
TAILWIND	+34	+59

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 than 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
FLAP<35, SPOILERS AT NLG TDN ONLY
NOSEWHL STEERING RESTRICTED RIGHT

NOTES: 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.

(CONTINUED)

HYD 2 & 3 FAIL (Continued)

- 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 will 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.
- NOSEWHEEL 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.

When ready for approach,

(CONTINUED)

HYD 2 & 3 FAIL (Continued)

FLAP/SLAT Handle 28/EXT

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

AUTO BRAKE Selector . . . . OFF

GPWS Switch . . . . FLAP OVRD

28/EXT APPROACH SPEEDS
HYDRAULIC SYSTEMS 2 AND 3 FAIL

WEIGHT (1000 KG)	160	170	180	190	200	210	220	230
Vapp (Vref + 8)	148	153	157	161	165	169	173	176

(CONTINUED)

HYD 2 & 3 FAIL (Continued)

28/EXT ESTIMATED LANDING DISTANCES (METERS) HYDRAULIC SYSTEMS 2 AND 3 FAIL

General Electric CF6-80C2 Engines

WEIGHT (1000 KG)		160	170	180	190	200	210	220	230
S.L.	**DRY**	1580	1660	1740	1830	1920	2010	2120	2230
STD=15°C	**WET**	1980	2080	2180	2280	2380	2480	2580	2700
2000 FT	**DRY**	1680	1760	1850	1950	2050	2150	2260	2380
STD=11°C	**WET**	2110	2210	2320	2430	2540	2640	2760	2880
4000 FT	**DRY**	1780	1880	1970	2080	2190	2300	2420	2550
STD=7°C	**WET**	2250	2360	2470	2590	2710	2830	2950	3090
6000 FT	**DRY**	1900	2010	2110	2220	2350	2460	2590	2740
STD=3°C	**WET**	2400	2520	2650	2770	2910	3030	3170	3320
8000 FT	**DRY**	2040	2150	2270	2390	2520	2650	2790	2960
STD=–1°C	**WET**	2580	2710	2840	2980	3120	3260	3410	3580
10000 FT	**DRY**	2190	2310	2440	2570	2720	2890	3060	3230
STD=–5°C	**WET**	2770	2910	3050	3210	3370	3550	3720	3910

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 –20°C to STD +40°C		
METERS PER °C	**DRY**	**WET**
BELOW standard day	–5	–6
ABOVE standard day	+15	+17

Slope: Valid from –2% downhill +2% uphill		
METERS PER 1% SLOPE	**DRY**	**WET**
UPHILL	–32	–61
DOWNHILL	+153	+237

(CONTINUED)

HYD 2 & 3 FAIL (Continued)

Wind: Valid from –10 knot tailwind +20 knot headwind		
METERS PER KNOT	**DRY**	**WET**
HEADWIND	–14	–20
TAILWIND	+49	+58

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, lavatory oxygen compartment door will open.

[END]

TNK__FUEL QTY LO

Consequences:

STOP FUEL DUMP

NOTES: This alert is displayed when the Fuel Dump Cutoff level has been reached in tanks 1, 2, or 3 and fuel dumping has not terminated.

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.

[END]

Intentionally
Blank

Emergency Procedures — Chapter EP

Table of Contents — Section 20

Intentionally
Blank

AIRSPEED: LOST, SUSPECT OR ERRATIC

Unreliable airspeed/Mach, vertical speed and altitude information can be caused by pitot static system or air data malfunctions. This may or may not be accompanied by level 1 and level 2 alerts, autopilot/autothrottle disconnects and/or instrument failure indications and/or aural warnings. These malfunctions can have several causes, including pitot-static blockage, volcanic ash, system damage, loss or damage to the radome, ice accumulation, and improper maintenance. Multiple pitot-static source malfunctions can occur. When these malfunctions occur simultaneously, comparisons are not available and the flight crews are unable to identify the causes.

During takeoff roll, pitot-static or air data malfunctions may be recognized by abnormal indications at standard airspeed callouts such as “80 knots.” In flight, recognition occurs by normal monitoring of basic flight instruments and crew familiarity with pitch, power and airspeed relationships.

It is important that the flight crews recognize an unreliable airspeed condition, and imperative that their initial action is to maintain aircraft control.

Air data and pitot system malfunctions can result in different EIS alerting system displays or erroneous indications depending on the nature of the malfunction. Not all malfunctions will be readily obvious or result in specific alerts.

The following are some of the indications the flight crew might see if a malfunction occurs in the pitot-static or air data systems:

- Indicated airspeed not consistent with normal pitch attitude and power setting for phase of flight.
- Indicated altitude different from actual altitude.
- “PITOT HEAT” alert.
- “WSHEAR DET FAIL” alert.
- “SEL FADEC ALT” alert.
- Many Level 1 and Level 2 alerts such as “SEL ELEV FEEL MAN,” “SEL FLAP LIM OVRD.”
- IAS and/or ALT miscompare annunciation displayed on PFDs.

(CONTINUED)

AIRSPEED: LOST, SUSPECT OR ERRATIC (Continued)

- Pressurization system problems.
- Overspeed and/or altitude aural warnings.

Procedure

NOTE: The following information and displays can be considered reliable: PFD attitude, NAV display, ground speed, engine N1 and stick shaker.

AFS OVRD Switches . . . . OFF

Aircraft Pitch/Thrust . . . . .STABILIZE

Establish a normal pitch/thrust relation.

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.

NOTE: With autopilot disconnected at altitude, control wheel may seem sensitive in pitch.

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.

NOTE: Establish control of the aircraft through pitch/thrust relation. Respond to malfunction alerts after safe flight is assured.

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

(CONTINUED)

AIRSPEED: LOST, SUSPECT OR ERRATIC (Continued)

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.

Flight directors may be engaged using the reliable ADC.

If ADC 1 is reliable,

• Select FLT DIR . . . . F/O ON 1

If ADC 2 is reliable,

• Select FLT DIR . . . . CAPT ON 2

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

(CONTINUED)

AIRSPEED: LOST, SUSPECT OR ERRATIC (Continued)

Maintain normal pitch attitude and thrust for the phase of flight.

NOTES: 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.

(CONTINUED)

AIRSPEED: LOST, SUSPECT OR ERRATIC (Continued)

General Electric CF6-80C2 Engines

FLIGHT PHASE	CONFIG	PRESSURE ALTITUDE	REF	WEIGHT (1000 KG)			
				200	240	280	285
CLIMB Use max thrust (throttles to overboost bar)	UP/RET	5000	PITCH *IAS*	14.0 *247*	12.0 *270*	10.0 *295*	9.5 *299*
		FL 100	PITCH *IAS*	13.0 *248*	10.5 *277*	8.5 *307*	8.0 *311*
		FL150	PITCH *IAS*	11.0 *256*	8.5 *288*	7.0 *317*	6.5 *321*
		FL 200	PITCH *IAS*	8.5 *266*	6.5 *298*	5.5 *327*	5.0 *331*
CRUISE Use N1 for thrust setting	UP/RET	FL 100	PITCH N1 *IAS*	2.0 76.5 *330*	2.5 78.6 *330*	3.0 80.8 *330*	3.0 81.1 *330*
		FL 200	PITCH N1 *IAS*	2.0 83.4 *330*	2.5 85.5 *330*	3.0 87.9 *330*	3.0 88.2 *330*
		FL 300	PITCH N1 MACH *IAS*	2.0 89.0 .827 *315*	2.5 91.6 .827 *315*	3.0 95.0 .827 *315*	3.0 95.5 .827 *315*
		FL 350	PITCH N1 MACH *IAS*	2.5 90.9 .830 *283*	– – – –	– – – –	– – – –
DESCENT Use Idle thrust	UP/RET	FL 350	PITCH MACH *IAS* VS	1.0 .768 *260* 2020	– – – –	– – – –	– – – –
		FL 300	PITCH MACH *IAS* VS	1.5 .693 *260* 1920	1.5 .715 *269* 2000	1.5 .772 *292* 2170	– – – –
		FL 200	PITCH *IAS* VS	1.5 *260* 1770	2.5 *260* 1760	2.5 *278* 1880	– – –
		FL 100	PITCH *IAS* VS	2.0 *250* 1500	2.5 *262* 1560	– – –	– – –

(CONTINUED)

AIRSPEED: LOST, SUSPECT OR ERRATIC (Continued)

General Electric CF6-80C2 Engines

FLIGHT PHASE	CONFIG	PRESSURE ALTITUDE	REF	WEIGHT (1000 KG)			
				160	180	200	220
ARRIVAL LVL FLT	UP/RET	5000	PITCH N1 *IAS*	5.0 59.1 *222*	5.0 62.1 *235*	5.0 64.9 *247*	5.0 67.5 *259*
	0/EXT	3000	PITCH N1 *IAS*	8.5 61.7 *183*	8.5 64.9 *193*	8.5 67.8 *203*	8.5 70.6 *213*
Use N1 for thrust setting	15/EXT	3000	PITCH N1 *IAS*	6.0 64.9 *174*	6.0 68.2 *184*	6.5 71.2 *194*	6.5 74.0 *203*
	28/EXT	3000	PITCH N1 *IAS*	4.0 70.4 *169*	4.0 73.8 *178*	4.5 76.9 *187*	4.5 79.7 *196*
APPROACH *IAS* APPROX Vref + 15 Use N1 for thrust setting	35/EXT GEAR DOWN	DESCENT	PITCH N1 *IAS*	2.5 62.2 *153*	2.5 65.4 *162*	2.5 68.3 *170*	3.0 70.8 *177*
	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 *170*	18.0 *177*
		5000	PITCH *IAS*	20.0 *159*	18.5 *162*	17.0 *170*	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.

ENG IGN OVRD Switch. . . . . OVRD ON

Push ENG IGN OVRD switch and observe OVRD ON light illuminates.

ADG . . . . DEPLOY

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.

MINIMUM AIRSPEED FOR CONTROLLABILITY (KIAS)

Gross Weight (1000 Kg)	**160**	**180**	**200**	**230**	**250**
UP/RET	188	200	209	224	234
0/EXT	155	161	170	182	190
28/EXT	155	155	157	168	176

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.

Throttles (All). . . . . IDLE

NOTE: Airstarts, especially at high altitudes, may result in the engine(s) accelerating to idle very slowly. Slow acceleration may be incorrectly interpreted as a hung start or engine malfunction. If N2 is steadily increasing and EGT remains within limits, the start is progressing normally.

ANY ENGINE RESTARTS

NO

ADG ELEC Switch . . . . ON

Remaining Engine(s) . . . . RESTART

Refer to Abnormal Non-Alert procedure – ENGINE RESTART IN FLIGHT.

(CONTINUED)

ALL ENGINE FLAMEOUT (Continued)

ANY ENGINE RESTARTS

NO

(CONTINUED)

Verify all systems are operating as required.

Land at nearest suitable airport.

[END]

FUEL Switches (All). . . . . OFF, THEN ON

NOTE: If N2 is steadily increasing, and EGT remains within limits, the start is progressing normally. Additional cycling of the fuel switches will result in delayed engine recovery times.

ANY ENGINE RESTARTS

NO

ADG ELEC Switch . . . . .ON

Remaining Engines(s) . . . . RESTART

Refer to Abnormal Non-Alert procedure - ENGINE RESTART IN FLIGHT.

Verify all systems are operating as required.

Land at nearest suitable airport.

[END]

Flaps/Slats . . . . MAINTAIN

Maintain last flap/slat position. Do not reconfigure.

DITCHING REQUIRED

NO

Landing Gear . . . . UP

Refer to Abnormal Non-Alert procedure – DITCHING.

[END]

(CONTINUED)

ALL ENGINE FLAMEOUT (Continued)

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

PF	PNF
NOTE: If crew rest module is occupied, the occupants should remain in position until the flight crew informs them to come forward.	
Altitude Select Knob . . . . . REDUCE/PULL	
10,000 Feet/ Safe Altitude . . . . SELECT	
NOTE: If the intermediate safe cabin altitude is higher than 10,000 feet but less than 25,000 feet and the flight deck crew determines it is safe for one occupant of the crew rest module to come forward, that person may do so by using the crew rest module PBE as a source of hypoxia protection while proceeding to the cockpit. Upon arrival at the cockpit it is recommended that this person switch to a standard crew oxygen mask if available. The remaining crew rest module occupants should stay in their positions until the required 15-minute descent to 10,000 feet is completed. ***WARNING:* PBEs have not been demonstrated to provide protection against hypoxia above 25,000-feet cabin altitude.**	
SPOILER Handle . . . . SPD BRK FULL	
IAS/ MACH. . . . . SELECT .85/320-350	
***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	
EROS 02 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 35° 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/FIRE/FUMES

DIVERSION MAY BE REQUIRED.

Oxygen Masks (If Required) ON/100%

Don smoke goggles as required.

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

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

EMER LT Switch . . . . ON

CAB BUS Switch . . . . OFF

Lift guard and push CAB BUS switch. Observe OFF light illuminates.

NOTE: When CAB BUS OFF light is illuminated, power is removed from the cabin AC ground service bus and cargo loading bus.

Anytime smoke or fumes becomes the greatest threat, refer to the Abnormal Non-Alert procedure SMOKE/FUMES REMOVAL.

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.

SOURCE OBVIOUS AND ACCESSIBLE

NO

Isolate and extinguish the source. If possible remove power from the affected equipment by switch or circuit breaker on the flight deck or in the cabin.

SOURCE CONFIRMED EXTINGUISHED AND SMOKE/FUMES ARE DECREASING

NO

Flight may be continued at Captain's discretion.

At Captain's discretion,

(CONTINUED)

SMOKE/FIRE/FUMES (Continued)

SOURCE OBVIOUS AND ACCESSIBLE

NO

(CONTINUED)

SOURCE CONFIRMED EXTINGUISHED AND SMOKE/FUMES ARE DECREASING

NO

(CONTINUED)

CAB BUS Switch . . . . ON

Lift guard and push CAB BUS switch. Observe OFF light extinguishes.

NOTE: Pushing the CAB BUS switch restores power to all cabin AC ground service bus and cargo loading bus.

At Captain's discretion,

EMER LT Switch . . . . ARM

[END]

Diversion . . . . INITIATE

Initiate a diversion to the nearest suitable airport while continuing the checklist.

(CONTINUED)

SMOKE/FIRE/FUMES (Continued)

WARNING: ***Consider an immediate landing if smoke, fire, or fumes become uncontrollable.***

Consider the following:

- ***Overweight landing.***
- ***Tailwind landing.***
- ***Off-airport landing.***
- ***Ditching.***

Do not delay landing in order to accomplish Emergency or Abnormal procedures as well as fuel dump.

LANDING IMMINENT

NO

Time permitting and at Captain's discretion, review OPERATIONAL CONSIDERATIONS located at the end of this procedure.

[END]

Do not delay landing in an attempt to complete all of the following steps:

NOTE: Direct courier(s) to fight the fire.

XPDR Switch . . . . SELECT 1

Verify XPDR switch 1 is selected on transponder panel.

VHF-1 or HF-1 . . . . SELECT VHF-1 AND/OR HF-1

Push the VHF-1 or HF-1 volume control knob, as appropriate, to receive and push the appropriate MIC/CALL light to transmit.

Autothrottles. . . . . OFF

Throttles. . . . . SET 70% N1 OR LESS

FADEC MODE Switches (All Engines) . . . . SELECT ALTN

Open cover and push each FADEC MODE switch. Observe each ALTN light illuminates.

"ENG(1, 2, 3) FADEC ALTN" Level 1 alerts will be displayed on secondary engine display.

(CONTINUED)

SMOKE/FIRE/FUMES (Continued)

AP 1 (If Desired) . . . . SELECT

If autopilot is desired, verify AP 1 is displayed on FMA.

Fuel dump considerations,

CAUTION: 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.

SMOKE ELEC/AIR Selector . . . . 3/1 OFF

Push and rotate SMOKE ELEC/AIR selector to 3/1 OFF.

NOTE: All actions are the same whether systems are in automatic or manual.

Evaluate smoke/fumes for up to 2 minutes.

CAUTION: If smoke and/or fumes increase during the waiting period, proceed immediately to the next step.

NOTES: With SMOKE ELEC/AIR selector in 3/1 OFF, generator channel 3 is unpowered and BLEED AIR 1 and PACK 1 are off.

Observe displayed alerts and consequences that are a result of moving SMOKE ELEC/AIR selector out of NORM.

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

If required, push ENG IGN switch A and observe switch light A illuminates.

(CONTINUED)

SMOKE/FIRE/FUMES (Continued)

SMOKE/FUMES DECREASE

NO

(CONTINUED)

FLAP LIMIT Selector . . . . OVRD 1

Rotate FLAP LIMIT selector to OVRD 1 and observe MANUAL light illuminates.

Manual Thrust Limits . . . . SELECT G/A

Select G/A thrust limit on MCDU THRUST LIMITS page and observe G/A thrust limit is displayed on EAD.

AUTO BRAKE Selector. . . . . OFF

NOTE: The following will be inoperative:

- *Ignition system B*
- *GA switch*
- *Auto brakes*
- *Auto slats*
- *BLEED AIR 1*
- *ECON system*
- *F/O pitot heat*
- *PACK 1*
- *Landing gear aural warning*
- *Communications radio panel 2*
- *Audio control panel 2*
- *VHF-2*
- *VHF-3*
- *HF-2*
- *Tail anti-ice*

GO AROUND REQUIRED

NO

Autopilot/Autothrottles . . . . DISCONNECT

Thrust. . . . . SET

(CONTINUED)

SMOKE/FIRE/FUMES (Continued)

SMOKE/FUMES DECREASE

NO

(CONTINUED)

GO AROUND REQUIRED

NO

(CONTINUED)

Speed . . . . Vref (28) + 5

When positive rate of climb is indicated,

GEAR Handle . . . . UP

Land at nearest suitable airport.

Time permitting and at Captain's discretion, review OPERATIONAL CONSIDERATIONS located at the end of this procedure.

[END]

SMOKE ELEC/AIR Selector . . . . 2/3 OFF

Push and rotate SMOKE ELEC/AIR selector to 2/3 OFF.

Evaluate smoke/fumes for up to 2 minutes.

CAUTION: If smoke and/or fumes increase during the waiting period, proceed immediately to the next step.

NOTES: With SMOKE ELEC/AIR selector in 2/3 OFF, generator channel 2 is unpowered and BLEED AIR 3 and PACK 3 are off.

Generator channel 3, air system 1 and PACK 1 will be restored.

(CONTINUED)

SMOKE/FIRE/FUMES (Continued)

SMOKE/FUMES DECREASE

NO

Leave SMOKE ELEC/AIR selector in 2/3 OFF for remainder of flight.

NOTES: 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.

The following will be inoperative:

- *AUX pitot heat*
- *BLEED AIR 3*
- *Engine 2 reverser*
- *PACK 3*
- *Horizontal stabilizer trim switches*
- *Landing gear position indicator lights*

Land at nearest suitable airport.

Time permitting and at Captain's discretion, review OPERATIONAL CONSIDERATIONS located at the end of this procedure.

[END]

AP 2 (If Desired) . . . . .SELECT

If autopilot is desired, verify AP 2 is displayed on FMA.

XPDR Switch . . . . SELECT 2

Verify XPDR switch 2 is selected on transponder panel.

VHF-2 or HF-2 . . . . SELECT VHF-2 AND/OR HF-2

Push the VHF-2 or HF-2 volume control knob, as appropriate, to receive and push the appropriate MIC/CALL light to transmit.

SMOKE ELEC/AIR Selector . . . . 1/2 OFF

Push and rotate SMOKE ELEC/AIR selector to 1/2 OFF.

(CONTINUED)

SMOKE/FIRE/FUMES (Continued)

Evaluate smoke/fumes for up to 2 minutes.

CAUTION: If smoke and/or fumes increase during the waiting period, proceed immediately to the next step.

NOTES: With SMOKE ELEC/AIR selector in 1/2 OFF, generator channel 1 is unpowered and BLEED AIR 2 and PACK 2 are off.

Generator channel 2 and air system 3 will be restored.

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 right inboard flap indication on CONFIG synoptic or PFD to determine flap position.

ENG IGN . . . . .VERIFY B SELECTED

If required, push ENG IGN switch B and observe switch light B illuminates.

FLAP LIMIT Selector . . . . OVRD 2

Rotate FLAP LIMIT selector to OVRD 2 and observe MANUAL light illuminates.

Manual Thrust Limits . . . . SELECT G/A

Select G/A thrust limit on MCDU THRUST LIMITS page and observe G/A thrust limits is displayed on EAD.

CAPT FLT DIR OFF Switch . . . . OFF

Push CAPT FLT DIR OFF switch and observe OFF light illuminates. Captain's flight director must be off to allow normal functioning of First Officer's flight director.

AUTO BRAKE Selector . . . . OFF

NOTES: Autopilot will become inoperative when IRU 1 and IRU AUX become inoperative.

(CONTINUED)

SMOKE/FIRE/FUMES (Continued)

SMOKE/FUMES DECREASE

NO

(CONTINUED)

The following will be inoperative.

- *IGNITION system A*
- *GA switch*
- *Auto slats*
- *Auto GND spoilers*
- *BLEED AIR 2*
- *Captain pitot heat*
- *Engine 1 reverse*
- *Engine 3 reverse*
- *GPWS*
- *GPWS glideslope lights*
- *PACK 2*
- *Communications radio panel 1*
- *Audio control panel 1*
- *VHF-1*
- *HF-1*
- *Wing anti-ice*

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.

(CONTINUED)

SMOKE/FIRE/FUMES (Continued)

SMOKE/FUMES DECREASE

NO

(CONTINUED)

Time permitting and at Captain's discretion, review OPERATIONAL CONSIDERATIONS located at the end of this procedure.

[END]

SMOKE ELEC/AIR Selector . . . . NORM

Push and rotate SMOKE ELEC/AIR selector to NORM.

FADEC MODE Switches (All Engines) . . . . PUSH

Open cover and push each FADEC MODE switch. Observe each ALTN light extinguishes.

"ENG (1, 2, 3,) FADEC ALTN" level 1 alerts will be removed from secondary engine display.

Land at nearest suitable airport.

WARNING: ***Consider an immediate landing if smoke, fire, or fumes become uncontrollable.***

Do not delay landing in order to accomplish Emergency or Abnormal procedures as well as fuel dump.

OPERATIONAL CONSIDERATIONS

(CONTINUED)

SMOKE/FIRE/FUMES (Continued)

- Declare an emergency
- Accomplish the Abnormal Non-Alert procedure SMOKE/FUMES REMOVAL if required
- Expedite descent/arrival
- Request radar vector direct to the final approach
- Do not delay approach and landing
- Overweight landing may be necessary
- Tailwind landing may be necessary
- Off-airport landing may be necessary
- Ditching may be necessary
- Consider use of AUTOLAND
- Use braking appropriate for conditions
- After stopping the aircraft, consider accomplishing the Abnormal Non-Alert procedure - EVACUATION.

[END]

SPECIFIC BOMB THREAT/ BOMB ON BOARD

The following procedures are recommended guidelines and the Captain may elect to implement alternatives, if he sees fit.

INFLIGHT:

Declare an emergency.

Notify ATC, Company and Courier/Extra crewmembers.

Cabin Altitude . . . . MAINTAIN EXISTING _______ FT

Select the AIR SD page. Rotate CABIN PRESS MANUAL LDG ALT knob to set landing field elevation to existing cabin altitude.

Aircraft Altitude . . . . DESCEND TO CABIN ALTITUDE OR MEA (IF TERRAIN AND FUEL REQUIREMENTS PERMIT)

The Captain will brief the courier/extra crewmembers.

Cabin Differential Pressure . . . . CHECK ZERO OR LOWEST POSSIBLE

Check that cabin differential on the SD display is zero, or lowest possible differential pressure if aircraft is unable to descend to the cabin pressure altitude. Follow cabin pressurization manual operation in Chapter 5 Supplemental Normal Procedures.

Maintain Turbulence Penetration Airspeed. . . . . .80 TO .82 MACH/290 TO 305 KTS WHICHEVER RANGE IS LOWER

Set airspeed to turbulence penetration speed, except during approach phase of flight. If the time of detonation is known or suspected, adjust speed as required and take the appropriate action to land before this time.

Land at nearest suitable airport.

Prepare for landing at the nearest suitable airport. If a pressure activated device is suspected or confirmed, consideration should be given to landing at an airport at an altitude equal to or higher than the existing cabin altitude.

(CONTINUED)

SPECIFIC BOMB THREAT/ BOMB ON BOARD (Continued)

Request emergency landing instructions.

Request landing and parking instruction from Air Traffic Control and any special bomb threat procedures that are in force at the airport.

Review Evacuation Checklist

Time permitting, review the Evacuation checklist and assign any special duties.

Evaluate the need to deplane or evacuate courier/extra crewmembers.

Complete normal Descent, Approach and Landing checklists.

Consider lowering landing gear early during descent or approach to reduce possible damage from an explosive device that may be located in the wheel well or adjacent areas.

NOTE: Least risk area for bomb stowage is door 4L. Next least risk area is door 1R.

ON GROUND:

Notify ATC, ground crew and courier/extra crewmembers.

Alert Air Traffic Control and if required, request an isolated parking area. If on the ramp, inform ATC and ground crew.

Evaluate the need to deplane or evacuate the aircraft.

[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

NOTE: Below 14,000 feet MSL, 5 minutes of go-around power is permissible, if required.

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 (Unless on Final). . . . . RET

ENG IGN OVRD Switch . . . . ON

Plan to land at nearest suitable airport.

DRIFTDOWN REQUIRED

NO

Autothrottles . . . . OFF

Thrust . . . . MCT

Driftdown Speed Schedule . . . . CHECK

Determine start of driftdown speed and bottom of driftdown speed one-engine altitude from following table. Continue level flight until reaching start of driftdown speed. Plan driftdown to gradually reach bottom of driftdown speed one-engine altitude at bottom of driftdown.

(CONTINUED)

TWO ENGINES INOPERATIVE (Continued)

DRIFTDOWN REQUIRED

NO

(CONTINUED)

DRIFTDOWN

General Electric CF6-80C2 Engines

ALT (1000 FT)	UNITS	INITIAL GROSS WEIGHT (1000 KG) 140	160	180	200	220	240	260
40	Kt	227	245	249	-Start of Driftdown Speed			
	Ft	25454	22130	19292	-Max 1 Eng Alt (Airfoil & engine A-ice ON, reduce by 1500ft)			
	NMi	348	376	387	-Distance to Bottom of Driftdown			
	Kg	4265	5117	5802	-Fuel Burned to Bottom of Driftdown			
	Kt	216	230	244	-Bottom of Driftdown Speed 1 Eng Altitude			
	Kg/Hr	4638	5311	6033	-Fuel Flow at 1 Engine Altitude			
35	Kt	224	241	257	272	279		
	Ft	25406	22095	19265	16328	13623		
	NMi	307	342	361	393	407		
	Kg	3974	4878	5603	6660	7410		
	Kt	216	230	244	256	268		
	Kg/Hr	4649	5320	6039	6672	7348		
30	Kt	221	238	253	268	282	296	309
	Ft	25312	22031	19212	16285	13588	10688	7482
	NMi	249	296	323	360	379	427	483
	Kg	3410	4448	5291	6367	7184	8710	10613
	Kt	217	231	244	256	268	279	289
	Kg/Hr	4670	5336	6050	6682	7356	7953	8493

(CONTINUED)

TWO ENGINES INOPERATIVE (Continued)

DRIFTDOWN REQUIRED

NO

(CONTINUED)

DRIFTDOWN (Continued)

General Electric CF6-80C2 Engines

ALT (1000 FT)	UNITS	INITIAL GROSS WEIGHT (1000 KG)						
		140	160	180	200	220	240	260
25	Kt		235	250	265	278	292	304
	Ft		21887	19113	16212	13528	10631	7421
	NMi		218	269	316	342	393	453
	Kg		3482	4663	5871	6791	8373	10335
	Kt		231	245	257	269	279	289
	Kg/Hr		5372	6071	6699	7369	7964	8500
20	Kt			248	262	276	288	301
	Ft			18836	16066	13421	10538	7323
	NMi			156	248	291	351	416
	Kg			2896	4882	6097	7815	9888
	Kt			246	257	269	279	289
	Kg/Hr			6131	6732	7391	7981	8511
15	Kt					273	286	298
	Ft					13142	10344	7141
	NMi					192	284	365
	Kg					4284	6660	9060
	Kt					270	280	290
	Kg/Hr					7451	8017	8531
10	Kt						284	296
	Ft						9786	6733
	NMi						120	277
	Kg						2983	7203
	Kt						282	291
	Kg/Hr						8141	8577

Minimum Safe Altitude/Range Capability . . . . . . DETERMINE

(CONTINUED)

TWO ENGINES INOPERATIVE (Continued)

DRIFTDOWN REQUIRED

NO

(CONTINUED)

Fuel Dump . . . . CONSIDER

Dump fuel as required to allow level-off at desired safe altitude while maintaining range capability.

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

Complete engine(s) shutdown using appropriate procedure depending on cause (e.g., ENG___FIRE OR SEVERE DAMAGE or ENGINE SHUTDOWN IN FLIGHT).

ENG IGN OVRD Switch. . . . . OFF

NOTES: Consider fuel dump to reduce gross weight to minimum practical.

When ENG IGN OVRD is selected ON, the inoperative engine main tank fuel pumps will be on. Selecting ENG IGN OVRD to OFF will cause the inoperative engines main tank fuel pump(s) to go off.

Autothrottles. . . . . AS REQUIRED

Altimeters . . . . SET/CROSS CHECKED

GPWS . . . . FLAP OVRD

At or below 10,000 feet MSL,

(CONTINUED)

TWO ENGINES INOPERATIVE (Continued)

AIR SYS MANUAL

NO

Pack Switches (All). . . . . OFF

NOTE: Any time the aircraft altitude is greater than 10,000 feet, select a single pack to ON.

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 KG)	160	170	180	190	200	210	220	230
UP/RET Vmin + 30	217	223	228	234	240	245	250	255
0/EXT Vmin + 30	182	187	191	196	200	204	208	212
0/EXT Vmin + 15	167	172	176	181	185	189	193	197

(CONTINUED)

TWO ENGINES INOPERATIVE (Continued)

0/EXT ESTIMATED LANDING DISTANCES (METERS) TWO ENGINES INOPERATIVE

General Electric CF6-80C2 Engines

WEIGHT (1000 KG)		160	170	180	190	200	210	220	230
S.L.	**DRY**	1520	1600	1680	1760	1850	1930	2010	2100
STD=15°C	**WET**	2090	2210	2330	2450	2580	2690	2820	2950
2000 FT	**DRY**	1610	1690	1780	1870	1960	2040	2140	2230
STD=11°C	**WET**	2210	2340	2470	2600	2740	2870	3000	3140
4000 FT	**DRY**	1700	1790	1880	1980	2080	2170	2270	2370
STD=7°C	**WET**	2350	2490	2630	2770	2920	3060	3210	3360
6000 FT	**DRY**	1800	1900	2000	2100	2220	2310	2420	2530
STD=3°C	**WET**	2500	2650	2800	2950	3120	3270	3430	3590
8000 FT	**DRY**	1910	2020	2130	2240	2360	2470	2590	2710
STD=–1°C	**WET**	2660	2830	2990	3160	3340	3500	3680	3860
10000 FT	**DRY**	2030	2150	2270	2390	2530	2660	2820	2990
STD=–5°C	**WET**	2840	3020	3200	3380	3580	3790	4020	4260
NOTE: Standard day, no wind, zero slope, no reverse thrust (includes air run distances).									

CORRECTIONS:

Temperature: Valid from STD –20°C to STD +40°C		
METERS PER °C	**DRY**	**WET**
BELOW standard day	–5	–7
ABOVE standard day	+13	+20

Slope: Valid from –2% downhill +2% uphill		
METERS PER 1% SLOPE	**DRY**	**WET**
UPHILL	–23	–55
DOWNHILL	+98	+240

Wind: Valid from –10-kt tailwind +20-kt headwind		
METERS PER KNOT	**DRY**	**WET**
HEADWIND	–11	–19
TAILWIND	+41	+65

(CONTINUED)

TWO ENGINES INOPERATIVE (Continued)

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 (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 KG)								
					STD TEMP				
S.L.	–65°C 235	–45°C 237	–25°C 239	–5°C 240	15°C 241	25°C 242	35°C 222	45°C 206	55°C 189
2000 FT	–69°C 227	–49°C 229	–29°C 231	–9°C 232	11°C 233	21°C 233	31°C 214	41°C 198	51°C 182
4000 FT	–73°C 221	–53°C 222	–33°C 223	–13°C 222	7°C 222	17°C 221	27°C 207	37°C 190	47°C 175
6000 FT	–77°C 211	–57°C 211	–37°C 211	–17°C 211	3°C 210	13°C 209	23°C 201	33°C 185	43°C 169
8000 FT	– –	–61°C 199	–41°C 198	–21°C 197	–1°C 195	9°C 195	19°C 194	29°C 179	39°C 162
10000 FT	– –	–65°C 185	–45°C 184	–25°C 183	–5°C 182	5°C 181	15°C 180	25°C 172	35°C 159

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

Disconnect autothrottles prior to 50 feet or approaching the threshold.

Zero rudder trim before touchdown.

NOTES: 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.

Auto ground spoilers will not deploy until nose gear touchdown.

Reverse Thrust . . . . AS REQUIRED

[END]

Abnormal Procedures — Chapter AP

Section Table of Contents — Section 0

Intentionally
Blank

Abnormal Procedures — Chapter AP

Table of Contents — Section 00

Intentionally
Blank

General

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

Troubleshooting beyond checklist directed actions is rarely helpful and has caused further loss of system function or failure. In some cases, accidents and incidents have resulted. The crew should consider additional actions beyond the checklist only when completion of the published checklists steps clearly results in an unacceptable situation. In the case of aircraft controllability problems when a safe landing is considered uncertain, aircraft handling evaluations with gear, flaps or speedbrakes extended may be appropriate. Do not attempt troubleshooting to free jammed flight controls beyond actions directed in the appropriate published procedure unless the aircraft cannot be safely landed with the existing condition.

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 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.

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.

WARNING: ***Do not reset any tripped fuel pump or hydraulic auxiliary pump circuit breakers.***

CAUTION: Resetting of a tripped circuit breaker by the flight crew is not recommended. If an Abnormal or Emergency procedure specifies a circuit breaker reset or if the Captain considers a system to essential for safe completion of the flight, a one-time reset per flight of the circuit breaker may be made after allowing approximately a two minute cooling period. If the circuit breaker trips again, do not attempt another reset.

If a procedure recommends or directs the pulling and resetting of a circuit breaker, allow a pause of approximately 10 seconds between pulling and resetting.

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

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 Volume 1 Checklist Philosophy

A crewmember recognizing an abnormal condition shall identify and call out the condition, and when applicable, reset the alerting system.

NOTES: 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.

In the accomplishment of in-flight Abnormal procedures which result in irreversible system configurations or which may substantially affect aircraft performance capability, verbal confirmation by both pilots is required prior to execution of the line items listed below:

- THROTTLE
- FUEL Switch
- ENG FIRE Handle
- FIRE BOTTLE Discharge
- DRIVE Switch
- IRS Mode Selector

The Pilot Flying's (PF's) attention will be dedicated to aircraft control. The Pilot In Command (PIC) will call for the appropriate Volume I checklist. The Pilot Not Flying (PNF) will then state the name of the appropriate checklist and refer to that Volume I procedure. The PF will confirm selection of the appropriate checklist. The PNF, when applicable, will state the word "CONFIRM" followed by the line item and action required. The PF will reply "CONFIRMED" and repeat the associated line item. The PNF will then accomplish the line item. The PNF, using the "Challenge-Do-Verify" method, will accomplish each item in the procedure if it is in the PNF's 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. The PNF will also read the consequences and assure verbal confirmation by the PF.

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

Normal, Abnormal and Emergency checklists are designed to assist crews in completing those actions necessary for the safe conduct and completion of their flight. They are intended to be followed in the sequence in which they are presented. This philosophy applies to the individual phase-of-flight checklists themselves (i.e., Cockpit Preparation, Before Start, After Start, etc.), as well as the individual items listed within each specific checklist. Any disruption to the flow of either the specific checklists or the line items within those checklists, demands careful crew attention to ensure re-establishing the proper sequence of, and completion of, required checklists and/or associated line items.

If the sequence of checklists is interrupted (e.g., a ground turnback to the gate following taxi out), the appropriate phase-of-flight checklist should be called for and completed. In the above example, as the aircraft is taxied back to the gate or ramp area, the After Landing Checklist should be accomplished followed by the Parking Checklist once at the gate. Prior to resuming operations, all pertinent checklists should be re-accomplished. In effect, the crew would view subsequent dispatch as a new flight requiring the accomplishment of all checklists applicable to a new flight.

Intentionally
Blank

Abnormal Procedures — Chapter AP

Table of Contents — Section 10

Intentionally
Blank

AIR ALERTS

Consequences:

AIR SYSTEM ALERTS MAY BE INOP
OVERHEAD PANEL IS OPERATIVE
SYSTEM DISPLAY INCOMPLETE
ICE DETECTION INOPERATIVE

AIRCRAFT ON GROUND

NO

Call maintenance.

[END]

First Officer's EIS SOURCE Selector . . . . AUX (OR 1)

Rotate First Officer's EIS SOURCE selector to desired position. Observe appropriate SISP lights illuminate.

"AIR ALERTS" REMAINS DISPLAYED

NO

First Officer's
EIS SOURCE Selector . . . . ORIGINAL POSITION

Rotate First Officer's EIS SOURCE selector to original position. Observe appropriate SISP lights extinguish.

NOTE: Some subsequent air system faults will not present alerts on EAD or illuminate MASTER WARNING/CAUTION lights; however, annunciator lights on overhead panel are operative.

[END]

Air alerts and system display will operate normally.

[END]

AIR SYS 1-2 OFF

Consequences:

NONE

NOTE: The "AIR SYS 1-2 OFF" alert will be displayed on the EAD when a manifold failure has occurred in the left forward tunnel and the air system is in MANUAL. The ESC commands both affected pressure regulating valves closed. The pilot must determine which manifold(s) has failed.

When manifolds 1 and 2 are no longer displayed red on synoptic,

NOTE: When manifolds 1 and 2 red flow lines change to white, the "AIR SYS 1-2 OFF" alert will no longer be displayed. It will be replaced with "AIR SYS 1 OFF and "AIR SYS 2 OFF", which are level 1 alerts.

BLEED AIR 2 Switch . . . . ON

Push BLEED AIR 2 switch and observe OFF light extinguishes and "AIR SYS 2 OFF" alert is no longer displayed.

"AIR SYS 1-2 OFF" ALERT DISPLAYED AGAIN WITHIN 15 MINUTES

NO

PACK 2 Switch . . . . OFF

Push PACK 2 switch and observe OFF light illuminates.

Do not repressurize air system 2.

When manifolds 1 and 2 are no longer displayed red on synoptic,

BLEED AIR 1 Switch . . . . ON

Push BLEED AIR 1 switch and observe OFF light extinguishes and "AIR SYS 1 OFF" alert is no longer displayed.

(CONTINUED)

AIR SYS 1-2 OFF (Continued)

"AIR SYS 1-2 OFF" ALERT DISPLAYED AGAIN WITHIN 15 MINUTES

NO

(CONTINUED)

"AIR SYS 1-2 OFF" ALERT DISPLAYED AGAIN WITHIN 15 MINUTES

NO

PACK 1 Switch . . . . OFF

Push PACK 1 switch and observe OFF light illuminates.

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

Consequences:

NONE

Affected BLEED AIR Source . . . . OFF

Push affected BLEED AIR switch and verify “AIR SYS__OFF” alert is displayed.

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]

AVNCS AIR FLO OFF

Consequences:

POSSIBLE AVIONICS FAILURE
LAND AT NEAREST SUITABLE AIRPORT

AIRCRAFT ON GROUND

NO

Call maintenance.

[END]

AVNCS FAN SWITCH OVRD LIGHT ILLUMINATED AND/OR AVNCS FAN OVRD LEVEL 1 ALERT DISPLAYED ON AIR SYNOPTIC

NO

ECON Switch . . . . OFF

Push ECON switch and observe OFF light illuminates and/or ECON OFF Level 1 alert is displayed on AIR synoptic.

NOTE: 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.

Land at nearest suitable airport.

If more than 90 minutes from nearest suitable airport, refer to CIRCUIT BREAKER GUIDANCE at end of this procedure.

[END]

(CONTINUED)

AVNCS AIR FLO OFF (Continued)

AIR SYS MANUAL LEVEL 1 ALERT DISPLAYED ON AIR SYNOPTIC AND/OR AIR SYSTEM SELECT SWITCH MANUAL LIGHT ILLUMINATED

NO

AVNCS FAN Switch . . . . OVHD

Push AVNCS FAN switch and observe OVRD light illuminates and AVNCS FAN OVRD Level 1 alert is displayed on AIR synoptic.

ECON Switch . . . . OFF

Push ECON switch and observe OFF light illuminates and/or ECON OFF Level 1 alert is displayed on AIR synoptic.

NOTE: 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.

Land at nearest suitable airport.

If more than 90 minutes from nearest suitable airport, refer to CIRCUIT BREAKER GUIDANCE at end of this procedure.

[END]

AIR SYSTEM SELECT Switch . . . . MANUAL

Push AIR SYSTEM SELECT switch and observe MANUAL light illuminates and AIR SYS MANUAL Level 1 alert is displayed on AIR synoptic.

AVNCS FAN Switch . . . . OVRD

Push AVNCS FAN switch and observe OVRD light illuminates and/or AVNCS FAN OVRD Level 1 alert is displayed on AIR synoptic.

(CONTINUED)

AVNCS AIR FLO OFF (Continued)

ECON Switch . . . . OFF

Push ECON switch and observe OFF light illuminates and/or ECON OFF Level 1 alert is displayed on AIR synoptic.

NOTE: 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.

Land at nearest suitable airport.

If more than 90 minutes from nearest suitable airport, refer to CIRCUIT BREAKER GUIDANCE listed below.

CIRCUIT BREAKER GUIDANCE

Pull the following circuit breakers, all located on pilot's overhead circuit breaker panel:

- VHF COMM 1
- VHF COMM 2
- VOR 1
- VOR 2
- ATC 2
- ILS 2

CAUTION: The above circuit breakers should remain off (pulled) until aircraft is within 1 hour of landing, then reset.

MCDU 1 Circuit Breaker . . . . PULL

After 1 hour has elapsed,

MCDU 1 Circuit Breaker . . . . RESET

Verify reset (MCDU 1) indications agree with working (MCDU 2) indications.

After MCDU verification,

MCDU 2 Circuit Breaker . . . . PULL

After an additional hour has elapsed,

MCDU 2 Circuit Breaker . . . . RESET

Verify reset (MCDU 2) indications agree with working (MCDU 1) indications.

(CONTINUED)

AVNCS AIR FLO OFF (Continued)

After MCDU verification,

MCDU 1 Circuit Breaker . . . . PULL

Repeat MCDU cycling procedure each hour until safely landed.

[END]

AVNCS COMPT OVHT

Consequences:

NONE

NOTE: This alert will be accompanied by the illumination of the TRIM AIR AVNCS OVHT light on the overhead panel. This light will remain illuminated until reset by maintenance.

AIR SYSTEM SELECT Switch . . . . MANUAL

Push AIR SYSTEM SELECT switch and observe MANUAL light illuminates.

PACK 1 and PACK 3 Switches . . . . OFF

Push PACK 1 and PACK 3 switches and observe OFF lights illuminate.

When “AVNCS COMP OVHT” alert is no longer displayed,

PACK 1 Switch. . . . . ON

Push PACK 1 switch and observe OFF light extinguishes.

“AVNCS COMPT OVHT” ALERT DISPLAYED AGAIN

NO

PACK 1 Switch . . . . OFF

Push PACK 1 switch and observe OFF light illuminates.

When “AVNCS COMPT OVHT” alert is no longer displayed,

(CONTINUED)

AVNCS COMPT OVHT (Continued)

"AVNCS COMPT OVHT" ALERT DISPLAYED AGAIN

NO

(CONTINUED)

PACK 3 Switch . . . . ON

Push PACK 3 switch and observe OFF light extinguishes.

"AVNCS COMPT OVHT" ALERT DISPLAYED AGAIN

NO

PACK 3 Switch . . . . OFF

Push PACK 3 switch and observe OFF light illuminates.

PACK 1 and PACK 3 must remain off for remainder of flight.

[END]

PACK 1 must remain off for remainder of flight.

[END]

PACK 3 must remain off for the remainder of flight.

[END]

AVNCS EXH FLO OFF

Consequences:

POSSIBLE AVIONICS OVHT ON GROUND

ECON Switch . . . . OFF

Push ECON switch and observe OFF light is illuminated.

AVNCS FAN Switch . . . . VERIFY OVRD

If required, push AVNCS FAN switch and observe OVRD light is illuminated.

AIRCRAFT ON GROUND

NO

Call maintenance.

[END]

No further crew action required.

NOTES: 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.

AVNCS FAN will remain in OVRD until system status indicates aircraft is on the ground.

[END]

BLEED AIR__FAULT

Consequences:

TEMP/PRESS TOO LOW FOR ANTI-ICE

Throttle for Affected Bleed Air System . . . . SLOWLY ADVANCE

Slowly advance throttle to extinguish alert.

“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

Push affected BLEED AIR switch and observe “AIR SYS__OFF” alert is displayed.

Associated PACK . . . . OFF

Push associated PACK switch and observe OFF light illuminates.

Associated ISOL Switch . . . . ON

Push associated ISOL switch and observe ON light illuminates.

NOTES: 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]

CREW REST SMOKE

Consequences:

NONE

NOTES: "CREW REST SMOKE" alert will remain displayed until smoke clears.

Ventilation to the crew rest will automatically shut off.

Red light outside the crew rest will illuminate. A horn inside the crew rest will activate.

The smoke light(s) on the crew rest smoke detection panel will illuminate.

Coordinate with off duty crew/courier and identify origin of smoke.

ORIGIN OF SMOKE/FUMES UNKNOWN

NO

Refer to Emergency Non-Alert – SMOKE/FIRE/FUMES.

[END]

SMOKE/FIRE EXTINGUISHED

NO

DAMAGE QUESTIONABLE OR SUBSTANTIAL

NO

Land at nearest suitable airport and, if required, refer to Abnormal Non-Alerts – EVACUATION.

[END]

Close crew rest area to crew members and continue to monitor area until maintenance is present.

(CONTINUED)

CREW REST SMOKE (Continued)

SMOKE/FIRE EXTINGUISHED

NO

(CONTINUED)

Proceed to original destination.

[END]

AIRCRAFT IN FLIGHT

NO

Land at nearest suitable airport.

If required, refer to Abnormal Non-Alerts – EVACUATION.

[END]

TAIL A-ICE DISAG

Consequences:

MAY HAVE TO DEPART ICING AREA
L/E DAMAGE POSSIBLE ON GROUND

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

NOTE: Alert is displayed on the ground when differential pressure sensors detect flow condition.

TAIL ANTI-ICE Switch. . . . . OFF

Push TAIL ANTI-ICE switch and observe ON light extinguishes.

AIR APU Switch . . . . OFF

Push AIR APU switch and observe ON light extinguishes.

Notify maintenance to remove external air.

BLEED AIR 2 Switch . . . . VERIFY OFF

If required, AIR SYSTEM SELECT switch to MANUAL, then push BLEED AIR 2 switch and observe OFF light illuminates.

1-2 ISOL Switch . . . . VERIFY OFF

If required, push 1-2 ISOL switch and observe ON light extinguishes.

[END]

(CONTINUED)

TAIL A-ICE DISAG (Continued)

TAIL ANTI-ICE SWITCH OFF

NO

NOTE: Alert is displayed in flight when tail anti-ice protection has not been selected on and differential pressure sensors detect a flow condition.

Assume tail anti-ice is on.

AIR SYSTEM MANUAL

NO

After landing,

BLEED AIR 2 Switch . . . . OFF

AIR SYSTEM SELECT switch to MANUAL, then push BLEED AIR 2 switch and observe OFF and PRESS lights illuminate.

1-2 ISOL Switch . . . . OFF

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

After landing, do not pressurize pneumatic system 2.

[END]

Depart icing area.

ANTI-ICE SYSTEM MANUAL

NO

After departing icing area,

(CONTINUED)

TAIL A-ICE DISAG (Continued)

ANTI-ICE SYSTEM MANUAL

NO

(CONTINUED)

TAIL ANTI-ICE Switch. . . . . OFF

Push TAIL ANTI-ICE switch and observe ON light extinguishes.

NOTE: Alert is displayed in flight when tail anti-switch is on and differential pressure sensors detect no flow condition.

[END]

Land with maximum of 35° flaps.

[END]

TRIM AIR OFF

Consequences:

NONE

COCKPIT Temperature Selector . . . . SET AS DESIRED

NOTE: Select cockpit zone, set temperature at least 2°C less than cabin zone set temperature (cyan).

CARGO Temperature Selector . . . . OFF

Rotate CARGO temperature selector on AIR control panel to OFF.

NOTES: The above actions ensure that the COCKPIT temperature selector will control PACK 1 to regulate the cooling demand of the cockpit. The COURIER temperature selector will control PACKs 2 and 3 to regulate the cooling demands of the entire cabin.

If the COURIER temperature selector is set lower than the COCKPIT temperature selector, the COURIER temperature selector will control the temperature output of all operating packs.

[END]

WNG A-ICE__DISAG

Consequences:

MAY HAVE TO DEPART ICING AREA
SLAT DAMAGE POSSIBLE ON GROUND

CAUTION: Slats may be damaged if wing anti-ice is operated on ground for more than 30 seconds.

AIRCRAFT ON GROUND

NO

NOTE: Alert is displayed on the ground when the differential pressure sensors detect a flow condition.

WING ANTI-ICE Switch . . . . OFF

Push WING ANTI-ICE switch and observe ON light extinguishes.

Notify maintenance to remove external air.

Associated BLEED AIR 1 or 3 Switch. . . . . VERIFY OFF

If required, AIR SYSTEM SELECT switch to MANUAL, then push associated BLEED AIR 1 or 3 switch and observe OFF and PRESS lights illuminate.

Associated ISOL Switch(es) . . . . VERIFY OFF

If required, push associated ISOL switch(es) and observe ON light(s) extinguishes.

[END]

(CONTINUED)

WNG A-ICE__DISAG (Continued)

WING ANTI-ICE SWITCH OFF

NO

NOTE: Alert is displayed in flight when wing anti-ice protection has not been selected on and the differential pressure sensors detect a flow condition.

Assume wing anti-ice is on.

AIR SYSTEM MANUAL

NO

After landing,

Associated BLEED AIR 1 or 3 Switch . . . . OFF

AIR SYSTEM SELECT switch to MANUAL, then push associated BLEED AIR 1 or 3 switch and observe OFF and PRESS lights illuminate.

Associated ISOL Switch(es) . . . . OFF

Push associated ISOL switch(es) and observe ON light(s) extinguishes.

After landing, do not pressurize associated pneumatic system.

[END]

WING ANTI-ICE Switch. . . . . OFF

Push WING ANTI-ICE switch and observe ON light extinguishes.

NOTE: Alert is displayed in flight when wing anti-ice protection has not been selected on and the differential pressure sensors detect a flow condition.

Depart icing area.

[END]

Intentionally
Blank

Intentionally
Blank

AIL DEFLECT DISAG

Consequences:

NONE

AIRCRAFT ON GROUND

NO

Call maintenance.

NOTE: An attempt to clear the alert may be attempted on the ground by placing the FLAP/SLAT handle to 0/RET then back to the planned takeoff position. Should this clear the alert, no further crew action is required.

[END]

AIL DEFLECT DISAG ALERT DISPLAYED AFTER INITIAL FLAP/SLAT HANDLE MOVEMENT TO UP/RET

NO

AILERON DEFLECT OVRD Switch . . . . OVRD ON

Push the AILERON DEFLECT OVRD switch and observe OVRD ON light illuminates.

Airspeed . . . . MAX 255 KIAS/.51 MACH

FLAP/SLAT Handle 15/EXT

FLAP/SLAT Handle 0/EXT

(CONTINUED)

AIL DEFLECT DISAG (Continued)

AIL DEFLECT DISAG ALERT DISPLAYED AFTER INITIAL FLAP/SLAT HANDLE MOVEMENT TO UP/RET

NO

(CONTINUED)

AILERON DEFLECT OVRD Switch . . . . OFF

Push the AILERON DEFLECT OVRD switch and observe OVRD ON light extinguishes.

NOTE: The use of the AILERON DEFLECT OVRD switch is limited to one cycle.

"AIL DEFLECT DISAG" ALERT EXTINGUISHED

NO

When desired,

FLAP/SLAT Handle . . . . UP/RET

Make log entry.

[END]

When desired,

FLAP/SLAT Handle. . . . . UP/RET

Do not exceed 280 KIAS/.82 Mach.

Do not use FMS fuel computations for flight planning.

NOTE: Fuel consumption may be increased up to 20%.

Diversion to suitable airport may be required.

Plan a normal FLAP/SLAT landing.

Do not use autoland.

Disconnect the autopilot by 200 feet AGL.

Make log entry.

[END]

ANTI-SKID FAIL

OR

ANTI-SKID__FAIL

Consequences:

DO NOT SELECT ANTI-SKID OFF
LANDING DISTANCE WILL BE INCREASED

Auto Brake Selector . . . . OFF

CAUTION: Do not initiate manual braking until nosewheel is on the runway and ground spoilers are fully deployed.

Use 50/EXT unless 35/EXT is required. Consider reducing aircraft weight by dumping fuel. Select longest runway available for existing conditions. Use full length of runway for deceleration. Use full reverse thrust while applying brakes smoothly and gradually until a moderate deceleration is felt. This manual braking technique is intended to prevent wheel lockup, and blown tires. Compute landing distance from applicable table.

(CONTINUED)

ANTI-SKID FAIL OR ANTI-SKID__FAIL (Continued)

50/EXT ESTIMATED LANDING DISTANCES (METERS)
ANTI-SKID INOPERATIVE

General Electric CF6-80C2 Engines

WEIGHT (1000 KG)		160	170	180	190	200	210	220	230
S.L.	**DRY**	1693	1758	1825	1895	1967	2041	2118	2197
STD=15°C	**WET**	2184	2277	2371	2466	2563	2662	2761	2862
2000 FT	**DRY**	1781	1851	1923	1998	2075	2155	2238	2323
STD=11°C	**WET**	2306	2407	2510	2613	2716	2821	2925	3031
4000 FT	**DRY**	1865	1945	2028	2111	2195	2281	2368	2457
STD=7°C	**WET**	2441	2551	2661	2771	2882	2994	3016	3218
6000 FT	**DRY**	1970	2056	2143	2233	2324	2417	2512	2609
STD=3°C	**WET**	2597	2712	2828	2946	3066	3187	3310	3434
8000 FT	**DRY**	2087	2181	2277	2374	2472	2571	2672	2774
STD=–1°C	**WET**	2759	2883	3008	3136	3265	3396	3528	3662
10000 FT	**DRY**	2195	2298	2404	2514	2626	2743	2862	2985
STD=–5°C	**WET**	2932	3067	3205	3349	3497	3649	3806	3967

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 –20°C to STD +40°C		
METERS PER °C	**DRY**	**WET**
BELOW standard day	–5	–6
ABOVE standard day	+14	+20

Slope: Valid from –2% downhill +2% uphill		
METERS PER 1% SLOPE	**DRY**	**WET**
UPHILL	–41	–107
DOWNHILL	+210	+485

Wind: Valid from –10 knot tailwind +50 knot headwind		
METERS PER KNOT	**DRY**	**WET**
HEADWIND	–16	–23
TAILWIND	+48	+82

(CONTINUED)

ANTI-SKID FAIL OR ANTI-SKID__FAIL (Continued)

35/EXT ESTIMATED LANDING DISTANCES (METERS) ANTI-SKID INOPERATIVE

General Electric CF6-80C2 Engines

WEIGHT (1000 KG)		160	170	180	190	200	210	220	230
S.L.	**DRY**	1898	1990	2084	2179	2277	2376	2478	2581
STD=15°C	**WET**	2528	2652	2778	2906	3036	3168	3303	3439
2000 FT	**DRY**	2006	2106	2207	2310	2414	2520	2628	2737
STD=11°C	**WET**	2689	2821	2956	3094	3235	3379	3526	3677
4000 FT	**DRY**	2128	2233	2340	2451	2564	2680	2798	2920
STD=7°C	**WET**	2861	3004	3152	3303	3457	3615	3776	3941
6000 FT	**DRY**	2254	2372	2491	2612	2734	2858	2984	3111
STD=3°C	**WET**	3056	3210	3369	3532	3700	3872	4049	4230
8000 FT	**DRY**	2399	2520	2647	2778	2913	3054	3198	3347
STD=–1°C	**WET**	3273	3437	3608	3786	3970	4162	4360	4565
10000 FT	**DRY**	2559	2689	2828	2976	3133	3300	3475	3660
STD=–5°C	**WET**	3502	3684	3878	4082	4296	4522	4759	5006

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 –20°C to STD +40°C		
METERS PER °C	**DRY**	**WET**
BELOW standard day	–5	–6
ABOVE standard day	+14	+20

Slope: Valid from –2% downhill +2% uphill		
METERS PER 1% SLOPE	**DRY**	**WET**
UPHILL	–41	–107
DOWNHILL	+210	+485

Wind: Valid from –10 knot tailwind +50 knot headwind		
METERS PER KNOT	**DRY**	**WET**
HEADWIND	–16	–23
TAILWIND	+48	+82

[END]

AUTO BRAKE FAIL

Consequences:

NONE

IN FLIGHT

NO

AUTO BRAKE Selector. . . . . OFF

Anti-Skid operates normally.

After landing, apply anti-skid braking consistent with runway conditions.

[END]

AUTO BRAKE Selector . . . . OFF

"AUTO BRAKE FAIL" ALERT REMAINS DISPLAYED

NO

Takeoff not permitted unless MEL procedure is satisfied.

Call maintenance.

[END]

Takeoff is permitted.

For subsequent landing, AUTO BRAKE LAND mode may be used.

Anti-skid operates normally.

For rejected takeoff, apply anti-skid braking consistent with runway conditions and aircraft speed.

[END]

BRAKE OVERHEAT

Consequences:

NONE

AIRCRAFT ON GROUND

NO

Do not take off. Advise ground personnel to remain clear of main gear. Fuse plugs may melt.

Avoid non-essential use of parking brake when BRAKE OVERHEAT alert is displayed.

CAUTION: "BRAKE OVERHEAT" alert is displayed above 550°C. If temperature exceeds 800°C, stop aircraft and call emergency services.

NOTES: Brakes, wheels and tires will require maintenance before next flight.

Temperatures above 936°C cannot be displayed and will go blank for the affected brake(s). As the temperature decreases below 936°C, the temperature(s) will display again if sensors are not damaged.

[END]

Flight conditions permitting, extend landing gear for cooling for 10 minutes or until alert is not displayed.

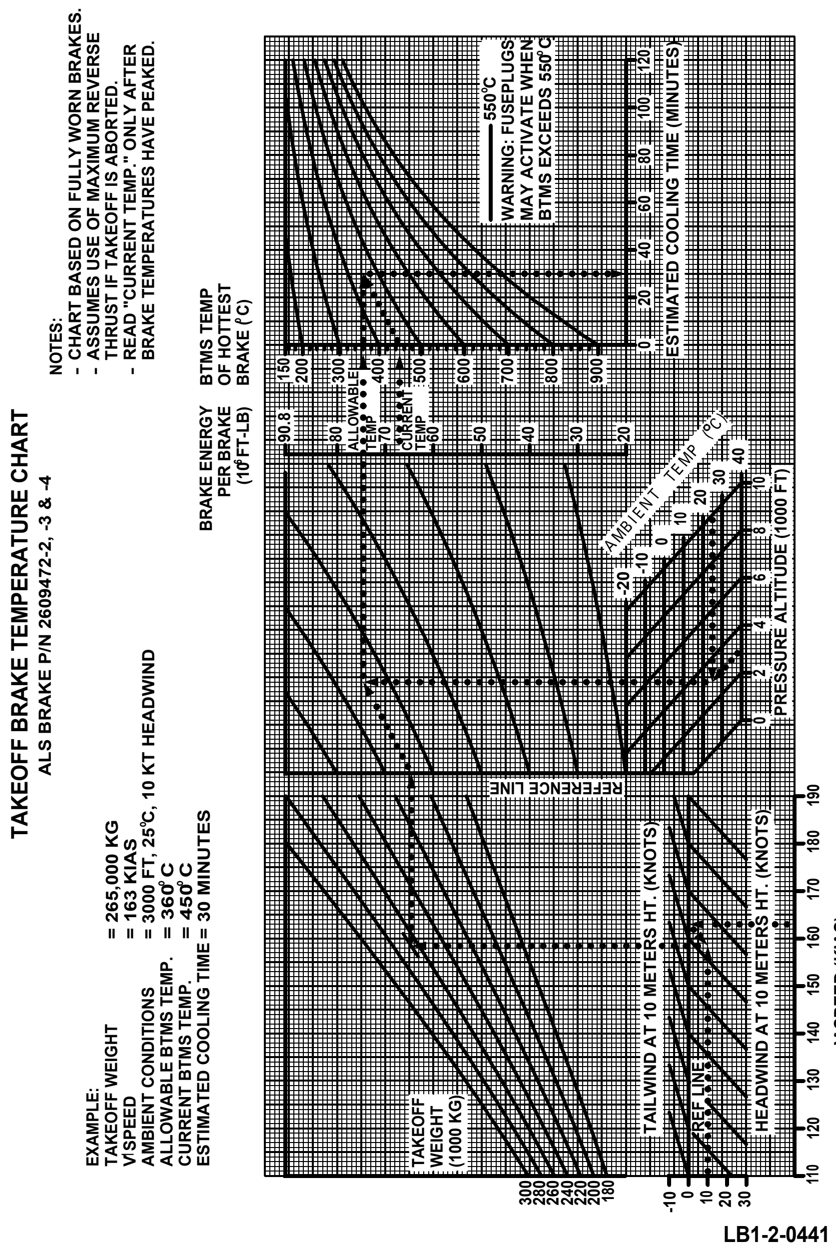
Record applicable brake position(s) and maximum temperature reading in maintenance log.

[END]

(CONTINUED)

BRAKE OVERHEAT (Continued)

TAKEOFF BRAKE TEMPERATURE CHART



FCC__DATA FAULT

Consequences:

SYSTEM DISPLAY INCOMPLETE

First Officer's EIS SOURCE Selector . . . . AUX (OR 1)

Rotate First Officer's EIS SOURCE selector to desired position. Observe appropriate SISP lights illuminate.

"FCC__DATA FAULT" ALERT EXTINGUISHED

NO

No further crew action required.

[END]

AIRCRAFT ON GROUND

NO

Call maintenance.

[END]

First Officer's EIS SOURCE Selector . . . . ORIGINAL POSITION

Rotate First Officer's EIS SOURCE selector to original position. Observe appropriate SISP lights extinguish.

Select appropriate procedure below.

NOTE: During the following actions, the associated LSAS and YAW DAMP OFF light(s) will illuminate but "LSAS__OFF" and "YAW DAMP__OFF" alert(s) will not be displayed.

FCC 1A DATA FAULT

LSAS RIGHT OUTBD Switch . . . . OFF

(CONTINUED)

FCC__DATA FAULT (Continued)

LWR YAW DAMP A Switch . . . . OFF

[END]

FCC 1B DATA FAULT

LSAS LEFT INBD Switch. . . . . OFF

LWR YAW DAMP B Switch . . . . OFF

[END]

FCC 2A DATA FAULT

LSAS LEFT OUTBD Switch. . . . . OFF

UPR YAW DAMP A Switch . . . . OFF

[END]

FCC 2B DATA FAULT

LSAS RIGHT INBD Switch . . . . OFF

UPR YAW DAMP B Switch . . . . OFF

[END]

FLAP DISAG

Consequences:

FLAP <35, AUTOBRAKES NOT AVAILABLE
FLAP <35, SPOILERS AT NLG TD ONLY

Place FLAP/SLAT handle to match flap position. Allow several seconds for system response. If alert remains displayed, select the last symmetrical configuration.

NOTE: If required to calculate Vapp speeds, refer to Volume I, NORMAL & ABNORMAL CONFIGURATION REFERENCE SPEED (VREF) table located under the PERFORMANCE tab.

PROBLEM WAS ASYMMETRIC FLAPS

NO

Land at nearest suitable airport using existing flap/slat setting.

If final flap setting is less than 35°,

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 50°, 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 35°,

(CONTINUED)

FLAP DISAG (Continued)

ALERT APPEARED DURING ATTEMPTED FLAP RETRACTION

NO (CONTINUED)

GPWS Switch . . . . FLAP OVRD

Autobrakes . . . . OFF

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 FLAP/SLAT handle to match actual flap position.

FLAP POSITION 0 DEGREES

NO

Refer to Abnormal Non-Alert procedure – NO FLAP/SLAT EXTENDED LANDING.

[END]

Land with existing flap/slat setting.

If flaps less than 35°,

(CONTINUED)

FLAP DISAG (Continued)

GPWS Switch . . . . .FLAP OVRD

Autobrakes . . . . OFF

At 50 feet,

Autothrottles . . . . OFF

[END]

LSAS ALL FAIL

Consequences:

NONE

Autopilot . . . . DISCONNECT

LSAS Switches . . . . ALL OFF

Push LSAS switches and observe OFF lights illuminate.

Any One LSAS Switch . . . . ON

Push LSAS switch and observe OFF light extinguishes.

ASSOCIATED LSAS LIGHT ILLUMINATED

NO

Associated LSAS Switch . . . . OFF

Push associated LSAS switch and observe OFF light illuminates.

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.

(CONTINUED)

LSAS ALL FAIL (Continued)

Pitch sensitivity increases with altitude,

Avoid overcontrolling. Also avoid pitch attitudes above 7 degrees during landing.

[END]

SEL ELEV FEEL MAN

Consequences:

NONE

"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

Pull ELEV FEEL selector out for manual operation. Observe "ELEV FEEL MANUAL" alert replaces "SEL ELEV FEEL MAN" alert.

ELF Speed . . . . SET AS REQUIRED

Rotate and hold ELEV FEEL selector in HI or LO (1 or 2) as required.

NOTES: 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

Consequences:

NONE

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 procedure – AIRSPEED: LOST, SUSPECT OR ERRATIC.

[END]

FLAP LIMIT Selector . . . . OVRD 1

Rotate FLAP LIMIT selector to OVRD 1 and observe "FLAP LIMIT OVRD" alert is displayed.

After 20 seconds,

"FLAP LIMIT DISAG" ALERT DISPLAYED

NO

FLAP LIMIT Selector . . . . OVRD 2

Rotate FLAP LIMIT selector to OVRD 2.

After 20 seconds,

(CONTINUED)

SEL FLAP LIM OVRD (Continued)

"FLAP LIMIT DISAG" ALERT DISPLAYED

NO

(CONTINUED)

"FLAP LIMIT DISAG" ALERT DISPLAYED

NO

Flap extension may be limited.

[END]

Observe placarded flap limit speed.

[END]

SLAT DISAG

Consequences:

FLAP <35, AUTOBRAKES NOT AVAILABLE
FLAP <35, SPOILERS AT NLG TDN ONLY

ALERT APPEARED DURING CLIMBOUT, WITH SLATS EXTENDED AND FLAP/SLAT HANDLE IN A SLAT EXTENDED POSITION

NO

Stick shaker may actuate temporarily.

If flaps greater than 15°, retract flaps to 15°.

Accelerate and retract flaps and slats on schedule.

SLAT DISAG ALERT DISPLAYED WITH FLAP/SLAT HANDLE IN UP/RET DETENT

NO

Maintain airspeed below 280 KIAS/.55M.

When ready for approach,

FLAP/SLAT Handle 0/EXT

NOTE: A "SLAT/DISAG" alert that is displayed with FLAP/SLAT handle in both extended or retracted position is likely due to proximity sensor failure. Plan a 28/EXT landing using 28/RET Vapp speeds and Estimated Landing Distances.

GPWS Switch . . . . FLAP OVRD

FLAP/SLAT Handle 28/EXT

(CONTINUED)

SLAT DISAG (Continued)

ALERT APPEARED DURING CLIMBOUT, WITH SLATS EXTENDED AND FLAP/SLAT HANDLE IN A SLAT EXTENDED POSITION

NO

(CONTINUED)

SLAT DISAG ALERT DISPLAYED WITH FLAP/SLAT HANDLE IN UP/RET DETENT

NO

(CONTINUED)

Refer to 28/RET applicable reference speeds and landing distances listed in later part of this procedure.

NOTE: Autothrottles will not automatically retard at 50 feet with flaps less than landing range. Autothrottles must be disconnected prior to 50 feet AGL.

[END]

AIRSPEED ABOVE 280 KIAS/.55 MACH

NO

FLAP/SLAT Handle . . . . UP/RET

[END]

(CONTINUED)

SLAT DISAG (Continued)

ALERT APPEARED DURING ATTEMPTED EXTENSION

NO

"SLATS INHIBITED" ALERT DISPLAYED ON SD CONFIG SYNOPTIC

NO

FLAP/SLAT Handle . . . . 10/EXT OR GREATER

NOTE: The display of the "SLATS INHIBITED" alert when speed is less than 280 KIAS/.55 Mach indicates an erroneous speed/Mach inhibit signal. The "SLATS INHIBITED" alert will be removed when FLAP/SLAT handle is set to 10° or greater.

"SLATS DISAG" ALERT REMOVED

NO

Plan a normal flap/slat landing.

[END]

FLAP/SLAT Handle. . . . . UP/RET

SLAT STOW Switch . . . . SLAT STOW

FLAP/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.

(CONTINUED)

SLAT DISAG (Continued)

ALERT APPEARED DURING
ATTEMPTED EXTENSION

NO

(CONTINUED)

15/RET REFERENCE SPEEDS
SLATS DISAG

WEIGHT (1000 KG)	160	170	180	190	200	210	220	230
Vref	176	181	187	192	197	202	207	212

25/RET REFERENCE SPEEDS
SLATS DISAG

WEIGHT (1000 KG)	160	170	180	190	200	210	220	230
Vref	171	176	181	186	191	195	200	205

28/RET APPROACH SPEEDS
SLATS DISAG

WEIGHT (1000 KG)	160	170	180	190	200	210	220	230
Vapp (Vref +5)	175	180	185	190	194	199	204	209

(CONTINUED)

SLAT DISAG (Continued)

ALERT APPEARED DURING
ATTEMPTED EXTENSION

NO

(CONTINUED)

28/RET ESTIMATED LANDING DISTANCES (METERS)
SLATS DISAG

General Electric CF6-80C2 Engines

WEIGHT (1000 KG)		160	170	180	190	200	210	220	230
S.L.	**DRY**	2040	2160	2280	2410	2530	2670	2790	2920
STD=15°C	**WET**	2490	2630	2760	2910	3060	3210	3350	3490
2000 FT	**DRY**	2170	2310	2440	2580	2710	2860	2990	3130
STD=11°C	**WET**	2650	2810	2950	3110	3270	3430	3580	3740
4000 FT	**DRY**	2320	2470	2610	2760	2910	3070	3220	3370
STD=7°C	**WET**	2830	3000	3160	3340	3500	3680	3840	4010
6000 FT	**DRY**	2490	2650	2800	2970	3130	3300	3470	3640
STD=3°C	**WET**	3040	3220	3390	3580	3760	3950	4130	4320
8000 FT	**DRY**	2680	2850	3020	3210	3380	3570	3750	3940
STD=–1°C	**WET**	3260	3460	3650	3860	4050	4260	4460	4660
10000 FT	**DRY**	2880	3080	3260	3470	3670	3930	4180	4430
STD=–5°C	**WET**	3510	3730	3940	4160	4380	4660	4930	5180

NOTE: Standard day, no wind, zero slope, two engines at maximum reverse thrust to 80 KIAS, then reverse idle to 60 KIAS, then forward idle to stop. Tail engine at idle reverse (includes air run distances).

CORRECTIONS:

Temperature: Valid from STD –20°C to STD +40°C		
METERS PER °C	**DRY**	**WET**
BELOW standard day	–7	–8
ABOVE standard day	+22	+23

(CONTINUED)

SLAT DISAG (Continued)

ALERT APPEARED DURING ATTEMPTED EXTENSION

NO

(CONTINUED)

Slope: Valid from –2% downhill +2% uphill		
METERS PER 1% SLOPE	**DRY**	**WET**
UPHILL	–43	–72
DOWNHILL	+214	+306

Wind: Valid from –10 knot tailwind +20 knot headwind		
METERS PER KNOT	**DRY**	**WET**
HEADWIND	–16	–21
TAILWIND	+62	+69

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.

CAUTION: Tail strike may occur at deck angles greater than 10°.

[END]

FLAP/SLAT Handle 0/EXT

Plan a normal flap/slat landing.

[END]

STAB OUT OF TRIM

Consequences:

ABRUPT PITCH INPUT IF AP/LSAS DISC

Observe stabilizer position on CONFIG synoptic for proper autotrim. If no indication of trim response after 5 seconds,

AUTO FLIGHT Switch . . . . .PUSH

Push AUTO FLIGHT switch to engage other autopilot. Observe stabilizer position on CONFIG synoptic for indications autopilot automatic trim is correcting situation.

STABILIZER FAILS TO MOVE

NO

To counteract any abrupt pitching tendencies, firmly grasp control wheel.

Autopilot . . . . .DISCONNECT

Trim aircraft using control wheel trim switches or center pedestal LONG TRIM handles.

STABILIZER FAILS TO MOVE

NO

Refer to Abnormal Non-Alert procedure – STABILIZER INOPERATIVE.

[END]

No further crew action required.

[END]

TIRE FAIL

Consequences:

DO NOT RETRACT LANDING GEAR
DO NOT USE ABS FOR LANDING

BEFORE TAKEOFF ROLL

NO

Do not take off.

[END]

Reject or continue takeoff, depending on conditions.

NOTE: At speeds in excess of V1 – 20, consider continuing takeoff. Stopping performance is degraded with tire failure.

LANDING GEAR EXTENDED

NO

Do not retract landing gear.

When ready to land,

Gross Weight. . . . . REDUCE AS REQUIRED

AUTO BRAKE Selector . . . . OFF

[END]

USE MAN SPOILERS

Consequences:

GND SPOILERS AT NLG TOUCHDOWN ONLY
LANDING DISTANCE WILL BE INCREASED

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 (METERS)
USE MAN SPOILERS**

General Electric CF6-80C2 Engines

WEIGHT (1000 KG)		160	170	180	190	200	210	220	230
S.L.	DRY	1297	1353	1409	1462	1511	1569	1621	1673
STD=15°C	WET	1550	1624	1698	1766	1835	1911	1982	2053
2000 FT	DRY	1356	1417	1478	1533	1586	1648	1704	1760
STD=11°C	WET	1637	1716	1795	1868	1941	2024	2101	2178
4000 FT	DRY	1421	1486	1551	1610	1667	1733	1793	1853
STD=7°C	WET	1731	1816	1901	1980	2059	2147	2229	2311
6000 FT	DRY	1494	1562	1630	1694	1755	1826	1890	1954
STD=3°C	WET	1837	1927	2017	2104	2189	2283	2372	2461
8000 FT	DRY	1568	1642	1716	1784	1850	1926	1996	2066
STD=–1°C	WET	1947	2046	2145	2237	2330	2432	2528	2624
10000 FT	DRY	1651	1730	1809	1883	1960	2051	2134	2217
STD=–5°C	WET	2070	2177	2284	2385	2491	2615	2727	2839

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).

(CONTINUED)

USE MAN SPOILERS (Continued)

CORRECTIONS:

Temperature: Valid from STD –20°C to STD +40°C		
METERS PER °C	**DRY**	**WET**
BELOW standard day	–4	–4
ABOVE standard day	+8	+11

Slope: Valid from –2% downhill +2% uphill		
METERS PER 1% SLOPE	**DRY**	**WET**
UPHILL	–26	–42
DOWNHILL	+70	+135

Wind: Valid from –10 knot tailwind +20 knot headwind		
METERS PER KNOT	**DRY**	**WET**
HEADWIND	–10	–14
TAILWIND	+25	+40

35/EXT ESTIMATED LANDING DISTANCES (METERS) USE MAN SPOILERS

General Electric CF6-80C2 Engines

WEIGHT (1000 KG)		**160**	**170**	**180**	**190**	**200**	**210**	**220**	**230**
S.L.	**DRY**	1395	1451	1508	1568	1630	1684	1746	1806
STD=15°C	**WET**	1674	1749	1824	1903	1985	2059	2142	2225
2000 FT	**DRY**	1462	1522	1583	1647	1713	1771	1838	1907
STD=11°C	**WET**	1769	1850	1931	2017	2105	2185	2273	2361
4000 FT	**DRY**	1534	1597	1663	1732	1803	1865	1937	2009
STD=7°C	**WET**	1879	1964	2049	2140	2234	2321	2418	2515
6000 FT	**DRY**	1612	1680	1750	1825	1901	1968	2045	2116
STD=3°C	**WET**	1992	2085	2178	2278	2381	2472	2577	2682
8000 FT	**DRY**	1693	1769	1845	1924	2007	2079	2167	2250
STD=–1°C	**WET**	2112	2216	2320	2427	2537	2637	2755	2873
10000 FT	**DRY**	1784	1866	1948	2043	2127	2228	2324	2420
STD=–5°C	**WET**	2254	2364	2474	2592	2715	2851	2980	3190

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).

(CONTINUED)

USE MAN SPOILERS (Continued)

CORRECTIONS:

Temperature: Valid from STD –20°C to STD +40°C		
METERS PER °C	**DRY**	**WET**
BELOW standard day	–4	–5
ABOVE standard day	+9	+12

Slope: Valid from –2% downhill +2% uphill		
METERS PER 1% SLOPE	**DRY**	**WET**
UPHILL	–29	–47
DOWNHILL	+84	+159

Wind: Valid from –10 knot tailwind +20 knot headwind		
METERS PER KNOT	**DRY**	**WET**
HEADWIND	–11	–15
TAILWIND	+29	+44

[END]

YAW DAMP ALL FAIL

Consequences:

NONE

YAW DAMP Switches . . . . ALL OFF

Push all YAW DAMP switches and observe OFF lights are illuminated.

Any One YAW DAMP Switch. . . . . ON

Push any one YAW DAMP switch and observe OFF light extinguishes.

ASSOCIATED YAW DAMP FAIL LIGHT ILLUMINATED

NO

Associated YAW DAMP Switch . . . . OFF

Push associated YAW DAMP switch and observe OFF light illuminates.

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]

Intentionally
Blank

Abnormal Procedures — Chapter AP

Table of Contents — Section 30

Intentionally
Blank

BUS L EMER AC OFF

Consequences:

NONE

EMER PWR Selector . . . . OFF

NOTES: Continuing flight with "EMER PWR ON" level 1 alert displayed would result in depletion of the battery.

"EMER PWR SW OFF" level 1 alert will be displayed on the EAD and ELEC synoptic.

DISPLAY UNITS 1 AND/OR 3 OPERATING

NO

NOTES: When display units 1 and/or 3 are operating, the left emergency AC bus is powered.

The left emergency AC bus sensing circuit has failed.

"BUS L EMER AC OFF" level 2 alert and "EMER PWR SW OFF" level 1 alert will be displayed for the remainder of the flight.

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]

(CONTINUED)

BUS L EMER AC OFF (Continued)

Land at the nearest suitable airport.

NOTES: “BUS L EMER AC OFF” level 2 alert and “EMER PWR SW OFF” and “PITOT HEAT CAPT” level 1 alerts will be displayed for the remainder of the flight.

The left emergency AC bus is unpowered.

MCDU 1 and DEU 1 will be inoperative.

DU 2 will display a red "X" until the Captain’s EIS SOURCE selector is rotated to AUX (or 2).

Captain’s EIS SOURCE Selector. . . . . AUX (OR 2)

Rotate Captain’s EIS SOURCE selector to AUX (or 2 if dispatched with AUX DEU inoperative) and observe "CAPT ON AUX" (or "CAPT ON 2") light is illuminated.

NOTES: The Captain’s PFD will move to DU 2.

The EAD will move to DU 4.

DU 5 will function as either the F/O’s ND or as the system synoptic. The ND switch on the system display control panel will enable selection of the ND when desired.

The F/O’s PFD will remain on DU 6.

When the Captain’s EIS SOURCE selector is rotated to AUX (or 2 if dispatched with the AUX DEU inoperative), "CAPT ON AUX" (or "CAPT ON 2") light is illuminated adjacent to associated EIS SOURCE selectors.

Captain’s CADC Switch . . . . CAPT ON 2

Push Captain’s SISP CADC switch and observe "CAPT ON 2" light illuminates.

NOTES: Pushing the Captain’s CADC switch selects ADC 2 data for display on the Captain’s PFD.

"CAPT ON 2" will be illuminated on the Captain’s and F/O’s CADC switches. CADC 2 will be displayed in amber on the Captain’s and F/O’s PFDs.

(CONTINUED)

BUS L EMER AC OFF (Continued)

Captain's IRS Switch. . . . . .CAPT ON AUX

Push the Captain's SISP IRS switch and observe CAPT ON AUX light is illuminated.

NOTES: IRU 1 will operate for approximately 15 minutes on a dedicated battery after the left emergency AC bus becomes unpowered. When the battery is depleted, IRU 1 will no longer supply information to the DEUs.

Selecting the AUX IRU commands this unit to supply data to the AUX DEU for display on DU 2. The CAPT ON AUX lights on the Captain's and F/O's IRS switches will be illuminated and IRS AUX will be displayed in white on the Captain's PFD.

"ENG IGN NOT ARMED" LEVEL 1 ALERT DISPLAYED

NO

ENG IGN Switch. . . . . SELECT B

Push ENG IGN switch B and observe B is illuminated and "ENG IGN NOT ARMED" level 1 alert is no longer displayed.

If subsequent electrical malfunction(s) occur requiring use of emergency power, rotate the EMER PWR selector to ARM or ON and deploy the ADG.

NOTES: The emergency power system is designed to provide power for approximately 15 minutes until the ADG is deployed.

The following components/systems are inoperative when the left emergency AC bus is unpowered.

- *DEU 1*
- *MCDU 1*
- *IRU 1 (after battery is depleted)*
- *CADC 1*
- *Engine 1, 2 and 3 system A ignitors*
- *1-3 isolation valve*

(CONTINUED)

BUS L EMER AC OFF (Continued)

- *Standby instruments backup lighting*
- *Captain's pitot heat*
- *Pack 1, 2 and 3 ram air door control*

[END]

BUS L EMER DC OFF

Consequences:

NONE

EMER PWR Selector . . . . OFF

NOTES: Continuing flight with "EMER PWR ON" level 1 alert displayed would result in depletion of the battery.

"EMER PWR SW OFF" level 1 alert will be displayed on the EAD and ELEC synoptic.

CAPTAIN'S FLIGHT DIRECTOR AND/OR AUTOPILOT 1 OPERATIONAL

NO

NOTES: When Captain's flight director and/or AUTOPILOT 1 are operating, the left emergency DC bus is powered.

The left emergency DC bus sensing circuit has failed.

"BUS L EMER DC OFF" level 2 alert and "EMER PWR SW OFF" level 1 alert will be displayed for the remainder of the flight.

If subsequent electrical malfunction(s) occurs 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.

(CONTINUED)

BUS L EMER DC OFF (Continued)

CAPTAIN'S FLIGHT DIRECTOR
AND/OR AUTOPILOT 1
OPERATIONAL

NO

(CONTINUED)

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.

NOTES: The emergency power system is designed to provide power for approximately 15 minutes until the ADG is deployed.

The left emergency DC bus is unpowered.

"BUS L EMER DC OFF" level 2 alert and "EMER PWR SW OFF" level 1 alert will be displayed for remainder of flight.

The following components/systems are inoperative when the left emergency DC bus is unpowered:

- *FCC 1B power*
- *GCP A power*
- *Autoflight and Flight Director 1*
- *VHF communications radio 1*
- *CABIN AIR shutoff valve*
- *CABIN AIR switch valve control and light power*
- *Captain's stick shaker*
- *Captain's audio control panel/audio management unit*
- *Emergency lighting standby power*
- *Engines 1 and 3 fuel fire shutoff valves*
- *Lower cargo smoke and overheat detection*
- *Upper cargo smoke detection*

[END]

ELEC ALERTS

Consequences:

ELEC SYSTEM ALERTS MAY BE INOP
OVERHEAD PANEL IS OPERATIVE
SYSTEM DISPLAY INCOMPLETE

NOTE: Under certain conditions ELEC PANEL may be partially inoperative.

AIRCRAFT ON GROUND

NO

Call maintenance.

[END]

“BAT BUS OFF” LIGHT ILLUMINATED

NO

Land at nearest suitable airport.

Battery bus is not powered.

Electrical system is in manual mode, but MANUAL light will not be illuminated.

NOTES: The following are inoperative:

- *Standby attitude indicator.*
- *Overspeed aural warning.*
- *MASTER WARNING/MASTER CAUTION lights.*
- *Engine and APU fire detection.*
- *Ignition override.*
- *APU.*
- *ELEC synoptic.*

Some subsequent electrical system faults will not present alerts on EAD or illuminate MASTER CAUTION lights.

(CONTINUED)

ELEC ALERTS (Continued)

"BAT BUS OFF" LIGHT ILLUMINATED

NO

(CONTINUED)

If indications of equipment failure in other systems are received, observe overhead ELEC control panel for possible bus failure to determine if new alert is primary or only a result of a faulted electrical bus. If "BUS L EMER AC OFF" and/or "BUS L EMER DC OFF" alerts are observed, use appropriate Abnormal procedure.

NOTE: Subsequent alerts from other systems may be displayed as a result of not being inhibited.

[END]

First Officer's EIS SOURCE Selector . . . . AUX (OR 1)

Rotate First Officer's EIS SOURCE selector to desired position and observe appropriate SISP lights illuminate.

"ELEC ALERTS" REMAINS DISPLAYED

NO

First Officer's
EIS SOURCE Selector . . . . ORIGINAL POSITION

Rotate First Officer's EIS SOURCE selector to original position and observe appropriate SISP lights extinguish.

NOTES: Some subsequent electrical system faults will not present alerts on EAD or illuminate MASTER CAUTION lights.

Electrical system may be in manual mode.

(CONTINUED)

ELEC ALERTS (Continued)

"ELEC ALERTS" REMAINS DISPLAYED

NO

(CONTINUED)

If indications of equipment failure in other systems are received, observe overhead ELEC control panel for possible bus failure to determine if new alert is primary or only a result of a faulted electrical bus. If "BUS L EMER AC OFF" and/or "BUS L EMER DC OFF" alerts are observed, use appropriate Abnormal procedure.

NOTE: Subsequent alerts from other systems may be displayed as a result of not being inhibited.

[END]

Electrical alerts and system display will operate normally.

[END]

GEN ALL OFF

OR TOTAL LOSS OF AC GENERATOR POWER

Consequences:

LAND AT NEAREST SUITABLE AIRPORT
MANUAL CONTROL REQ, PRESSURIZATION
MANUAL CONTROL REQ, TAIL TANK FUEL
TAIL TANK ALTERNATE PUMP AVAILABLE
WING & TAIL ANTI-ICE INOPERATIVE
UPR & LWR AUX TANK FUEL TRAPPED
FUEL DUMP INOPERATIVE
GPWS INOPERATIVE
AUTO SLAT EXTENSION INOPERATIVE
FLAP EXTENSION MAY BE LIMITED
LDG GEAR INDICATIONS INOPERATIVE
ANTI-SKID INOPERATIVE
AUTO GROUND SPOILERS INOPERATIVE
ALL ENG REVERSERS INOPERATIVE
AUTO BRAKES INOPERATIVE

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.

NOTES: Battery emergency power is limited to 15 minutes until ADG is deployed.

Autothrottles and autopilot will be disconnected and red warning boxes on the FMA will flash.

If the “GEN ALL OFF” Level 2 alert is not displayed on the EAD, the generators all off condition “TOTAL LOSS OF AC GENERATOR POWER” is indicated when the following are observed:

- *DU’s 1 and 3 are powered/functional and DU’s 2, 4, 5 and 6 are unpowered/blank.*

(CONTINUED)

GEN ALL OFF OR TOTAL LOSS OF AC GENERATOR POWER (Continued)

- *The Emergency Power ON light is illuminated on the ELEC overhead panel and/or “EMER PWR ON” Level 1 alert is displayed on the EAD.*
- *MCDU 1 (Captain) is powered/functional and MCDU 2 (F/O) and 3 (aft pedestal) are unpowered/blank.*

ENG IGN OVRD Switch. . . . . OVRD ON

AIRCRAFT ALTITUDE > 38,000 FEET

NO

While continuing this procedure, begin descent to an altitude of 38,000 feet or less.

NOTES: Engines may not sustain fuel suction feed at altitudes above 38,000 feet.

COMM should be on VHF-1 to insure uninterrupted communication.

If all generators have failed, fuel pressure to engine 2 will not be available. Engine 2 will probably flame out.

ELEC SYSTEM MANUAL

NO

GEN Switches With OFF Light Illuminated . . . . .PUSH

CAUTION: Only one reset attempt is permitted.

(CONTINUED)

GEN ALL OFF OR TOTAL LOSS OF AC GENERATOR POWER (Continued)

ELEC SYSTEM MANUAL

NO

(CONTINUED)

GENERATOR BUSES 1 AND 3 POWERED

NO

EMER PWR Selector . . . . OFF THEN ARM

NOTES: Generator bus 1 is powered when AC 1 OFF light is extinguished.

Generator bus 3 is powered when AC 3 OFF and/or R EMER AC OFF lights are extinguished.

If required, start engine 2. Refer to Abnormal Non-Alert procedure – ENGINE RESTART IN FLIGHT.

NOTE: Tail tank alternate pump and left aft pump in tank 2 is powered by R EMER AC bus.

Land at nearest suitable airport.

[END]

ADG. . . . . DEPLOY

ADG ELEC Switch. . . . . ON

Push ADG ELEC switch and observe ON light illuminates.

NOTES: Horizontal stabilizer trim is available only through the LONG TRIM handles on the pedestal.

Consequence messages can be displayed on the SD after the right emergency AC bus is powered by the ADG.

(CONTINUED)

GEN ALL OFF OR TOTAL LOSS OF AC GENERATOR POWER (Continued)

When the ADG ELEC switch ON light is illuminated, the ADG is supplying power to the left and right emergency AC buses.

The right emergency AC bus supplies power to the battery charger and TR 3. TR 3 supplies power to the left and right emergency DC buses and the battery bus.

CAPT SISP FMS and APPR Switches . . . . .PUSH

Push CAPT SISP FMS and APPR switches and observe Captain's ND displays FMS 2 data.

NOTES: SISP lights will not illuminate; however, the switches are functional.

ILS 2 data will be displayed when an ILS frequency is tuned on MCDU 2.

If required, restart engine 2. Refer to Abnormal Non-Alert procedure – ENGINE RESTART IN FLIGHT.

NOTES: Tail tank alternate pump and the left aft pump in tank 2 are powered by the right emergency AC bus.

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.

Landing gear position indications will be displayed on the instrument panel only if DC bus 2 is powered.

Landing gear position indications will be displayed on the configuration synoptic only if DC bus 3 is powered.

Landing gear position indications may be observed through overwing windows and the viewing port in the forward cabin.

Landing gear aural warnings are available only if DC bus 2 or DC bus 3 are powered.

TOO LOW GEAR aural warning is available only if AC bus 1 is powered.

Flap position indications on the PFD and configuration synoptic are not available when AC bus 1 and AC bus 3 are not powered.

(CONTINUED)

GEN ALL OFF OR TOTAL LOSS OF AC GENERATOR POWER (Continued)

Flaps may not extend into the landing range when operating on emergency power only.

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	22°
191 KIAS to 210 KIAS	28°
176 KIAS to 190 KIAS	35°
At or below 175 KIAS	50°

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 KG)	160	170	180	190	200	210	220	230
Vapp = Vref+5	147	152	156	160	164	168	172	176

(CONTINUED)

GEN ALL OFF OR TOTAL LOSS OF AC GENERATOR POWER (Continued)

AIRSPEED KNOWN AT TIME OF FAILURE

NO

(CONTINUED)

FLAP 22/EXT ESTIMATED LANDING DISTANCES (METERS) GEN ALL OFF

General Electric CF6-80C2 Engines

WEIGHT (1000 KG)		160	170	180	190	200	210	220	230
S.L.	**DRY**	2060	2160	2270	2380	2490	2610	2720	2850
STD=15°C	**WET**	3180	3330	3480	3640	3800	3960	4130	4310
2000 FT	**DRY**	2180	2290	2410	2530	2650	2770	2900	3030
STD=11°C	**WET**	3390	3550	3710	3880	4050	4230	4410	4600
4000 FT	**DRY**	2320	2440	2560	2690	2820	2950	3090	3230
STD=7°C	**WET**	3620	3790	3960	4140	4330	4520	4720	4920
6000 FT	**DRY**	2470	2600	2730	2870	3010	3160	3300	3460
STD=3°C	**WET**	3870	4050	4240	4430	4630	4840	5050	5270
8000 FT	**DRY**	2630	2770	2910	3060	3210	3370	3530	3700
STD= –1°C	**WET**	4130	4330	4530	4740	4960	5180	5410	5640
10000 FT	**DRY**	2800	2960	3120	3290	3460	3650	3840	4030
STD= –5°C	**WET**	4420	4630	4860	5100	5340	5600	5870	6140

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 –20°C to STD +40°C		
METERS PER °C	**DRY**	**WET**
BELOW standard day	–7	–11
ABOVE standard day	+17	+26

(CONTINUED)

GEN ALL OFF OR TOTAL LOSS OF AC GENERATOR POWER (Continued)

AIRSPEED KNOWN AT TIME OF FAILURE

NO

(CONTINUED)

Slope: Valid from –2% downhill +2% uphill		
METERS PER 1% SLOPE	**DRY**	**WET**
UPHILL	–73	–204
DOWNHILL	+276	+809

Wind: Valid from –10 knot tailwind +20 knot headwind		
METERS PER KNOT	**DRY**	**WET**
HEADWIND	–20	–34
TAILWIND	+66	+127

28/EXT APPROACH SPEEDS GEN ALL OFF

WEIGHT (1000 KG)	160	170	180	190	200	210	220	230
Vapp = Vref+5	145	150	154	158	162	166	170	174

(CONTINUED)

GEN ALL OFF OR TOTAL LOSS OF AC GENERATOR POWER (Continued)

AIRSPEED KNOWN AT TIME OF FAILURE

NO

(CONTINUED)

FLAP 28/EXT ESTIMATED LANDING DISTANCES (METERS) GEN ALL OFF

General Electric CF6-80C2 Engines

WEIGHT (1000 KG)		160	170	180	190	200	210	220	230
S.L.	**DRY**	2010	2120	2230	2340	2450	2560	2670	2780
STD=15°C	**WET**	3090	3240	3390	3540	3690	3850	4010	4170
2000 FT	**DRY**	2140	2250	2370	2480	2600	2720	2840	2960
STD=11°C	**WET**	3290	3450	3610	3780	3940	4110	4280	4450
4000 FT	**DRY**	2270	2390	2520	2640	2770	2900	3030	3160
STD=7°C	**WET**	3510	3680	3850	4030	4210	4390	4570	4750
6000 FT	**DRY**	2410	2550	2680	2820	2950	3090	3230	3370
STD=3°C	**WET**	3750	3930	4120	4310	4500	4690	4890	5090
8000 FT	**DRY**	2570	2710	2860	3000	3150	3300	3450	3610
STD= –1°C	**WET**	4000	4200	4400	4600	4810	5020	5230	5450
10000 FT	**DRY**	2740	2890	3050	3210	3380	3560	3740	3930
STD= –5°C	**WET**	4280	4490	4710	4940	5170	5420	5670	5930

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 –20°C to STD +40°C		
METERS PER °C	**DRY**	**WET**
BELOW standard day	–7	–11
ABOVE standard day	+16	+25

(CONTINUED)

GEN ALL OFF OR TOTAL LOSS OF AC GENERATOR POWER (Continued)

AIRSPEED KNOWN AT TIME OF FAILURE

NO

(CONTINUED)

Slope: Valid from –2% downhill +2% uphill		
METERS PER 1% SLOPE	**DRY**	**WET**
UPHILL	–72	–198
DOWNHILL	+267	+769

Wind: Valid from –10 knot tailwind +20 knot headwind		
METERS PER KNOT	**DRY**	**WET**
HEADWIND	–20	–33
TAILWIND	+63	+121

35/EXT APPROACH SPEEDS
GEN ALL OFF

WEIGHT (1000 KG)	160	170	180	190	200	210	220	230
Vapp = Vref+5	143	147	152	156	160	164	167	170

(CONTINUED)

GEN ALL OFF OR TOTAL LOSS OF AC GENERATOR POWER (Continued)

AIRSPEED KNOWN AT TIME OF FAILURE

NO

(CONTINUED)

FLAP 35/EXT ESTIMATED LANDING DISTANCES (METERS) GEN ALL OFF

General Electric CF6-80C2 Engines

WEIGHT (1000 KG)		160	170	180	190	200	210	220	230
S.L.	**DRY**	1943	2057	2164	2272	2379	2480	2589	2683
STD=15°C	**WET**	2963	3110	3255	3396	3536	3691	3840	3985
2000 FT	**DRY**	2077	2184	2301	2403	2520	2637	2748	2859
STD=11°C	**WET**	3152	3308	3463	3629	3778	3938	4097	4250
4000 FT	**DRY**	2197	2314	2448	2559	2686	2813	2932	3053
STD=7°C	**WET**	3360	3526	3691	3865	4035	4204	4367	4530
6000 FT	**DRY**	2328	2470	2597	2734	2855	2986	3123	3246
STD=3°C	**WET**	3586	3762	3946	4132	4309	4483	4670	4852
8000 FT	**DRY**	2484	2621	2773	2903	3050	3190	3331	3480
STD= –1°C	**WET**	3824	4018	4212	4402	4598	4796	4989	5195
10000 FT	**DRY**	2651	2790	2946	3096	3262	3431	3601	3786
STD= –5°C	**WET**	4089	4293	4501	4717	4935	5172	5403	5650

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 –20°C to STD +40°C		
METERS PER °C	**DRY**	**WET**
BELOW standard day	–7	–11
ABOVE standard day	+9	+24

(CONTINUED)

GEN ALL OFF OR TOTAL LOSS OF AC GENERATOR POWER (Continued)

AIRSPEED KNOWN AT TIME OF FAILURE

NO

(CONTINUED)

Slope: Valid from –2% downhill +2% uphill		
METERS PER 1% SLOPE	**DRY**	**WET**
UPHILL	–70	–188
DOWNHILL	+252	+712

Wind: Valid from –10 knot tailwind +20 knot headwind		
METERS PER KNOT	**DRY**	**WET**
HEADWIND	–20	–32
TAILWIND	+60	+114

50/EXT APPROACH SPEEDS
GEN ALL OFF

WEIGHT (1000 KG)	160	170	180	190	200	210	220	230
Vapp = Vref+5	140	144	148	151	155	158	161	165

(CONTINUED)

GEN ALL OFF OR TOTAL LOSS OF AC GENERATOR POWER (Continued)

AIRSPEED KNOWN AT TIME OF FAILURE

NO

(CONTINUED)

FLAP 50/EXT ESTIMATED LANDING DISTANCES (METERS) GEN ALL OFF

General Electric CF6-80C2 Engines

WEIGHT (1000 KG)		160	170	180	190	200	210	220	230
S.L.	**DRY**	1770	1860	1950	2050	2140	2230	2330	2420
STD=15°C	**WET**	2610	2740	2860	2990	3110	3240	3370	3510
2000 FT	**DRY**	1880	1970	2070	2170	2270	2370	2470	2570
STD=11°C	**WET**	2780	2910	3040	3180	3310	3450	3590	3730
4000 FT	**DRY**	1990	2090	2200	2300	2410	2520	2620	2730
STD=7°C	**WET**	2960	3100	3240	3380	3530	3680	3830	3980
6000 FT	**DRY**	2110	2220	2330	2450	2560	2680	2800	2910
STD=3°C	**WET**	3150	3300	3450	3610	3760	3920	4080	4240
8000 FT	**DRY**	2240	2360	2480	2600	2730	2850	2980	3110
STD= –1°C	**WET**	3360	3520	3680	3850	4010	4180	4360	4530
10000 FT	**DRY**	2390	2510	2640	2780	2920	3070	3220	3380
STD= –5°C	**WET**	3580	3750	3930	4110	4300	4500	4710	4920

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 –20°C to STD +40°C		
METERS PER °C	**DRY**	**WET**
BELOW standard day	–5	–9
ABOVE standard day	+13	+20

(CONTINUED)

GEN ALL OFF OR TOTAL LOSS OF AC GENERATOR POWER (Continued)

AIRSPEED KNOWN AT TIME OF FAILURE

NO

(CONTINUED)

Slope: Valid from –2% downhill +2% uphill		
METERS PER 1% SLOPE	**DRY**	**WET**
UPHILL	–60	–154
DOWNHILL	+202	+550

Wind: Valid from –10 knot tailwind +20 knot headwind		
METERS PER KNOT	**DRY**	**WET**
HEADWIND	–18	–29
TAILWIND	+52	+98

[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

Consequences:

(Refer to end of procedure for Consequence list.)

ELEC SYSTEM MANUAL

NO

Associated GEN Switch. . . . . PUSH TO RESET

Push associated GEN switch and determine if bus power is restored.

CAUTION: Only one reset attempt is permitted.

NOTES: Pushing the GEN switch initiates a generator reset and if no fault is detected, the OFF light is extinguished and the ARM light is illuminated. The ARM light will extinguish when the generator powers its respective bus.

When the electrical system is in the automatic mode, a single bus fault reset is controlled automatically by the respective GCU.

(CONTINUED)

GEN BUS__FAULT (Continued)

ELEC SYSTEM MANUAL

NO

(CONTINUED)

GEN BUS POWERED

NO

"EMER PWR ON" ALERT DISPLAYED AND/OR EMER PWR ON LIGHT ILLUMINATED

NO

EMER PWR Selector . . . . . . OFF THEN ARM

NOTES: If a "GEN BUS 1 FAULT" alert condition existed, emergency power would be commanded ON. The "EMER PWR ON" level 1 alert will be displayed on the EAD and electrical synoptic, and the emergency power ON light on the electrical overhead panel will be illuminated. If generator bus 1 power is restored, the EMER PWR selector must be rotated to OFF to avoid depletion of the battery. The EMER PWR selector must then be rotated to ARM to restore the emergency power system to its normal operating configuration.

Rotating the EMER PWR selector to OFF turns off the emergency power system and disarms the emergency power relay.

(CONTINUED)

GEN BUS__FAULT (Continued)

ELEC SYSTEM MANUAL

NO

(CONTINUED)

GEN BUS POWERED

NO

(CONTINUED)

"EMER PWR ON" ALERT DISPLAYED AND/OR EMER PWR ON LIGHT ILLUMINATED

NO

(CONTINUED)

Rotating the EMER PWR selector to ARM allows the emergency power system to automatically power the left emergency AC bus and left emergency DC bus if either bus becomes unpowered. The emergency power relay will be armed.

[END]

No further crew action required.

[END]

(CONTINUED)

GEN BUS__FAULT (Continued)

"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.
- Generator bus 3 fault condition may cause activation of left stick shaker. Stick shaker may be deactivated by disconnecting cannon plug on the control column or pulling CAPT STICK SHAKER circuit breaker on overhead circuit breaker panel.

ADG . . . . DEPLOY

ADG ELEC Switch . . . . ON

NOTES: This action will power the emergency buses, the battery charger, Captain's display units 1 and 3 (DU 1 and DU 3) and First Officer's display units 4, 5 and 6 (DU 4, DU 5 and DU 6) for duration of flight.

When generator bus 1 is not powered.

- *FMC 1 will be unpowered and will fail. Captain may select FMC 2 by pushing FMS switch on the Captain's source input select panel and selecting FMC 2 on MCDU 1.*
- *After generator bus 1 becomes unpowered, the auxiliary inertial reference unit (AUX IRU) will function for approximately 15 minutes on a dedicated battery; then, the AUX IRU will become unpowered and will fail.*
- *Captain's display unit 2 (DU 2) and the auxiliary display electronic unit (AUX DEU) will be unpowered.*

(CONTINUED)

GEN BUS__FAULT (Continued)

"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.

NOTES: When generator 2 is not powered,

- *The AC ground service tie relay is automatically opened.*

When electrical operation of the forward cabin doors is required, the ground service bus must be powered through external ground service power.

- *Inflight AC bus 2 and AC ground service bus cannot be powered.*
- *Inflight transformer rectifier 2A (TR 2A) and transformer rectifier 2B (TR 2B) cannot be powered.*
- *Inflight DC bus 2 and DC ground service bus cannot be powered prior to incorporation of Service Bulletin 24-55 or production equivalent.*

Continue with affected circuits inoperative.

Land at nearest suitable airport.

Review applicable consequences.

ALERT DISPLAYED	CONSEQUENCES
GEN BUS 1 FAULT	GPWS INOPERATIVE AND AUTO GROUND SPOILERS INOPERATIVE
GEN BUS 2 FAULT	AUX PITOT HEAT INOPERATIVE
GEN BUS 3 FAULT	AUTO SLAT EXTENSION INOPERATIVE

[END]

GEN DRIVE__FAULT

Consequences:

NONE

NOTE: Alert will appear if IDG oil temperature is high, pressure low, or oil differential temperature is out of limits. With installation of Service Bulletin 24-142, each affected IDG will automatically disconnect when internal temperature reaches a pre-set value (~185° C).

ANY OTHER ENGINE GENERATOR OPERATING NORMALLY

NO

DRIVE Switch. . . . . DISC

Open guard and push DRIVE switch with illuminated FAULT light and hold for approximately 2 seconds.

NOTE: When IDG disconnect has occurred, DISC switchlight will illuminate and "GEN DRIVE DISC" level 1 alert will be displayed on the ELEC synoptic.

If only one engine driven generator remains operating normally, refer to Abnormal Non-Alert procedure, ONE ENGINE DRIVEN GENERATOR OPERATING.

[END]

Land at nearest suitable airport.

Refer to Abnormal Non-Alert procedure, ONE ENGINE DRIVEN GENERATOR OPERATING.

NOTE: Failure of the operating IDG should be considered imminent. If IDG fails or is disconnected, refer to GEN ALL OFF, in this section. Flight may continue with "GEN DRIVE___FAULT" alert displayed, however, it is highly probable that the IDG will fail.

[END]

GEN LOAD HI

Consequences:

NONE

Reduce all nonessential loads.

Monitor generator load on ELEC synoptic.

NOTE: Controller may turn generator off when load limits are exceeded. This will cause the “GEN LOAD HI” alert to extinguish and the “GEN__OFF” alert to be displayed.

[END]

GEN___OFF

Consequences:

ONE GEN RESET ATTEMPT ALLOWED

Associated GEN Switch . . . . PUSH TO RESET

CAUTION: Only one reset attempt is permitted.

RESET SUCCESSFUL

NO

No further crew action required.

[END]

DRIVE Switch . . . . DISC

Open guard and push DRIVE switch and hold for approximately 2 seconds.

NOTE: When IDG disconnect has occurred, DISC switchlight will illuminate and the GEN DRIVE DISC Level 1 alert will be displayed on the ELEC synoptic.

Monitor generator load of operating generator(s) on ELEC synoptic.

If only one engine driven generator remains operating normally, refer to Abnormal Non-Alert procedure - ONE ENGINE DRIVEN GENERATOR OPERATING.

[END]

Intentionally
Blank

Abnormal Procedures — Chapter AP

Table of Contents — Section 40

Intentionally
Blank

ENG__EGT HI

Consequences:

NONE

Affected Throttle . . . . RETARD

Retard affected throttle and operate engine at a throttle setting necessary to maintain acceptable EGT.

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 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 EGT below red line.

[END]

ENG__OIL FILTER

Consequences:

NONE

NOTE: "ENG__OIL FILTER" alert indicates a clogged or impending clogging of oil filter. Filter bypass valve will open when oil filter is clogged and contaminated oil will bypass filter directly to engine.

AIRCRAFT ON GROUND

NO

Call maintenance.

[END]

Associated Throttle . . . . .IDLE

NOTE: The reduction in oil pressure resulting from retarding throttle to idle may cause "ENG__OIL FILTER" alert to no longer be displayed assuring that no oil is bypassing the filter.

"ENG__OIL FILTER" ALERT REMAINS DISPLAYED

NO

Shut down affected engine.

Refer to Abnormal Non-Alert procedure – ENGINE SHUTDOWN IN FLIGHT.

[END]

Advance throttle to a point below that which causes "ENG__OIL FILTER" alert to be displayed. Operate engine at or below thrust level necessary to keep "ENG__OIL FILTER" alert from being displayed.

[END]

ENG__OIL PRES LO

OR ENGINE OIL PRESSURE BELOW REDLINE

Consequences:

NONE

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

If oil pressure is in normal or caution range while alert is displayed, or oil pressure is below redline and alert is not displayed, monitor oil quantity, temperature and pressure on system display.

[END]

ENG__OIL TEMP HI

Consequences:

NONE

Throttle. . . . . .ADJUST

NOTE: Advancing 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

Consequences:

NONE

NOTE: Alert is displayed and remains displayed when any engine N1 or N2 is at or above redline limit.

Affected Throttle . . . . RETARD

Retard affected throttle until RPM is within allowable limits.

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 red lines.

[END]

ENG__RPM LO

Consequences:

NONE

NOTE: This alert will be displayed during an inflight start until N2 reaches 55%.

Observe engine parameters for flameout or failure indications.

RESTART DESIRED

NO

Associated Throttle . . . . .IDLE

ENG IGN OVRD Switch . . . . OVRD ON

Push ENG IGN OVRD switch and observe OVRD ON light illuminates.

NOTE: Air starts, especially at high altitude, may result in the engine accelerating to idle very slowly. Slow acceleration may be incorrectly interpreted as a hung start or an engine malfunction. If N2 is steadily increasing, and EGT remains within limits, the start is progressing normally.

ABNORMAL START

NO

Fuel Switch . . . . OFF

ENG IGN OVRD Switch. . . . . OFF

Refer to Abnormal Non-Alert procedure – ENGINE SHUTDOWN IN FLIGHT.

If another start attempt is desired,

Refer to Abnormal Non-Alert procedure – ENGINE RESTART IN FLIGHT.

[END]

After engine is stabilized at idle,

(CONTINUED)

ENG__RPM LO (Continued)

RESTART DESIRED

NO

(CONTINUED)

ENG IGN OVRD Switch . . . . OFF

Push ENG IGN OVRD switch and observe OVRD ON light extinguishes.

Unless thrust is required for safety of flight, observe 1 minute engine warm-up at idle before gradually increasing thrust to resume normal operations.

[END]

Refer to Abnormal Non-Alert procedure – ENGINE SHUTDOWN IN FLIGHT.

[END]

SELECT FADEC ALTN

Consequences:

NONE

"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

Push ATS disconnect switch and observe ATS OFF displayed on PFD.

Associated Throttle . . . . SET 70% N1 OR LESS

NOTE: When N1 is reduced to70% or less, engine overboost will be prevented when ALTN mode is selected.

Illuminated FADEC MODE Switch . . . . .PUSH

Open cover and push illuminated FADEC MODE switch. Observe SELECT light extinguishes and ALTN light remains illuminated.

Associated FADEC MODE Switch. . . . . PUSH AGAIN

Open cover and push associated FADEC MODE switch. Observe ALTN light extinguishes.

NOTE: First push selects FADEC ALTN mode. Second push attempts to return FADEC to normal mode.

(CONTINUED)

SELECT FADEC ALTN (Continued)

"SELECT FADEC ALTN" ALERT EXTINGUISHES

NO

Autothrottles . . . . ENGAGE

[END]

Illuminated FADEC MODE Switch. . . . . PUSH

Open cover and push illuminated FADEC MODE switch. Observe SELECT light extinguishes and ALTN light remains illuminated.

Associated Throttle . . . . SET AS DESIRED

Increase thrust to reestablish N1 equal to highest N1 of remaining engines.

Remaining Engines (One at a Time) . . . . REDUCE THRUST/ SELECT ALTN

NOTE: Selecting FADEC ALTN mode for remaining engines re-establishes thrust lever alignment.

Autothrottles . . . . ENGAGE

Push AUTO FLIGHT switch and observe ATS OFF is no longer displayed on PFD.

During landing roll, limit reverse thrust to 90% N1.

[END]

Intentionally
Blank

Abnormal Procedures — Chapter AP

Table of Contents — Section 50

Intentionally
Blank

BALST FUEL DISAG

Consequences:

NONE

AIRCRAFT ON GROUND

NO

Compare FMS ballast fuel entry with actual ballast fuel quantity and distribution.

NOTES: Tank 2 is allowed up to 11,000 kilograms of ballast fuel.

The upper aux tank may contain all or part of its total quantity as ballast fuel.

The tail tank must contain either all ballast or usable fuel.

Ballast fuel may not be loaded in more than one tank at the same time.

FMS BALLAST FUEL QUANTITY CORRECT

NO

BALLAST TANK FUEL QUANTITY CORRECT

NO

Call maintenance.

[END]

(CONTINUED)

BALST FUEL DISAG (Continued)

AIRCRAFT ON GROUND

NO

(CONTINUED)

FMS BALLAST FUEL QUANTITY CORRECT

NO

(CONTINUED)

Advise ground personnel to correct ballast tank fuel quantity.

[END]

Enter correct quantity into FMS.

[END]

FUEL SYSTEM SELECT Switch . . . . MANUAL

Push FUEL SYSTEM SELECT switch and observe MANUAL light illuminates.

Operate fuel pumps as necessary to stop erroneous transfer.

[END]

CG OUT OF LIMIT

Consequences:

NONE

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 IN AUTO MODE

NO

Observe FUEL synoptic.

FUEL BEING RESCHEDULED

NO

No further action required.

[END]

FUEL SYSTEM SELECT Switch . . . . MANUAL

Push FUEL SYSTEM SELECT switch and observe MANUAL light illuminates.

Reschedule fuel distribution and monitor fuel as follows.

Observe current fuel distribution on FUEL synoptic.

If forward CG limit is exceeded,

- Push AUX TANKS L and R TRANS switches and observe ON lights illuminate.
- Push TANK 1 and 3 FILL switches and observe ARM and FILL lights illuminate.
- When the “CG OUT OF LIMIT” alert is no longer displayed, resume normal fuel schedule.

[END]

(CONTINUED)

CG OUT OF LIMIT (Continued)

If aft CG limit is exceeded and tail tank transfer pump is operational,

- Push TAIL TANK TRANS switch and observe ON light illuminates and tail tank fuel is transferred to upper aux tank.
- When the “CG OUT OF LIMIT” is no longer displayed, resume normal fuel schedule.

[END]

If aft CG limit is exceeded and only tail tank alternate pump is available,

- Push TAIL TANK ALT PUMP switch and observe ON light illuminates.
- Push TANK 2 PUMPS switch and observe OFF light illuminates.
- Monitor tail tank fuel quantity.

CAUTION: Do not allow fuel pressure to engine 2 to be interrupted as flameout could occur.

- When tail tank fuel quantity has decreased to 450 kilograms, push tank 2 PUMPS switch and observe OFF light extinguishes.
- Push TAIL TANK ALT PUMP switch and observe ON light extinguishes.
- When “CG OUT OF LIMIT” alert is no longer displayed, resume normal fuel schedule.

[END]

DUMP VLV__DISAG

Consequences:

VALVE OPEN, DUMPS IF MANIFOLD USED
VALVE CLOSED, REDUCED DUMP RATE

DUMP SWITCH ON

NO

Fuel dump time will be increased.
[END]

Do not pressurize the fuel crossfeed manifold for remainder of flight.

NOTE: Pressurizing the crossfeed manifold will cause fuel to be dumped.

Tank TRANS Switches (All). . . . . VERIFY OFF

Tank XFEED Switches (All). . . . . VERIFY OFF

[END]

FSC AUTO FAIL

Consequences:

SELECT FUEL SYSTEM MANUAL

FUEL SYSTEM SELECT Switch. . . . . MANUAL

Push FUEL SYSTEM SELECT switch and observe MANUAL light illuminates.

Continue flight with fuel system in manual.

NOTE: Automatic mode is inoperative.

[END]

FUEL DUMP LEVEL

Consequences:

STOP FUEL DUMP

NOTES: Fuel dump is independent of automatic/manual mode of fuel system controller.

This alert signifies that dump system did not automatically shut off at the fuel dump low level shutoff valve.

DUMP Switch. . . . . OFF

Push DUMP switch and observe ON light extinguishes.

DUMP SWITCH ON LIGHT FAILS TO EXTINGUISH

NO

FUEL DUMP EMER STOP Switch . . . . .STOP

Push FUEL DUMP EMER STOP switch and observe STOP light illuminates.

[END]

No further crew action required.

[END]

FUEL OFF SCHEDULE

Consequences:

NONE

FUEL SYSTEM IN AUTO MODE

NO

Observe FUEL synoptic.

FUEL BEING RESCHEDULED

NO

No further crew action required.
[END]

FUEL SYSTEM SELECT Switch . . . . MANUAL

Push FUEL SYSTEM SELECT switch and observe MANUAL light illuminates.

Reschedule fuel distribution and monitor fuel usage as required.
[END]

FUEL QTY ALERTS

Consequences:

SYSTEM DISPLAY INCOMPLETE

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__FUEL QTY LO” alert is displayed,

(CONTINUED)

FUEL QTY ALERTS (Continued)

OVERHEAD FUEL QUANTITY READOUTS BLANK

NO

(CONTINUED)

TANKS 1 AND 3 FILL VALVES ARMED

NO

(CONTINUED)

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 2,268 kilograms 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,

(CONTINUED)

FUEL QTY ALERTS (Continued)

OVERHEAD FUEL QUANTITY
READOUTS BLANK

NO

(CONTINUED)

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 2,268 kilograms 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)

Rotate First Officer's EIS SOURCE selector to desired position and observe appropriate SISP lights illuminate.

"FUEL QTY ALERTS" REMAINS
DISPLAYED

NO

First Officer's EIS Source Selector . . . . . ORIGINAL POSITION

Monitor fuel quantity readouts on overhead panel.

NOTES: 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 now calculated using fuel flow only. If fuel dump is required, calculate dump time using 2,268 kilograms 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]

(CONTINUED)

FUEL QTY ALERTS (Continued)

Fuel quantity alerts and system display data are normal.

FUEL SYSTEM SELECT Switch. . . . . AS REQUIRED

[END]

FUEL QTY FAULT

(Amber, “X”ed or Frozen)

Consequences:

NONE

Select appropriate procedure below:

– TANK FUEL QUANTITY ON SD – AMBER

NOTE: Affected tank fuel quantity displayed in amber indicates two or more tank sensors have failed in the associated tank. The affected tank fuel quantity is valid.

Enter fuel quantity fault in maintenance log.

[END]

– TANK FUEL QUANTITY ON SD – “X”ED

NOTES: An amber “X” displayed in lieu of affected tank fuel quantity indicates the gaging system in the associated tank is inoperative, resulting in loss of the following indications:

- *Total fuel*
- *Aircraft CG*
- *Aircraft gross weight*
- *Fuel panel indicates blank*

If tanks 1, 2 or 3 are “X”ed the fuel system reverts to MANUAL.

TANK 1, 2, OR 3, “X”ED OR ANY TANK CONTAINS BALLAST FUEL

NO

FUEL SYSTEM Select Switch . . . . MANUAL

(CONTINUED)

FUEL QTY FAULT (Amber, "X"ed or Frozen) (Continued)

TANK 1, 2, OR 3, "X"ED OR ANY TANK CONTAINS BALLAST FUEL

NO

(CONTINUED)

ANY TANK CONTAINS BALLAST FUEL

NO

Maintain ballast fuel as required.

Calculate fuel quantity in affected tank.

NOTES: 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 2,268 kilograms 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.

[END]

– FUEL QUANTITIES DO NOT CHANGE (FROZEN)

FUEL SYSTEM SELECT Switch. . . . . MANUAL

Push FUEL SYSTEM SELECT switch and observe MANUAL light illuminates.

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.

(CONTINUED)

FUEL QTY FAULT (Amber, "X"ed or Frozen) (Continued)

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

NOTES: 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 2,268 kilograms 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,

(CONTINUED)

FUEL QTY FAULT (Amber, “X”ed or Frozen) (Continued)

Tank XFEED Switches (All) . . . . ON

NOTES: 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 2,268 kilograms 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]

FUEL QTY/USED CHK

Consequences:

POSSIBLE FUEL LEAK

FUEL Quantity . . . . EVALUATE

Check departure fuel minus total used is approximately equal to present fuel on board.

NOTES: Pressing the FUEL USED RESET button after engine start may also cause the "FUEL QTY/USED CHK" to be displayed.

Some inflight maneuvers or turbulence may cause fuel quantity indications to fluctuate enough to cause the "FUEL QTY/USED CHK" alert to be displayed. In such cases, the alert should extinguish after the aircraft is established in stable flight for 2 to 3 minutes.

If a fuel leak is confirmed, land at nearest suitable airport. If sufficient reserves cannot be verified, continue with the remainder of the FUEL QTY/USED CHK procedure and consider diverting to a suitable airport.

Continue fuel comparison checks, check fuel quantity against the flight planned fuel, and if conditions permit, scan outside for possible fuel venting.

After fuel quantity indications stabilize,

FUEL ON BOARD IS APPROXIMATELY EQUAL TO CALCULATED FUEL

NO

No further crew action required.

[END]

FUEL SYSTEM SELECT Switch . . . . MANUAL

(CONTINUED)

FUEL QTY/USED CHK (Continued)

All TANK TRANS and FILL Valve Switches . . . . OFF

Push all TANK TRANS and FILL valve switches and observe all ON lights extinguish and all ARM/FILL lights extinguish.

NOTE: The previous action isolates each tank to determine which tank quantity is decreasing abnormally.

ABNORMAL QUANTITY DECREASE FROM TANK 1, 2, OR 3

NO

NOTE: The following actions will isolate leak to either the tank or the engine.

TANK TRANS Switch
(Aux or Nonleaking Main Tank) . . . . ON

TANK XFEED Switch (Leaking Tank). . . . . ON

TANK PUMP Switch (Leaking Tank) . . . . OFF

ABNORMAL QUANTITY DECREASE FROM AUX OR NONLEAKING MAIN TANK

NO

Throttle (Leaking Engine) .IDLE

FUEL Switch (Leaking Engine) . . . . OFF

ENG FIRE Handle (Leaking Engine). . . . . DOWN

Pull ENG FIRE handle of leaking tank full down.

FUEL SYSTEM SELECT Switch. . . . . AS REQUIRED

Consider effects on any system operating in manual mode.

Refer to Abnormal Non-Alert procedure – ENGINE SHUTDOWN IN FLIGHT, as required.

[END]

(CONTINUED)

FUEL QTY/USED CHK (Continued)

ABNORMAL QUANTITY DECREASE FROM TANK 1, 2, OR 3

NO

(CONTINUED)

TRANSFER OF FUEL FROM LEAKING TANK INTO MAINS DESIRED

NO

CAUTION: Do not transfer fuel into leaking tank.

TANK PUMP Switch (Leaking Tank) . . . . ON

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

TANK FILL Valve Switch(es)
(Nonleaking Tank) . . . . VERIFY ARM/FILL

Verify ARM light is illuminated on the appropriate tank FILL valve switch(es). “FILL” will illuminate only when the valve is open.

NOTES: Fuel may be manually transferred only into tanks 1, 2 or 3. Tank 2 fill valve will remain armed following switch release only if an upper aux tank pump is on. Tank 1 and 3 fill valves will remain armed following switch release if tank 2 contains more than 18,144 kilograms of fuel.

ARM illuminates blue when respective fill valve is armed. FILL illuminates blue when respective fill valve is open. On the FUEL synoptic the fill valve symbol is displayed in white when the valve is armed and is displayed green when it is open.

Once desired amount of fuel is transferred from leaking tank,

(CONTINUED)

FUEL QTY/USED CHK (Continued)

ABNORMAL QUANTITY DECREASE
FROM TANK 1, 2, OR 3

NO

(CONTINUED)

TRANSFER OF FUEL FROM
LEAKING TANK INTO MAINS
DESIRED

NO

(CONTINUED)

TANK PUMP Switch (Leaking Tank) . . AS REQUIRED

TANK XFEED Switch (Leaking Tank) . . . . OFF

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

Use fuel from leaking tank until nearly empty, then supply engine from another source.

CAUTION: Use fuel from leaking tank to supply engine fuel feed while transferring fuel to another nonleaking tank. To avoid possible fuel starvation/flameout, supply fuel from another source when the leaking tank quantity approaches approximately 680 kilograms.

[END]

TANK PUMP Switch (Leaking Tank) . . . . ON

TANK XFEED Switch (Leaking Tank). . . . . OFF

TANK TRANS Switch (Aux [If Installed] or
Nonleaking Main Tank). . . . . OFF

(CONTINUED)

FUEL QTY/USED CHK (Continued)

ABNORMAL QUANTITY DECREASE FROM TANK 1, 2, OR 3

NO

(CONTINUED)

Use fuel from leaking tank until nearly empty, then supply engine from another source.

CAUTION: Use fuel from leaking tank to supply engine fuel feed while transferring fuel to another nonleaking tank. To avoid possible fuel starvation/flameout, supply fuel from another source when the leaking tank quantity approaches approximately 680 kilograms.

[END]

AUX TANK L and R TRANS Switches . . . . ON

TANK FILL Valve Switches (All). . . . . ARM/FILL

Push TANK FILL valve switches and observe ARM/FILL lights illuminate.

ABNORMAL QUANTITY DECREASE FROM AUX TANK

NO

TANK FILL Valve Switches (All) . . . . OFF

Push TANK FILL valve switches and observe ARM/FILL lights extinguish.

Refer to TNK__OVERFILL procedure, in this section.

[END]

Transfer fuel out of tail tank as required.

[END]

FUEL SYS ALERTS

Consequences:

OVERHEAD PANEL IS OPERATIVE
SYSTEM DISPLAY INCOMPLETE

AIRCRAFT ON GROUND

NO

Call maintenance.

[END]

First Officer's EIS SOURCE Selector . . . . AUX (OR 1)

Rotate First Officer's EIS SOURCE selector to desired position. Observe appropriate SISP lights illuminate.

"FUEL SYS ALERTS" REMAIN DISPLAYED

NO

First Officer's EIS SOURCE Selector. . . ORIGINAL POSITION

Rotate First Officer's EIS SOURCE selector to original position and observe appropriate SISP lights extinguish.

NOTE: Some subsequent fuel system faults will not present alerts on EAD or illuminate MASTER WARNING/CAUTION lights; however, annunciator lights on overhead panel are operative.

[END]

Fuel alerts and system display will operate normally.

[END]

LAT FUEL UNBAL

Consequences:

NONE

NOTES: If a fuel leak is suspected, accomplish the "FUEL LEAK" procedure in the Abnormal Non-Alert section of 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

Push tank TRANS switch for tank supplying fuel and observe ON light illuminates.

Tank XFEED Switch(es) (Receiving Engine[s]) . . . . ON

Push tank XFEED switch(es) for engine(s) receiving fuel and observe ON light illuminates.

(CONTINUED)

LAT FUEL UNBAL (Continued)

FUEL CROSSFEED DESIRED

NO

(CONTINUED)

Tank PUMPS Switch(es) (Receiving Engine[s]) . . . . OFF

Push tank PUMPS switch(es) for tank receiving engine(s) and observe OFF light illuminates.

Fuel Quantities . . . . MONITOR

When tank quantities are approximately balanced,

Tank PUMPS Switch(es) (Receiving Engine[s]) . . . . ON

Push tank PUMPS switch(es) for tank receiving engine(s) and observe OFF light extinguishes.

Tank XFEED Switch(es) (Receiving Engine[s]) . . . . OFF

Push tank XFEED switch(es) for engine(s) receiving fuel and observe ON light(s) extinguish.

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

Push tank TRANS switch for tank supplying fuel and observe ON light extinguishes.

[END]

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

Push tank TRANS switch for tank supplying fuel and observe ON light illuminates.

Tank FILL Switch(es) (Receiving Tank[s]) . . . . PUSH AND HOLD

Push and hold tank FILL switch(es) for tank(s) receiving fuel and observe FILL light(s) illuminate.

Fuel Quantities . . . . MONITOR

When tank quantities are approximately balanced,

Tank FILL Switch(es) (Receiving Tank[s]) . . . . RELEASE

Release tank FILL switch(es) for tank(s) receiving fuel and observe FILL light(s) extinguishes.

(CONTINUED)

LAT FUEL UNBAL (Continued)

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

Push tank TRANS switch for tank supplying fuel and observe ON light extinguishes.

[END]

TAIL FUEL QTY LO

Consequences:

ENGINE 2 MAY FLAME OUT

Tank 2 PUMPS Switch. . . . . ON

Push tank 2 PUMPS switch and observe OFF light extinguishes..

TAIL TANK ALT PUMP Switch. . . . . OFF

Push TAIL TANK ALT PUMP switch and observe ON light extinguishes.

CAUTION: Immediate action is required to prevent flameout of engine 2 due to fuel starvation.

NOTE: Alert is displayed when alternate tail tank pump is on, tank 2 pumps are not on and tail fuel quantity is less than 450 kilograms or tail empty float is uncovered.

[END]

TAIL PUMPS LO

Consequences:

NONE

NOTE: "TAIL PUMPS LO" alert will be displayed in MANUAL when tail tank is empty or tail transfer pumps are commanded on but not pumping fuel.

TAIL TANK QUANTITY LESS THAN 450 KILOGRAMS

NO

TAIL TANK TRANS Switch . . . . OFF

Push TAIL TANK TRANS switch and observe ON light extinguishes.

[END]

TAIL TANK ALT PUMP Switch . . . . ON

Push TAIL TANK ALT PUMP switch and observe ON light illuminates and LOW light remains extinguished.

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

Push tank 2 PUMPS switch and observe OFF light illuminates and "TANK 2 PUMPS OFF" alert is displayed.

CAUTION: Do not allow fuel quantity in tail tank to decrease below 450 kilograms as flameout of engine 2 could occur.

When tail tank quantity has decreased to 450 kilograms or "TAIL FUEL QTY LO" alert is displayed,

Tank 2 PUMPS Switch . . . . ON

Push tank 2 PUMPS switch and observe OFF light extinguishes.

(CONTINUED)

TAIL PUMPS LO (Continued)

TAIL TANK ALT PUMP Switch. . . . . OFF

Push TAIL TANK ALT PUMP switch and observe ON light extinguishes.

[END]

TANK__PUMPS LO

Consequences:

NO. 2 ENGINE MAY FLAME OUT (For “TANK 2 PUMPS LO” Alert Only)

Associated TANK TRANS Switch . . . . ON

Push associated TANK TRANS switch and observe ON light illuminates.

Associated XFEED Switch. . . . . ON

Push associated XFEED switch and observe ON light illuminates.

Associated Tank PUMPS Switch . . . . OFF

Push associated tank PUMPS switch and observe OFF light illuminates.

[END]

TNK__AFT PMP LO

Consequences:

NONE

NOTE: The associated tank PUMPS LO light will not be illuminated.

Associated Tank TRANS Switch . . . . ON

Push associated tank TRANS switch and observe ON light illuminates.

Associated XFEED Switch . . . . ON

Push associated XFEED switch and observe ON light illuminates.

[END]

TNK__FWD PMP LO

Consequences:

NONE

NOTE: The associated tank PUMPS LOW light will not be illuminated. With the aft pump operating fuel supply to engine is normal during climb and cruise.

At top of descent,

TANK FUEL QUANTITY LESS THAN 5,200 KILOGRAMS

NO

Associated XFEED Switch . . . . ON

Push associated XFEED switch and observe ON light illuminates.

Another XFEED Switch. . . . . ON

Push any other XFEED switch and observe its ON light illuminates.

NOTE: It is recommended that crossfeeding from another tank's forward pump be utilized instead of a transfer pump since the transfer pump is located in the aft portion of the fuel tank and may become uncovered with attitude change.

[END]

No further crew action required.

[END]

TNK__OVERFILL

Consequences:

FUEL MAY BE VENTING OVERBOARD

FUEL SYSTEM AUTO

NO

Observe FUEL synoptic.

FSC TAKING CORRECTIVE ACTION

NO

No further crew action required.

[END]

FUEL SYSTEM SELECT Switch . . . . MANUAL

Push FUEL SYSTEM SELECT switch and observe MANUAL light illuminates.

Select appropriate procedure below.

TNK WING OVERFILL

Depressurize crossfeed manifold using the following steps,

XFEED Switches (All) . . . . OFF

As required, push XFEED switch(es) and observe ON light(s) extinguish(es).

Tank TRANS Switches (All). . . . . OFF

As required, push tank TRANS switch(es) and observe ON light(s) extinguish(es).

(CONTINUED)

TNK__OVERFILL (Continued)

Pressurize manifold only to maintain fuel quantity in upper aux and main tanks 900 to 1,400 kilograms below full.

[END]

TNK TAIL OVERFILL

Transfer fuel out of tail tank using TAIL TANK TRANS pumps.

[END]

TNK__TIP FUEL LO

Consequences:

NONE

NOTES:

- *Mmo above 30,704 feet is limited to .85 Mach.*
- *Vmo below 30,704 feet is limited to 320 KIAS.*

This alert indicates premature fuel transfer from tip tank into inboard compartment of respective main tank.

Associated Tank TRANS Switch . . . . ON

Push associated tank TRANS switch and observe ON light illuminates.

Associated Tank FILL Valve Switch. . . . . PUSH AND HOLD

Push and hold associated tank FILL valve switch and observe ARM/FILL lights illuminate.

Two minutes after alert is no longer displayed,
Associated Tank FILL Valve Switch. RELEASE

Release associated tank FILL valve switch and observe ARM/FILL lights extinguish.

Associated Tank TRANS Switch . . . . OFF

Push associated tank TRANS switch and observe ON light extinguishes.

NOTE: If alert is displayed again, repeat procedure.

[END]

TNK__XFER PMP LO

Consequences:

NONE

Associated XFEED Switch. . . . . ON

Push associated XFEED switch and observe ON light is illuminated.

NOTE: This action allows tank pump to replace transfer pump as a supply source.

Associated Tank TRANS Switch . . . . OFF

Push associated tank TRANS switch and observe ON and LOW lights extinguish.

[END]

Abnormal Procedures — Chapter AP

Table of Contents — Section 60

Intentionally
Blank

HSC AUTO FAIL

Consequences:

NONE

HYD SYSTEM SELECT Switch . . . . MANUAL

Push HYD SYSTEM SELECT switch and observe MANUAL light illuminates.

HYD SYSTEM SELECT Switch . . . . .AUTO

Push HYD SYSTEM SELECT switch again and observe MANUAL light extinguishes.

“HSC AUTO FAIL” ALERT DISPLAYED

NO

HYD SYSTEM SELECT Switch . . . . MANUAL

Push HYD SYSTEM SELECT switch and observe MANUAL light illuminates.

Continued flight with system in manual.

NOTE: Automatic mode is inoperative.

[END]

Log malfunction.

[END]

HYD ALERTS

Consequences:

HYD SYSTEM ALERTS MAY BE INOP
OVERHEAD PANEL IS OPERATIVE
SYSTEM DISPLAY INCOMPLETE

AIRCRAFT ON GROUND

NO

Call maintenance.

[END]

First Officer's EIS SOURCE Selector . . . . AUX (OR 1)

Rotate First Officer's EIS SOURCE selector to desired position. Observe appropriate SISP lights illuminate.

“HYD ALERTS” REMAINS DISPLAYED

NO

First Officer's EIS SOURCE Selector . . . ORIGINAL POSITION

Rotate First Officer's EIS SOURCE selector to original position and observe appropriate SISP lights extinguish.

NOTE: Some subsequent hydraulic system faults will not present alerts on EAD or illuminate MASTER WARNING/CAUTION lights; however, annunciator lights on overhead panel are operative.

[END]

Hydraulic alerts and system display will operate normally.

[END]

HYD 1 FAIL

Consequences:

AUTOPILOT 2 NOT AVAILABLE
FLAP/SLAT MAY NOT EXTN > MAX LDG WT
MAX 35 FLAPS FOR LANDING
DO NOT ARM AUTOBRAKES
NOSEWHEEL STEERING RESTRICTED LEFT

"HYD 3 ELEV OFF" ALERT DISPLAYED

NO

Land at nearest suitable airport.

AUTO BRAKE Selector . . . . OFF

Plan a 35/EXT landing.

Review following effects on controllability:

- Spoiler panels 2 and 4 on left and right wings are inoperative.
- Flaps and slats may not extend to selected position until below maximum landing weight and speed is reduced. If desired, dump fuel to achieve planned landing weight.
- Outboard slats will 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.
- Dual land not available.
- Autopilot 1 may be used; autopilot 2 is inoperative.
- If "RUDDER UPR INOP" alert is not displayed, upper rudder is available through 2-1 nonreversible motor pump.
- Nosewheel steering limited to 25 degrees to left and unrestricted to the right.
- Brake system 2 fully operative. Brake system 1 accumulator only.

(CONTINUED)

HYD 1 FAIL (Continued)

- Do not use auto brakes for landing.

[END]

HYD 2 FAIL

Consequences:

AUTOPILOT 1 NOT AVAILABLE
FLAPS MAY NOT EXTN IF > MAX LDG WT
MAX 35 FLAPS FOR LANDING

"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.

Review following effects on controllability.

- Spoiler panels 1 and 5 on left and right wings are inoperative.
- Flaps may not extend to selected position until below maximum landing weight and speed is reduced. If desired, dump fuel to achieve planned landing weight.
- Dual land is not available.
- Autopilot 2 may be used; autopilot 1 is inoperative.

(CONTINUED)

HYD 2 FAIL (Continued)

- If "HYD 3 ELEV OFF" alert or "RUDDER LWR INOP" alert is not displayed, lower rudder is available through 3-2 nonreversible motor pump.

[END]

HYD 3 FAIL

Consequences:

AP1 PITCH TRIM INOP, USE AP2
1-3 AND 2-3 RMPS INOPERATIVE
MAX 35 FLAPS FOR LANDING
SLATS MAY NOT EXTN IF > MAX LDG WT
ALTERNATE GEAR EXTENSION REQUIRED
DO NOT ARM AUTOBRAKES
NOSEWHL STEERING RESTRICTED RIGHT

NOTES: Autoland is not approved. Autopilot must be disconnected by 100 feet AGL.

Autopilot GA not recommended.

Plan a 35/EXT landing.

Review following effects on controllability:

- Slats may not extend to selected position until below maximum landing weight and speed is reduced. If desired, dump fuel to achieve planned landing weight.
- Outboard slats will 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.
- Spoiler panel 3 on left and right wings inoperative.
- Autopilot 2 may be used.
- Autopilot 1 may be used, however, auto pitch trim is inoperative.
- Nosewheel steering limited to 25 degrees to right and unrestricted to the left.
- Brake system 1 fully operative. Brake system 2 accumulator only.
- Do not use auto brakes for landing.

When gear extension is required,

Airspeed. . . . . .MAX 230 KIAS

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

After three green lights illuminate,

(CONTINUED)

HYD 3 FAIL (Continued)

Center Gear Alternate Extension Handle/Lights PULL/4GREEN

GEAR Handle . . . . DOWN

AUTO BRAKE Selector . . . . OFF

Autopilot . . . . DISCONNECT BY 100 FEET AGL

[END]

HYD___PRES HI

Consequences:

NONE

NOTE: "HYD___PRES HI" alert will be displayed when hydraulic pressure exceeds 3500 psi.

This alert will not normally be displayed during automatic mode. When automatic mode senses overpressure, it deactivates engine pump with high pressure and "HYD___ OFF" alert is displayed. Therefore, "HYD___PRES HI" alert will be displayed only during manual mode or when automatic mode cannot compensate for high pressure condition.

HYDRAULIC SYSTEM IN MANUAL MODE

NO

Associated HYD SYS L PUMP Switch . . . . OFF

Push associated HYD SYS L PUMP switch and observe OFF light illuminates.

After 10 seconds,

"HYD___PRES HI" ALERT REMAINS DISPLAYED

NO

Associated HYD SYS L PUMP Switch . . . . ON

Push associated HYD SYS L PUMP switch and observe ON light illuminates.

Make log entry.

NOTE: If alert remains displayed, system pressure sensor has failed.

[END]

(CONTINUED)

HYD___PRES HI (Continued)

HYDRAULIC SYSTEM IN MANUAL MODE

NO (CONTINUED)

"HYD___PRES HI" ALERT REMAINS DISPLAYED

NO (CONTINUED)

[END]

Make log entry.

NOTE: If alert remains displayed, system pressure sensor has failed.

[END]

HYD___PRES LO

Consequences:

NONE

Affected HYD PUMP Switch(es) . . . . OFF

Push affected HYD PUMP switch(es) and observe OFF light(s) illuminates.

Repressurize system for approach and landing.

If system does not repressurize,

Refer to Abnormal Alert procedure – HYD 1 FAIL, HYD 2 FAIL, or HYD 3 FAIL, as appropriate.

[END]

HYD___QTY LO

Consequences:

NONE

NOTE: This alert is displayed when 10 qt of fluid remain in hydraulic tank. Alert will not normally be displayed during automatic mode. When automatic mode senses fluid is at 10 qt, it will deactivate all pumps in the system and display "HYD___OFF" alert. Therefore, "HYD___QTY LO" alert will be displayed only during manual mode or when automatic mode cannot compensate for low quantity condition.

Affected HYD SYS PUMP and RMP Switches . . . . OFF

Push affected HYD SYS L and R PUMP switches and observe OFF lights illuminate.

Push associated RMP switches and observe ON light(s) extinguish.

NOTE: Hydraulic system may be used for approach and landing.

[END]

HYD__TEMP HI

Consequences:

PRESSURIZE HYD SYS FOR APPR & LDG

NOTE: This alert will not normally be displayed when in automatic mode of operation. When automatic mode senses excessive hydraulic fluid temperature it will deactivate all the pumps in the system and display "HYD__OFF" alert. Therefore, the "HYD__TEMP HI" alert will only be displayed during manual mode or when the automatic mode cannot compensate for high temperature condition.

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 extinguish. If alert remains displayed, call maintenance.

[END]

Intentionally
Blank

Abnormal Procedures — Chapter AP

Table of Contents — Section 70

Intentionally
Blank

CARGO DOOR__

Consequences:

NONE

NOTE: Alert will be displayed on EAD after first engine start when one or both cargo door sensors indicate open.

SINGLE ALERT DISPLAYED

NO

Cargo Door Test . . . . PERFORM

Push CARGO DOOR TEST switch and observe both CARGO DOOR A and B for the faulted door are displayed on MISC system display.

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

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

NOTE: Cabin altitude and differential pressure are displayed on AIR synoptic.

(CONTINUED)

CARGO DOOR__ (Continued)

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.

NOTES: An aircraft altitude of 15,000 feet provides 9,500-feet cabin altitude at 2-psi differential pressure.

Cabin altitude above 9,500 feet will actuate cabin altitude warning system.

Land at nearest suitable airport.

[END]

IRU__FAIL

Consequences:

NONE

Associated IRS Mode Selector . . . . OFF

Rotate associated NAV system IRS mode selector on the IRS panel to OFF and observe the NAV/OFF light illuminates.

IRU 1 OFF

NO

IRS Switch (Captain's SISP Panel) . . . . .CAPT ON AUX

Push IRS switch on the Captain's source input select panel (SISP) and observe CAPT ON AUX light illuminates.

IRU 2 OFF

NO

IRS Switch (F/O's SISP Panel) . . . . F/O ON AUX

Push IRS switch on the First Officer's source input select panel (SISP) and observe F/O ON AUX light illuminates.

[END]

MISC ALERTS

Consequences:

MISC SYSTEM ALERTS MAY BE INOP
OVERHEAD PANEL IS OPERATIVE

NOTE: This alert is displayed when both MSC data buses are invalid.

AIRCRAFT ON GROUND

NO

Call maintenance.

[END]

First Officer's EIS SOURCE Selector . . . . AUX (OR 1)

Rotate First Officer's EIS SOURCE selector to desired position. Observe appropriate SISP lights illuminate.

"MISC ALERTS" REMAINS DISPLAYED

NO

First Officer's EIS SOURCE Selector . . . ORIGINAL POSITION

Rotate First Officer's EIS SOURCE selector to original position and observe appropriate SISP lights extinguish.

NOTES: Some subsequent miscellaneous system faults will not present alerts on EAD or illuminate MASTER WARNING or MASTER CAUTION lights; however, annunciator lights on overhead panel are operative.

This condition results in:

- *No air data sensor heat monitoring.*
- *No cargo door position indications. Test inoperative.*

(CONTINUED)

MISC ALERTS (Continued)

"MISC ALERTS" REMAINS DISPLAYED

NO

(CONTINUED)

- *No ignition lightning bolts. Overhead panel indications are operative.*
- *Cargo flow disagree alerts are inoperative.*
- *Automatic and manual cargo compartment fire test inoperative.*
- *Emergency light battery test inop.*
- *"DISCH CARGO AGENT" alert will not display. Overhead panel indications are operative.*
- *No lower cargo temperature indications.*
- *No engine nacelle temperature indications.*

[END]

Miscellaneous alerts and systems display will operate normally.

[END]

MSC AUTO FAIL

Consequences:

CARGO FIRE AGENT DISC TIMING INOP

NOTES: Automatic cargo fire test is inoperative.

Automatic cargo door test is inoperative.

Operate engine ignition manually. Refer to Supplementals 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 in 90 minutes by agent 2.

[END]

TAIL CONE UNLOCK

Consequences:

NONE

AIRCRAFT ON GROUND

NO

Call maintenance.

NOTE: Aircraft may be dispatched with this alert provided maintenance verifies that tailcone and number 2 engine service platform (patio) doors are locked in accordance with the MEL. The Level 1 alert "DOOR OPEN" will remain displayed until after engine start.

[END]

AIRCRAFT DISPLAYS BUFFETING OR CONTROL COLUMN PULSES

NO

Reduce airspeed to low cruise and log malfunction.

[END]

Continue normal operations and speed.

Log malfunction.

NOTE: Alert message will be displayed until malfunction is corrected.

[END]

Intentionally
Blank

Abnormal Procedures — Chapter AP
Table of Contents — Section 80

ABNORMAL CABIN/COCKPIT AIRFLOW FLUCTUATION

NOTE: This procedure replaces Interim Operating Procedure 2-225A. It assists in eliminating abnormal fluctuations in cabin/cockpit airflow on MD-11F airplanes, usually associated with initial main deck cargo demand for hot air. It is NOT a problem with the pack itself.

AIRCRAFT ON GROUND

NO

If takeoff is to be accomplished,

Consider a PACKS OFF takeoff.

AFTER TAKEOFF

NO

NOTE: Following a PACKS OFF takeoff, when the aircraft passes through 1,000 feet above airport elevation and climb power is set, but no later than 4,500 feet above airport elevation, the ESC will restore the air conditioning. Allow sufficient time for the ESC to stabilize the air conditioning system before evaluating airflow fluctuation.

FLUCTUATION STOPS

NO

No further crew action required.

[END]

(CONTINUED)

ABNORMAL CABIN/COCKPIT AIRFLOW FLUCTUATION
(Continued)

AFTER TAKEOFF

NO

(CONTINUED)

Crew workload permitting,

Zone Temperature Selector(s) . . . SELECT COLDER TEMPERATURE

One at a time and in the following order (cargo, courier, cockpit), select a temperature at least 5 degrees below the actual temperature of the associated zone. Pause 2 minutes, if fluctuation continues, select zone temperature to full cold and evaluate. If fluctuation persists after 1 minute, proceed to the next zone, leaving previous zone selection at full cold.

FLUCTUATION STOPS

NO

No further crew action required.
[END]

Zone Temperature Selectors . . . . .SET AS DESIRED

With all packs operating,

AIR SYSTEM SELECT Switch . . . . MANUAL

Push AIR SYSTEM SELECT switch and observe MANUAL light illuminates.

PACK 2 Switch. . . . . OFF

Push PACK 2 switch and observe OFF light illuminates.

FLUCTUATION STOPS

NO

No further crew action required.
[END]

(CONTINUED)

ABNORMAL CABIN/COCKPIT AIRFLOW FLUCTUATION
(Continued)

PACK 2 Switch . . . . ON

Push PACK 2 switch and observe OFF light extinguishes.

PACK 3 Switch . . . . OFF

Push PACK 3 switch and observe OFF light illuminates.

FLUCTUATION STOPS

NO

No further crew action required.
[END]

PACK 3 Switch . . . . ON

Push PACK 3 switch and observe OFF light extinguishes.

PACK 1 Switch . . . . OFF

Push PACK 1 switch and observe OFF light illuminates.

FLUCTUATION STOPS

NO

No further crew action required.
[END]

Select any one pack to OFF and make log book entry.

Prior to approach,

Pack Selected to OFF . . . . .SELECT ON

AIR SYSTEM SELECT Switch . . . . AUTO/AS REQUIRED

[END]

DEU FAIL

NOTE: Three red X's or a combination of red X's on the CRTs represent a DEU failure. Incomplete presentations on the CRTs also represent indications of a DEU failure.

EIS SOURCE Selector (On Failed Side) . . . . AUX

Rotate EIS SOURCE selector (on failed side) to AUX and observe AUX light illuminates.

DISPLAY UNITS RECOVERED

NO

DEU 1 FAILED

NO

The Captain's ND must display VOR or APPR mode whenever the First Officer's ND displays the VOR or APPR mode. The selected modes need not be identical.

The Captain's ND display may be in VOR or APPR when the First Officer's display is in MAP or PLAN.

When the Captain's and First Officer's displays are in MAP or PLAN, the RANGE must be the same.

[END]

With DEU 2 failed,

The First Officer's ND must display the VOR or APPR mode whenever the Captain's ND displays the VOR or APPR mode. The selected modes need not be identical.

The First Officer's ND display may be in VOR or APPR when the Captain's display is in MAP or PLAN.

When the First Officer's and Captain's ND displays are in MAP or PLAN, the RANGE must be the same.

[END]

(CONTINUED)

DEU FAIL (Continued)

EIS SOURCE
Selector (On Failed Side) . . . . RETURN TO ORIGINAL POSITION

Rotate EIS SOURCE selector (on failed side) to original position.

CAUTION: Do not rotate the EIS SOURCE selector on the failed side to the opposite (cross-cockpit) position. Such action may cause the operating displays to replicate the failure pattern of the failed DEU.

DISPLAY ELEC UNIT
Circuit Breaker (On Failed Side) . . . . PULL (WAIT 5 SEC)/RESET

NOTES: DISPLAY ELEC UNIT 1 circuit breaker is located at the left overhead C/B panel F-3. DISPLAY ELEC UNIT 2 circuit breaker is located at right overhead C/B panel F-28.

A 5-sec time delay between pulling and resetting the circuit breaker is required to ensure the DEUs go through a cold start to initialize the memory to remove the lockup.

DISPLAY UNITS RECOVERED

NO

No further crew action required.

[END]

DISPLAY ELEC UNIT
Circuit Breaker (On Failed Side) . . . . PULL

Complete flight using the operating displays.

[END]

DITCHING

Crew and Courier(s) . . . . ALERT

Captain alert crew and courier(s) to prepare for ditching, time available for preparation and brace signal to be used.

Transponder. . . . . SET 7700

At Captain's command, First Officer set transponder to 7700.

ATC . . . . ADVISE

Advise ATC of identification, ground speed, position, true course, altitude, number of persons on board and fuel remaining. Describe nature of the emergency, state intentions and request assistance.

Fuel Quantity . . . . REDUCE

Reduce fuel to a minimum consistent with ditching plan.

Vapp . . . . CHECKED

APU . . . . VERIFY OFF

First Aid and Survival Equipment/Loose Equipment . . . . STOWED

Verify first aid, survival equipment, and flashlights are stowed and accessible for evacuation. Stow all loose non-emergency equipment in lavatory.

Left Observer's Seat . . . . FACING FORWARD

NOTE: Left observers seat must be facing forward to allow left sliding window to open.

Right Observers Seat (If Occupied). . . . . FACING FORWARD

NO SMOKE/SEAT BELTS . . . . ON

Courier(s) Ditching Preparation . . . . COMPLETED

Verify cabin ditching preparations are complete and courier(s) is (are) wearing life vest(s) and has seat belt(s) and harness(es) fastened.

Crew Vests, Belts, Harnesses . . . . ON/FASTENED

(CONTINUED)

DITCHING (Continued)

DITCHING Switch . . . . ON

Push DITCHING switch and observe ON light illuminates.

NOTE: When ON, the DITCHING switch,

- *Inhibits GPWS.*
- *Maintains exiting cabin altitude*
- *Shuts off packs at 2,500 feet radio height or when cabin differential pressure is less than 0.5 psi.*
- *Closes avionics shutoff valve.*
- *Closes ram air door (if open).*
- *Closes outflow valve.*

AIR SYSTEM MANUAL

NO

AVNCS FAN Switch . . . . .OVRD

At or below 10,000 feet,

PACK/BLEED Switches . . . . OFF

Move or verify all PACK BLEED switches are selected to OFF. Observe OFF lights for all packs are illuminated.

CABIN PRESS CONTROLLER MANUAL

NO

At or below 10,000 feet,

CABIN PRESS Manual Rate Selector . . . . CLIMB

Rotate CABIN PRESS manual rate selector to climb. Observe cabin outflow valve position moves toward the OP position.

When aircraft is depressurized (cabin differential pressure less than 0.5 psi),

(CONTINUED)

DITCHING (Continued)

CABIN PRESS CONTROLLER
MANUAL

NO

(CONTINUED)

CABIN PRESS Manual Rate Selector . . . . .FULL DESC

Rotate CABIN PRESS manual rate selector to the full DESC position. Observe cabin valve position 2 goes to full CL position.

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 a complete stop.

GEAR Handle/Lights . . . . UP/OFF

FLAP/SLAT Handle 50/EXT

NOTES: 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.

(CONTINUED)

DITCHING (Continued)

CREW DUTY CHART

	BEFORE LANDING DITCHING	AFTER LANDING	AFTER DITCHING
CM1	Transmit emergency messages Instruct CM2. Brief ACMs.	Perform cockpit duties. Assist in the evacuation through either forward door or cockpit windows. Take command of the situation outside the aircraft.	Perform cockpit duties. Remove and take the portable rescue beacon from the aircraft. Check life vest inflation. Board slide raft through either forward door and take command. Separate the slide/raft from the aircraft. If evacuation through the cockpit window; fasten mooring line of the life raft to the aircraft, push life raft out of the cockpit window and inflate it. Evacuate through window. Inflate life vest. Board raft and take command.
CM2	As desired by CM1.	Perform cockpit duties.	Perform cockpit duties.

(CONTINUED)

DITCHING (Continued)

CREW DUTY CHART (Continued)

	BEFORE LANDING DITCHING	AFTER LANDING	AFTER DITCHING
CM2	Alert ACMs approximately 30 seconds before touch down to brace for impact.	Open either forward door deploy slide/raft and check correct inflation. Direct the evacuation through either forward door or cockpit windows. Remove the portable rescue beacon. Leave the aircraft. Take command of the situation outside the aircraft, if required.	Open either forward door, deploy slide/raft and check for correct inflation. Check removal of portable rescue beacon from the aircraft. Inflate life vest. Check slide/raft boarding. Board the slide/raft. Separate the slide/raft from the aircraft. If evacuating through the cockpit window; assist CM1 to fasten mooring line, push the life raft out of the cockpit window and inflate it. Evacuate through window. Inflate life vest. Board raft. Take command if required.
ACMs	As directed by CM1. Relocate to the assigned seats.	As directed by CM1. Assist in evacuation. Leave via the nearest suitable exit.	As directed by CM1 Assist in evacuation. Leave via the nearest suitable exit. Check life vest inflation. Board raft.

[END]

ENGINE ABNORMAL START (Hot, Hung, or No Start)

FUEL Switch . . . . OFF

Move associated FUEL switch to OFF.

STARTER DISENGAGED

NO

Allow N2 RPM to decrease to 30% or less.

Verify IGN A or B is selected.

ENG START Switch . . . . PULL

Pull ENG START switch and observe light illuminates.

Motor engine with starter for 30 seconds.

ENG START Switch . . . . .PUSH

Verify ENG START switch light extinguishes.

Determine type of abnormal start:

HOT START

Record maximum EGT and elapsed time EGT was above 750°C.

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.

(CONTINUED)

ENGINE ABNORMAL START (Hot, Hung, or No Start)

(Continued)

Observe starter 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 starter 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

Push ENG IGN OVRD switch and observe OVRD ON light illuminates.

Associated ENG & WING or TAIL ANTI-ICE Switches . . . . ON

ECON Switch. . . . . OFF

(CONTINUED)

ENGINE COMPRESSOR STALL(S) (Continued)

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

Slowly advance throttle to determine if stall recurs. Observe N1, N2 and EGT indications follow throttle movement.

NOTES: 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

Push ENG IGN OVRD switch and observe OVRD ON light extinguishes.

ENG, WING and TAIL ANTI-ICE Switches . . . . AS REQUIRED

ECON Switch . . . . ON

[END]

Shut down affected engine. Refer to ENGINE SHUTDOWN 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 or fuel/oil fumes are detected.

Maintain normal thrust settings.

FUEL/OIL FUMES DETECTED

NO

AIR SYSTEM SELECT Switch . . . . MANUAL

Push AIR SYSTEM SELECT switch and observe MANUAL light illuminates.

Associated BLEED AIR Switch. . . . . OFF

Push associated BLEED AIR switch and observe OFF light illuminates.

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.

NOTE: When in icing with only one bleed air source, exit icing area and maintain ice protection until clear of icing.

Log malfunction.

[END]

ENG OIL QUANTITY LO/DECREASING

Continue engine operation.

If oil pressure/temperature become abnormal, shut down affected engine. Refer to Abnormal Non-Alert procedure – ENGINE 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.

NOTES: 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

Push affected HYD SYS L and R PUMP switches and observe OFF lights illuminate.

FUEL SYSTEM IN MANUAL MODE

NO

Associated TANK PUMPS Switch . . . . ON

Push associated TANK PUMPS switch and observe OFF light extinguishes.

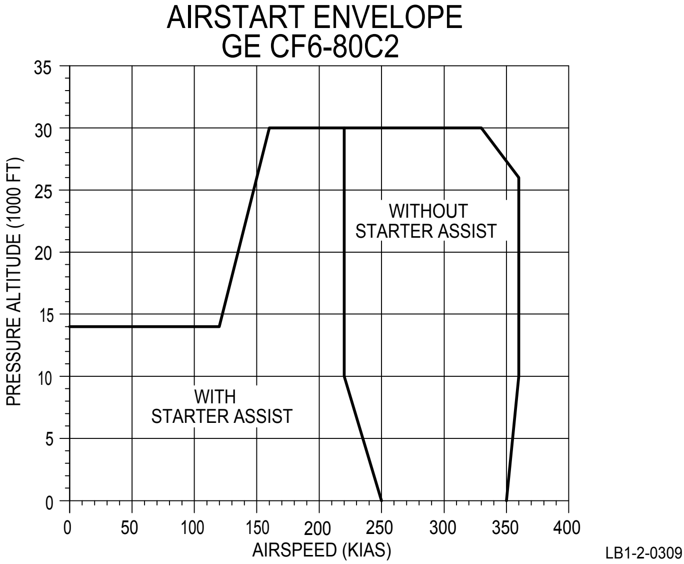
Air starts may be attempted at any altitude and airspeed. Recommended altitude and airspeed for air starts are as follows:

- Above 10,000 feet, greater than 220 KIAS
- Below 10,000 feet, greater than 250 KIAS

(CONTINUED)

ENGINE RESTART IN FLIGHT (Continued)

AIRSTART ENVELOPE



ENG IGN OVRD Switch. . . . . OVRD ON

Push ENG IGN OVRD switch and observe OVRD ON light illuminates.

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 aircraft ignition system. If a restart is not completed within 60 seconds, the engine anti-ice can be selected again.

(CONTINUED)

ENGINE RESTART IN FLIGHT (Continued)

N2 RPM LESS THAN 15%

NO

AIR SYSTEM IN MANUAL MODE

NO

Associated BLEED AIR Switch . . . . VERIFY OFF

If required, push associated BLEED AIR switch and observe OFF light illuminates.

Associated PACK Switch. . . . . VERIFY OFF

If required, push associated PACK switch and observe OFF light illuminates.

BLEED AIR Switch
(Engine Supplying Bleed for Start) . . . . . . VERIFY ON

If required, push BLEED AIR switch and observe OFF light extinguishes.

Appropriate ISOL Switch . . . . VERIFY ON

If required, push appropriate ISOL switch and observe ON light illuminates.

ENG START Switch . . . . PULL

When N2 rpm is 15% or greater,

(CONTINUED)

ENGINE RESTART IN FLIGHT (Continued)

FUEL Switch . . . . ON

Move FUEL switch to ON and monitor N1, N2, EGT and fuel flow.

NOTE: Airstarts, especially at high altitudes, may result in engine(s) accelerating to idle very slowly. Slow acceleration may be incorrectly interpreted as a hung start or engine malfunction. If N2 is steadily increasing, and EGT remains within limits, the start is progressing normally.

ABNORMAL START

NO

FUEL Switch. . . . . OFF

Move FUEL switch to OFF and terminate attempted start.

ENG IGN OVRD Switch . . . . OFF

Push ENG IGN OVRD switch and observe OVRD ON light extinguishes.

Refer to Abnormal Non-Alert Procedure - ENGINE SHUTDOWN IN FLIGHT.

If another start attempt is desired,

Re-accomplish ENGINE RESTART IN FLIGHT procedure in its entirety.

[END]

Unless thrust is required for safety of flight, observe 1-minute warmup at idle and gradually resume normal operation.

ENG IGN OVRD Switch. . . . . OFF

Push ENG IGN OVRD switch and observe OVRD ON light extinguishes.

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 Switch . . . . VERIFY OFF

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

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.

Transponder/TCAS Selector . . . . TA

Consider landing at nearest suitable airport.

[END]

EVACUATION

Couriers (CM1) . . . . ALERT

Alert couriers as to nature of emergency, time available for preparation and brace signal to be used.

After aircraft has stopped,

Outflow Valve (CM1) . . . . VERIFY OPEN

PARK BRAKE Handle (CM1). . . . . .PARK

FUEL Switches (CM1) . . . . OFF

EVACUATION Command (CM1) . . . . INITIATE

ENG FIRE Handles (CM1). . . . . DOWN

NOTE: If required, discharge fire agent.

APU FIRE Handle (CM1). . . . . PULL

NOTE: If required, discharge fire agent.

EMER PWR Selector (CM1) . . . . OFF

BAT Switch (CM1) . . . . OFF

[END]

FLIGHT CONTROLS JAMMED OR RESTRICTED

NOTES: If jam occurs during manually controlled flight, attempt to engage autopilot.

If freezing water is the cause, control may be regained by descending into warmer air.

Seat Belts Switch . . . . ON

AILERON CONTROLS JAMMED OR RESTRICTED

NO

If jam was detected during cruise, and if aircraft control is adequate, continue to normal descent point.

NOTE: If Roll Control Wheel Steering is installed, some lateral control may be available through the control wheel position sensors.

If controls remain jammed or restricted,

Autopilot/Autothrottles . . . . DISCONNECT

Maximum Airspeed. . . . . 290 KIAS/.80 M

Control Wheels
(Roll Axis). SEPARATE/DISCONNECT

Use force as required to separate/disconnect the two halves of the control system (approximately 40.82 kilograms).

Autothrottles will be available.

Autopilot may be available, but should be disconnected during descent and approach and landing.

Select a runway with minimum crosswind.

If roll authority is reduced, fly a wider pattern than normal to allow a stabilized approach.

[END]

(CONTINUED)

FLIGHT CONTROLS JAMMED OR RESTRICTED (Continued)

ELEVATOR CONTROLS JAMMED OR RESTRICTED

NO

If jam was detected during cruise, and if aircraft control is adequate through use of the autopilot, consider continuing to normal descent point.

If controls remain jammed or restricted, and pitch is not controllable,

Autopilot/Autothrottles. .DISCONNECT

Maximum Airspeed . . . . 290 KIAS/.80 M

Apply force as necessary to free jam.

Autothrottles will be available.

Autopilot may be available.

Elevator authority may be reduced.

[END]

RUDDER JAMMED OR RESTRICTED

NO

Use rudder trim (if available) and ailerons for directional control.

If rudder input is not possible, use operative flight controls, trim, and thrust as required to maintain aircraft control.

Select a runway with minimum crosswind.

The possibility of limited directional control with a wing engine inoperative should be considered prior to executing a missed approach.

AUTOBRAKE Selector . . . . OFF

Rudder pedal steering is inoperative.

If directional control is a concern, use differential braking at high speed.

Nose gear steering wheel may be used as speed decreases.

(CONTINUED)

FLIGHT CONTROLS JAMMED OR RESTRICTED (Continued)

RUDDER JAMMED OR RESTRICTED

NO

(CONTINUED)

NOTE: The following replaces Interim Operating Procedure 2-211 regarding unresponsive rudder pedal input due to rudder torque tube failure. It provides guidance to flight crews in such a circumstance.

Limited directional control and unresponsive rudder pedal input could be the result of a rudder torque-tube failure. A characteristic of this failure is that, although the rudder pedals may move, the pilot's control input to the rudders will have no effect or a reduced effect.

If rudder pedals are movable, but directional control is greatly reduced or unresponsive to rudder pedal input:

- Directional control is available from ailerons, spoilers and asymmetric engine thrust.
- If a wing engine is inoperative, a missed approach should not be attempted.
- Plan landing on runway with the least cross-wind component, conditions permitting.

[END]

[END]

FMC DUAL FAILURE

Both MCDUs . . . . .SELECT STANDBY

No FMS database is available in standby mode.

NOTE: If an FMS is available, a level zero alert “CDU__MENU REQUEST” will be annunciated on the EAD.

Next Waypoint . . . . VERIFY

Original routing will be retained in both MCDUs.

Confirm active waypoint is correct or enter required waypoint with NAME/LAT/LONG format before continuing this procedure.

SISP Switches . . . . AS REQUIRED

- FLT DIR – If NAV 1 or NAV 2 is selected, offside roll bar will bias out of view. If desired, onside FLT DIR may be selected by pushing CAPT ON 2 (for NAV 2) or F/O ON 1 (for NAV 1).
- FMS – FMS switching should be in normal. If both MCDUs are in standby operation, NDs will display the information depicted in the following table.

FMS SISP SW	CAPT ND DISPLAY	F/O ND DISPLAY
NORMAL	MCDU 1	MCDU 2
CAPT ON 2	MCDU 2	MCDU 2
F/O ON 1	MCDU 1	MCDU 1

NOTE: AP 1 will always follow MCDU 1. AP 2 will always follow MCDU 2 regardless of SISP switching.

- CADC, IRS, VOR and APPR should be left in normal unless anomalies in those systems require switching.

Navigation Routing . . . . CONFIRM

Continue to destination at Captain’s discretion.

If changes to routing are required, both MCDUs should be updated, time and workload permitting. If over water or if few navigational aids are available, both MCDU routings should be maintained. If time does not permit, one MCDU may be updated and utilized for navigational guidance. Waypoints must be entered in the NAME/LAT/LONG format. Direct-to is available only for waypoints entered in the route or to a LAT/LONG entered in data field 1(L).

(CONTINUED)

FMC DUAL FAILURE (Continued)

VOR, NDB, and ILS navaids must be tuned by **frequency** on respective MCDUs.

NOTES: The Captain's MCDU "NAV RADIO" page can only be used to select or preselect ILS 1/(course), VOR 1/(course), and/or NDB 1. The First Officer's MCDU "NAV RADIO" page can only be used to select or preselect ILS 2/(course), VOR 2/(course), and/or NDB 2.

When stations (and courses if applicable) are selected by the crew on either MCDU "NAV RADIO" page, the ILS and VOR Course Deviation Indicators (CDI), VOR, and NDB Bearing Indicators associated with that MCDU may be displayed on either ND, if they are selected on the respective SISP and EIS Control Panels.

The three- or four-letter identifier will be decoded and displayed on the PFD and ND for proper identification after tuning.

Monitor IRU positions.

NOTE: Three IRUs are available; however, position updates are not possible. Normal IRU drift will occur. Compare IRU positions and use navigational aid raw data to verify position when available.

IRU/MCDU with most accurate position (i.e. MCDU 1, AP 1 and NAV 1, if number 1 is most accurate) should be used for lateral guidance.

Compare fuel used/remaining to flight plan at each waypoint.

NOTE: Fuel/gross weight predictions are not available. Actual fuel remaining and gross weight are displayed normally.

Vertical navigation is not available. Plan cruise, climb, and descent points accordingly.

Autothrottles are available in speed mode; however, autothrottles will disconnect in level change and G/A modes.

In the event of a go-around, pushing thrust levers to overboost bar below 14,000 feet MSL and 300 KIAS will provide G/A thrust.

NOTE: Do not exceed G/A thrust time limit. Below 14,000 feet MSL, five minutes of go-around power is permissible, if required.

(CONTINUED)

FMC DUAL FAILURE (Continued)

Above 14,000 feet or 300 KIAS throttle advance to overboost bar will provide MCT thrust. During climb use following table to set thrust manually.

APPROXIMATE CLIMB THRUST N1 (%) SETTINGS

TAT (°C)	PRESSURE ALTITUDE (FEET)									
	0	**5,000**	**10,000**	**15,000**	**20,000**	**25,000**	**30,000**	**35,000**	**40,000**	**45,000**
–30	89.7	93.6	97.9	97.5	98.7	99.5	102.2	102.3	102.2	102.8
–25	90.6	94.5	98.8	98.4	99.6	100.4	103.1	103.2	103.1	103.7
–20	91.5	95.4	99.7	99.3	100.5	101.3	104.0	104.1	104.0	104.5
–15	92.4	96.3	100.6	100.2	101.4	102.2	104.9	105.0	104.7	105.1
–10	93.2	97.2	101.5	101.1	102.3	103.1	105.8	105.6	104.9	104.3
–5	94.1	98.1	102.3	101.9	103.1	103.9	106.6	105.1	103.7	103.1
0	95.0	99.0	103.2	102.8	104.0	104.8	106.6	103.9	102.4	101.9
5	95.8	99.8	104.1	103.7	104.9	105.7	105.6	102.8		
10	96.7	100.7	105.0	104.5	105.8	104.9	104.8			
15	97.5	101.6	105.9	105.4	105.5	104.1	103.9			
20	98.4	102.5	105.7	105.6	104.7	103.5				
25	99.2	103.4	105.1	104.9	104.0	102.9				
30	100.1	102.7	104.5	104.3	103.4					
35	100.4	102.0	103.9	103.6	102.9					
40	99.7	101.3	103.2	103.0						
45	98.9	100.6	102.7							
50	98.1									

Below 10,000 feet, climb at 250 KIAS or UP/RET Vref + 35, whichever is higher. Refer to QRH under Performance – NORMAL & ABNORMAL CONFIGURATION REFERENCE SPEEDS table. Above 10,000 feet, climb at 330 KIAS to FL270 and .82 Mach to level off. Descend at .82 Mach to FL270, then 330 KIAS to 10,000 feet and 250 KIAS below 10,000 feet.

NOTE: The Vmin foot will not be available.

To compute approach speeds, use QRH under Performance – NORMAL & ABNORMAL CONFIGURATION REFERENCE SPEEDS tables.

Low speed protection is not available.

NOTE: It is recommended that MCDU navigation routing not be utilized in the terminal area due to crew workload.

(CONTINUED)

FMC DUAL FAILURE (Continued)

FMS databases STARS and APPROACHES are not available.

NOTE: Nonprecision approaches should be flown from raw data with the appropriate VOR or APPR display selected on both NDs.

DUAL LAND, SINGLE LAND and APPR ONLY ILS modes are available.

NOTE: The APPR display should be selected on both NDs during ILS approaches. Both ILS receivers must be tuned by frequency on the MCDU NAV RADIO pages.

[END]

FMC LOSS OF PREDICTIONS

NOTES: This procedure replaces Interim Operating Procedures 2-229 or 2-230. It provides crews with an interim procedure that will restore normal predictions while efforts continue to pursue a permanent solution.

Loss of FMC performance predictions such as ETO, SPD, and FL on the ACT F-PLAN page, ETA and EFOB on the PROGRESS page, and VAPP and LW on the APPROACH PAGE have been reported for FMS -921 Pegasus operators.

The following steps may be taken in an effort to recover this data. It is recommended, if the predictions are restored at any point, that the procedure be ended at that time. The procedure may be re-initiated should subsequent loss of predictions occur.

Change active autopilot.

FMC PREDICTIONS RESTORED

NO

Continue to destination.

[END]

Autopilot 1 . . . . ENGAGE

FMC 2 Circuit Breaker . . . . PULL

FMC Circuit Breaker (After 30 Seconds) . . . . .RESET

Confirm FMC 2 restored, then,

Autopilot 2 . . . . ENGAGE

FMC PREDICTIONS RESTORED

NO

Continue to destination. Do not change autopilot unless predictions lost.

[END]

No further crew action required.

[END]

FMC SINGLE FAILURE

Immediately following any disconnect or switching of the autopilot, verify the desired FMS lateral mode is displayed. Desired mode may be reselected if necessary.

FMS 1 FAIL

NO

CAPT FMS SISP . . . . CAPT ON 2

Push FMS on CAPT SISP and observe CAPT ON 2 illuminates.

MCDU 1 (MENU Page, LSK 1L) . . . . FMC 2

Push LSK 1L to select FMC 2 and observe FMC 2 <ACT> displays.

[END]

FMS 2 failed,

F/O FMS SISP. . . . . F/O ON 1

Push FMS on F/O SISP and observe F/O ON 1 illuminates.

MCDU 2 (MENU Page, LSK 1L) . . . . FMC 1

Push LSK 1L to select FMC 1 and observe FMC 1 <ACT> displays.

[END]

FUEL DUMP

NOTES: Fuel dump is independent of automatic/manual mode of fuel system controller (FSC).

Automatic system control or manual system control are identical in fuel dumping procedure. Fuel dump rate is approximately 2,268 kilograms per minute.

DUMP Switch. . . . . ON

Open guard, push DUMP switch and observe ON light illuminates.

NOTES: 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 5,216 kilograms per tank), “FUEL DUMP LEVEL” alert will be displayed.

When desired fuel level is reached or calculated dump time is reached,

DUMP Switch. . . . . OFF

Push DUMP switch and observe ON light extinguishes.

FURTHER FUEL DUMP DESIRED

NO

DUMP Switch . . . . ON

Push DUMP switch and observe ON light illuminates.

When desired fuel level is reached or calculated dump time is reached,

DUMP Switch . . . . OFF

Push DUMP switch and observe ON light extinguishes.

(CONTINUED)

FUEL DUMP (Continued)

DUMP SWITCH ON LIGHT FAILS TO EXTINGUISH

NO

FUEL DUMP EMER STOP Switch . . . . STOP

Push FUEL DUMP EMER STOP switch and observe STOP light illuminates.

[END]

No further crew action required.

[END]

FUEL LEAK

Check departure fuel minus total used is approximately equal to present fuel on board. Land at nearest suitable airport if a fuel leak is confirmed. If sufficient fuel reserves cannot be verified consider diverting to a suitable airport.

FUEL SYSTEM SELECT Switch . . . . MANUAL

All TANK TRANS and FILL Valve Switches . . . . OFF

Push all TANK TRANS and FILL valve switches and observe all ON lights extinguish and all ARM/FILL lights extinguish.

NOTE: The previous action isolates each tank to determine which tank quantity is decreasing abnormally.

ABNORMAL QUANTITY DECREASE FROM TANK 1, 2, OR 3

NO

NOTE: The following actions will isolate leak to either the tank or the engine.

TANK TRANS Switch (Aux or Nonleaking Main Tank). . . . . ON

TANK XFEED Switch (Leaking Tank) . . . . ON

TANK PUMP Switch (Leaking Tank). . . . . OFF

ABNORMAL QUANTITY DECREASE FROM AUX OR NONLEAKING MAIN TANK

NO

Throttle (Leaking Engine) . . . . .IDLE

FUEL Switch (Leaking Engine) . . . . OFF

ENG FIRE Handle (Leaking Engine) . . . . DOWN

Pull ENG FIRE handle of leaking tank full down.

FUEL SYSTEM SELECT Switch . . . . . AS REQUIRED

Consider effects on any system operating in manual mode.

(CONTINUED)

FUEL LEAK (Continued)

ABNORMAL QUANTITY DECREASE FROM TANK 1, 2, OR 3

NO

(CONTINUED)

ABNORMAL QUANTITY DECREASE FROM AUX OR NONLEAKING MAIN TANK

NO

(CONTINUED)

Refer to Abnormal Non-Alert procedure – ENGINE SHUTDOWN IN FLIGHT, as required.

[END]

TRANSFER OF FUEL FROM LEAKING TANK INTO MAINS DESIRED

NO

CAUTION: Do not transfer fuel into leaking tank.

TANK PUMP Switch (Leaking Tank) . . . . ON

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

(CONTINUED)

FUEL LEAK (Continued)

ABNORMAL QUANTITY DECREASE FROM TANK 1, 2, OR 3

NO

(CONTINUED)

TRANSFER OF FUEL FROM LEAKING TANK INTO MAINS DESIRED

NO

(CONTINUED)

TANK FILL Valve Switch(es)
(Nonleaking Tank) . . . . VERIFY ARM/FILL

Verify ARM light is illuminated on the appropriate tank FILL valve switch(es). “FILL” will illuminate only when the valve is open.

NOTES: Fuel may be manually transferred only into tanks 1, 2 or 3. Tank 2 fill valve will remain armed following switch release only if an upper aux tank pump is on. Tank 1 and 3 fill valves will remain armed following switch release if tank 2 contains more than 18,144 kilograms of fuel.

ARM illuminates blue when respective fill valve is armed. FILL illuminates blue when respective fill valve is open. On the FUEL synoptic the fill valve symbol is displayed in white when the valve is armed and is displayed green when it is open.

Once desired amount of fuel is transferred from leaking tank,

TANK PUMP Switch (Leaking Tank) . . AS REQUIRED

TANK XFEED Switch (Leaking Tank) . . . . OFF

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

(CONTINUED)

FUEL LEAK (Continued)

ABNORMAL QUANTITY DECREASE FROM TANK 1, 2, OR 3

NO

(CONTINUED)

TRANSFER OF FUEL FROM LEAKING TANK INTO MAINS DESIRED

NO

(CONTINUED)

Use fuel from leaking tank until nearly empty, then supply engine from another source.

CAUTION: Use fuel from leaking tank to supply engine fuel feed while transferring fuel to another nonleaking tank. To avoid possible fuel starvation/flameout, supply fuel from another source when the leaking tank quantity approaches approximately 680 kilograms.

[END]

TANK PUMP Switch (Leaking Tank) . . . . ON

TANK XFEED Switch (Leaking Tank). . . . . OFF

TANK TRANS Switch (Aux [If Installed] or Nonleaking Main Tank). . . . . OFF

(CONTINUED)

FUEL LEAK (Continued)

ABNORMAL QUANTITY DECREASE FROM TANK 1, 2, OR 3

NO

(CONTINUED)

Use fuel from leaking tank until nearly empty, then supply engine from another source.

CAUTION: Use fuel from leaking tank to supply engine fuel feed while transferring fuel to another nonleaking tank. To avoid possible fuel starvation/flameout, supply fuel from another source when the leaking tank quantity approaches approximately 680 kilograms.

[END]

AUX TANK L and R TRANS Switches. . . . . .ON

TANK FILL Valve Switches (All). . . . . ARM/FILL

Push TANK FILL valve switches and observe ARM/FILL lights illuminate.

ABNORMAL QUANTITY DECREASE FROM AUX TANK

NO

TANK FILL Valve Switches (All) . . . . OFF

Push TANK FILL valve switches and observe ARM/FILL lights extinguish.

Refer to TNK__OVERFILL procedure, in the Abnormal Alert - Fuel section of this manual.

[END]

Transfer fuel out of tail tank as required.

[END]

FUEL QUANTITY ABNORMAL INDICATION (ALL MAIN TANKS)

NOTE: This procedure replaces Interim Operating Procedures 2-215A. It provides crews with an interim procedure should they encounter a fuel system anomaly that causes indications of an abnormal fuel quantity decrease in all main tanks.

ABNORMAL DECREASE IN ALL MAIN TANK QUANTITY INDICATIONS

NO

LOW PRESSURE (INTERMITTENT OR STEADY) FROM FORWARD PUMP IN ANY MAIN TANK

NO

NOTE: At constant speed and normal cruise attitudes, Tank 2 FWD Pump low pressure should occur at approximately 700 kilograms and Tank 1 and 3 FWD Pumps at approximately 300 kilograms.

Land at nearest suitable airport.

FUEL SYSTEM SELECT Switch . . . . MANUAL

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 1 or 3 FUEL QTY LO" alert is displayed and Tank 2 fuel quantity is >900 kilograms,

TANK XFEED Switches (All) . . . . ON

[END]

(CONTINUED)

FUEL QUANTITY ABNORMAL INDICATION (ALL MAIN TANKS) (Continued)

ABNORMAL DECREASE IN ALL MAIN TANK QUANTITY INDICATIONS

NO

(CONTINUED)

FUEL QTY NORMAL POWER and
FUEL QUANTITY ALTN POWER
Circuit Breakers (Upper Main C/B Panel) . . . . .CYCLE

NOTES: Circuit breakers should be opened simultaneously and then closed again after 30 seconds.

While quantity system is unpowered, FUEL QTY ALERTS and SEL FUEL SYS MAN alerts may be displayed.

NORMAL QUANTITY OPERATION RESTORED

NO

FUEL SYSTEM SELECT Switch . . . . AS REQUIRED

Check departure fuel minus total fuel used is approximately equal to present fuel on board.

[END]

FUEL SYSTEM SELECT Switch . . . . VERIFY MANUAL

NOTE: Fuel quantity system is inoperative. 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.

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,

(CONTINUED)

FUEL QUANTITY ABNORMAL INDICATION (ALL MAIN TANKS) (Continued)

ABNORMAL DECREASE IN ALL MAIN TANK QUANTITY INDICATIONS

NO

(CONTINUED)

AUX TANK L and R TRANS Switches . . . . OFF

If "TNK 1 or 3 FUEL QTY LO" alert is displayed,

TANK XFEED Switches (All) . . . . ON

Land at nearest suitable airport.

[END]

Refer to Abnormal Non-Alert Procedure - FUEL LEAK.

[END]

GEAR HANDLE WILL NOT MOVE TO DOWN POSITION

NOTE: Considerable force may be required to move gear handle. A force of 72.58 kilograms may be applied to handle without causing damage to system.

Indicated Airspeed . . . . MAX 230 KIAS

Verify speed is below maximum free fall speed (230 KIAS).

Alternate Gear Extension Lever. RAISE/LATCH

NOTES: Considerable force may be required to move alternate gear extension lever. A force of 72.58 kilograms may be applied to lever without causing damage to system.

Main gear doors will remain open. Limit airspeed to 260 KIAS.

GEAR Lights . . . . 3 GREEN

CAUTION: After alternate extension of main gear, wait until three green lights illuminate before next action.

NOTE: Required delay between main gear and center gear extension allows gear hydraulic system bypass to be effective and prevents temporary hydraulic blockage of center gear alternate extension handle.

Center Gear Alternate Extension Handle . . . . PULL

GEAR Lights . . . . 4 GREEN

CAUTION: Main gear alternate extension lever must be left in the raised position to prevent inadvertent gear retraction.

NOTE: Nosewheel steering will be 25° to the right and unrestricted to the left.

[END]

GEAR HANDLE WILL NOT MOVE TO UP POSITION

Indicated Airspeed. . . . . MAX 230 KIAS

Verify speed is below maximum gear retraction speed (230 KIAS).

GEAR HANDLE REL Button . . . . PUSH/HOLD

Gear Handle . . . . UP

GEAR HANDLE REMAINS DOWN

NO

Landing gear trim system has failed. Failure should have no adverse effect on landing.

GEAR Handle/Lights .DOWN/4 GREEN

Indicated Airspeed . . . . MAX 300 KIAS/.70 MACH

[END]

GEAR Lights . . . . EXTINGUISHED

If ground sensor is not in flight mode, as indicated by the following systems not being in normal mode, refer to Abnormal Non-Alert procedure – GROUND SENSOR FAILURE.

- Autopilot cannot be engaged.
- FCP functions cannot be engaged.
- Takeoff warning will sound when flaps or slats are retracted.
- Auto cabin pressurization is inoperative.

[END]

GEAR PRIMARY OR SECONDARY LIGHT(S) ILLUMINATE WITH GEAR HANDLE UP

CONFIG Cue Switch . . . . .PUSH

NOTES: The gear primary lights are adjacent to the gear handle; the gear secondary lights are on the synoptic.

If either the gear primary or secondary lights are extinguished, the gear is up and locked.

FOR EACH GEAR, THE PRIMARY OR SECONDARY DISPLAY INDICATES GEAR UP

NO

Consider the gear up and locked.

[END]

Airspeed. . . . . .MAX 230 KIAS

NOTE: The maximum gear extension speed is 260 KIAS. Specifying a maximum speed of 230 KIAS is to accommodate gear retraction.

Gear Handle . . . . DOWN

FOR EACH GEAR, A PRIMARY OR SECONDARY GREEN LIGHT IS ILLUMINATED

NO

Gear Handle . . . . UP

FOR EACH GEAR THE PRIMARY OR SECONDARY DISPLAY INDICATES GEAR UP

NO

Consider the gear up and locked.

[END]

(CONTINUED)

GEAR PRIMARY OR SECONDARY LIGHT(S) ILLUMINATE WITH GEAR HANDLE UP (Continued)

FOR EACH GEAR, A PRIMARY OR SECONDARY GREEN LIGHT IS ILLUMINATED

NO

(CONTINUED)

FLIGHT CONDITIONS AND TIME PERMIT A LANDING GEAR VISUAL UPLOCK CHECK

NO

Landing Gear Visual Uplock Markings . . . . . . CHECK

NOTES: Observe the main gear through the viewing ports in the aft cabin floor, and the nose gear through the uplock viewing tube in the forward cabin floor. The main gear and nose gear are up and locked when the appropriate red marking are aligned.

To determine the position of the center gear, gently pull the center gear alternate extension handle until a pronounced increase in resistance is felt (a force of 4.54-6.80 kilograms may extend the gear if a loss of hydraulic system 3 pressure has occurred). As long as the red band on the cable is not visible or the bottom of the red band is at or below the floor level, the gear is up and locked. If the bottom of the red band is above the floor level, the center gear is unlocked.

(CONTINUED)

GEAR PRIMARY OR SECONDARY LIGHT(S) ILLUMINATE WITH GEAR HANDLE UP (Continued)

FOR EACH GEAR, A PRIMARY OR SECONDARY GREEN LIGHT IS ILLUMINATED

NO

(CONTINUED)

FLIGHT CONDITIONS AND TIME PERMIT A LANDING GEAR VISUAL UPLOCK CHECK

NO

(CONTINUED)

VISUAL UPLOCK MARKINGS INDICATE GEAR IS UP AND LOCKED

NO

Consider the gear up and locked.

[END]

Do not exceed gear extension speed (260 KIAS/.70 Mach).
Diversion to a suitable airport may be required.

[END]

Do not exceed gear extension speed (260 KIAS/.70 Mach). Diversion to a suitable airport may be required.

When ready for landing,

Refer to Abnormal Non-Alert procedure – GEAR UNSAFE INDICATION WITH GEAR HANDLE DOWN.

[END]

GEAR UNSAFE INDICATION WITH GEAR HANDLE DOWN

Gear Handle . . . . VERIFY DOWN AND FORWARD

Verify GEAR handle is completely in the down and forward position by pushing down and in on the gear handle.

CONFIG Cue Switch . . . . PUSH

NOTES: The gear primary lights are adjacent to the gear handle. The gear secondary lights are on the synoptic.

Green indication of either the gear primary or secondary lights indicates the gear is down and locked.

If any gear primary light indicates unsafe, the landing gear aural warning will sound until touchdown.

FOR EACH GEAR, A PRIMARY OR SECONDARY GREEN LIGHT IS ILLUMINATED

NO

Consider the gear down and locked.

[END]

Airspeed . . . . MAX 230 KIAS

Alternate Gear Extension Lever . . . . RAISE/LATCH

(CONTINUED)

GEAR UNSAFE INDICATION WITH GEAR HANDLE DOWN

(Continued)

LEFT, RIGHT AND NOSE GEAR PRIMARY OR SECONDARY LIGHTS ARE GREEN

NO

CENTER GEAR PRIMARY OR SECONDARY LIGHT IS GREEN

NO

Nosewheel steering is restricted 25° to the right and is unrestricted to the left.

[END]

CAUTION: After alternate extension of the main gear, wait until gear is extended before next action.

NOTE: The required delay between main gear and center gear extension allows gear hydraulic system bypass to be effected, and will prevent temporary hydraulic blockage of the center gear alternate extension handle.

Center Gear Alternate Extension Handle . . . . PULL

CENTER GEAR PRIMARY OR SECONDARY LIGHT IS GREEN

NO

Nosewheel steering is restricted 25° to the right and is unrestricted to the left.

[END]

Consider maximum landing weight for center gear retracted.

[END]

Alternate Gear Extension Lever. . . . . UNLATCH/STOW

(CONTINUED)

GEAR UNSAFE INDICATION WITH GEAR HANDLE DOWN

(Continued)

Gear Handle . . . . UP

When gear is retracted,

CTR GEAR Isolation Switch . . . . UP

Gear Handle . . . . DOWN

LEFT, RIGHT AND NOSE GEAR
PRIMARY OR SECONDARY LIGHTS
ARE GREEN

NO

Consider maximum landing weight for center gear retracted.

[END]

Alternate Gear Extension Lever . . . . RAISE/LATCH

LEFT, RIGHT AND NOSE GEAR
PRIMARY OR SECONDARY LIGHTS
ARE GREEN

NO

Consider maximum landing weight for center gear retracted.

Nosewheel steering is restricted 25° to the right and is unrestricted to the left.

[END]

FLIGHT CONDITIONS AND TIME
PERMITS A LANDING GEAR VISUAL
DOWNLOCK CHECK

NO

Landing Gear Visual Downlock Indicators . . . . CHECK

NOTES: Visual downlock indicators extend above top of wing when main gear is down and locked.

(CONTINUED)

GEAR UNSAFE INDICATION WITH GEAR HANDLE DOWN

(Continued)

FLIGHT CONDITIONS AND TIME PERMITS A LANDING GEAR VISUAL DOWNLOCK CHECK

NO

(CONTINUED)

Nose gear may be checked through downlock viewing tube in forward cabin floor. Gear is locked when appropriate red markings on downlock are aligned.

VISUAL DOWNLOCK(S) INDICATE GEAR IS DOWN AND LOCKED

NO

Consider maximum landing weight for center gear retracted.

Nosewheel steering is restricted 25° to the right and is unrestricted to the left.

[END]

Do not exceed gear extension speed (260 KIAS/.70 Mach)

If nose gear is down and locked, nosewheel steering is restricted 25° to the right and is unrestricted to the left.

Refer to Abnormal Non-Alert procedure – LANDING WITH ABNORMAL LANDING GEAR CONFIGURATION.

[END]

GROUND SENSOR FAILURE

NOTES: When ground shift mechanism does not shift to flight mode, some systems will not be in normal mode.

- *Autopilot cannot be engaged.*
- *FCP functions cannot be engaged.*
- *Takeoff warning will sound when flaps or slats are retracted*
- *Auto cabin pressurization is inoperative.*
- *Air data heaters*
- *Engine 2 reverse*
- *Stall warning, stick shakers, auto slats*
- *Airfoil anti-ice*
- *Possible ground spoilers*

Normal inflight mode may be recovered for all systems by pulling ground sensing circuit breakers.

GROUND SENSING Circuit Breakers (Left and Right). . . . . PULL

(Located on left avionics circuit breaker panel.)

During approach and just prior to final approach fix,

WING and TAIL ANTI-ICE Switches . . . . VERIFY OFF

If required, push WING and TAIL ANTI-ICE switches and observe ON light is extinguished.

CABIN PRESS SYSTEM SELECT Switch . . . . MANUAL

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

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

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

NOTE: Normal engine 2 reversing and automatic cabin depressurization are not available until ground sensing circuit breakers are reset.

Upon touchdown,

Manually assist spoiler handle as it deploys.

After landing,

(CONTINUED)

GROUND SENSOR FAILURE (Continued)

GROUND SENSING Circuit Breakers (Left and Right) . . . . .RESET

CABIN PRESS SYSTEM SELECT Switch . . . . .AUTO

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

Outflow VALVE Indicator . . . . VERIFY OPEN

[END]

LANDING WITH ABNORMAL LANDING GEAR CONFIGURATION

CAUTION: Land with center gear retracted and as many other gear extended as possible.

NOTES: This procedure is based on the assumption that all methods to extend the landing gear have been unsuccessful.

If a main gear is partially or fully retracted, consideration should be given to selecting the widest runway available for landing due to the possibility of direction control difficulties.

Fly a power on approach on computed approach speed, carrying power to touchdown, if required, so as to contact the runway as gently as possible.

Complete normal approach and landing checklist and prepare for evacuation at the appropriate time.

All slide rafts will be usable with aircraft stopped in any failed landing gear configuration.

ACM(s)/Courier(s) . . . . .ALERT

Alert couriers of the emergency situation, specifying how much time is available for preparation.

Crew . . . . BRIEF

Brief cockpit crew and couriers of plans and assign specific duties to extra crewmembers.

Fuel Quantity . . . . REDUCE

Reduce fuel quantity to a minimum.

NOTE: This will reduce speed of aircraft and minimize risk of fire.

(CONTINUED)

LANDING WITH ABNORMAL LANDING GEAR CONFIGURATION (Continued)

APU START/STOP Switch . . . . VERIFY OFF

If required, push APU START/STOP switch to OFF and observe APU rpm and exhaust temperature gages show a decrease.

Loose Equipment . . . . STOW

Stow all cockpit loose equipment.

Cabin Ready Report . . . . COMPLETE

CAWS TO/LDG/CABIN ALTITUDE C/B
(Right Avionics C/B Panel) . . . . PULL

GND PROXIMITY WARN C/B
(Right Avionics C/B Panel) . . . . PULL

AUTO BRAKE Selector . . . . OFF

Plan a 50/EXT landing, normal approach and flare.

NOSE GEAR PARTIALLY OR FULLY RETRACTED

NO

Spoiler Handle . . . . ARM

Make a normal approach and touchdown.

At touchdown,

Stabilizer Trim . . . . TRIM TO NOSE UP

At touchdown begin actuating stabilizer trim to NOSE UP to assist in holding nose off runway.

Gently lower nose before losing elevator effectiveness.

After nose contact, maintain directional control with rudder and differential braking.

Do not use reverse thrust.

FUEL Switches 1 and 3 . . . . OFF

[END]

(CONTINUED)

LANDING WITH ABNORMAL LANDING GEAR CONFIGURATION (Continued)

NOSE GEAR EXTENDED AND BOTH MAIN GEAR PARTIALLY OR FULLY RETRACTED

NO

Do not arm spoilers.

Make normal approach and flare.

After touchdown,

Maintain wings level attitude and maintain directional control as long as possible with rudder, nosewheel steering and thrust (if available).

Do not use reverse thrust.

FUEL Switches 1 and 3 . . . . OFF

[END]

ONE MAIN GEAR PARTIALLY OR FULLY RETRACTED

NO

Do not arm spoilers.

Make a normal approach and flare.

After touchdown,

Maintain pitch attitude of 6° to 8° while holding wings level until nearly all lateral control is used.

NOTE: This will be the minimum practical speed to lower wing to the ground (while maintaining pitch attitude).

Promptly lower nosewheels to the runway.

After wing is on ground (pod contacts runway), extend ground spoilers to aid in deceleration.

Do not use reverse thrust on engine 2, or on the side with the abnormal gear.

Associated FUEL Switch . . . . OFF

(CONTINUED)

LANDING WITH ABNORMAL LANDING GEAR CONFIGURATION (Continued)

ONE MAIN GEAR PARTIALLY OR FULLY RETRACTED

NO

(CONTINUED)

Maintain directional control by using opposite engine reverse thrust, brakes, and nosewheel steering.

[END]

ONE MAIN GEAR AND NOSE GEAR PARTIALLY OR FULLY RETRACTED

NO

Do not arm spoilers.

Make a normal approach and flare.

At touchdown,

Stabilizer Trim. . . . . TRIM TO NOSE UP

At touchdown begin actuating stabilizer trim to NOSE UP to assist in holding nose off runway.

After touchdown,

Maintain pitch attitude of 6° to 8° while holding the wings level until nearly all lateral control is used.

NOTE: This will be the minimum practical speed to lower the wing to the ground (while maintaining pitch attitude).

Gently lower wing and nose to runway before control is lost.

Do not use reverse thrust.

As the engine pod contacts runway,

Associated FUEL Switches . . . . OFF

Maintain directional control using brakes and rudder.

[END]

(CONTINUED)

LANDING WITH ABNORMAL LANDING GEAR CONFIGURATION (Continued)

ALL GEAR RETRACTED OR PARTIALLY EXTENDED

NO

Do not arm spoilers

NOTES: Aircraft will touchdown on aft fuselage and engine pods.

Anticipate a lower than normal cockpit elevation with respect to runway at touchdown because of lack of landing gear.

Do not use reverse thrust.

As soon as aircraft contacts runway,

FUEL Switches . . . . OFF

[END]

[END]

NO FLAP/NO SLAT LANDING

Reduce gross weight to lowest practicable.

NOTE: When dumping fuel to obtain lowest practicable gross weight, maximum tire speed of 204 knots should be considered.

UP/RET ESTIMATED LANDING DISTANCES (METERS)
NO FLAP/NO SLAT LANDING

General Electric CF6-80C2 Engines

WEIGHT (1000 KG)		160	170	180	190	200	210	220	230
S.L.	**DRY**	2250	2390	2530	2670	2820	2950	3100	3240
STD=15°C	**WET**	2750	2910	3070	3230	3390	3540	3700	3860
2000 FT	**DRY**	2400	2560	2710	2870	3030	3170	3340	3490
STD=11°C	**WET**	2930	3110	3280	3460	3630	3800	3970	4140
4000 FT	**DRY**	2570	2750	2910	3090	3260	3420	3610	3780
STD=7°C	**WET**	3140	3330	3520	3710	3900	4080	4270	4460
6000 FT	**DRY**	2770	2960	3140	3340	3530	3710	3910	4100
STD=3°C	**WET**	3370	3590	3790	4000	4210	4400	4610	4810
8000 FT	**DRY**	2990	3200	3400	3620	3840	4040	4260	4480
STD=–1°C	**WET**	3630	3870	4090	4310	4550	4750	4990	5210
10000 FT	**DRY**	3240	3480	3700	3940	4190	4410	4680	4990
STD=–5°C	**WET**	3930	4180	4420	4680	4930	5160	5430	5750

NOTE: Standard day, no wind, zero slope, two engines at maximum reverse thrust to 80 KIAS, then reverse idle to 60 KIAS, then forward idle to stop. Tail engine at idle reverse (includes Air Run Distances).

CORRECTIONS:

Temperature: Valid from STD –20°C to STD +40°C		
METERS PER °C	**DRY**	**WET**
BELOW standard day	–8	–9
ABOVE standard day	+26	+28

(CONTINUED)

NO FLAP/NO SLAT LANDING (Continued)

Slope: Valid from –2% downhill +2% uphill		
METERS PER 1% SLOPE	**DRY**	**WET**
UPHILL	–42	–70
DOWNHILL	+229	+316

Wind: Valid from –10-knot tailwind +20-knot headwind		
METERS PER KNOT	**DRY**	**WET**
HEADWIND	–17	–22
TAILWIND	+70	+77

Plan a wide pattern for speed stabilization on final.

GPWS Switch . . . . FLAP OVRD

NOTE: In OVRD, ground proximity warning is disabled as a result of flaps not in landing range. All other functions of ground proximity warning system remain functional.

AUTO BRAKE Selector . . . . OFF

NOTE: Auto brake landing mode will be inoperative.

Perform appropriate normal checklist.

After stabilization on approach, reduce speed in level flight until approach speed is achieved.

UP/RET APPROACH SPEEDS
NO FLAP/NO SLAT LANDING

WEIGHT (1000 KG)	160	170	180	190	200	210	220	230
Vapp (Vref +5)	192	198	203	209	215	220	225	230

NOTE: In the NO FLAP/NO SLAT configuration, the go-around switch provides go-around thrust limits only without autopilot, autothrottles, or flight director guidance. Autoflight and autothrottles must be controlled by the GCP during the approach. Autothrottles will maintain speed, but must be disconnected and retarded manually below 50 feet AGL.

Fly approach using ATS, if available, at Vref + 5.

Fly a normal glideslope.

Disconnect autothrottles prior to 50 feet or approaching the threshold.

(CONTINUED)

NO FLAP/NO SLAT LANDING (Continued)

Retard throttles to idle and fly no slower than Vref to touchdown with a slight flare.

Do not attempt to achieve a smooth touchdown.

On touchdown, positively lower nose gear to runway and immediately apply full reverse thrust and brakes as required.

NOTE: Spoilers will not deploy until nose gear touchdown.

Full reverse thrust may be used to a complete stop.

[END]

NO FLAP/SLAT EXTENDED LANDING

Reduce gross weight as desired.

0/EXT APPROACH SPEEDS
NO FLAP/SLAT EXTENDED LANDING

WEIGHT (1000 KG)	160	170	180	190	200	210	220	230
Vapp (Vref + 15)	167	172	176	181	185	189	193	197

0/EXT ESTIMATED LANDING DISTANCES (METERS)
NO FLAP/SLAT EXTENDED LANDING

General Electric CF6-80C2 Engines

WEIGHT (1000 KG)		160	170	180	190	200	210	220	230
S.L.	**DRY**	1700	1790	1880	1980	2080	2170	2280	2390
STD=15°C	**WET**	2120	2230	2340	2460	2580	2690	2810	2940
2000 FT	**DRY**	1800	1910	2010	2110	2230	2330	2440	2550
STD=11°C	**WET**	2260	2380	2500	2620	2760	2880	3010	3140
4000 FT	**DRY**	1920	2030	2140	2260	2380	2490	2620	2740
STD=7°C	**WET**	2400	2540	2670	2800	2950	3080	3220	3370
6000 FT	**DRY**	2050	2180	2300	2420	2560	2680	2820	2960
STD=3°C	**WET**	2570	2710	2860	3010	3170	3310	3460	3620
8000 FT	**DRY**	2200	2330	2470	2610	2760	2890	3050	3200
STD=–1°C	**WET**	2750	2910	3070	3230	3400	3560	3730	3910
10000 FT	**DRY**	2360	2510	2660	2810	2990	3160	3360	3580
STD=–5°C	**WET**	2960	3130	3300	3480	3670	3870	4090	4330

NOTE: Standard day, no wind, zero slope, two engines at maximum reverse thrust to 80 KIAS, then reverse idle to 60 KIAS, then forward idle to stop, tail engine at idle reverse (includes Air Run Distances).

CORRECTIONS:

Temperature: Valid from STD –20°C to STD +40°C		
METERS PER °C	**DRY**	**WET**
BELOW standard day	–5	–7
ABOVE standard day	+19	+20

(CONTINUED)

NO FLAP/SLAT EXTENDED LANDING (Continued)

Slope: Valid from –2% downhill +2% uphill		
METERS PER 1% SLOPE	**DRY**	**WET**
UPHILL	–30	–56
DOWNHILL	+163	+238

Wind: Valid from –10-knot tailwind +20-knot headwind		
METERS PER KNOT	**DRY**	**WET**
HEADWIND	–14	–19
TAILWIND	+60	+65

NOTE: Speeds are Vref + 15 to preclude tail strike.

GPWS Switch . . . . .FLAP OVRD

AUTO BRAKE Selector . . . . OFF

Perform appropriate normal checklists.

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

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

On touchdown, positively lower nose gear to runway and immediately apply full reverse thrust and brakes as required.

NOTE: Auto ground spoilers will not deploy until nose gear touchdown.

Full reverse thrust may be used to a complete stop.

[END]

ONE ENGINE DRIVEN GENERATOR OPERATING

AC Load. . . . . CHECK

Observe AC load on operating generator.

If required, reduce non-essential electrical load.

APU/APU GENERATOR AVAILABLE

NO

If flight conditions permit,

Start APU. Refer to Supplemental Procedures, ENG/APU - APU INFLIGHT OPERATION.

When APU start is complete,

APU GENERATOR OPERATING NORMALLY

NO

No further crew action required.

[END]

Land at nearest suitable airport.

[END]

SEVERE DAMAGE TO COCKPIT OVERHEAD STRUCTURE

This procedure is to be used any time the cockpit overhead structure is struck by a foreign object.

NOTE: A severe blow to the fuselage structure in the area of the cockpit overhead could result in a loss of all primary electrical power, and all hydraulic power, and all hydraulic system status indications on the EAD and/or hydraulic system display (synoptic) and/or HYD control panel (forward overhead panel).

HYD Cue Switch . . . . PUSH

SYNOPTIC LINES OR SYSTEM PRESSURE DISPLAYED AND INDICATE NORMAL OPERATION OF HYDRAULIC PUMPS

NO

No further action required.

[END]

ADG. . . . . DEPLOY

ENG HYD PUMPS Control Left and Right
Circuit Breakers (Left Overhead). . . . . PULL

NOTE: Removing electrical power from ENG HYD PUMPS control will cause the associated engine driven hydraulic pumps to come on.

ADG ELEC Switch. . . . . ON

NOTE: If electric power is not available, engine 2 may flame out.

CAUTION: Do not dump fuel. If necessary, perform an overweight landing.

[END]

SEVERE TURBULENCE AND/OR HEAVY RAIN INGESTION

NOTE: In areas of turbulence, fly the FMS optimum altitude when possible. Buffet margin and economy will be enhanced. Descend if necessary to improve buffet margin.

Turbulence,
Penetration Speed . . . . 290 TO 305 KIAS OR .80 TO .82 MACH, WHICHEVER RANGE IS LOWER

NOTE: Below 10,000 feet, the greater of 250 KIAS or CLIMB SPEED may be used.

ENG IGN OVRD Switch. . . . . OVRD ON

Push ENG IGN OVRD switch and observe OVRD ON light illuminates.

Auto Throttles . . . . OFF

Push either ATS disconnect switch and observe the ATS OFF display on the PFD.

NOTE: Adjust throttles only if necessary to correct excessive airspeed variation or to avoid exceeding redline limits. Do not chase airspeed.

(CONTINUED)

SEVERE TURBULENCE AND/OR HEAVY RAIN INGESTION (Continued)

Autopilot . . . . MONITOR

Use the autopilot in turbulence. Closely monitor autopilot operation and be prepared to disconnect the autopilot only if the aircraft does not maintain an acceptable attitude. If the autopilot disconnects, the pilot should smoothly take control and stabilize the pitch attitude. Fly attitude as the primary pitch reference. Sacrifice altitude to maintain attitude. Disregard the flight director pitch bar. Do not trim manually. After recovery, the autopilot should be reengaged if available. If the autopilot is engaged outside the capture zone of the FCP altitude, a new altitude will be automatically commanded and smoothly captured.

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.

(CONTINUED)

SEVERE TURBULENCE AND/OR HEAVY RAIN INGESTION (Continued)

<u>WARNING:</u> Applying 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.

ANTI-ICE SYSTEM Switch . . . . MANUAL

Push ANTI-ICE SYSTEM switch and observe MANUAL light illuminates.

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

ECON Switch. . . . . OFF

Push ECON switch and observe OFF light illuminates.

NOTE: Increasing the compressor bleed air demand increases the compressor stall margin thereby decreasing the possibility of compressor stall.

When severe turbulence and/or heavy rain no longer exist,

ECON Switch. . . . . ON

Push ECON switch and observe OFF light extinguishes.

(CONTINUED)

SEVERE TURBULENCE AND/OR HEAVY RAIN INGESTION (Continued)

ANTI-ICE SYSTEM Switch . . . . .AUTO

Push ANTI-ICE SYSTEM switch and observe MANUAL light extinguishes.

Observe ENG, WING and TAIL ANTI-ICE ON lights are no longer illuminated on the anti-ice control panel.

Auto Throttles . . . . ON

Push AUTO FLIGHT switch on FCP and observe ATS OFF is no longer displayed on PFD.

ENG IGN OVRD Switch . . . . OVRD OFF

Push ENG IGN OVRD switch and observe OVRD ON light extinguishes.

[END]

SMOKE/FUMES REMOVAL

Oxygen Masks ON/100%

Don smoke goggles as required.

Use emergency oxygen pressure as required to purge mask and goggles of smoke and/or fumes.

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

ECON Switch . . . . OFF

Push ECON switch and observe OFF light illuminates.

Cockpit Air Outlets . . . . OPEN

Descend to 10,000 feet (terrain permitting).

CABIN PRESS Control Panel . . . . SYSTEM MANUAL/CLIMB

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

Rotate CABIN PRESS manual rate selector to climb.

Establish cabin rate at 1,000 to 2,000 fpm up.

NOTES: “CABIN ALTITUDE” alert will be displayed.

“CABIN RATE” alert may be displayed if greater than 1,500 fpm climb is exceeded.

When depressurized,

Set outflow VALVE indicator to 10:30 position.

COCKPIT SMOKE SEVERE

NO

Configure aircraft as required to maintain 205 KIAS or minimum maneuvering speed whichever is lower.

Headsets . . . . ON

NOTE: When clearview window is open, communications will be difficult unless headsets are used.

(CONTINUED)

SMOKE/FUMES REMOVAL (Continued)

COCKPIT SMOKE SEVERE

NO

(CONTINUED)

PNF Clearview Window . . . . OPEN 3 INCHES

NOTE: Windows may be closed and opened periodically for noise abatement and smoke removal. Observe speed limitations.

Land at nearest suitable airport.

NOTE: After the mask is restowed into the box and doors are shut, pushing the PRESS TO TEST AND RESET lever will stop the flow of oxygen to the mask, reset the microphone from mask to boom and retract the OXY ON FLAG.

[END]

STABILIZER INOPERATIVE

AIRCRAFT IN TRIM WITH LANDING FLAPS SET

NO

Land with existing flap/slat setting.

[END]

ELEV FEEL Selector . . . . PULL, ROTATE AS NECESSARY

Slew elevator feel reference speed on CONFIG synoptic page to desired speed. Update as required.

SLATS AVAILABLE

NO

Plan a 35/EXT approach and landing.

Determine stabilizer inoperative speed additive from following table and add to Vapp, not to exceed Vref + 25.

STABILIZER INOPERATIVE SPEED ADDITIVE 35/EXT

STABILIZER SETTING (DEG)	CENTER OF GRAVITY (% MAC)						
	12	14	16	18	20	22	23 to 34
	SPEED ADDITIVE (KIAS)						
1 AND	20	20	17	12	8	5	0
0	20	16	12	7	5	0	0
1 ANU	16	11	7	5	0	0	0
2 ANU	11	7	5	0	0	0	0
3 ANU	7	5	0	0	0	0	0
4 ANU	5	0	0	0	0	0	0
5 to 16 ANU	0	0	0	0	0	0	0

NOTES: If stabilizer and/or CG is unknown, add 20 knots to normal Vapp, not to exceed Vref + 25.

Landing distance will increase approximately 1% for each 1 knot added to Vref.

(CONTINUED)

STABILIZER INOPERATIVE (Continued)

SLATS AVAILABLE

NO

(CONTINUED)

Maintain adjusted Vapp until touchdown.

NOTE: If go-around is required, use normal procedure, but do not allow speed to go below adjusted Vapp.

[END]

Plan a 28/RET approach and landing.

GPWS Switch . . . . .FLAP OVRD

[END]

START VALVE LIGHT ILLUMINATED AFTER START OR IN FLIGHT

ASSOCIATED ENG START SWITCH EXTENDED

NO

ENG START Switch . . . . PUSH IN

START VALVE LIGHT EXTINGUISHED

NO

No further crew action required.

[END]

AIR SYSTEM SELECT Switch . . . . MANUAL

Push AIR SYSTEM SELECT switch and observe MANUAL light illuminates.

Associated BLEED AIR Switch . . . . OFF

Push associated BLEED AIR switch and observe OFF light illuminates.

Associated ISOL Switch(es) . . . . OFF

Push associated ISOL switch(es) and observe ON light(s) extinguishes.

AIRCRAFT ON GROUND

NO

AIR APU Switch/External Air . . . . OFF/AS REQD

If required, push AIR APU switch and observe ON light extinguishes or request ground personnel to shut off external air supply.

(CONTINUED)

START VALVE LIGHT ILLUMINATED AFTER START OR IN FLIGHT (Continued)

AIRCRAFT ON GROUND

NO

(CONTINUED)

Verify all air sources to associated starter are off.

Associated FUEL Switch . . . . OFF

Call maintenance.

NOTE: For engine restart, refer to Supplemental procedure – STARTER VALVE MANUAL OPERATION.

[END]

Do not repressurize affected pneumatic system unless necessary.

Avoid icing conditions.

[END]

TAILPIPE FIRE

CAUTION: Tailpipe fires are not displayed in the cockpit. The first notification of a tailpipe fire may be from an external source. Discharging the engine fire extinguishing agent will not extinguish the fire. If the fire cannot be extinguished by motoring or if motoring is not possible, the use of ground fire fighting equipment may be required.

FUEL Switch . . . . OFF

STARTER DISENGAGED

NO

Allow N2 rpm to decrease to 30% or less.

Verify IGN A or B is selected.

ENG START Switch . . . . PULL

Pull ENG START switch and observe light illuminates.

After fire is extinguished,

ENG START Switch. . . . . .PUSH

Push ENG START switch in and observe light extinguishes.

Call maintenance.

[END]

VOLCANIC ASH

NOTES: Volcanic ash can cause abnormal system operation such as engine and/or airspeed malfunctions.

These procedures should be used in the event of inadvertent flight into a volcanic ash cloud and during ground operations in volcanic ash and dust conditions. They are intended to maximize engine surge protection and to decrease engine EGT.

Lower EGT values will slow or eliminate further accretion of molten volcanic ash material in the engine hot section, particularly on the Nozzle Guide Vanes (NGVs). Accretion on the NGVs can lead to compressor stalls, EGT exceedences or engine flameout, and may require that engine(s) be shutdown. Should shutdown and restart be necessary, delaying restart for 15 to 30 seconds will allow accreted ash material to cool and may promote the shedding of that material from the NGVs, increasing the likelihood of a successful relight.

Indications when entering a volcanic ash cloud may be a decrease in N1, N2, fuel flow and an increase in EGT, possible engine surges, torching from the tailpipe and engine flameout. Physical evidence may be smoke or dust in the cockpit or odor similar to electrical smoke.

At night, heavy static discharges (St. Elmo's Fire) may be visible around the windshields. The landing lights will cast sharp distinct shadows.

Do not rely on weather radar to detect and display the presence of volcanic ash and dust. Airborne weather radar systems on commercial aircraft are not capable of detecting very small ash and dust particles.

Volcanic ash and dust may not be visible at night or in Instrument Meteorological Conditions (IMC).

Fly on the upwind side of the ash cloud. If an ash cloud is inadvertently entered, exit immediately via the shortest route at the lowest practical thrust setting.

(CONTINUED)

VOLCANIC ASH (Continued)

During prolonged exposure to ash-laden air, use the crew oxygen system (100%) when there is evidence of sulfur odor from the air conditioning system or of volcanic dust in the cockpit.

As soon as practical after discovering volcanic activity, make a pilot report. Transmit all available information concerning location, altitude, and drift direction of the ash cloud to ATC. Transmit to ATC the information requested in sections 1 through 8 of the ICAO Volcanic Activity Report. Log the information on the form. Complete sections 9 through 16 as crew duties permit. Submit the completed form to airline operations at the next landing.

Communications difficulties may be experienced due to electrostatic conditions.

If a volcanic ash cloud is inadvertently entered during flight, depart the area by the shortest route possible. Consider a descending 180 degree turn.

Do not use windshield wipers.

NOTE: Use of windshield wipers for ash or dust removal will result in minute scratches on the windshield. These will create a blossoming effect at night and could make landing approach difficult.

CAUTION: If airspeed indications are abnormal, refer to Emergency Non-Alert procedure – AIRSPEED: LOST, SUSPECT OR ERRATIC for pitch guidance information.

NOTES: Airspeed indications may be erratic and unreliable or a complete loss of airspeed indication may occur.

Avoid rapid throttle movements if possible.

If compressor and/or turbine blades have been eroded, an increase in fuel flow and EGT may be noticed.

Perform the following actions as rapidly as possible:

Autothrottles. . . . . DISENGAGE

Throttles (All) . . . . .IDLE

ENG IGN OVRD Switch. . . . . OVRD ON

ECON Switch. . . . . OFF

ANTI-ICE SYSTEM MANUAL Switch . . . . MANUAL

(CONTINUED)

VOLCANIC ASH (Continued)

ENG ANTI-ICE Switches. . . . . ON

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

NOTE: Decreasing EGT will reduce debris buildup on the turbine blades and hot section, and significantly reduce damage to the compressor section and blade tips due to erosion.

ENGINE(S) FLAMED OUT OR STALLED, OR EGT BEYOND LIMITS OR INCREASING RAPIDLY TOWARD LIMITS

NO

FUEL Switch (Affected Engine[s]) . . . . OFF

Time and conditions permitting, leave fuel switch in the OFF position for 15 to 30 seconds to allow engine to cool.

NOTE: Allowing engine hot section to cool before restart may enhance shedding of accreted molten volcanic ash material from Nozzle Guide Vanes.

N2 RPM LESS THAN 15%

NO

ENG START Switch. . . . . PULL

FUEL Switch (Affected Engine[s]) . . . . ON

Monitor start.

NOTES: Engines accelerate to idle very slowly at high altitudes. This may be incorrectly interpreted as a hung start or an engine malfunction not caused by volcanic ash.

If an engine fails to start, repeated attempts should be made immediately. A successful start may not be possible until clear of volcanic ash cloud and airspeed and altitude are within the normal range.

(CONTINUED)

VOLCANIC ASH (Continued)

ENGINE(S) FLAMED OUT OR STALLED, OR EGT BEYOND LIMITS OR INCREASING RAPIDLY TOWARD LIMITS

NO

(CONTINUED)

Consider starting APU, if available. The APU can be used to power the electrical system in the event of multiple engine loss.

Land at nearest suitable airport.

NOTES: A precautionary landing should be made if damage has occurred to the aircraft or abnormal engine operation was observed while operating in the ash cloud.

The abrasive effects of volcanic ash on windshields and landing lights may significantly decrease visibility for approach and landing.

For ground operations in volcanic ash or dust conditions, review the following notes.

NOTES: Discontinue bleed air use when reverser operation is imminent.

Limit use of reverse thrust to prevent ingestion of volcanic ash into engines and to prevent further reduction of visibility.

Maintain a greater than normal separation from other aircraft while taxiing. Use caution when taxiing – limit thrust operation to the minimum required to taxi.

Use all engines during taxi. Taxi at low speed. Whenever possible, avoid operating the engines above idle.

Limit braking. The presence of volcanic ash or dust will increase brake wear. A light layer of ash or dust on the taxiway or runway may reduce tire adhesion.

(CONTINUED)

VOLCANIC ASH (Continued)

Volcanic ash or dust-covered taxiways or runways, especially if wet, will reduce braking efficiency.

Avoid use of air conditioning while on the ground. If dust is visible and air conditioning use is necessary, operate air conditioning at full cold setting.

Ash or dust deposits should be hosed off the windshield with water. Any ash or dust residue should be removed with a clean cloth.

Verify pitot and static ports are free of ash or dust.

Inspect all ventilation scoops and inlets and ensure they are clear of ash or dust accumulations.

Check engine inlets for acoustic panel dust coating.

Do not takeoff into or in the area of an ash cloud.

Limit use of the APU to engine start.

Prior to takeoff, allow ash and dust to settle. Ramp, taxiways and runway should be swept.

A rolling takeoff should be used. Whenever possible, avoid setting high thrust at low speed. Do not take off with packs on.

[END]

WINDSHIELD/CLEARVIEW/AFT WINDOW CRACKED OR ARCING

WINDSHIELD CRACKED AND/OR ARCING

NO

Associated WINDSHLD ANTI-ICE Switch . . . . OFF

Push associated WINDSHLD ANTI-ICE switch and observe ON light is extinguished.

ARCING CONTINUES

NO

WINDSHLD DEFOG Switch . . . . OFF

Associated WINDSHLD DEFOG C/B . . . . PULL

Pull associated WINDSHLD DEFOG circuit breaker (left avionics C/B panel) for failed windshield.

After associated WINDSHLD DEFOG circuit breaker has been pulled,

WINDSHLD DEFOG Switch . . . . ON

Push WINDSHLD DEFOG switch and observe OFF light extinguishes.

CLEARVIEW OR AFT WINDOW CRACKED AND/OR ARCING

NO

WINDSHLD DEFOG Switch . . . . OFF

(CONTINUED)

WINDSHIELD/CLEARVIEW/AFT WINDOW CRACKED OR ARCING (Continued)

CLEARVIEW OR AFT WINDOW
CRACKED AND/OR ARCING

NO

(CONTINUED)

Associated CLEARVIEW
or AFT WINDOW DEFOG C/B . . . . PULL

Pull associated CLEARVIEW or AFT WINDOW DEFOG circuit breaker (left avionics C/B panel) for failed window.

After associated CLEARVIEW or AFT WINDOW DEFOG circuit breaker has been pulled,

WINDSHLD DEFOG Switch . . . . ON

Push WINDSHLD DEFOG switch and observe OFF light extinguishes.

Monitor damaged unit.

NOTES: All cockpit windshields, clearview and aft windows can withstand full pressurization with one pane cracked.

If both windshields are cracked or were arching, avoid known or forecast icing conditions.

[END]

Intentionally
Blank

Level 1/0 Alerts — Chapter A

Table of Contents — Section 0

Intentionally
Blank

LEVEL 1 AND LEVEL 0 ALERTS

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 LEVEL 1 ALERTS” 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:

1. 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.

2. Level 1 alerts 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 illuminated 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 cue switch when time and condition permit. This will display the synoptic and reset the flashing reminder message.

(CONTINUED)

LEVEL 1 AND LEVEL 0 ALERTS (Continued)

3. Level 1 alerts 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.

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:

(CONTINUED)

LEVEL 1 AND LEVEL 0 ALERTS (Continued)

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 alerts are associated with more than one action code; i.e., one code may apply with the system in manual, while another applies with the system in auto.

Some level 1 alerts have associated consequence statements on the system synoptic display. These consequences are listed under the CONSEQUENCE(S) DESCRIPTION column when they apply. The word NONE indicates that no electronic consequence is presented with the associated alert. However, crew action may still be required.

Some alerts are the result of a temporary condition. QRH checklists, procedures, or other actions may resolve the condition and result in removal of the alert. Action codes, CONSEQUENCES, descriptions, etc., do not apply when an alert is no longer displayed.

Intentionally
Blank

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 (AFSC). System operation may be affected.
A-ICE SENSOR FAIL	MAINT	Consequences: DEPART ICING AREA Airfoil anti-ice system monitoring has failed. With this monitor failure, detection and alerting is not provided for wing/tail anti-ice manifold failure or wing/tail anti-ice disagree. Wing and tail surface anti-icing may be inoperative. Avoid icing area. If in icing conditions, depart icing area. As soon as practical, select wing/tail anti-ice to OFF.
A-ICE SYS MANUAL	MAINT SW	Consequences: NONE The automatic anti-ice system has reverted to MANUAL because of a fault or has been selected to MANUAL by the flight crew. The automatic anti-ice system will revert to MANUAL if the AIR system is selected to MANUAL.

ALERT	CODE	CONSEQUENCE(S) DESCRIPTION
A-ICE TEST FAIL	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	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.

ALERT	CODE	CONSEQUENCE(S) DESCRIPTION
AIR SYS 1 OFF	MAINT SW	Consequences: IF MANF FAILED DO NOT REPRESSURZE 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 REPRESSURIZE TAIL ANTI-ICE NOT AVAILABLE FLAP 35 FOR LDG IF ICE SUSPECTED NO AFT/CTR CARGO 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 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.

ALERT	CODE	CONSEQUENCE(S) DESCRIPTION
AIR SYS 3 OFF	MAINT SW	Consequences: 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	SW	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 (AOA) probe heater has failed.
APU AUTO SHUTDOWN	MAINT	Consequences: RESTART FROM APU PANEL ONLY The auxiliary power unit (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.

ALERT	CODE	CONSEQUENCE(S) DESCRIPTION
APU FAULT	MAINT	Consequences: NONE There is a fault in the APU control circuit. APU operation may not be affected.
APU FIRE AGENT LO	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.

ALERT	CODE	CONSEQUENCE(S) DESCRIPTION
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 the cooling flow goes below normal or if manually selected ON by the flight crew.

ALERT	CODE	CONSEQUENCE(S) DESCRIPTION
AVNCS NOSE WHL DR	MAINT	Consequences: NONE The external avionics nose wheel access door is not closed and latched.
BALST SW/FMS XCHK	MAINT SW	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 DISCHARGING	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 Associated engine bleed valve is closed with associated air system pressurized from 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.

ALERT	CODE	CONSEQUENCE(S) DESCRIPTION
BUS AC 1 OFF	NO T/O	Consequences: GPWS INOPERATIVE AUTO GROUND SPOILERS INOPERATIVE AC BUS 1 is unpowered or the associated sensing circuit has failed.
BUS AC 2 OFF	NO T/O	Consequences: NONE AC BUS 2 is unpowered or the associated sensing circuit has failed.
BUS AC 3 OFF	NO T/O	Consequences: AUTO EXTENSION INOPERATIVE AC BUS 3 is unpowered or the associated sensing circuit has failed.
BUS AC GND OFF	NO T/O	Consequences: NONE AC ground service bus is unpowered or the associated sensing circuit has failed.
BUS DC 1 OFF	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	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	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 BRAKES INOP DC BUS 3 is unpowered or the associated sensing circuit has failed.

ALERT	CODE	CONSEQUENCE(S) DESCRIPTION
BUS DC CABIN OFF	NO T/O	Consequences: NONE DC CABIN BUS is unpowered or the associated sensing circuit has failed.
BUS DC GND OFF	NO T/O	Consequences: NONE DC GROUND SERVICE BUS is unpowered or the associated sensing circuit has failed.
BUS R EMER AC OFF	NO T/O	Consequences: NONE RIGHT EMERGENCY AC BUS is unpowered or the associated sensing circuit has failed.
BUS R EMER DC OFF	NO T/O	Consequences: NONE RIGHT EMERGENCY DC BUS is unpowered or the associated sensing circuit has failed.
CAB AIR NOT OFF	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 PRES SYS MAN	SW	Consequences: MAX CABIN DP FOR LANDING 0.5 PSI The cabin pressurization system is in manual mode.
CABIN AIR OFF	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 DOOR___ (AFT L, FWD L, FWD R)	MAINT SW	Consequences: NONE The respective main cabin passenger door is not closed and armed.

ALERT	CODE	CONSEQUENCE(S) DESCRIPTION
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 exceeds limits (approximately 1500-fpm climb or 750-fpm descent).
CAC AIR FLO OFF	MAINT	Consequences: POSSIBLE AVIONIC FAILURE ON GND All center accessory compartment (CAC) fans are inoperative.
CAC DOOR	MAINT	Consequences: NONE The CAC 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 FLO 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.

ALERT	CODE	CONSEQUENCE(S) DESCRIPTION
CAWS FAULT	MAINT	Consequences: NONE Some functions of the central aural warning system (CAWS) 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 FMS. Confirm fuel load and assure correct data is entered.
COLD FUEL RECIRC	N/A	Consequences: NONE The fuel system controller (FSC) 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 3°C of the freeze point, the “FUEL TEMP LO” alert will be displayed.
CPC FAULT	MAINT	Consequences NONE: One of the two cabin pressure controllers is inoperative.
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 cargo 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 cargo compartment ventilation flow is in disagreement with the commanded position of the of the switch on the cargo fire panel.

ALERT	CODE	CONSEQUENCE(S) DESCRIPTION
CRG TEMP CTL OFF	SW	Consequences: NONE On or more of the CARGO TEMPERATURE control selectors are set in the OFF position. If 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 display electronics unit (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.
DFDAU FAULT	MAINT	Consequences: NONE Some or all digital flight data recorder (DFDR) parameters are not being recorded.
DFDR OFF	MAINT N/A	Consequences: NONE The DFDR 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.

ALERT	CODE	CONSEQUENCE(S) DESCRIPTION
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	One or more aircraft cabin doors are not closed and armed, or one or more cargo or external access doors (including the tail cone/number 2 engine service platform (patio) doors for those aircraft with Service Bulletin 52-12 incorporated) are not closed and latched.
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)	MAINT	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.)

ALERT	CODE	CONSEQUENCE(S) DESCRIPTION
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 OFF	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	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 FAULT (1, 2, 3)	MAINT	Consequences: NONE The FADEC has detected an internal fault or loss of redundancy. Engine operation is not affected.
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.

ALERT	CODE	CONSEQUENCE(S) DESCRIPTION
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: 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)	MAINT	Consequences: NONE The respective engine nacelle temperature is significantly higher than that of the other two engines.
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.
ENGINE__VIB HI (1, 2, 3)	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.

ALERT	CODE	CONSEQUENCE(S) DESCRIPTION
FADEC__B/U PWR (1, 2, 3)	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	MAINT	Consequences: NONE One of the two fire detector loops on the APU is inoperative. Fire detection capability is not affected.
FIRE DET__FAULT (1, 2, 3)	MAINT	Consequences: NONE One of the two fire detector loops on the respective engine 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.

ALERT	CODE	CONSEQUENCE(S) DESCRIPTION
FSC CONFIG	NO T/O	Consequences: NONE The fuel system controller (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 CONTAMINATED	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 FSC 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.

ALERT	CODE	CONSEQUENCE(S) DESCRIPTION
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 3°C 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.
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	MAINT	Consequences: SELECT ANY ND TO WXR The ground proximity and terrain awareness functions have failed. Select WXR on either ND.

ALERT	CODE	CONSEQUENCE(S) DESCRIPTION
GPWS FAULT	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 taken action to declare a hydraulic system component inoperative. The auto controller will reconfigure around the inoperative component in auto mode.
HYD__OFF (1, 2, 3)	NO T/O	Consequences: HYD SYS MAY BE USED FOR APPR & LDG AP1 PITCH TRIM INOP, USE AP2 (sys 3 only) The respective hydraulic system has been turned off. In auto, the hydraulic system controller (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.

ALERT	CODE	CONSEQUENCE(S) DESCRIPTION
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 hydraulic preflight engine-driven pump 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.
HYD__RMP DISAG (1-3, 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 HSC 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.

ALERT	CODE	CONSEQUENCE(S) DESCRIPTION
ICE DETECTED	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	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	MAINT	Consequences:USE VISUAL CUES FOR ICE CONDITIONS Both channels of the dual ice detection system are inoperative. Automatic anti-ice is inoperative. The crew is required to use visual means of detecting ice.
ICE DET SINGLE	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 REMAINS 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.

ALERT	CODE	CONSEQUENCE(S) DESCRIPTION
IRU OFF	SW	Consequences: NONE One or more of the inertial reference unit mode selectors 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.
LDG ALTITUDE MAN	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 DETECTED	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 exceeds allowable limits to open doors while aircraft is on ground.

ALERT	CODE	CONSEQUENCE(S) DESCRIPTION
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 environmental system controller (ESC) due to a fault or configuration requirement.
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	MAINT	Consequences: NONE The weather radar predictive windshear function has failed, or data from the weather radar is not valid.
PRED WSHEAR FAULT	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.

ALERT	CODE	CONSEQUENCE(S) DESCRIPTION
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	MAINT	Consequences: NONE Roll control wheel steering (CWS) 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.

ALERT	CODE	CONSEQUENCE(S) DESCRIPTION
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	Consequences: 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 MAN” 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 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.

ALERT	CODE	CONSEQUENCE(S) DESCRIPTION
SEL HYD SYS MAN	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	NO T/O	Consequences: NONE The SLAT MACH INHIBIT relay is preventing slats from extending (electrically controlled slats).

ALERT	CODE	CONSEQUENCE(S) DESCRIPTION
SLAT STOW	NO T/O SW	Consequences: NONE The SLAT STOW switch is activated (electrically controlled slats).
SMOKE SW IN USE	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 FSC 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	MAINT	Consequences: CRUISE PERFORMANCE 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 FSC has detected a fault in the respective tail tank transfer pump and turned the pump off.
TANK__PUMPS LO (1, 2, 3)	NO T/O	Consequences: NONE All the boost pumps in the respective main fuel tank have low pressure.

ALERT	CODE	CONSEQUENCE(S) DESCRIPTION
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.
TERRAIN FAIL	MAINT	Consequences: NONE The terrain awareness functions of the GPWS have failed.
TERRAIN NOT AVAIL	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 pressures.
TIRE PRES 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 1,724 kilograms.
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.

ALERT	CODE	CONSEQUENCE(S) DESCRIPTION
TNK__TIP FUEL LO (1, 3)	MAINT	Consequences: NONE Tank 1 or 3 tip compartment is not full when there is more than 2,700 kilograms 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 compartment 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	MAINT SW	Consequences: NONE The required navigation performance (RNP) cannot presently be met. ATC may need to be informed.
WBS FAULT	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.

ALERT	CODE	CONSEQUENCE(S) DESCRIPTION
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	DESCRIPTION
ACARS MESSAGE	The ACARS system has received a message.
ACARS NO COM	The ACARS system has no available communications link.
A-ICE ALL ON	The engine and airfoil anti-ice switches have been commanded ON.
A-ICE SYS TEST	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 TAIL 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).
AIR SYS TEST	The automatic air system preflight test is in progress.
APU AIR ON	The APU load bleed valve is open and the APU is providing air.
APU AIR/ELEC ON	The APU is providing air and electrical power.
APU ON	The APU is running, but not providing air or electrical power.
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.
CARGO FIRE TEST	The cargo fire test is in progress.
CDU__MENU REQUEST (1, 2)	A message is displayed on the MENU page of the MCDU.
EMER LTS TST PASS	The cockpit and cabin emergency lights test is successful.

ALERT	DESCRIPTION
ENG__A-ICE ON (1, 2, 3)	The respective engine anti-ice switch has been commanded ON.
ENGINE A-ICE ON	All three engine anti-ice switches have been commanded ON.
ENGINE COOL	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 electrical 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 valve has been commanded open.
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 (1-3, 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.

ALERT	DESCRIPTION
PRED WSHEAR OFF	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 dispatched in the refueling mode.
SEAT BELTS	The SEAT BELT signs in the cabin are ON.
TERRAIN OVRD	Terrain override has been selected.
VHF-3 VOICE	This alert is displayed when VHF3 is in voice mode.
WHEEL BRAKE INOP	A wheel brake has been rendered inoperative by maintenance. Aircraft performance must be adjusted accordingly.
WSHLD HEAT HI	The left and/or right windshield heat is ON and in HIGH mode.
WSHLD HEAT ON	The left and/or right windshield heat is ON and in NORM mode,

Intentionally
Blank

General

The following include both The Boeing Company/vendor suggested operational recommendations and FAA approved limitations. The FAA approved limitations are from the FAA Approved Airplane Flight Manual (MDC-K0031) and are preceded by an asterisk (*). The Boeing Company/vendor suggested operational recommendations in this section are not preceded by an asterisk.

* Aircraft must be operated in compliance with the AFM limitations contained in this section.

Maximum Weights

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

  OPERATING LIMITATIONS

  CENTER OF GRAVITY ENVELOPE

  FUEL LOADING

  FUEL MANAGEMENT

* The following weight configurations are applicable to model MD-11F (freighter) only.
* The maximum taxi weight of 287,124 kg. and the maximum start of takeoff weight of 285,990 kg. requires the use of AFM Appendix 18 and or Appendix 18A.

Maximum Taxi Weight

287,124 Kilograms

Maximum Start of Takeoff Weight

285,990 Kilograms

Maximum Inflight (Landing Flaps) Weight

219,766 Kilograms

Maximum Landing Weight

218,405 Kilograms

Maximum Zero Fuel Weight

209,242 Kilograms

Maximum Weights - Center Gear Retracted

Maximum Taxi Weight

203,209 Kilograms

Maximum Start of Takeoff Weight

201,849 Kilograms

Maximum Inflight (Landing Flaps) Weight

182,798 Kilograms

Maximum Landing Weight

181,437 Kilograms

Maximum Zero Fuel Weight

167,829 Kilograms

Minimum Flight Weight

* The minimum flying weight is 116,573 kilograms.

Airplane General

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

* 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)

* 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.

Do not operate the weather radar in a hangar or within 50 feet of any personnel or a fuel spill.

NOTE: The hangar and personnel restrictions do not apply to the weather radar test mode.

Aircraft Communications Addressing Reporting System (ACARS)

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

1. The message or parts of the message are delayed or not received,
2. The message is delivered to the wrong recipient, or
3. The message content may be frequently corrupted.

Reactive Windshear Detection and Recovery Guidance System (WAGS)

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

Predictive Windshear System (PWS)

* The predictive windshear system, if 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.

CONFIGURATION	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 pullup 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-11 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-11 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, MDC-K5542.

Weight and Balance System

* 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-K5542.
* 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 of the AFM 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

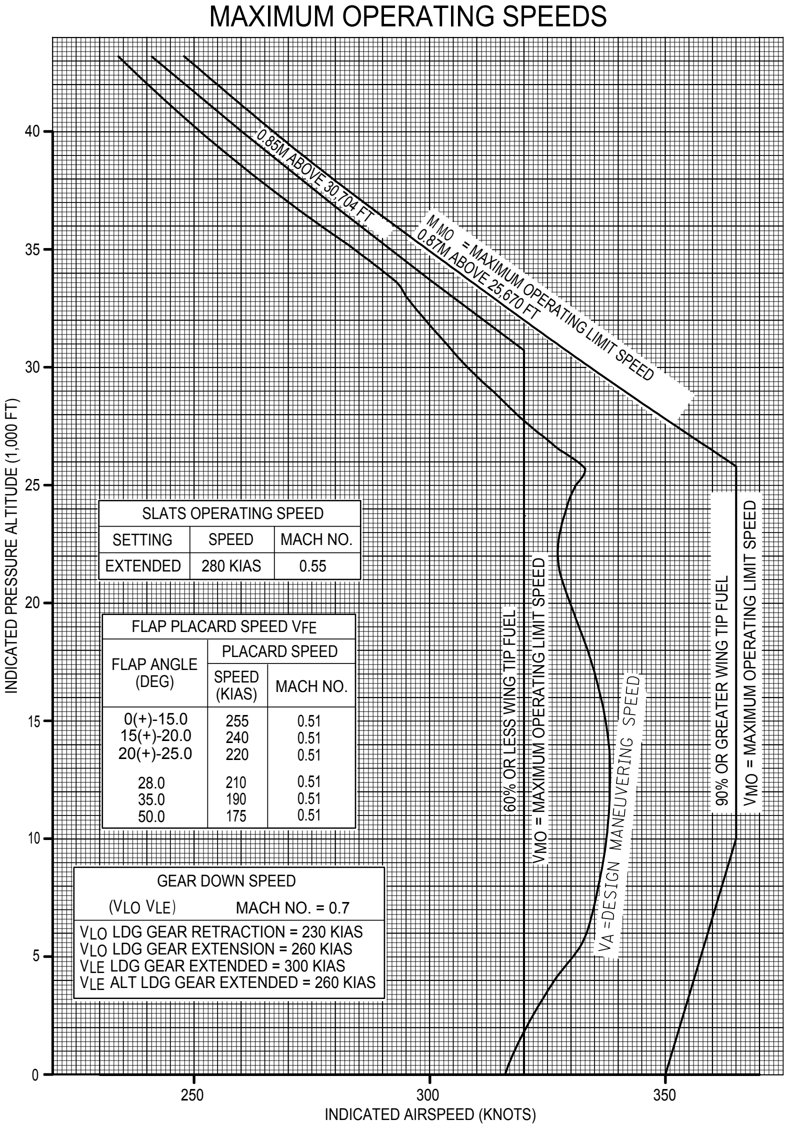
* Maximum takeoff weight can be determined by the following charts but may be limited by the most restrictive applicable charts:
  • SECOND SEGMENT LIMITING WEIGHT
  • WEIGHT LIMITED BY FUEL DUMPING
  • MAXIMUM TIRE SPEED LIMITING WEIGHT
  • OBSTACLE CLEARANCE, TAKEOFF FLIGHT PATH
* Takeoff field length 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:

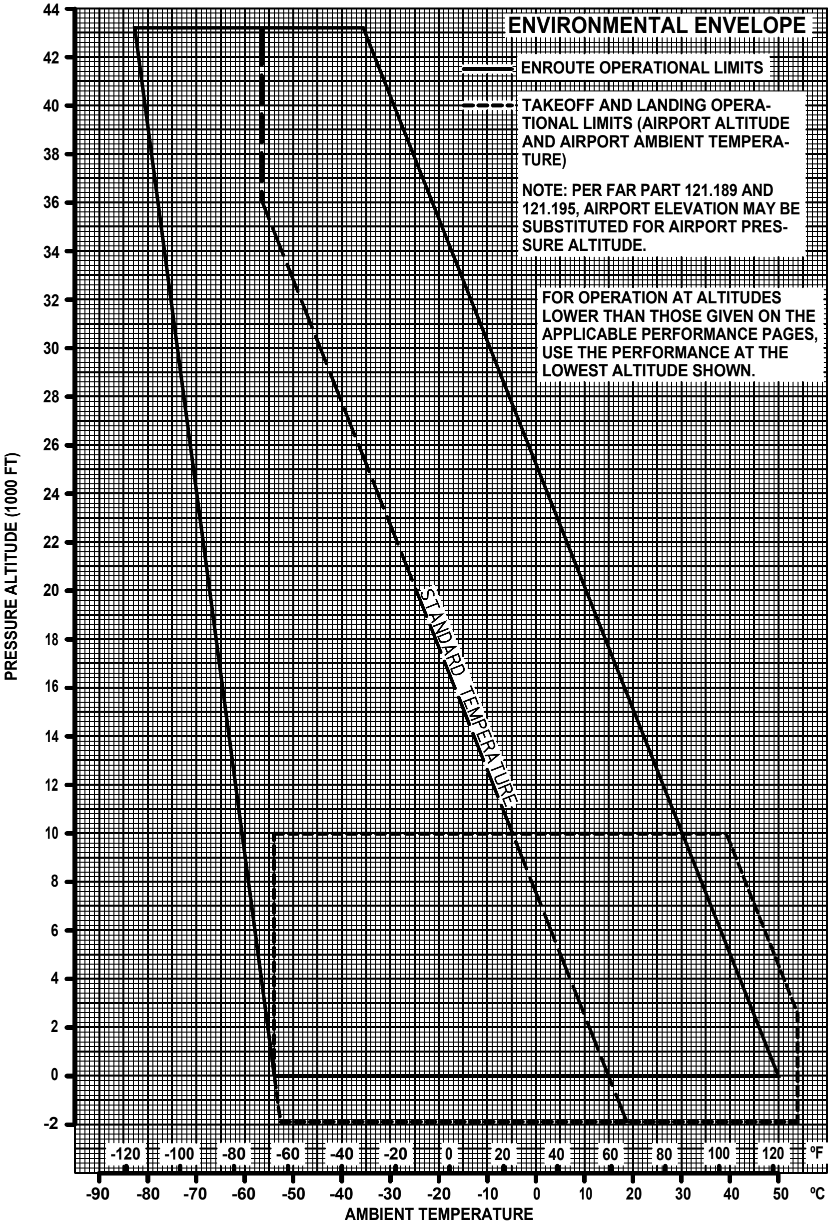
- MAXIMUM TAKEOFF WEIGHT FIELD LENGTH LIMITS
- CORRECTIONS TO TAKEOFF DISTANCE TO 35 FEET
- CORRECTIONS TO ACCELERATION-STOP DISTANCE
- UNBALANCED TAKEOFF FIELD LENGTH

Maximum Operating Speeds Chart



DATA SOURCE: MDC-K0041, SECTION 1, PAGE 2-2, DATED 3-8-91 LB1-2-0330

Environmental Envelope Chart



DATA SOURCE: MDC-K0031, SECTION 1, PAGE 3-2, DATED 10-25-96

LB1-2-0444

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 19,187 kilograms.

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 Firex

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. 4059050-920/-921

* The following limitations apply only to aircraft with FMC Honeywell System part no. 4059050-920/-921. The system part number can be verified by checking the FMS A/C STATUS page under the title OP PROGRAM as PS4084794-920/-921.

* 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, unless other appropriate procedures are used.
- * 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.

The above limitation does not apply to aircraft with all three multipurpose control display units (MCDU) updated by Service Bulletin 31-78 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 at weights greater than 218,405 kilograms.
- * If a LSAS failure is annunciated enroute, the failed LSAS channel must remain in the OFF position for autoland operations.

  Automatic landings have been demonstrated using a reference approach speed of 1.3 Vs + 5 under the following wind conditions:
  - Headwinds to 25 knots
  - Tailwinds to 10 knots
  - Crosswinds to 15 knots

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)

* 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 2.72 to 3.22 kilograms/gallon. The allowable fuel temperature at takeoff ranges from –40°C to 50°C.
* The following takeoff gross weight limitation applies when takeoff center of gravity is equal to forward of 22% MAC.
  – Freighter configuration:
    – The **MTOGW** must be reduced 1,134 kilograms for each 0.045 kilograms/gallon of fuel density below 2.95 kilograms/gallon.

When tank 3 has less than 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 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.

NOTES: Detailed fuel loading information is found in the Weight and Balance Manual (MDC-K0032 or MDC-K5542).

Variations (±5%) in each fuel tank quantity prior to engine start can occur as a result of the fuel system test. After engine start, fuel will be automatically transferred to meet the programmed fuel schedule.

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 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.
* 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:

- Freighter and combi aircraft: 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

* 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.

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

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 and terrain display 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 and display 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.

* Terrain awareness features must be inhibited by the terrain OVRD switch when the FMS NAV mode is IRS ONLY NAVIGATION (IRS NAV indicated on the ND), and the aircraft is over land. This will eliminate false terrain alarms.

Hydraulics

Hydraulic Quantity

System 3 minimum hydraulic quantity for dispatch is 6.0 gallons.

Hydraulic Auxiliary Pump Circuit Breakers

* Do not reset any tripped hydraulic auxiliary pump circuit breakers.

Ice and Rain Protection

Wing Anti-Ice System

There are no AFM 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 AFM 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.

Wing/Tail/Engine Anti-Ice System

Prior to reducing thrust for descent when icing conditions (defined by visible moisture in the air and TAT is 6°C or below) are present, or anticipated, the ENG IGN OVRD switch and the ENG, WING and TAIL ANTI-ICE switches must be placed in the ON position. When icing conditions are no longer present or anticipated, place the ENG IGN OVRD switch and the ENG, WING and TAIL ANTI-ICE switches to the OFF position.

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

* Engine and airfoil (if applicable) anti-ice should be selected to ON anytime icing conditions exist or are anticipated. However, the ice detection system is to be used as the primary means of detecting icing conditions, and anti-ice should be selected on anytime the ICE DETECTED alert is displayed, whether or not defined icing conditions exist.

Automatic Anti-Ice System

* 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 6°C and either moisture is visible or outside dew point and air temperature are within 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 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 Wipers

Do not operate windshield wipers at high speed (FAST position on Windshield Wiper Selector) for more than 30 minutes.

Do not operate windshield wipers on a dry windshield.

Inertial Reference System (IRS)

Non-Directional Beacon (NDB) approaches are phohibited into airports where the actual magnetic variation exceeds the systems magnetic variation by 6.28 degrees.

NOTE: Refer to Performance chapter - MAGNETIC VARIATION TABLE for applicable airports.

Power Plants/APU

Engines

General Electric, Model CF6-80C2 DIF.

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	750°C	No time limit
	870°C	40 seconds
Maximum continuous	925°C	Continuous
Takeoff/Go-around	960°C	5 minutes (all engines) 10 minutes (one engine inop)

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 CF6-80C2 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.

GE CF6-80C2 ENGINES

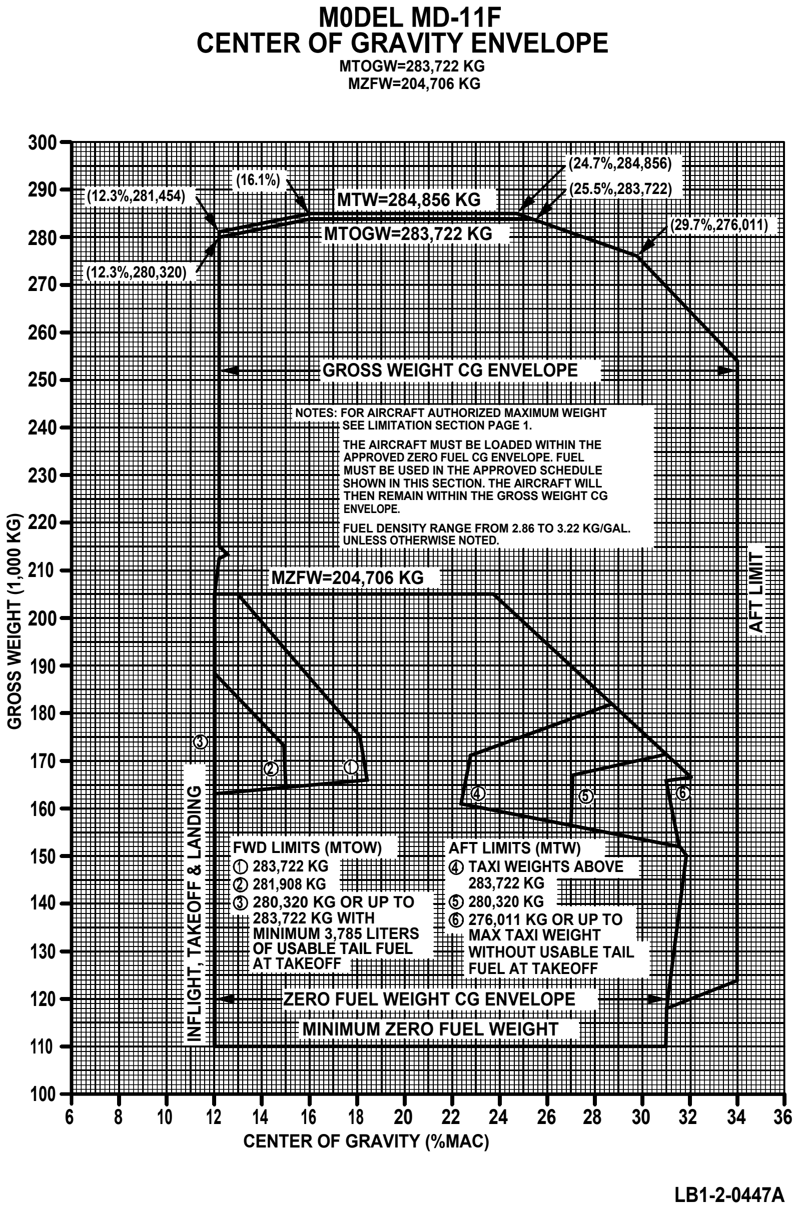
OVERSPEED/OVERTEMPERATURE RANGE			RECOMMENDED PILOT ACTIONS
N1	N2	EGT	
NOTES: If any engine indications are abnormal at minimum thrust, a precautionary shutdown should be considered. *All overspeed and/or overtemperature occurrences must be recorded in the flight log (magnitude and duration) and reported to maintenance.*			

APU

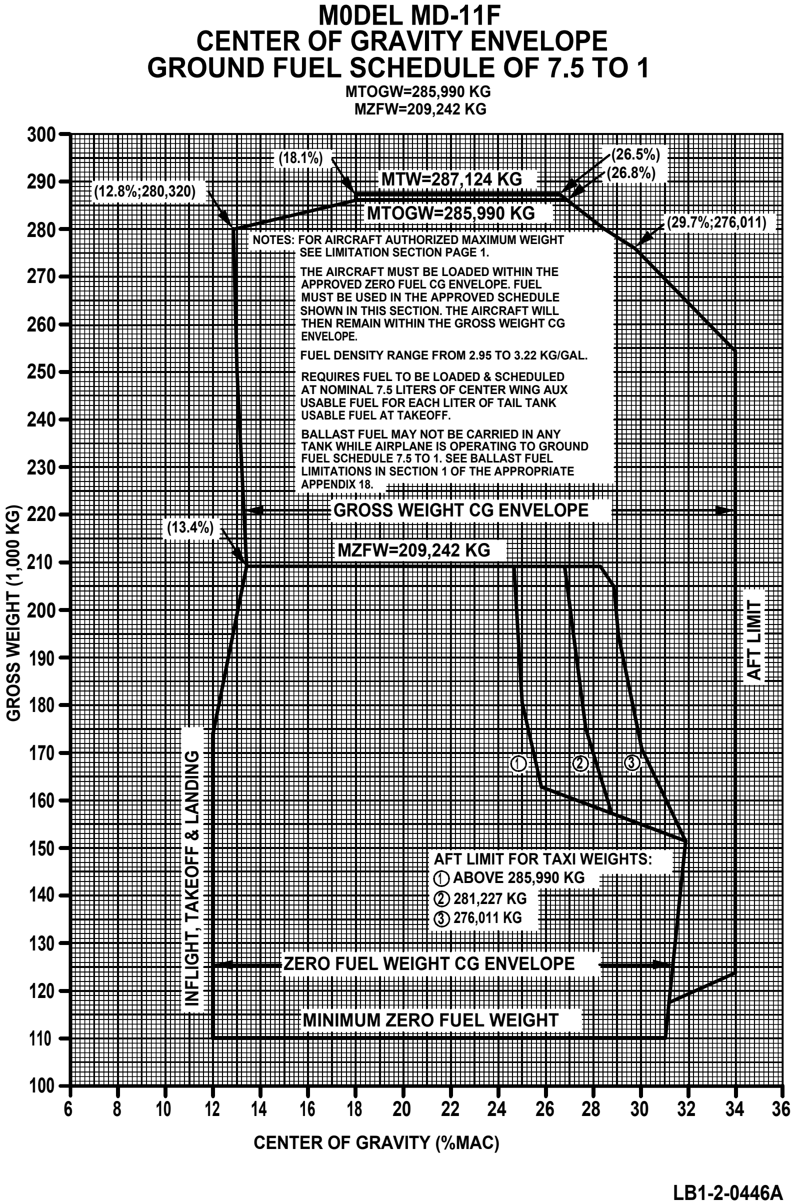
OPERATING CONDITIONS	OPERATING LIMITS		
Starting, ground, inflight	Max speed	**N1**	**N2**
		110.0%	110.0%
	Max EGT	**Start**	**Continuous**
		872°C	585°C

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.

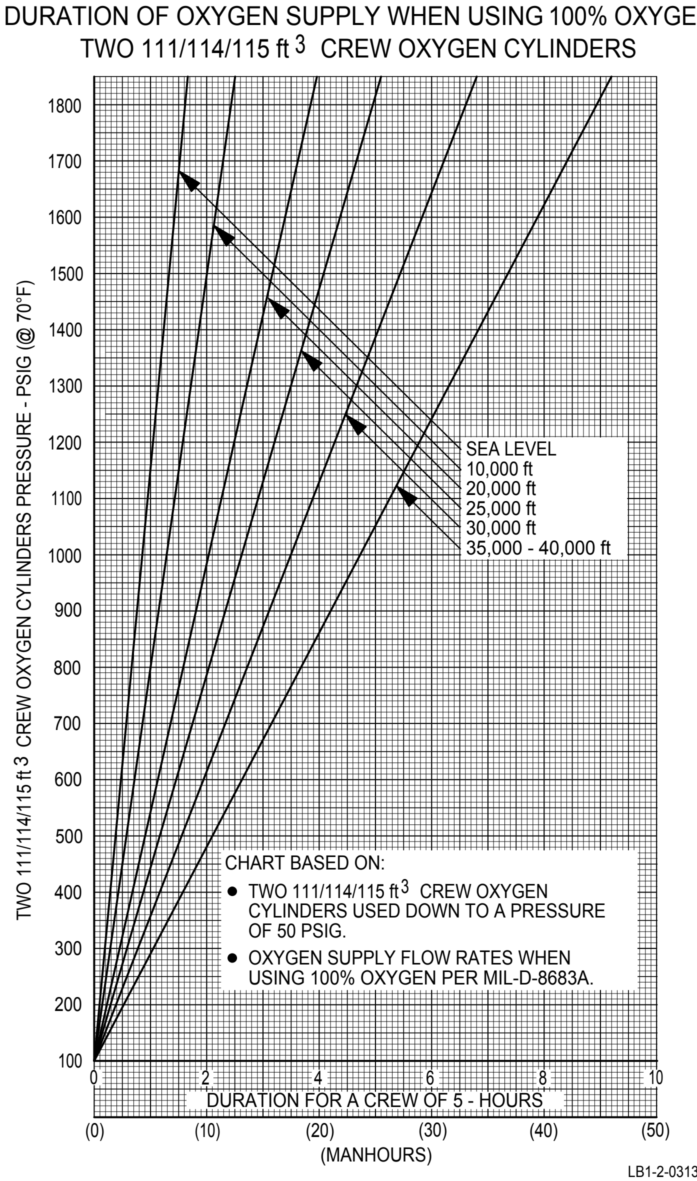
Center of Gravity - (TOGW 283,722 KG)



Center of Gravity - (TOGW 285,990 KG)



Crew Oxygen Chart



Intentionally
Blank

Procedures & Techniques — Chapter PT

Table of Contents — Section 0

Procedures & Techniques — Chapter PT

Introduction — Section 00

General

This section contains the procedures and techniques for operating the MD-11 aircraft on the ground and for various flight maneuvers.

The illustrations in this chapter are intended for reference only. Refer to the applicable Emergency, Abnormal, Supplemental, and Normal sections of this manual for detailed operating procedures.

Intentionally
Blank

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.

  NOTES: 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.

(CONTINUED)

Towing (Pushback) Procedures (Continued)

- 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.

(CONTINUED)

Taxi Procedures (Continued)

Maneuvering

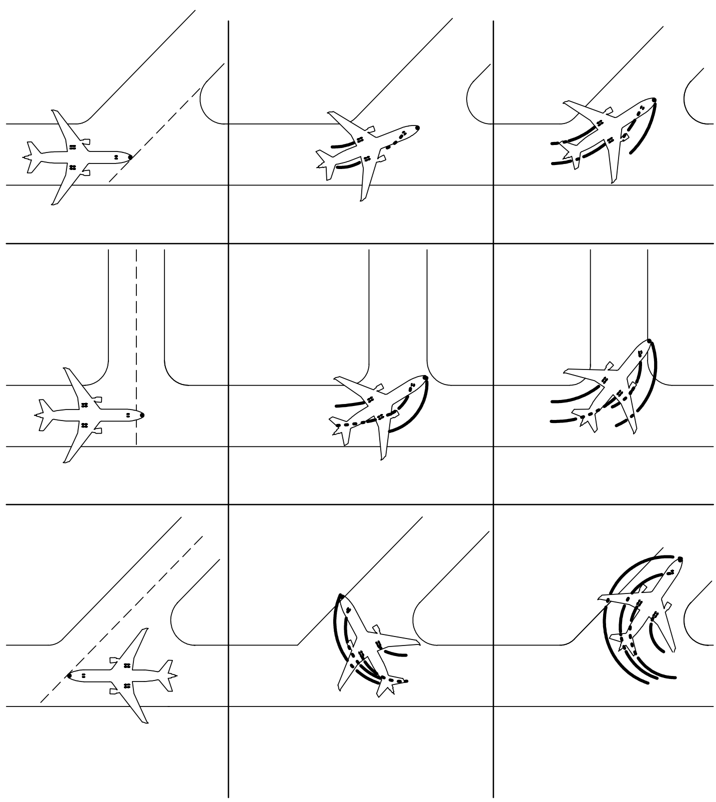
To start moving in a turn requires a considerably higher thrust level. When a turn is required immediately following the brake release, advance power to obtain sufficient speed to carry the aircraft throughout the turn. Brakes are not normally required during turns. If braking in a gentle turn is required, 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.

(CONTINUED)

Taxi Procedures (Continued)

Typical Taxi Turning Path

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.

LB1-2-0006

(CONTINUED)

Taxi Procedures (Continued)

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.

(CONTINUED)

Taxi Procedures (Continued)

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 14.6 meters 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 6.4 meters aft and the main gear is 31 meters 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).

(CONTINUED)

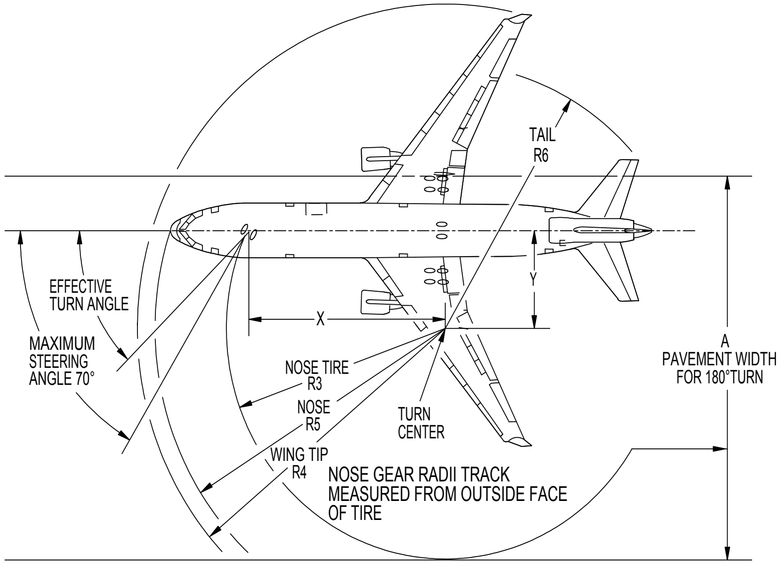
Taxi Procedures (Continued)

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.

(CONTINUED)

Taxi Procedures (Continued)

Minimum Aircraft Turning 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

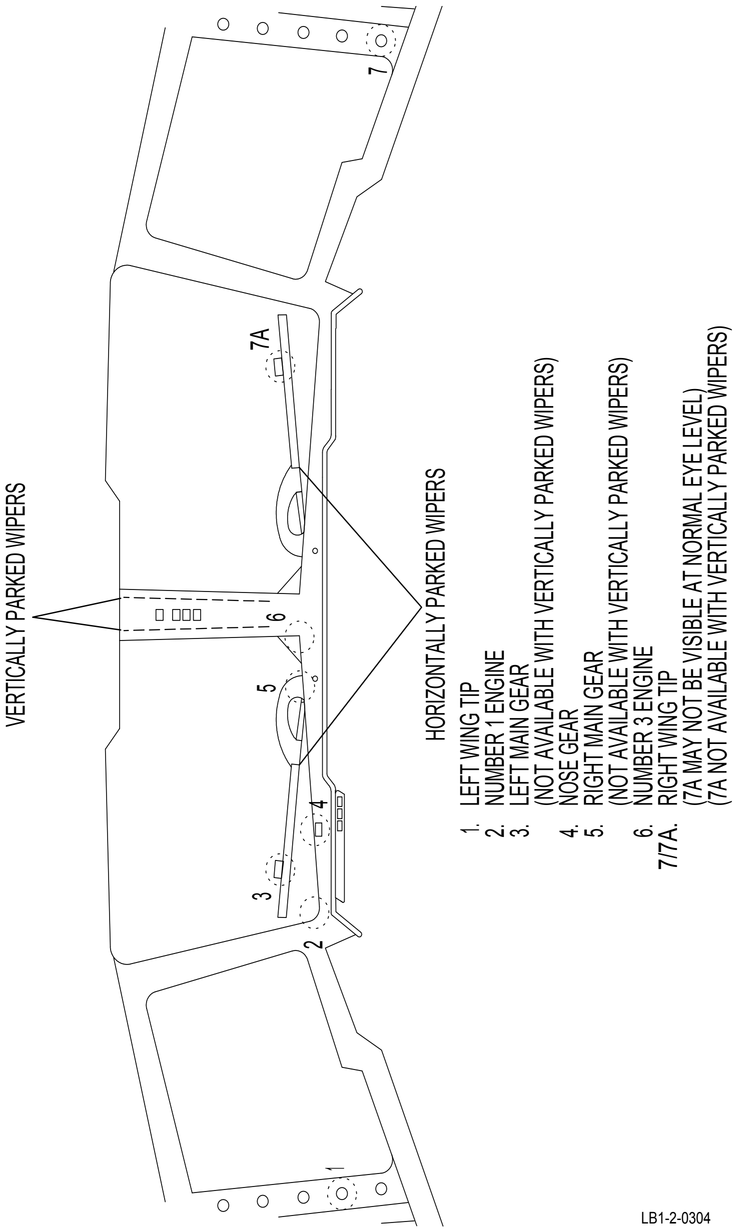
TYPE TURN	EFFECTIVE TURN ANGLE	TIRE SLIP ANGLE	X (Ft/M)	Y (Ft/M)	A (Ft/M)	R3 (Ft/M)	R4 (Ft/M)	R5 (Ft/M)	R6 (Ft/M)
1	60.8°	9.2°	81.2 / 24.7	45.3 / 13.8	160.6 / 49.0	94.7 / 28.9	136.4 / 41.6	118.1 / 36.0	111.9 / 34.1
2			81.2 / 24.7	42.1 / 12.8	155.8 / 47.5	93.1 / 28.4	133.4 / 40.6	116.9 / 35.6	109.8 / 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

LB1-2-0303

(CONTINUED)

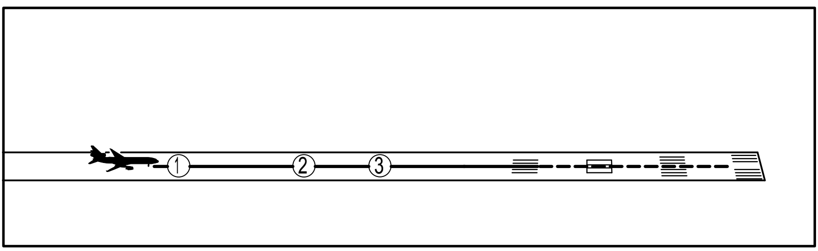
Taxi Procedures (Continued)

Pilot's Visual References During Taxi



LB1-2-0304

Rejected Takeoff



LB1-2-0043

NOTES: Prior to V1, the takeoff should be rejected for any of the following:

- *takeoff configuration warning*
- *fire or fire warning*
- *engine failure*
- *predictive windshear warning*
- *aircraft is unsafe or unable to fly*

Prior to 80 knots, the takeoff should also be rejected for any of the following:

- *activation of the Master Caution/Warning system*
- *system failure(s)*
- *unusual noise or vibration*
- *tire failure*
- *abnormally slow acceleration*

(CONTINUED)

Rejected Takeoff (Continued)

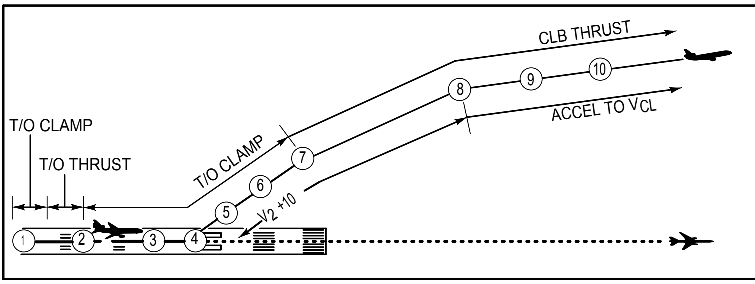
- *side window opens*

During the takeoff, the crewmember observing the abnormal situation will immediately call it out as clearly as possible.

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 calls "SPOILERS DEPLOYED" or "NO SPOILERS", and when green REV indications are displayed, calls "REVERSE THRUST AVAILABLE" or "NO REVERSE ENG(S)__". PNF also 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 (ICAO A)



LB1-2-0044

1. When aircraft is aligned on runway and cleared for takeoff, PF advances throttles to approximately 70% N1, confirms symmetrical thrust and commands “Auto Flight.” PNF pushes AUTO FLIGHT switch and calls “Auto Flight” while observing ATS OFF disappears from FMA ALT window and T/O THRUST replaces T/O CLAMP. PF push throttles up as necessary to ensure autothrottles advance to T/O thrust. PF calls “Check Thrust.” PNF observes throttles advance to proper N1 setting and responds “Thrust Set.” PF maintains directional control with rudder pedals, keeping one hand on throttles until V1.
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 and replies “Checked.”
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.

(CONTINUED)

Normal Takeoff (ICAO A) (Continued)

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.”

   NOTES: 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.

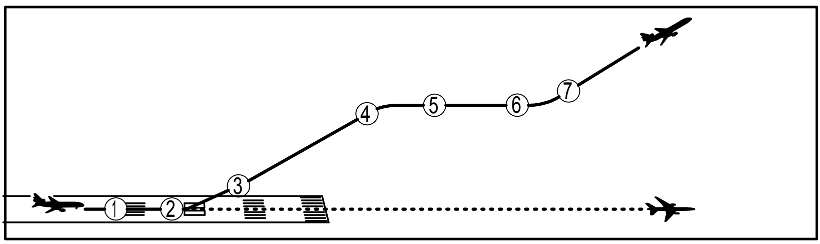
8. At acceleration altitude (default 3,000 feet above airport elevation or initial level off), pull the airspeed select knob or select FMS speed to initiate acceleration to VCL (this value can be obtained from the MCDU T/O page).

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 Takeoff



LB1-2-0045

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.

   NOTES: 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.

(CONTINUED)

Engine Fire/Failure Takeoff (Continued)

3. At positive rate of climb and V2, retract gear.

   NOTES: 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.

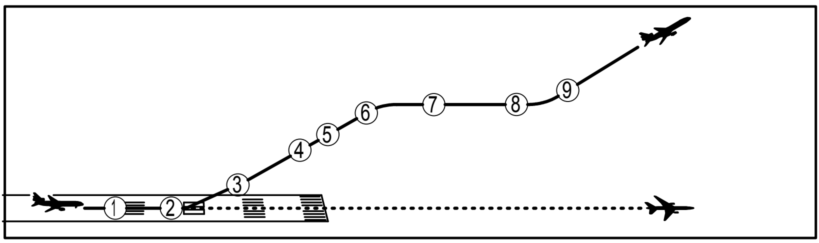
4. At EO ACCEL altitude, pull the airspeed select knob and select V3 in the PFD speed window to initiate a pitch reduction and acceleration.

   NOTES: 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 Takeoff
For FMS PROF and FMS Speed Engaged



LB1-2-0046

NOTE: EO ACCEL defaults to 800 feet above airport elevation (customer 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.

NOTES: 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.

(CONTINUED)

Engine Fire/Failure Takeoff For FMS PROF and FMS Speed Engaged (Continued)

3. At positive rate of climb and V2, retract gear.

   NOTE: AUTO FLIGHT may be engaged above 200 feet AGL. If NAV mode is not engaged, parallel rudder will be engaged in the T/O mode. Parallel rudder will disengage with a change in the roll mode, slat retraction or autopilot disconnect. PF should be prepared to maintain rudder position before disengaging parallel rudders.

4. 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.
5. 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.

6. 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.
7. Retract flaps on schedule.
8. Retract slats on schedule. Once V3 speed is reached, the aircraft will automatically resume a climb to the FCP altitude.
9. 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.

Landing Characteristics and Techniques

NOTE: Whether using the autoflight systems or manually controlling the aircraft during approach and landing, the PF is responsible for assuring the airplane path, speed and sink rate are acceptable. At anytime, particularly during the approach and landing, the PF should be prepared to assume authority of the flight controls or thrust levers if the automated systems are not performing adequately. This is especially critical below approximately 500 feet AGL.

Wind Additives and Approach Speeds

A minimum additive of 5 knots is to be applied to Vref for all approaches, unless a specific approach speed is specified.

Sufficient wind and gust protection is available with the autothrottle system (ATS) engaged so that no wind additives are needed. Thus, if ATS is engaged for approach and landing, wind additives may be applied at Captain’s discretion. If the ATS is not engaged, or is planned to be disengaged prior to landing, the appropriate wind additives should be applied to Vref. The minimum Vapp speed for normal configuration approaches shall not be less than Vref + 5 knots.

Wind additives should be applied using the following formula:

Add to Vref the greater of 1/2 of the reported steady state wind greater than 20 knots, or all of the gust increment above the steady state value. Add only the greater of the two. The maximum additive is 20 knots.

Examples:

1. Wind calm, minimum additive of 5 knots, Vref + 5.
2. Steady state wind 30 knots, additive is 1/2 of steady state wind above 20 knots (10/2=5); Vref + 5.
3. Steady state wind 20 knots gusting to 30 knots, additive is 30-20=10; Vref + 10.
4. Steady state wind 30 knots gusting to 45 knots, additive is 1/2 steady state wind above 20, 10/2=5, or full gust increment above steady state wind, 45-30=15, Vref + 15.

(CONTINUED)

Landing Characteristics and Techniques (Continued)

Maintain resulting airspeed (Vref plus additive) until initiation of landing flare.

Visual Approach

Aircraft should be stabilized in the final landing configuration, on descent flightpath, 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 aimpoint 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.

Crosswind Landings

Crosswind landings are best achieved when the aircraft longitudinal axis is aligned with the runway centerline. Landing with a crab angle at touchdown is not recommended. The maneuver recommended for crosswind landing requires cross-controlling, using the rudder to align the aircraft fuselage with the runway and aileron input sufficient to arrest crosswind induced drift.

Landing in this manner minimizes side load stresses on the main landing gear and tires. It also orients inertial moments along the runway centerline, permitting early detection of lateral drift, which may be especially important when landing on runways with reduced coefficients of friction.

Accomplish a crosswind landing as follows:

- Roll out on final with a crab angle that will track the extended runway centerline. Landing with a crab angle at touchdown is not recommended.
- Below approximately 200 feet AGL, gradually apply rudder so as to align with longitudinal axis (heading) of the aircraft with the runway centerline. Control lateral drift by applying aileron into the wind (the upwind wing will be lower), while continuing to apply opposite rudder to maintain fuselage alignment with the centerline of the runway.

(CONTINUED)

Landing Characteristics and Techniques (Continued)

- A roll tendency can be expected as downwind rudder is applied. Application of upwind aileron sufficient to prevent undesired roll should be applied simultaneously with rudder input.
- An increased sink rate can be expected as cross controls are applied due to increased drag resulting from the maneuver. Adjust pitch and thrust as required.
- Aircraft may touchdown on upwind wheels first.
- Ailerons will have increased effectiveness (sensitivity) in ground effect. Avoid over-controlling.
- Smoothly and gradually remove rudder cross-control as aileron input is reduced.
- Maintain wings level with upwind aileron as necessary during landing roll.
- Do not use nosewheel steering *except* to keep nosewheel straight on icy or slippery runways, while corrective rudder inputs are being made.
- Use normal reverse thrust.

  NOTE: Approach and touchdown speeds will possibly be higher than normal due to wind additives or gust factors. Do not hold the aircraft off attempting to achieve a smooth touchdown. Fly the aircraft to a positive touchdown and do not delay lowering the nosewheel.

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.

(CONTINUED)

Landing Characteristics and Techniques (Continued)

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.

Taking Manual Control for Landing

If the autopilot is engaged during an approach, and a manually flown landing is anticipated, pilots will be better able to adjust for environmental factors, like wind, if the autopilot is disengaged prior to minimums. Consider disengaging the autopilot by approximately 500 feet AGL, if a manual landing is planned, the pilot is in VMC, and the pilot is able to continue and land visually.

Flare

Autothrottles may be used for all landings and will begin to retard after passing 50 feet AGL. If ATS is not engaged, manual control should nominally follow the ATS profile. However, the PF should adjust thrust as necessary to maintain proper path, speed and sink-rate during the flare, and plan to touchdown with throttles at idle.

(CONTINUED)

Landing Characteristics and Techniques (Continued)

Flare altitude will vary depending upon factors such as aircraft speed, sink rate, weight, CG and flap setting, as well as environmental factors, airport physical properties, etc. Typically, a slight flare (approximately 2 degrees) should be initiated between 50 and 30 feet.

CAUTION: The aft fuselage will contact runway at approximately 10° pitch attitude with struts compressed.

NOTE: Below 10 feet with the aircraft fully flared (typical sink rate approximately 200 to 300 feet per minute), the basic technique is to maintain attitude by applying the required control column pressures. An alternate technique is to reduce back pressure slightly, allowing the nose to drop 1 degree prior to main gear touchdown.

Touchdown

CAUTION: Tail strikes or nosewheel structural damage can occur if large column movements are made prior to flying the nosewheel to the runway.

NOTE: If the number 2 throttle has been advanced from the idle position at touchdown, the spoilers may begin deployment, then immediately retract. Auto Ground Spoilers (AGS) will no longer be available, and the ground spoilers must then be manually extended.

After touchdown, monitor ground spoiler deployment and be prepared to counter any pitch-up tendency as spoilers extend. Maintain touchdown pitch attitude until certain main landing gear will remain on the runway, then fly the nosewheel to the runway, avoiding a rapid derotation rate.

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. LSAS will assist the pilot in avoiding nose pitch-up after touchdown, and in lowering nose to the runway.

Bounced Landing Recovery

CAUTION: Aircraft structural damage can occur if large and/or rapid pitch inputs are made while the aircraft is in the air following a bounce.

(CONTINUED)

Landing Characteristics and Techniques (Continued)

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.

It may be difficult to determine whether or not the aircraft is in the air after a firm touchdown or a slight skip. Following a bounce it may be necessary to add thrust to control subsequent sink rate. If the throttles are advanced beyond idle after AGS has deployed, the spoilers may retract, and subsequent deployment must be accomplished through manual extension.

If a go-around is not initiated, establish the normal landing attitude until the aircraft returns to the runway and it is determined that the main landing gear will positively remain on the runway. Then fly the nosewheel to the runway, avoiding a rapid derotation rate.

If the situation is in doubt, perform a go-around.

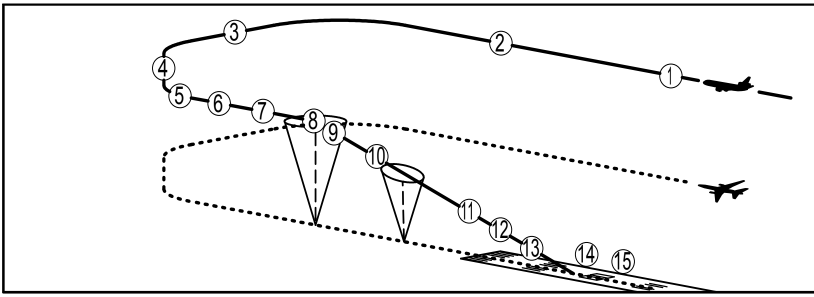
Rollout

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)



LB1-2-0047A

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 30° may result in overshooting LOC.

(CONTINUED)

ILS Approach (FD Only or Auto Flight Engaged) (With or Without FMS NAV/PROF) (Continued)

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).

    NOTES: 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.

(CONTINUED)

ILS Approach (FD Only or Auto Flight Engaged) (With or Without FMS NAV/PROF) (Continued)

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.

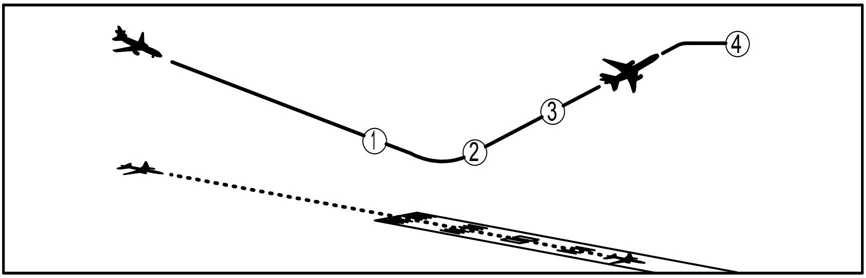
    NOTE: Maximum reverse thrust may be selected without delay and may occur prior to nosewheel touchdown. However, there should be no effort to delay lowering the nosewheel to the runway; aerodynamic braking is ineffective and not a recommended deceleration technique.

15. Allow the autopilot and autobrakes to remain engaged until a safe stop is assured and adequate visibility exists for pilot control.

    NOTES: 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



LB1-2-0048

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.

(CONTINUED)

Go-Around (Manual or Auto Flight Engaged) Two or Three Engines Operating (Continued)

3. Use heading select or NAV to follow missed approach instructions.

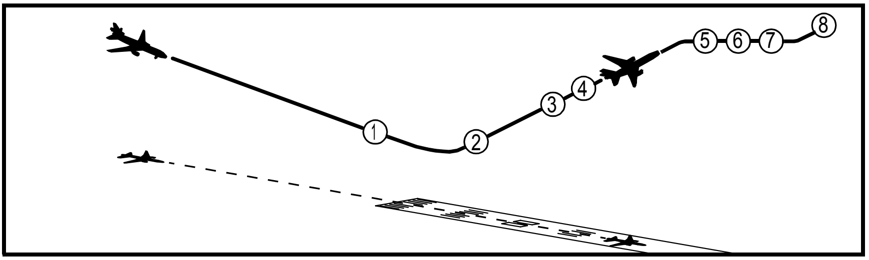
   NOTES: Commanded airspeed during climb will be Vmin + 5 for 28° flaps or indicated airspeed when GA button was pushed, whichever is higher.

   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.

4. Maintain commanded airspeed until reaching clearance altitude. Flaps/slats may be left extended if required.

Engine Out Go-Around For FMS PROF and FMS Speed Engaged



WARNING: ***If reverse thrust is initiated, a full stop landing must be made.***

NOTES: EO ACCEL defaults to 800 feet above airport elevation (customer option) and must be edited if local procedures dictate.

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.

(CONTINUED)

Engine Out Go-Around For FMS PROF and FMS Speed Engaged (Continued)

2. At positive climb rate, move GEAR handle to UP and verify appropriate missed approach altitude, heading and airspeed have been preselected.

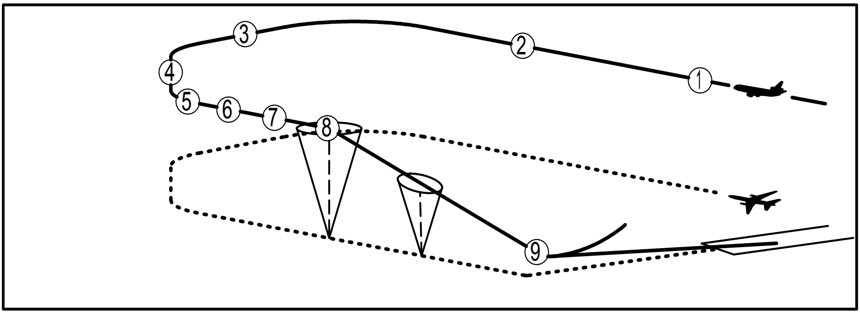
   NOTE: AUTO FLIGHT may be engaged above 200 feet AGL. Parallel rudder will be engaged in the GA mode. Parallel rudder will disengage with a change in the roll mode, slat retraction or autopilot disconnect. PF should be prepared to maintain rudder position before disengaging parallel rudders.

3. PROF may be engaged above 400 feet AGL. When PROF is engaged, FMS speed will also engage.
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, it need not be re-confirmed during the go-around. With PROF engaged and engine out confirmed, the FMS will level off at the EO ACCEL altitude. 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 aircraft levels off at the EO ACCEL ALT, Vsr/V3 (final segment climb speed) becomes the active FMS speed target. The aircraft will remain in ALT HOLD until Vsr/V3 speed is reached.
6. Retract flaps on schedule.
7. Retract slats on schedule. Once Vsr/V3 speed is reached, the aircraft will automatically resume a climb to the FCP altitude or to a constraint altitude, if applicable.
8. As the aircraft climbs through the ALL ENG ACCEL ALT, the speed target becomes the climb speed. Thrust will reduce from GA thrust to MCT thrust when the aircraft is above the ALL ENG ACCEL ALT and in clean configuration.

Instrument Guidance System (IGS) (FD Only or Auto Flight Engaged) (With or Without FMS NAV/PROF)



LB1-2-0049A

NOTES: 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).

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.

(CONTINUED)

Instrument Guidance System (IGS) (FD Only or Auto Flight Engaged) (With or Without FMS NAV/PROF)

(Continued)

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.”

(CONTINUED)

Instrument Guidance System (IGS) (FD Only or Auto Flight Engaged) (With or Without FMS NAV/PROF)

(Continued)

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.

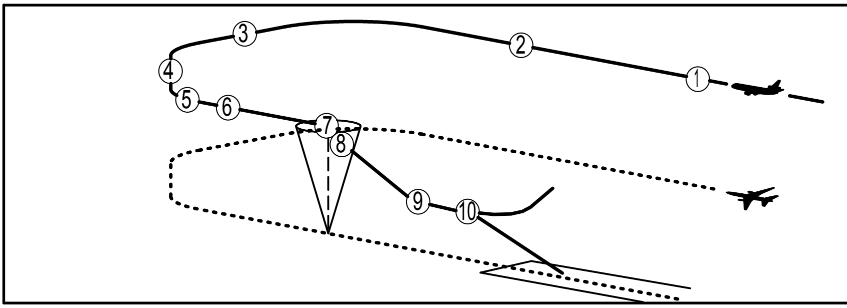
   At the DA, without the runway in sight, set the FCP to the missed approach altitude and perform the missed approach.

   NOTES: 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 (LOC) Approach (FD Only or Auto Flight Engaged) (With or Without FMS NAV/PROF)



LB1-2-0050A

NOTES: 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 ND 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.

(CONTINUED)

Localizer (LOC) Approach (FD Only or Auto Flight Engaged) (With or Without FMS NAV/PROF) (Continued)

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 30° 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.

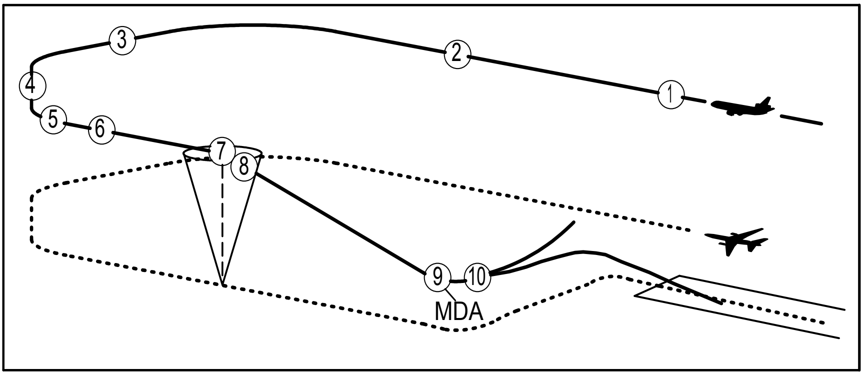
(CONTINUED)

Localizer (LOC) Approach (FD Only or Auto Flight Engaged) (With or Without FMS NAV/PROF) (Continued)

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 can not 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.

Localizer Type Directional Aid (LDA) Approach (FD Only or Auto Flight Engaged) (With or Without FMS NAV/PROF)



LB1-2-0051A

*NOTES: The LDA is a nonprecision 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.

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.

(CONTINUED)

Localizer Type Directional Aid (LDA) Approach (FD Only or Auto Flight Engaged) (With or Without FMS NAV/PROF) (Continued)

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 30° 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.

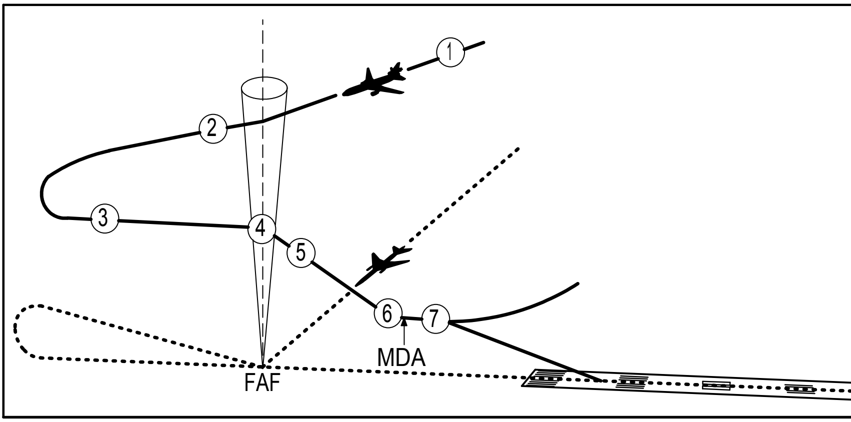
(CONTINUED)

Localizer Type Directional Aid (LDA) Approach (FD Only or Auto Flight Engaged) (With or Without FMS NAV/PROF) (Continued)

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)



LB1-2-0052A

*NOTES: 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 NAVAID 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.

(CONTINUED)

VOR or RNAV Approach (With or Without FMS NAV/PROF) (Continued)

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, 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.

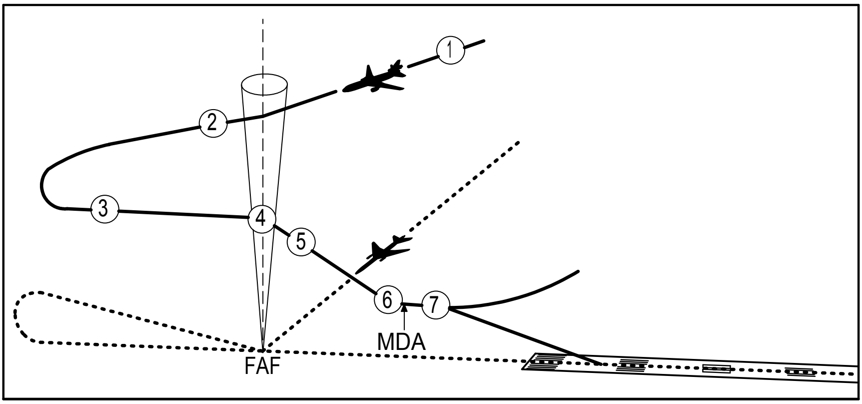
(CONTINUED)

VOR or RNAV Approach (With or Without FMS NAV/PROF) (Continued)

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 Approaches



LB1-2-0052A

NOTES: 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.

(CONTINUED)

GPS Overlay or RNAV Approaches (Continued)

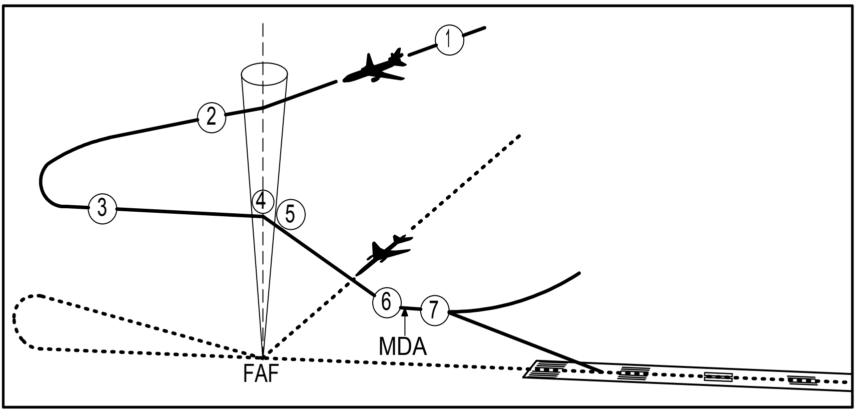
1. Complete appropriate checklists inbound to the IAF. Extend slats and maintain at or above Vmin + 5 for configuration. Engage FMS NAV mode.
2. Depart the IAF (or enter base leg) with FLAPS 28 and speed at or above Vmin + 5. For descending procedure turns, FLAPS 28 may be delayed until on extended final 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.

Nondirectional Radio Beacon (NDB) Non-Precision Approach (With or Without FMS NAV/PROF)



LB1-2-0053A

NOTES: 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 NAVAID 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.

(CONTINUED)

Nondirectional Radio Beacon (NDB) Non-Precision Approach (With or Without FMS NAV/PROF) (Continued)

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.

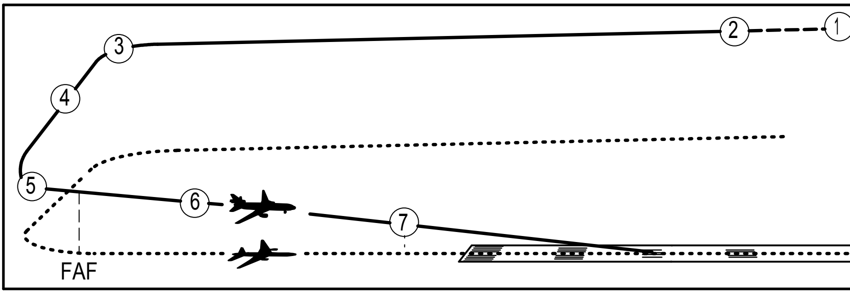
(CONTINUED)

Nondirectional Radio Beacon (NDB) Non-Precision Approach (With or Without FMS NAV/PROF) (Continued)

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)



LB1-2-0054

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.

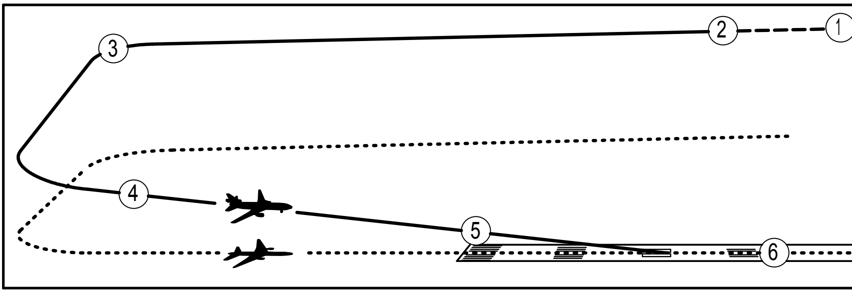
(CONTINUED)

FMS – VFR Approach and Landing (FMS NAV and FMS PROF) (Continued)

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/No Slat Approach



LB1-2-0055

1. Complete appropriate checklists, flaps/slats at UP/RET and Vmin + 5 for 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.

   NOTES: 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.

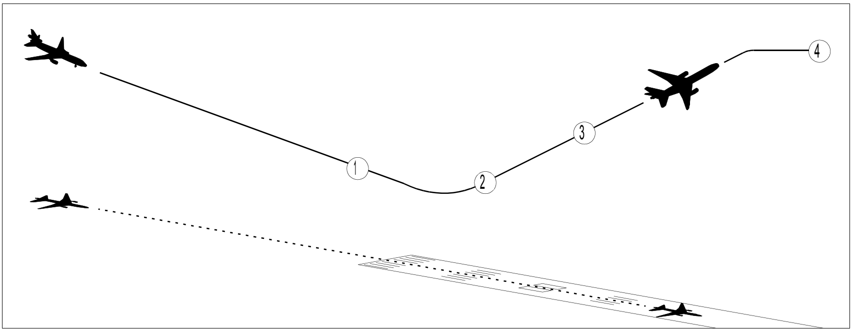
(CONTINUED)

No Flap/No Slat Approach (Continued)

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/No Slat Go-Around (Manual)



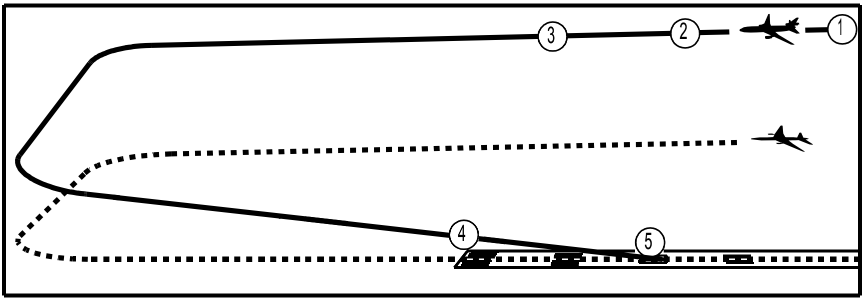
LB1-2-0305

NOTES: 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/No Slat Approach



LB1-2-0056A

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).

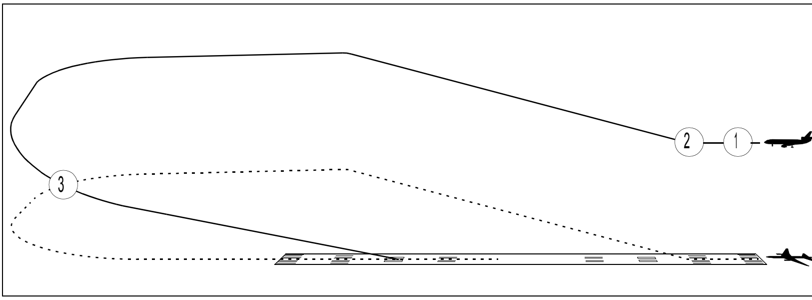
   CAUTION: The Vmin FLAPS 28 speed on the FMS APPROACH page is for slats extended configuration.

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 (Typical Three Engine)



LB1-2-0057

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.

(CONTINUED)

Circling Approach (Typical Three Engine) (Continued)

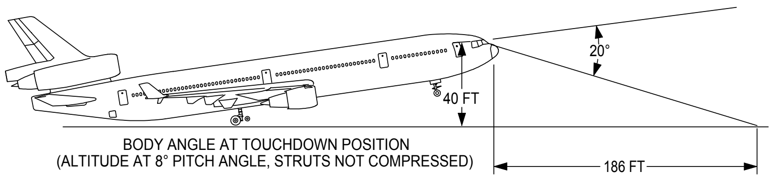
3. Turning to final, maintain Vapp for desired landing configuration. Establish normal final approach path for landing.

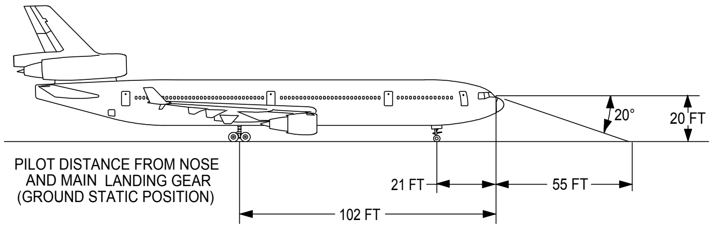
   NOTES: Procedures for a two-engine circling approach are the same, except landing flaps are limited to FLAPS 35.

   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.

Pilot Eye Orientation

PILOT EYE ORIENTATION AIRCRAFT ON GROUND





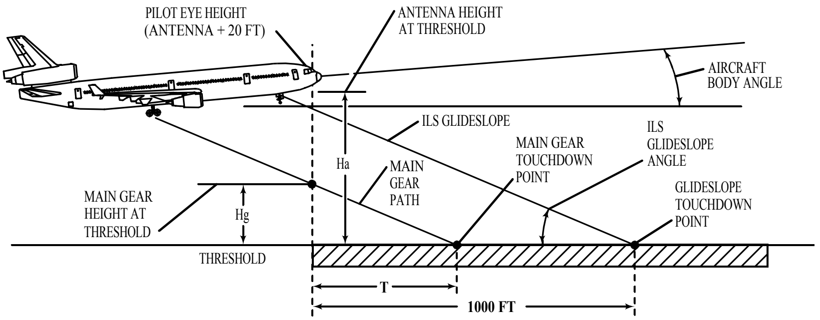
LB1-2-0308

(CONTINUED)

Pilot Eye Orientation Approach and Landing – Flaps 35° (1.3 Vs)

ILS APPROACH

ESTIMATED TOUCHDOWN POINT (NO FLARE) ASSUMING G/S TRANSMITTER AT 1000 FT

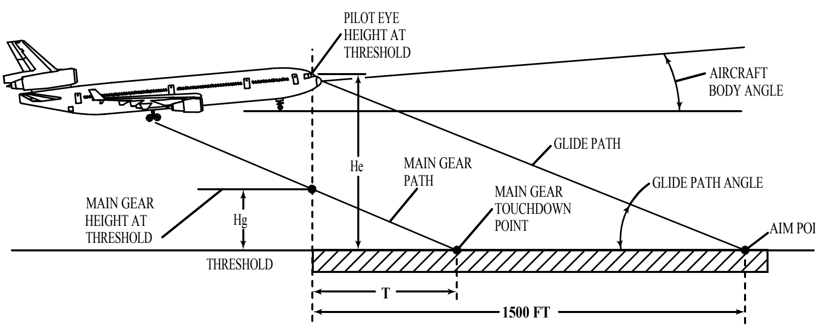


GLIDE PATH ANGLE (DEGREES)	ESTIMATED BODY ANGLE (DEGREES) ①	②	ANTENNA HEIGHT Ha AT THRESHOLD (FEET)	MAIN GEAR HEIGHT Hg AT THRESHOLD (FEET) ①	②	MAIN GEAR TOUCH DOWN POINT, T (FEET) ①	②
2.5	6.1	4.7	44	29	31	673	720
3.0	5.6	4.2	52	39	41	741	780
3.5	5.1	3.9	61	48	50	790	819

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	6.1	4.7	65	32	34	732	789
3.0	5.6	4.2	79	46	48	877	925
3.5	5.1	3.9	92	60	62	981	1016

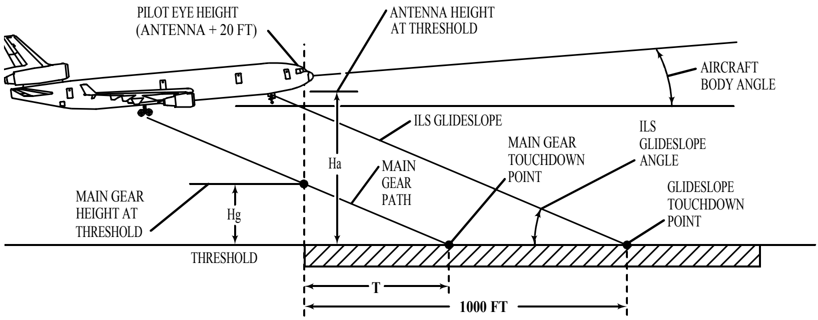
1 C.G. @ 12% MAC   2 C.G. @ 34% MAC

LB1-2-0307A

Pilot Eye Orientation Approach and Landing – Flaps 50° (1.3 Vs)

ILS APPROACH

ESTIMATED TOUCHDOWN POINT (NO FLARE) ASSUMING G/S TRANSMITTER AT 1000 FT

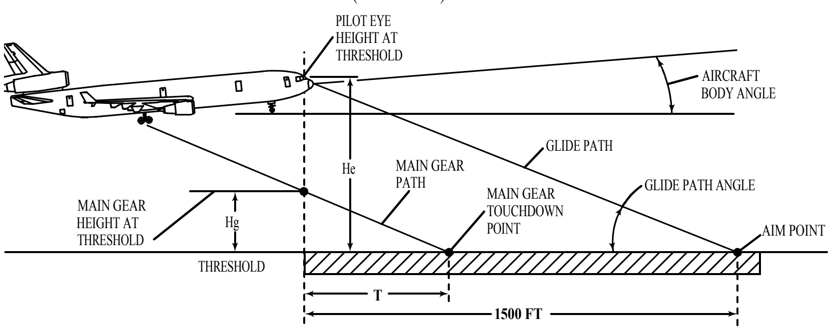


GLIDE PATH ANGLE (DEGREES)	ESTIMATED BODY ANGLE (DEGREES) ①	②	ANTENNA HEIGHT Ha AT THRESHOLD (FEET)	MAIN GEAR HEIGHT Hg AT THRESHOLD (FEET) ①	②	MAIN GEAR TOUCH-DOWN POINT, T (FEET) ①	②
2.5	4.9	3.5	44	31	33	713	760
3.0	4.4	3.0	52	41	43	775	814
3.5	3.9	2.5	61	50	52	819	852

① C.G. @ 12% MAC ② C.G. @ 34% MAC

VISUAL APPROACH

ESTIMATED TOUCHDOWN POINT (NO FLARE) ASSUMING AN AIM OF 1500 FT



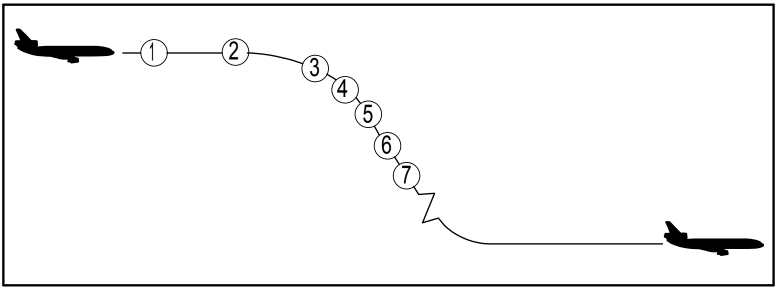
GLIDE PATH ANGLE (DEGREES)	ESTIMATED BODY ANGLE (DEGREES) ①	②	PILOT EYE HT He AT THRESHOLD (FEET)	MAIN GEAR HEIGHT Hg AT THRESHOLD (FEET) ①	②	MAIN GEAR TOUCH-DOWN POINT, T (FEET) ①	②
2.5	4.9	3.5	65	34	37	781	838
3.0	4.4	3.0	79	48	51	918	966
3.5	3.9	2.5	92	62	65	1016	1057

① C.G. @ 12% MAC ② C.G. @ 34% MAC

LB1-2-0306A

Intentionally
Blank

EMERGENCY DESCENT



LB1-2-0065A

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/IAS changeover point or FL 270, whichever occurs first.
5. Unless otherwise required, set code 7700 in the transponder.

(CONTINUED)

EMERGENCY DESCENT (Continued)

6. To assure positive crew control of the NO SMOKE/SEAT BELTS lights, move the NO SMOKE/SEAT BELTS switches to ON.
7. Verify descent to 10,000 feet or minimum safe altitude, whichever is higher.

   NOTE: To reactivate the boom mike when O2 mask is not longer required, close the Eros O2 mask doors and push the PRESS-TO-TEST AND RESET lever.

APPROACH TO STALL OR STALL RECOVERY

At first indication of approach to stall, simultaneously disconnect the autopilot and autothrottles, reduce pitch to decrease the angle of attack, apply maximum thrust to the overboost stop, level the wings and ensure that the speed brakes are retracted. In an emergency situation near terrain or obstacles (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 margin between the pitch limit indicator (PLI) and the aircraft pitch attitude represents the pitch margin to stall. Careful attention to the PLI will allow the pilot to minimize altitude loss. However, rapid pitch attitude changes may exceed PLI response resulting in the Angle of Attack (AoA) quickly exceeding the stick shaker activation AoA.

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 Speed-On-Pitch Protection.
- 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).

(CONTINUED)

APPROACH TO STALL OR STALL RECOVERY (Continued)

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 in order to obtain 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.

NOTES: 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 may cause damage to elevator skin panels. A maintenance log entry should be made and surfaces inspected after landing if these conditions are encountered.

As the stall AoA is approached, it is essential that pitch attitude and angle of attack be immediately reduced and airspeed increased to normal operational values, even if this means a loss of altitude.

Avoid abrupt or aggressive pitch control inputs following the initial nose down pitch input. Aggressive recovery inputs can result in a secondary stall.

All recoveries from approach to stall should be done as if an actual stall has occurred.

If terrain contact or obstacles are not a consideration, accept an altitude loss while accelerating to Vmin or greater.

NOTES: Do not use flight director pitch commands during the recovery.

Premature recovery may result in a secondary stall or inability to accelerate, with available thrust, to Vmin or greater for existing configuration.

Immediately do the following at the first indication of stall warning (buffet or stick shaker).

(CONTINUED)

APPROACH TO STALL OR STALL RECOVERY (Continued)

PILOT FLYING	PILOT NOT FLYING
Initiate the recovery: • Hold the control column firmly Simultaneously, • Disconnect autopilot and autothrottle system. Apply maximum thrust to the overboost stop. If ground contact is imminent, apply thrust through overboost stop to mechanical stop (maximum available thrust). • Reduce angle of attack by applying nose down elevator until buffet and stick shaker stop.	• Monitor altitude and airspeed. • Verify all required actions have been accomplished and call out any omissions. • Call out any trend toward terrain contact.

WARNING: ***In some cases, the control column may not immediately provide the needed pitch response. In such cases, it may be necessary to apply up to full forward control input, enhancing that input with pitch trim if necessary.***

Excessive use of pitch trim or rudder may result in one or more of the following:

- ***Aggravation of the condition.***
- ***Loss of control.***
- ***High structural loads.***

(CONTINUED)

APPROACH TO STALL OR STALL RECOVERY (Continued)

PILOT FLYING	PILOT NOT FLYING
Continue the recovery:	
• Call “HEADING HOLD” and roll in the shortest direction to, and maintain, wings level. • Confirm speed brakes stowed. • If conditions permit, accept an altitude loss while accelerating to Vmin or greater for existing configuration. • If flaps/slats or landing gear are extended, do not change the configuration during the stall recovery.	• Monitor altitude and airspeed. • Push HDG HLD. • Verify all required actions have been accomplished and call out any omissions. • Call out any trend toward terrain contact.
Complete the recovery:	
• Accelerate to Vmin or greater for existing configuration, then adjust configuration as desired. Return to appropriate altitude and airspeed. • Re-engage autopilot and autothrottles if desired.	• Monitor altitude and airspeed • Verify all required actions have been accomplished and call out any omissions. • Call out any trend toward terrain contact.

[END]

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

***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.
- Apply as much as full nose down elevator.
- Apply appropriate nose down stabilizer trim.

(CONTINUED)

UPSET RECOVERY (Continued)

- 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 (WITH TERRAIN AWARENESS FUNCTIONS)

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:

(CONTINUED)

GPWS WARNING PROCEDURES (WITH TERRAIN AWARENESS FUNCTIONS) (Continued)

PF	PNF
• Immediately apply go-around power	• Assure maximum thrust.
• Disengage the autopilot.	
	• Verify all required actions have been completed and call any omissions.
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.	• Monitor V/S and altitude (radio altitude for terrain clearance and barometric altitude for minimum safe altitude).
• 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.	• Call any trend towards terrain contact.
• After the GPWS warning ceases, continue climb to published minimum safe altitude.	

(CONTINUED)

GPWS WARNING PROCEDURES (WITH TERRAIN AWARENESS FUNCTIONS) (Continued)

GPWS Caution

Any of the following conditions is regarded as a GPWS caution:

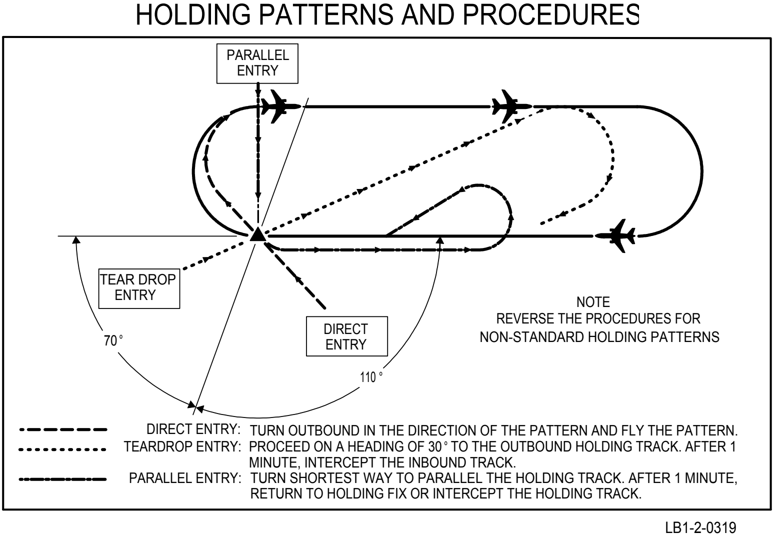
- Activation of the GPWS “TERRAIN AHEAD,” “CAUTION TERRAIN,” “TERRAIN TERRAIN,” “TOO LOW TERRAIN,” “SINK RATE,” “DON’T SINK,” “GLIDESLOPE,” “TOO LOW FLAPS,” or “TOO LOW GEAR” aural annunciations.
- A solid yellow caution area displayed on the ND.
- Amber GROUND PROX message in the FMA.

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.

[END]

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

(CONTINUED)

HOLDING PATTERNS AND PROCEDURES (Continued)

MAXIMUM HOLDING PATTERN AIRSPEEDS

ALTITUDES OR FLIGHT LEVELS	MAXIMUM KIAS		STILL AIR OUTBOUND TIMING
	ICAO	US	
Above FL 340	Mach 0.83	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		200*	

* 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)

(CONTINUED)

HYDRAULIC SYSTEM 1 AND 2 FAILURE WITH "HYD 3 ELEV OFF" ALERT (Continued)

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.

(CONTINUED)

HYDRAULIC SYSTEM 1 AND 2 FAILURE WITH "HYD 3 ELEV OFF" ALERT (Continued)

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.

(CONTINUED)

HYDRAULIC SYSTEM 1 AND 2 FAILURE WITH “HYD 3 ELEV OFF” ALERT (Continued)

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. **Descent**

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.

(CONTINUED)

HYDRAULIC SYSTEM 1 AND 2 FAILURE WITH "HYD 3 ELEV OFF" ALERT (Continued)

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 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.

(CONTINUED)

HYDRAULIC SYSTEM 1 AND 2 FAILURE WITH "HYD 3 ELEV OFF" ALERT (Continued)

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.

(CONTINUED)

HYDRAULIC SYSTEM 1 AND 2 FAILURE WITH "HYD 3 ELEV OFF" ALERT (Continued)

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. As the nose gear contacts 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 gear steering is available and may be used for directional control until the aircraft comes to a complete stop.

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.

[END]

TRAFFIC ALERT AND COLLISION AVOIDANCE SYSTEM (TCAS) (Change 7 Installed)

TCAS is an airborne system that interrogates ATC transponders in nearby aircraft, thereby aiding in timely visual acquisition or appropriate vertical flight path maneuvers to avoid potential collisions. Visual and aural warnings as well as vertical flight path maneuvers are provided when a penetration of the TCAS protected airspace is predicted. However, the responsibility for avoiding a collision still remains with the flight crew and ATC. Pilots should not become preoccupied with ATC advisories and displays at the expense of basic aircraft control, normal visual outlook and other crew duties. TCAS information can be displayed on the ND and PFD.

- TCAS should be used to:

  Increase crew awareness of nearby traffic.

  Assist in establishing visual contact with other aircraft.

  Supplement the ATC system.

  Avoid potential collision by following appropriate vertical flight path maneuvers.

- Use of TA/RA, TA Only, and Transponder Only Modes

  TCAS operation should be initiated shortly before takeoff and continued until just after landing.

  To achieve maximum benefit, operate in the TA/RA mode whenever practical.

  Operation in the Traffic Advisory (TA) Only or TCAS OFF (Transponder only) modes, to prevent nuisance advisories and display clutter should be in accordance with operator policy.

  The TCAS mode when selected on the ECP will declutter the ND and display the 10 mile range which can be changed by using the INCR/DECR switches.

- “Proximate” traffic is represented by cyan (blue) diamonds on the ND and represent aircraft that are not presently considered to be threat traffic, but are within 6 NM and 1200 feet vertically.

- “Other” traffic is an outlined cyan diamond on the ND and represents traffic detected outside the range/definition of TA, RA or “Proximate” traffic.

(CONTINUED)

TRAFFIC ALERT AND COLLISION AVOIDANCE SYSTEM (TCAS) (Change 7 Installed) (Continued)

- Traffic Advisory (TA)

  A Traffic Advisory occurs when nearby traffic meets system separation requirements of 25 to 45 seconds, from the closest point of approach, depending on altitude, and is indicated aurally and visually on the TCAS traffic display.

  The intent of a TA is to alert the pilot of the possibility of a RA.

  Maneuvers based solely on a TA may result in reduced separation and are not recommended.

  The TA ONLY mode may be appropriate when:

  - Conducting parallel or converging approaches.
  - Flying in close proximity to other aircraft positively identified and visual separation can be maintained.
  - Operating with an engine inoperative.
  - In Circumstances identified by the operator as having a verified and significant potential for unwanted or undesirable RAs.

DURING A TA

PILOT FLYING	PILOT NOT FLYING
Utilizing traffic display, visually identify and callout conflicting traffic.	
Maintain assigned altitude unless considered necessary to avoid threatening aircraft.	

- Resolution Advisory (RA)

  A Resolution Advisory (RA) occurs when nearby traffic meets system separation requirements of 20 to 30 seconds, from the closest point of approach, depending on altitude.

  When separation from approaching traffic becomes insufficient, TCAS will visually present an RA symbol on the ND with an aural warning and pitch command on the PFD.

(CONTINUED)

TRAFFIC ALERT AND COLLISION AVOIDANCE SYSTEM (TCAS) (Change 7 Installed) (Continued)

During the RA maneuver, the aircrew attempts to establish visual contact with the target. However, visual perception of the encounter can be misleading, particularly at night. The traffic acquired visually may not be the same traffic causing the RA. Continue to follow the lateral flight path unless positive visual contact with conflicting traffic confirms there is a safer course of action.

Maintain situational awareness as TCAS may issue an RA which conflicts with terrain considerations.

Stick shaker must be respected at all times while windshear, GPWS and stall advisories take precedence over TCAS advisories and cause it to revert to the TA ONLY mode.

CAUTION: Once the RA has been issued, safe separation could be compromised if current vertical speed is changed, except as necessary to comply with the RA. This is because TCAS II-to-TCAS II coordination may be in progress with the intruder airplane, and any change in vertical speed that does not comply with the RA may negate the effectiveness of the other airplane's compliance with the RA.

If a conflict exists between ATC clearance and RA, follow the Resolution Advisory and advise ATC.

When maneuvering in response to an RA, the pilot flying must disconnect the autopilot and manually establish the proper pitch attitude. Autopilot response time may be too slow to provide the desired separation.

(CONTINUED)

TRAFFIC ALERT AND COLLISION AVOIDANCE SYSTEM (TCAS) (Change 7 Installed) (Continued)

DURING AN RA

<table>
<tr><th>PILOT FLYING</th><th>PILOT NOT FLYING</th></tr>
<tr><td>Disengage the autopilot.

NOTE: Disconnecting the autopilot during an RA will remove the FD bars from view.

Smoothly and without delay adjust the pitch attitude.

NOTE: When executed properly, the maneuver does not require excessive or abrupt control input. Initiate a positive pitch control input within five seconds, in the direction indicated on the PFD, to place the aircraft in an attitude necessary to maintain the vertical path in the VSI GREEN fly to zone (approximately 0.25G). Avoid the RED zone.

If a Reversal RA is announced, initiate a smooth steady pitch input within two and one-half seconds, and establish the commanded vertical speed (approximately plus or minus 0.35 G).</td><td>Visually search for the threat aircraft.

Advise the pilot flying if there is a deviation from the commanded vertical speed.

Notify ATC:

• When initiating or reversing RA maneuvers requiring a vertical speed adjustment that causes an assigned altitude exceedance.

• If unable to comply with an ATC request due to an RA.

• When clear of conflict and returning to assigned altitude/clearance.</td></tr>
</table>

(CONTINUED)

TRAFFIC ALERT AND COLLISION AVOIDANCE SYSTEM (TCAS) (Change 7 Installed) (Continued)

DURING AN RA

PILOT FLYING	PILOT NOT FLYING
If possible visually confirm the necessity and suitability for the avoidance maneuver but recognize that any other aircraft seen visually may not necessarily be the threat aircraft or the only aircraft that is triggering the TCAS response. Continue to follow the planned lateral flight path. When a voice message "Clear of Conflict" is announced, promptly return to previous ATC clearance. *NOTE: The FD bars will automatically return to view.*	

TCAS provides the following information:

AURAL INFORMATIONAL MESSAGES

CONDITION	ADVISORY MESSAGE
TRAFFIC ADVISORY	"Traffic, Traffic"
RA CLEARED	"Clear of Conflict"
SELF TEST PASSED	"TCAS Test Pass"
SELF TEST FAILED	"TCAS Test Fail"

(CONTINUED)

TRAFFIC ALERT AND COLLISION AVOIDANCE SYSTEM (TCAS) (Change 7 Installed) (Continued)

AURAL CORRECTIVE RESOLUTION ADVISORIES

RA CATEGORY	CORRECTIVE	PREVENTATIVE
CLIMB	"Climb, Climb"	"Monitor Vertical Speed, Monitor Vertical Speed"
DESCENT	"Descend, Descend"	"Monitor Vertical Speed, Monitor Vertical Speed"
NON-CROSSING	"Maintain Vertical Speed, Maintain"	N/A
ALTITUDE CROSSING	"Maintain Vertical Speed, Crossing Maintain"	N/A
CROSSOVER CLIMB	"Climb, Crossing Climb, Climb, Crossing Climb"	N/A
CROSSOVER DESCENT	"Descend, Crossing Descend, Descend, Crossing Descend"	N/A
VERTICAL SPEED RESTRICTED (CLIMBING)	"Adjust Vertical Speed, Adjust"	"Monitor Vertical Speed, Monitor Vertical Speed"

AURAL CORRECTIVE RESOLUTION ADVISORIES

RA CATEGORY	CORRECTIVE	PREVENTATIVE
VERTICAL SPEED RESTRICTED (DESCENDING)	"Adjust Vertical Speed, Adjust"	"Monitor Vertical Speed, Monitor Vertical Speed"
VERTICAL SPEED RESTRICTED		"Monitor Vertical Speed"

"Monitor vertical speed" is spoken once if there is a softening of the advisory from a previous corrective advisory.

(CONTINUED)

TRAFFIC ALERT AND COLLISION AVOIDANCE SYSTEM (TCAS) (Change 7 Installed) (Continued)

AURAL INCREASE OR REVERSAL RESOLUTION ADVISORIES

RA CATEGORY	CORRECTIVE	PREVENTATIVE
INCREASE CLIMB RATE	“Increase Climb, Increase Climb”	N/A
INCREASE DESCENT RATE	“Increase Descent, Increase Descent”	N/A
CHANGE FROM CLIMB TO DESCENT	“Descend, Descend Now, Descend, Descend Now”	N/A
CHANGE FROM DESCENT TO CLIMB	“Climb, Climb Now, Climb, Climb Now”	N/A

Respond immediately to any increase or reversal RA maneuver advisory.

[END]

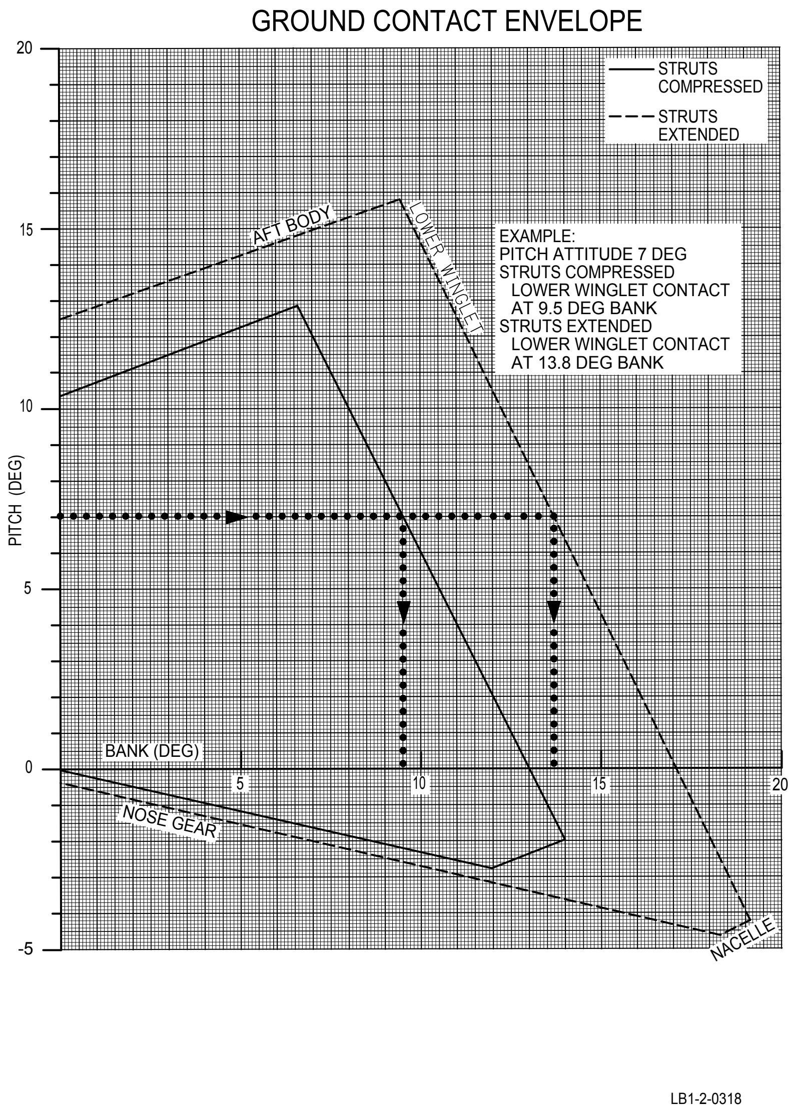
Intentionally
Blank

Reference Data — Chapter RD

Table of Contents — Section 0

Intentionally
Blank

GROUND CONTACT ENVELOPE

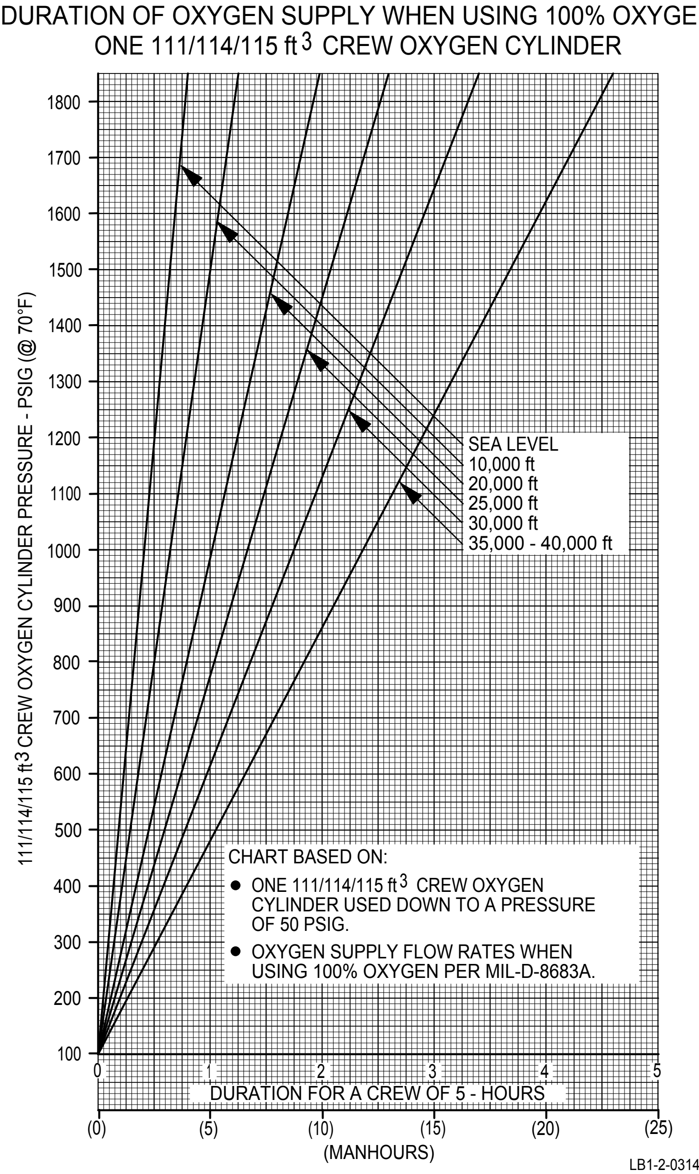


OXYGEN FLOW CHARTS

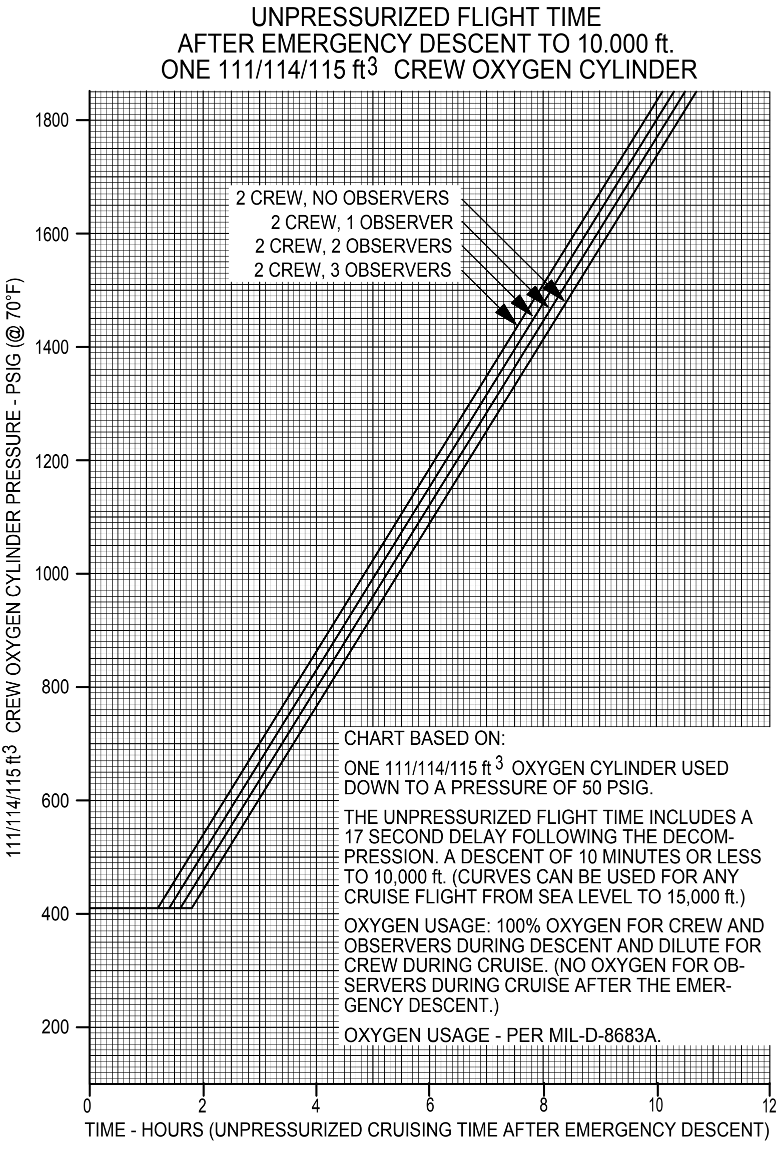
Charts are provided to show duration of oxygen supply using 100% oxygen for a crew of five and duration of oxygen supply for the crew after descent to 10,000 feet.

One Bottle Configuration

DURATION OF OXYGEN SUPPLY WHEN USING 100% OXYGEN ONE 111/114/115 FT^3 CREW OXYGEN CYLINDERS

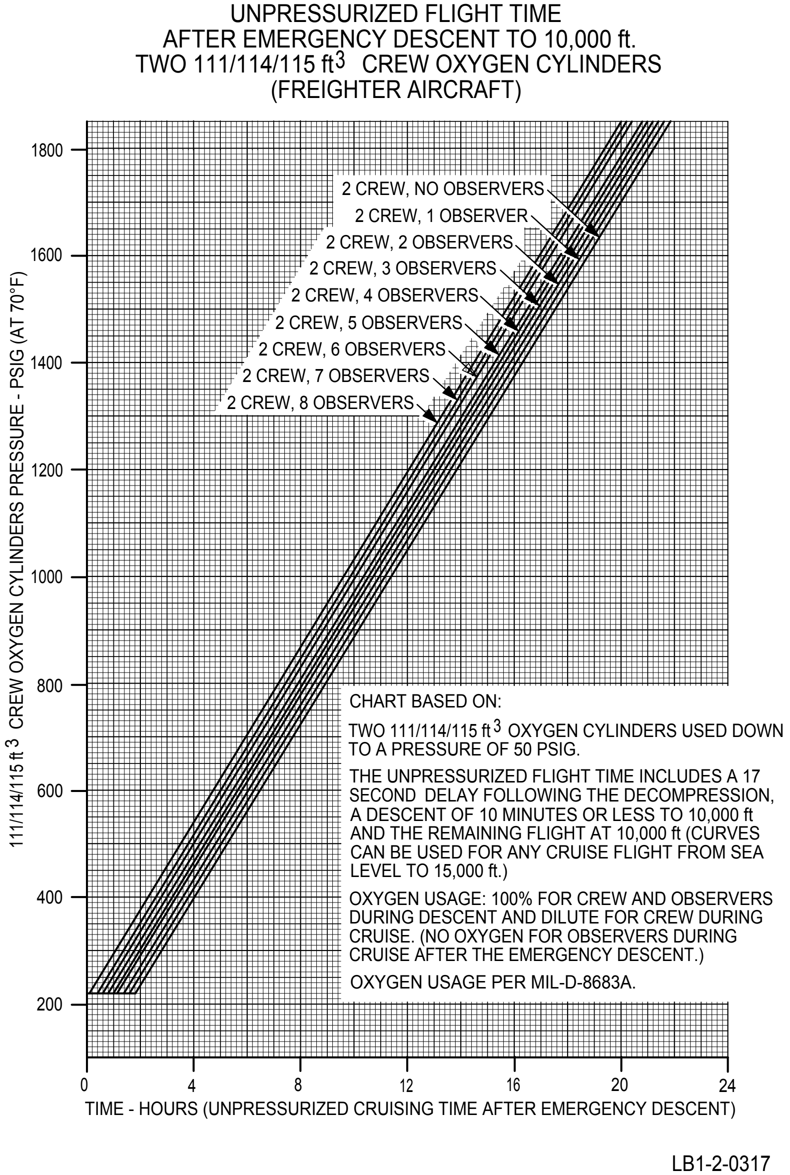


UNPRESSURIZED FLIGHT TIME AFTER EMERGENCY DESCENT TO 10,000 FT – ONE 111/114/115 FT^3 CREW OXYGEN CYLINDERS



Two Bottle Configuration

UNPRESSURIZED FLIGHT TIME AFTER EMERGENCY DESCENT TO 10,000 FT – TWO 111/114/115 FT^3 CREW OXYGEN CYLINDERS (Freighter Aircraft)



LB1-2-0317

Intentionally
Blank

Performance Data — Chapter PD

Table of Contents — Section 0

Intentionally
Blank

Normal & Abnormal Configuration Reference Speeds (VREF)(M)

LDG WT (1000 KG)	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)
130	131	129	169	137	136	130	129	127	127	158	153	152
140	131	129	175	142	138	135	133	132	131	165	159	158
150	134	132	181	147	143	140	138	137	136	171	165	164
160	138	135	187	152	148	145	143	141	140	176	171	170
170	142	139	193	157	152	149	147	146	145	181	176	175
180	147	143	198	161	156	154	151	150	149	187	181	180
190	151	146	204	166	161	158	156	154	153	192	186	185
200	155	150	210	170	165	162	160	158	157	197	191	189
210	159	153	215	174	169	166	164	162	161	202	195	194
220	162	156	220	178	173	170	167	166	165	207	200	199
230	165	160	225	182	177	173	171	169	169	212	205	204
240	169	163	229	186	181	177	174	173	173	216	209	208
250	173	166	234	190	185	181	178	177	176	221	214	*
260	176	169	239	194	188	185	182	180	179	225	218	*
270	179	172	243	198	192	188	185	183	182	229	*	*
280	183	175	248	201	195	191	189	187	186	234	*	*
290	186	178	252	205	199	195	192	190	189	238	*	*

1. **Vapp is the grater of Vref +5 or Vref + wind additive (see note 5).**
2. **Vapp is Vref +5. DO NOT ADD WIND.**
3. **Vapp is the greater of Vref +15 or Vref + wind additive (see note 5).**
4. **If HYD 2 & 3 failure, Vapp is the greater of Vref +8 or Vref + wind additive (see note 5).**
5. **Wind additive is 1/2 of the steady state wind greater than 20 knots or all of the gust increment above steady state value, whichever is greater (max 20 knots).**
6. **If ATS is engaged for approach and landing, wind additives may be applied at Captain's discretion.**
7. **If ATS is not engaged, or is planned to be disengaged prior to landing, the appropriate wind additives should be applied to Vref.**

*** Exceeds flap placard.**

General Electric CF6-80C2 Engines
Estimated Landing Distances (M)
Dry Runway
Flaps 50/EXT

LDG WT (1000 KG)	AIRPORT PRESSURE ALTITUDE / TEMPERATURE					
	S.L. STD=15°C	2000 FT STD=11°C	4000 FT STD=7°C	6000 FT STD=3°C	8000 FT STD=-1°C	10000 FT STD=-5°C
150	1010	1050	1110	1170	1220	1300
160	1040	1100	1160	1210	1280	1360
170	1090	1150	1200	1270	1350	1420
180	1140	1200	1260	1340	1410	1490
190	1190	1250	1320	1390	1470	1550
200	1230	1300	1370	1440	1530	1630
210	1280	1350	1420	1510	1600	1710
220	1330	1400	1480	1560	1660	1780
230	1380	1460	1550	1630	1740	1867
240	1430	1510	1600	1690	1790	1940
250	1480	1560	1660	1740	1850	2020
260	1530	1610	1710	1800	1910	2090
270	1570	1660	1770	1860	1970	2160
280	1620	1710	1820	1920	2040	2230
290	1670	1760	1880	1970	2100	2310

Full Reverse Thrust (3 engines at max reverse thrust to 80 KIAS, then reverse idle to 60 KIAS, then 3 engines at forward idle to stop), Standard Day, No Wind, Zero Slope, Maximum Manual Anti-skid Braking, Air run distance is approximately 305 meters, data is not factored.

Corrections
Temperature

METERS PER °C	
BELOW standard day	-3
ABOVE standard day	+7

Valid from STD -20°C to STD +40°C

Slope

METERS PER 1% SLOPE	
UPHILL	-19
DOWNHILL	+61

Valid from -2% downhill to +2% uphill

Wind

METERS PER KNOT	
HEADWIND	-8
TAILWIND	+24

Valid from -10 knots tailwind to +20 knots headwind

VREF

METERS PER KIAS	
ABOVE VREF	+13

Valid from 1 knot to 20 knots above VREF

Auto Brakes

HIGH DECELERATION CONFIG	
Auto Brakes MAX	13%
Auto Brakes MED	25%
Auto Brakes MIN	58%
STANDARD DECELERATION CONFIG	
Auto Brakes MAX	14%
Auto Brakes MED	59%
Auto Brakes MIN	134%

Reverser

One Reverser INOP	+20
Two Reversers INOP	+38
All Reversers INOP	+113

General Electric CF6-80C2 Engines
Estimated Landing Distances (M)
Dry Runway
Flaps 35/EXT

LDG WT (1000 KG)	AIRPORT PRESSURE ALTITUDE / TEMPERATURE					
	S.L. STD=15°C	2000 FT STD=11°C	4000 FT STD=7°C	6000 FT STD=3°C	8000 FT STD=-1°C	10000 FT STD=-5°C
150	1070	1130	1180	1240	1310	1390
160	1120	1170	1240	1300	1380	1460
170	1160	1230	1300	1370	1450	1530
180	1220	1290	1350	1430	1510	1610
190	1270	1340	1410	1490	1580	1680
200	1320	1400	1470	1560	1650	1760
210	1370	1450	1530	1630	1720	1850
220	1430	1500	1600	1690	1800	1940
230	1470	1560	1650	1760	1880	2030
240	1530	1620	1720	1820	1960	2120
250	1580	1660	1780	1890	2020	2200
260	1630	1720	1840	1950	2090	2280
270	1680	1770	1900	2020	2160	2370
280	1730	1830	1960	2090	2240	2450
290	1780	1880	2010	2150	2310	2530

Full Reverse Thrust (3 engines at max reverse thrust to 80 KIAS, then reverse idle to 60 KIAS, then 3 engines at forward idle to stop), Standard Day, No Wind, Zero Slope, Maximum Manual Anti-skid Braking, Air run distance is approximately 305 meters, data is not factored.

Corrections

Temperature

METERS PER °C	
BELOW standard day	-3
ABOVE standard day	+9

Valid from STD -20°C to STD +40°C

Slope

METERS PER 1% SLOPE	
UPHILL	-21
DOWNHILL	+73

Valid from -2% downhill to +2% uphill

Wind

METERS PER KNOT	
HEADWIND	-9
TAILWIND	+28

Valid from -10 knots tailwind to +20 knots headwind

VREF

METERS PER KIAS	
ABOVE VREF	+13

Valid from 1 knot to 20 knots above VREF

Auto Brakes

HIGH DECELERATION CONFIG	
Auto Brakes MAX	13%
Auto Brakes MED	25%
Auto Brakes MIN	58%
STANDARD DECELERATION CONFIG	
Auto Brakes MAX	14%
Auto Brakes MED	59%
Auto Brakes MIN	134%

Reverser

One Reverser INOP	+22
Two Reversers INOP	+58
All Reversers INOP	+85

General Electric CF6-80C2 Engines
Estimated Landing Distances (M)
Good Reported Braking Action
Flaps 50/EXT

LDG WT (1000 KG)	AIRPORT PRESSURE ALTITUDE / TEMPERATURE					
	S.L. STD=15°C	2000 FT STD=11°C	4000 FT STD=7°C	6000 FT STD=3°C	8000 FT STD=-1°C	10000 FT STD=-5°C
150	1400	1480	1560	1650	1750	1860
160	1460	1540	1630	1720	1830	1940
170	1520	1610	1700	1800	1920	2040
180	1580	1670	1780	1890	2010	2150
190	1650	1750	1850	1970	2100	2250
200	1710	1820	1930	2050	2190	2350
210	1780	1900	2010	2150	2290	2470
220	1850	1970	2090	2230	2390	2580
230	1930	2050	2180	2330	2490	2710
240	2000	2120	2260	2410	2580	2820
250	2070	2190	2340	2490	2670	2920
260	2140	2260	2420	2570	2760	3030
270	2200	2330	2500	2660	2850	3130
280	2270	2400	2570	2740	2950	3240
290	2340	2470	2650	2830	3040	3340

Full Reverse Thrust (3 engines at max reverse thrust to 80 KIAS, then reverse idle to 60 KIAS, then 3 engines at forward idle to stop), Standard Day, No Wind, Zero Slope, Maximum Manual Anti-skid Braking, Air run distance is approximately 305 meters, data is not factored.

Corrections

Temperature

METERS PER °C	
BELOW standard day	-4
ABOVE standard day	+11

Valid from STD -20°C to STD +40°C

Slope

METERS PER 1% SLOPE	
UPHILL	-38
DOWNHILL	+132

Valid from -2% downhill to +2% uphill

Wind

METERS PER KNOT	
HEADWIND	-14
TAILWIND	+40

Valid from -10 knots tailwind to +20 knots headwind

VREF

METERS PER KIAS	
ABOVE VREF	+18

Valid from 1 knot to 20 knots above VREF

Auto Brakes

HIGH DECELERATION CONFIG	
Auto Brakes MAX	4%
Auto Brakes MED	12%
Auto Brakes MIN	12%
STANDARD DECELERATION CONFIG	
Auto Brakes MAX	4%
Auto Brakes MED	14%
Auto Brakes MIN	67%

Reverser

One Reverser INOP	+34
Two Reversers INOP	+82
All Reversers INOP	+130

General Electric CF6-80C2 Engines
Estimated Landing Distances (M)
Good Reported Braking Action
Flaps 35/EXT

LDG WT (1000 KG)	AIRPORT PRESSURE ALTITUDE / TEMPERATURE					
	S.L. STD=15°C	2000 FT STD=11°C	4000 FT STD=7°C	6000 FT STD=3°C	8000 FT STD=-1°C	10000 FT STD=-5°C
150	1510	1580	1670	1770	1890	2020
160	1570	1650	1750	1870	1990	2120
170	1640	1730	1840	1960	2090	2230
180	1710	1810	1930	2050	2190	2340
190	1780	1890	2010	2150	2290	2450
200	1860	1980	2100	2250	2400	2570
210	1930	2050	2190	2340	2500	2710
220	2010	2140	2280	2440	2610	2830
230	2090	2220	2370	2530	2740	2970
240	2170	2310	2460	2630	2850	3090
250	2240	2380	2540	2720	2950	3230
260	2310	2460	2630	2810	3060	3350
270	2390	2540	2710	2910	3160	3470
280	2460	2620	2800	3000	3270	3590
290	2530	2700	2890	3100	3370	3710

Full Reverse Thrust (3 engines at max reverse thrust to 80 KIAS, then reverse idle to 60 KIAS, then 3 engines at forward idle to stop), Standard Day, No Wind, Zero Slope, Maximum Manual Anti-skid Braking, Air run distance is approximately 305 meters, data is not factored.

Corrections

Temperature

METERS PER °C	
BELOW standard day	-4
ABOVE standard day	+12

Valid from STD -20°C to STD +40°C

Slope

METERS PER 1% SLOPE	
UPHILL	-40
DOWNHILL	+152

Valid from -2% downhill to +2% uphill

Wind

METERS PER KNOT	
HEADWIND	-14
TAILWIND	+43

Valid from -10 knots tailwind to +20 knots headwind

VREF

METERS PER KIAS	
ABOVE VREF	+18

Valid from 1 knot to 20 knots above VREF

Auto Brakes

HIGH DECELERATION CONFIG	
Auto Brakes MAX	4%
Auto Brakes MED	12%
Auto Brakes MIN	12%
STANDARD DECELERATION CONFIG	
Auto Brakes MAX	4%
Auto Brakes MED	14%
Auto Brakes MIN	67%

Reverser

One Reverser INOP	+58
Two Reversers INOP	+134
All Reversers INOP	+222

General Electric CF6-80C2 Engines
Estimated Landing Distances (M)
Medium Reported Braking Action
Flaps 50/EXT

LDG WT (1000 KG)	AIRPORT PRESSURE ALTITUDE / TEMPERATURE					
	S.L. STD=15°C	2000 FT STD=11°C	4000 FT STD=7°C	6000 FT STD=3°C	8000 FT STD=-1°C	10000 FT STD=-5°C
150	2070	2200	2330	2480	2630	2800
160	2160	2280	2420	2570	2740	2920
170	2240	2370	2510	2670	2850	3040
180	2320	2460	2610	2790	2970	3170
190	2410	2560	2710	2890	3080	3290
200	2490	2640	2800	2990	3190	3420
210	2580	2740	2910	3110	3320	3560
220	2670	2830	3000	3220	3430	3700
230	2770	2940	3120	3340	3560	3860
240	2860	3020	3230	3440	3630	3990
250	2950	3120	3320	3540	3800	4130
260	3030	3210	3420	3650	3920	4260
270	3120	3300	3520	3750	4030	4390
280	3210	3400	3620	3860	4150	4520
290	3300	3490	3720	3970	4270	4650

Full Reverse Thrust (3 engines at max reverse thrust to 80 KIAS, then reverse idle to 60 KIAS, then 3 engines at forward idle to stop), Standard Day, No Wind, Zero Slope, Maximum Manual Anti-skid Braking, Air run distance is approximately 305 meters, data is not factored.

Corrections

Temperature

METERS PER °C	
BELOW standard day	-4
ABOVE standard day	+14

Valid from STD -20°C to STD +40°C

Slope

METERS PER 1% SLOPE	
UPHILL	-144
DOWNHILL	+246

Valid from -2% downhill to +2% uphill

Wind

METERS PER KNOT	
HEADWIND	-24
TAILWIND	+58

Valid from -10 knots tailwind to +20 knots headwind

VREF

METERS PER KIAS	
ABOVE VREF	+26

Valid from 1 knot to 20 knots above VREF

Auto Brakes

HIGH DECELERATION CONFIG	
Auto Brakes MAX	3%
Auto Brakes MED	8%
Auto Brakes MIN	8%
STANDARD DECELERATION CONFIG	
Auto Brakes MAX	3%
Auto Brakes MED	9%
Auto Brakes MIN	16%

Reverser

One Reverser INOP	+183
Two Reversers INOP	+290
All Reversers INOP	+451

General Electric CF6-80C2 Engines
Estimated Landing Distances (M)
Medium Reported Braking Action
Flaps 35/EXT

LDG WT (1000 KG)	AIRPORT PRESSURE ALTITUDE / TEMPERATURE					
	S.L. STD=15°C	2000 FT STD=11°C	4000 FT STD=7°C	6000 FT STD=3°C	8000 FT STD=-1°C	10000 FT STD=-5°C
150	2260	2390	2530	2700	2880	3080
160	2350	2480	2630	2810	3000	3200
170	2430	2580	2740	2920	3110	3330
180	2520	2680	2840	3030	3240	3460
190	2610	2780	2950	3150	3370	3600
200	2730	2880	3060	3280	3500	3750
210	2800	2980	3170	3390	3620	3910
220	2890	3080	3280	3510	3760	4060
230	2990	3190	3390	3640	3910	4220
240	3090	3290	3510	3750	4050	4370
250	3180	3390	3610	3860	4170	4530
260	3270	3480	3720	3980	4290	4670
270	3360	3580	3830	4090	4420	4820
280	3460	3680	3930	4210	4450	4960
290	3550	3780	4040	4320	4680	5110

Full Reverse Thrust (3 engines at max reverse thrust to 80 KIAS, then reverse idle to 60 KIAS, then 3 engines at forward idle to stop), Standard Day, No Wind, Zero Slope, Maximum Manual Anti-skid Braking, Air run distance is approximately 305 meters, data is not factored.

Corrections

Temperature

METERS PER °C	
BELOW standard day	-5
ABOVE standard day	+16

Valid from STD -20°C to STD +40°C

Slope

METERS PER 1% SLOPE	
UPHILL	-171
DOWNHILL	+215

Valid from -2% downhill to +2% uphill

Wind

METERS PER KNOT	
HEADWIND	-24
TAILWIND	+62

Valid from -10 knots tailwind to +20 knots headwind

VREF

METERS PER KIAS	
ABOVE VREF	+26

Valid from 1 knot to 20 knots above VREF

Auto Brakes

HIGH DECELERATION CONFIG	
Auto Brakes MAX	3%
Auto Brakes MED	8%
Auto Brakes MIN	8%
STANDARD DECELERATION CONFIG	
Auto Brakes MAX	3%
Auto Brakes MED	9%
Auto Brakes MIN	16%

Reverser

One Reverser INOP	+258
Two Reversers INOP	+387
All Reversers INOP	+644

General Electric CF6-80C2 Engines
Estimated Landing Distances (M)
Poor Reported Braking Action
Flaps 50/EXT

LDG WT (1000 KG)	AIRPORT PRESSURE ALTITUDE / TEMPERATURE					
	S.L. STD=15°C	2000 FT STD=11°C	4000 FT STD=7°C	6000 FT STD=3°C	8000 FT STD=-1°C	10000 FT STD=-5°C
150	2740	2920	3100	3300	3510	3750
160	2850	3020	3200	3420	3650	3890
170	2950	3130	3320	3540	3780	4040
180	3060	3250	3450	3680	3920	4190
190	3160	3360	3560	3810	4060	4330
200	3260	3460	3680	3930	4190	4490
210	3370	3580	3800	4070	4340	4660
220	3480	3690	3920	4200	4480	4820
230	3600	3820	4070	4340	4640	5000
240	3710	3930	4190	4470	4780	5160
250	3820	4050	4310	4590	4930	5330
260	3930	4160	4430	4720	5070	5490
270	4040	4280	4550	4850	5210	5650
280	4140	4390	4670	4980	5360	5800
290	4250	4500	4790	5110	5500	5960

Full Reverse Thrust (3 engines at max reverse thrust to 80 KIAS, then reverse idle to 60 KIAS, then 3 engines at forward idle to stop), Standard Day, No Wind, Zero Slope, Maximum Manual Anti-skid Braking, Air run distance is approximately 305 meters, data is not factored.

Corrections
Temperature

METERS PER °C	
BELOW standard day	-4
ABOVE standard day	+17

Valid from STD -20°C to STD +40°C

Slope

METERS PER 1% SLOPE	
UPHILL	-249
DOWNHILL	NOT RECOMMENDED

Valid from -2% downhill to +2% uphill

Wind

METERS PER KNOT	
HEADWIND	-33
TAILWIND	+76

Valid from -10 knots tailwind to +20 knots headwind

VREF

METERS PER KIAS	
ABOVE VREF	+34

Valid from 1 knot to 20 knots above VREF

Auto Brakes

HIGH DECELERATION CONFIG	
Auto Brakes MAX	2%
Auto Brakes MED	6%
Auto Brakes MIN	6%
STANDARD DECELERATION CONFIG	
Auto Brakes MAX	2%
Auto Brakes MED	7%
Auto Brakes MIN	7%

Reverser

One Reverser INOP	+329
Two Reversers INOP	+588
All Reversers INOP	+1033

General Electric CF6-80C2 Engines
Estimated Landing Distances (M)
Poor Reported Braking Action
Flaps 35/EXT

LDG WT (1000 KG)	AIRPORT PRESSURE ALTITUDE / TEMPERATURE					
	S.L. STD=15°C	2000 FT STD=11°C	4000 FT STD=7°C	6000 FT STD=3°C	8000 FT STD=-1°C	10000 FT STD=-5°C
150	3010	3200	3390	3630	3870	4140
160	3120	3310	3510	3750	4000	4290
170	3230	3420	3630	3880	4140	4440
180	3330	3540	3760	4010	4290	4590
190	3440	3660	3890	4150	4440	4750
200	3560	3780	4020	4300	4600	4930
210	3670	3900	4150	4430	4740	5110
220	3780	4020	4290	4580	4900	5290
230	3900	4150	4410	4720	5080	5470
240	4010	4270	4550	4870	5240	5650
250	4120	4390	4680	5000	5380	5830
260	4230	4510	4810	5140	5530	6000
270	4340	4630	4940	5270	5680	6170
280	4450	4750	5070	5410	5830	6340
290	4560	4870	5200	5550	5980	6510

Full Reverse Thrust (3 engines at max reverse thrust to 80 KIAS, then reverse idle to 60 KIAS, then 3 engines at forward idle to stop), Standard Day, No Wind, Zero Slope, Maximum Manual Anti-skid Braking, Air run distance is approximately 305 meters, data is not factored.

Corrections

Temperature

METERS PER °C	
BELOW standard day	-5
ABOVE standard day	+19

Valid from STD -20°C to STD +40°C

Slope

METERS PER 1% SLOPE	
UPHILL	-301
DOWNHILL	NOT RECOMMENDED

Valid from -2% downhill to +2% uphill

Wind

METERS PER KNOT	
HEADWIND	-35
TAILWIND	+80

Valid from -10 knots tailwind to +20 knots headwind

VREF

METERS PER KIAS	
ABOVE VREF	+34

Valid from 1 knot to 20 knots above VREF

Auto Brakes

HIGH DECELERATION CONFIG	
Auto Brakes MAX	2%
Auto Brakes MED	6%
Auto Brakes MIN	6%
STANDARD DECELERATION CONFIG	
Auto Brakes MAX	2%
Auto Brakes MED	7%
Auto Brakes MIN	7%

Reverser

One Reverser INOP	+459
Two Reversers INOP	+641
All Reversers INOP	+1065

General Electric CF6-80C2 Engines
Estimated Landing Distances (M)
Wet Runway Not Considering Hydroplaning
Flaps 50/EXT

LDG WT (1000 KG)	AIRPORT PRESSURE ALTITUDE / TEMPERATURE					
	S.L. STD=15°C	2000 FT STD=11°C	4000 FT STD=7°C	6000 FT STD=3°C	8000 FT STD=-1°C	10000 FT STD=-5°C
160	1460	1540	1630	1720	1830	1940
170	1520	1610	1700	1800	1920	2040
180	1580	1670	1780	1890	2010	2150
190	1650	1750	1850	1970	2100	2250
200	1710	1820	1930	2050	2190	2350
210	1780	1900	2010	2150	2290	2470
220	1850	1970	2090	2230	2390	2580
230	1930	2050	2180	2330	2490	2710

Full Reverse Thrust (3 engines at max reverse thrust to 80 KIAS, then reverse idle to 60 KIAS, then 3 engines at forward idle to stop), Standard Day, No Wind, Zero Slope, Maximum Manual Anti-skid Braking, Air run distance is approximately 305 meters, data is not factored.

Corrections

Temperature

METERS PER °C	
BELOW standard day	-4
ABOVE standard day	+11

Valid from STD -20°C to STD +40°C

Slope

METERS PER 1% SLOPE	
UPHILL	-38
DOWNHILL	+132

Valid from -2% downhill to +2% uphill

Wind

METERS PER KNOT	
HEADWIND	-14
TAILWIND	+40

Valid from -10 knots tailwind to +20 knots headwind

VREF

METERS PER KIAS	
ABOVE VREF	+18

Valid from 1 knot to 20 knots above VREF

General Electric CF6-80C2 Engines
Estimated Landing Distances (M)
Wet Runway Not Considering Hydroplaning
Flaps 35/EXT

LDG WT (1000 KG)	AIRPORT PRESSURE ALTITUDE / TEMPERATURE					
	S.L. STD=15°C	2000 FT STD=11°C	4000 FT STD=7°C	6000 FT STD=3°C	8000 FT STD=-1°C	10000 FT STD=-5°C
160	1570	1650	1750	1870	1990	2120
170	1640	1730	1840	1960	2090	2230
180	1710	1810	1930	2050	2190	2340
190	1780	1890	2010	2150	2290	2450
200	1860	1980	2100	2250	2400	2570
210	1930	2050	2190	2340	2500	2710
220	2010	2140	2280	2440	2610	2830
230	2090	2220	2370	2530	2740	2970

Full Reverse Thrust (3 engines at max reverse thrust to 80 KIAS, then reverse idle to 60 KIAS, then 3 engines at forward idle to stop), Standard Day, No Wind, Zero Slope, Maximum Manual Anti-skid Braking, Air run distance is approximately 305 meters, data is not factored.

Corrections
Temperature

METERS PER °C	
BELOW standard day	-4
ABOVE standard day	+12

Valid from STD -20°C to STD +40°C

Slope

METERS PER 1% SLOPE	
UPHILL	-40
DOWNHILL	+152

Valid from -2% downhill to +2% uphill

Wind

METERS PER KNOT	
HEADWIND	-14
TAILWIND	+43

Valid from -10 knots tailwind to +20 knots headwind

VREF

METERS PER KIAS	
ABOVE VREF	+18

Valid from 1 knot to 20 knots above VREF

General Electric CF6-80C2 Engines
Estimated Landing Distances (M)
Wet Runway Considering Hydroplaning
Flaps 50/EXT

LDG WT (1000 KG)	AIRPORT PRESSURE ALTITUDE / TEMPERATURE					
	S.L. STD=15°C	2000 FT STD=11°C	4000 FT STD=7°C	6000 FT STD=3°C	8000 FT STD=-1°C	10000 FT STD=-5°C
160	1560	1660	1780	1900	2040	2190
170	1640	1750	1870	2010	2160	2320
180	1730	1850	1980	2130	2280	2460
190	1810	1940	2080	2240	2400	2590
200	1900	2030	2180	2340	2520	2730
210	1990	2140	2300	2470	2660	2890
220	2090	2230	2400	2580	2780	3040
230	2180	2340	2520	2710	2930	3210

Full Reverse Thrust (3 engines at max reverse thrust to 80 KIAS, then reverse idle to 60 KIAS, then 3 engines at forward idle to stop), Standard Day, No Wind, Zero Slope, Maximum Manual Anti-skid Braking, Air run distance is approximately 305 meters, data is not factored.

Corrections
Temperature

METERS PER °C	
BELOW standard day	-5
ABOVE standard day	+14

Valid from STD -20°C to STD +40°C

Slope

METERS PER 1% SLOPE	
UPHILL	-43
DOWNHILL	+213

Valid from -2% downhill to +2% uphill

Wind

METERS PER KNOT	
HEADWIND	-18
TAILWIND	+64

Valid from -10 knots tailwind to +20 knots headwind

VREF

METERS PER KIAS	
ABOVE VREF	+29

Valid from 1 knot to 20 knots above VREF

General Electric CF6-80C2 Engines
Estimated Landing Distances (M)
Wet Runway Considering Hydroplaning
Flaps 35/EXT

LDG WT (1000 KG)	AIRPORT PRESSURE ALTITUDE / TEMPERATURE					
	S.L. STD=15°C	2000 FT STD=11°C	4000 FT STD=7°C	6000 FT STD=3°C	8000 FT STD=-1°C	10000 FT STD=-5°C
160	1700	1810	1940	2080	2240	2410
170	1790	1910	2050	2200	2360	2550
180	1880	2010	2160	2320	2500	2700
190	1980	2120	2280	2450	2640	2850
200	2080	2230	2390	2580	2780	3020
210	2170	2330	2510	2700	2920	3190
220	2280	2450	2630	2830	3070	3350
230	2380	2550	2750	2960	3230	3530

Full Reverse Thrust (3 engines at max reverse thrust to 80 KIAS, then reverse idle to 60 KIAS, then 3 engines at forward idle to stop), Standard Day, No Wind, Zero Slope, Maximum Manual Anti-skid Braking, Air run distance is approximately 305 meters, data is not factored.

Corrections
Temperature

METERS PER °C	
BELOW standard day	-5
ABOVE standard day	+15

Valid from STD -20°C to STD +40°C

Slope

METERS PER 1% SLOPE	
UPHILL	-53
DOWNHILL	+255

Valid from -2% downhill to +2% uphill

Wind

METERS PER KNOT	
HEADWIND	-18
TAILWIND	+72

Valid from -10 knots tailwind to +20 knots headwind

VREF

METERS PER KIAS	
ABOVE VREF	+31

Valid from 1 knot to 20 knots above VREF

General Electric CF6-80C2 Engines

Estimated Landing Distances (M)

Contaminated Runway Slush/Loose Snow/Standing Water Depth = 12.7 mm

Flaps 50/EXT

LDG WT (1000 KG)	AIRPORT PRESSURE ALTITUDE / TEMPERATURE					
	S.L. STD=15°C	2000 FT STD=11°C	4000 FT STD=7°C	6000 FT STD=3°C	8000 FT STD=-1°C	10000 FT STD=-5°C
160	1780	1880	1990	2110	2250	2400
170	1860	1970	2090	2200	2370	2540
180	1950	2070	2200	2340	2500	2680
190	2040	2160	2300	2450	2630	2810
200	2120	2260	2400	2570	2750	2960
210	2220	2360	2520	2690	2890	3120
220	2310	2460	2630	2810	3020	3270
230	2420	2580	2750	2950	3160	3430

Full Reverse Thrust (3 engines at max reverse thrust to 80 KIAS, then reverse idle to 60 KIAS, then 3 engines at forward idle to stop), Standard Day, No Wind, Zero Slope, Maximum Manual Anti-skid Braking, Air run distance is approximately 305 meters, data is not factored.

Corrections

Temperature

METERS PER °C	
BELOW standard day	-5
ABOVE standard day	+13

Valid from STD -20°C to STD +40°C

Slope

METERS PER 1% SLOPE	
UPHILL	-73
DOWNHILL	+254

Valid from -2% downhill to +2% uphill

Wind

METERS PER KNOT	
HEADWIND	-18
TAILWIND	+57

Valid from -10 knots tailwind to +20 knots headwind

VREF

METERS PER KIAS	
ABOVE VREF	+26

Valid from 1 knot to 20 knots above VREF

General Electric CF6-80C2 Engines
Estimated Landing Distances (M)
Contaminated Runway Slush/Loose Snow/Standing Water Depth = 12.7 mm
Flaps 35/EXT

LDG WT (1000 KG)	AIRPORT PRESSURE ALTITUDE / TEMPERATURE					
	S.L. STD=15°C	2000 FT STD=11°C	4000 FT STD=7°C	6000 FT STD=3°C	8000 FT STD=-1°C	10000 FT STD=-5°C
160	1930	2050	2180	2320	2480	2650
170	2030	2150	2290	2440	2610	2800
180	2120	2260	2400	2570	2740	2940
190	2220	2370	2520	2700	2890	3100
200	2330	2480	2650	2840	3040	3270
210	2430	2590	2760	2960	3170	3450
220	2530	2700	2890	3100	3330	3610
230	2640	2820	3010	3230	3490	3790

Full Reverse Thrust (3 engines at max reverse thrust to 80 KIAS, then reverse idle to 60 KIAS, then 3 engines at forward idle to stop), Standard Day, No Wind, Zero Slope, Maximum Manual Anti-skid Braking, Air run distance is approximately 305 meters, data is not factored.

Corrections
Temperature

METERS PER °C	
BELOW standard day	-5
ABOVE standard day	+14

Valid from STD -20°C to STD +40°C

Slope

METERS PER 1% SLOPE	
UPHILL	-74
DOWNHILL	+287

Valid from -2% downhill to +2% uphill

Wind

METERS PER KNOT	
HEADWIND	-20
TAILWIND	+62

Valid from -10 knots tailwind to +20 knots headwind

VREF

METERS PER KIAS	
ABOVE VREF	+27

Valid from 1 knot to 20 knots above VREF

General Electric CF6-80C2 Engines

Estimated Landing Distances (M)

Contaminated Runway Slush/Loose Snow/Standing Water Depth = 25.4 mm

Flaps 50/EXT

LDG WT (1000 KG)	AIRPORT PRESSURE ALTITUDE / TEMPERATURE					
	S.L. STD=15°C	2000 FT STD=11°C	4000 FT STD=7°C	6000 FT STD=3°C	8000 FT STD=-1°C	10000 FT STD=-5°C
160	1620	1710	1800	1910	2020	2140
170	1700	1790	1890	2000	2130	2270
180	1780	1870	1990	2120	2260	2420
190	1850	1960	2090	2230	2380	2560
200	1940	2060	2190	2340	2500	2700
210	2030	2160	2310	2470	2650	2860
220	2120	2260	2410	2590	2770	3020
230	2220	2380	2540	2720	2920	3180

Full Reverse Thrust (3 engines at max reverse thrust to 80 KIAS, then reverse idle to 60 KIAS, then 3 engines at forward idle to stop), Standard Day, No Wind, Zero Slope, Maximum Manual Anti-skid Braking, Air run distance is approximately 305 meters, data is not factored.

Corrections

Temperature

METERS PER °C	
BELOW standard day	-5
ABOVE standard day	+12

Valid from STD -20°C to STD +40°C

Slope

METERS PER 1% SLOPE	
UPHILL	-64
DOWNHILL	+208

Valid from -2% downhill to +2% uphill

Wind

METERS PER KNOT	
HEADWIND	-14
TAILWIND	+49

Valid from -10 knots tailwind to +20 knots headwind

VREF

METERS PER KIAS	
ABOVE VREF	+23

Valid from 1 knot to 20 knots above VREF

General Electric CF6-80C2 Engines
Estimated Landing Distances (M)
Contaminated Runway Slush/Loose Snow/Standing Water Depth = 25.4 mm
Flaps 35/EXT

LDG WT (1000 KG)	AIRPORT PRESSURE ALTITUDE / TEMPERATURE					
	S.L. STD=15°C	2000 FT STD=11°C	4000 FT STD=7°C	6000 FT STD=3°C	8000 FT STD=-1°C	10000 FT STD=-5°C
160	1770	1860	1970	2090	2230	2380
170	1850	1960	2080	2210	2360	2530
180	1940	2060	2190	2340	2500	2680
190	2040	2170	2310	2470	2650	2840
200	2140	2280	2430	2600	2800	3010
210	2240	2390	2550	2730	2930	3190
220	2350	2500	2680	2870	3090	3350
230	2450	2610	2800	3010	3250	3530

Full Reverse Thrust (3 engines at max reverse thrust to 80 KIAS, then reverse idle to 60 KIAS, then 3 engines at forward idle to stop), Standard Day, No Wind, Zero Slope, Maximum Manual Anti-skid Braking, Air run distance is approximately 305 meters, data is not factored.

Corrections
Temperature

METERS PER °C	
BELOW standard day	-5
ABOVE standard day	+13

Valid from STD -20°C to STD +40°C

Slope

METERS PER 1% SLOPE	
UPHILL	-68
DOWNHILL	+237

Valid from -2% downhill to +2% uphill

Wind

METERS PER KNOT	
HEADWIND	-16
TAILWIND	+54

Valid from -10 knots tailwind to +20 knots headwind

VREF

METERS PER KIAS	
ABOVE VREF	+23

Valid from 1 knot to 20 knots above VREF

General Electric CF6-80C2 Engines
Estimated Landing Distances (M)
Wet Ice Runway
Flaps 50/EXT

LDG WT (1000 KG)	AIRPORT PRESSURE ALTITUDE / TEMPERATURE					
	S.L. STD=15°C	2000 FT STD=11°C	4000 FT STD=7°C	6000 FT STD=3°C	8000 FT STD=-1°C	10000 FT STD=-5°C
160	2850	3020	3200	3420	3650	3890
170	2950	3130	3320	3540	3780	4040
180	3060	3250	3450	3680	3920	4190
190	3160	3360	3560	3810	4060	4330
200	3260	3460	3680	3930	4190	4490
210	3370	3580	3800	4070	4340	4660
220	3480	3690	3920	4200	4480	4820
230	3600	3820	4070	4340	4640	5000

Full Reverse Thrust (3 engines at max reverse thrust to 80 KIAS, then reverse idle to 60 KIAS, then 3 engines at forward idle to stop), Standard Day, No Wind, Zero Slope, Maximum Manual Anti-skid Braking, Air run distance is approximately 305 meters, data is not factored.

Corrections
Temperature

METERS PER °C	
BELOW standard day	-4
ABOVE standard day	+17

Valid from STD -20°C to STD +40°C

Wind

METERS PER KNOT	
HEADWIND	-33
TAILWIND	+76

Valid from -10 knots tailwind to +20 knots headwind

VREF

METERS PER KIAS	
ABOVE VREF	+35

Valid from -1 knot to 20 knots above VREF

Slope

METERS PER 1% SLOPE	
UPHILL	-249
DOWNHILL	*Note: Landing on downhill slope is not recommended due to excessive required distance.*

Valid from level to +2% uphill

General Electric CF6-80C2 Engines
Estimated Landing Distances (M)
Wet Ice Runway
Flaps 35/EXT

LDG WT (1000 KG)	AIRPORT PRESSURE ALTITUDE / TEMPERATURE					
	S.L. STD=15°C	2000 FT STD=11°C	4000 FT STD=7°C	6000 FT STD=3°C	8000 FT STD=-1°C	10000 FT STD=-5°C
160	3120	3310	3510	3750	4000	4290
170	3230	3420	3630	3880	4140	4440
180	3330	3540	3760	4010	4290	4590
190	3440	3660	3890	4150	4440	4750
200	3560	3780	4020	4300	4600	4930
210	3670	3900	4150	4430	4740	5110
220	3780	4020	4290	4580	4900	5290
230	3900	4150	4410	4720	5080	5470

Full Reverse Thrust (3 engines at max reverse thrust to 80 KIAS, then reverse idle to 60 KIAS, then 3 engines at forward idle to stop), Standard Day, No Wind, Zero Slope, Maximum Manual Anti-skid Braking, Air run distance is approximately 305 meters, data is not factored.

Corrections
Temperature

METERS PER °C	
BELOW standard day	-5
ABOVE standard day	+19

Valid from STD -20°C to STD +40°C

Wind

METERS PER KNOT	
HEADWIND	-35
TAILWIND	+80

Valid from -10 knots tailwind to +20 knots head-wind

VREF

METERS PER KIAS	
ABOVE VREF	+34

Valid from -1 knot to 20 knots above VREF

Slope

METERS PER 1% SLOPE	
UPHILL	-301
DOWNHILL	*Note: Landing on downhill slope is not recommended due to excessive required distance.*

Valid from level to +2% uphill

Magnetic Variation Table

AIRPORT IDENTITY	AIRPORT NAME	LATITUDE	LONGITUDE	ERROR IN 2011 (deg)	ERROR IN 2012 (deg)	ERROR IN 2013 (deg)	ERROR IN 2014 (deg)	ERROR IN 2015 (deg)
BGSF	Kangerlussuaq	N67°01.0	W050°41.4	8.88	9.32	9.77	10.20	10.65
BIAR	Akureyri	N65°39.5	W018°04.3					6.43
BIKF	Keflavik	N63°59.1	W022°36.3				6.32	6.58
CYFB	Iqaluit	N63°45.4	W068°33.3	9.12	9.53	9.95	10.37	10.77
CYXY	Whitehorse Intl	N60°42.6	W135°04.0	6.75	7.12	7.47	7.83	8.20
CYZF	Yellowknife	N62°27.8	W114°26.4	9.00	9.43	9.87	10.30	10.73
PABI	Allen Aaf	N63°59.7	W145°43.3	6.80	7.17	7.53	7.92	8.28
PAFB	Ladd Aaf	N64°50.2	W147°37.0	6.77	7.13	7.52	7.88	8.27

Notes:Blanks indicate no restrictions.

This table contains an annual listing of those airports for which Non Directional Beacon (NDB) approaches are prohibited due to the Inertial Reference Units (IRU) outdated Magnetic Variation tables causing magnetic heading errors of 6.28 degrees or more.