



ERJ170

LOT OPERATIONS MANUAL part B

VOLUME 1

EMBRAER170

POLISH AIRLINES



JAA

LOT OPERATIONS MANUAL part B VOLUME 1

(LOT POLISH AIRLINES)

THIS DOCUMENT INCLUDES ALL INFORMATION REQUIRED BY THE JOINT AVIATION REQUIREMENTS (JAR-OPS 1) TO BE FURNISHED TO PILOTS. THIS DOCUMENT HAS BEEN CUSTOMIZED BY LOT POLISH AIRLINES AND HAS BEEN APPROVED BY POLISH CIVIL AVIATION AUTHORITY. THIS DOCUMENT IS APPLICABLE TO ERJ-170 AIRCRAFT, STD/LR MODELS EQUIPPED WITH CF 34-8E ENGINES, OPERATED BY LOT POLISH AIRLINES.

THIS PUBLICATION IS INCOMPLETE WITHOUT LOT OPERATIONS MANUAL part B – ERJ-170 VOLUME 2 and VOLUME 3 - QRH.

THIS DOCUMENT HAS BEEN EDITED AND AUTHORIZED BY THE OPERATIONAL DOCUMENTATION SECTION OF LOT POLISH AIRLINES IN COOPERATION WITH FLIGHT INSTRUCTORS COLLEGE.

APPROVED BY POLISH CIVIL AVIATION AUTHORITY

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On the basis of JAR-OPS 1 Subpart P (Appendix 1 to JAR-OPS 1.1045)



APPROVED

Przewodniczący
Komisji Operacji Lotniczych
Urzędu Lotnictwa Cywilnego

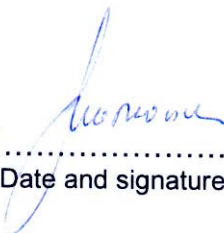
Czesław Mikrut

Letter no ULC-601-1/UK/PS/104

Date 12 March 2004

LOT Polish Airlines Operations Manual part B introduced for service implementation at **LOT Polish Airlines S.A.** following:

Confirmation by
Crew Training Postholder
Paweł Szczęsnowicz

10.03.2004 

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Date and signature

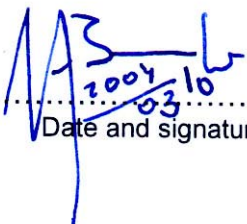
Confirmation by
Deputy Flight Operations Postholder
Krzysztof Lenartowicz

10.03.2004 

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Date and signature

Implemented by
Flight Operations Postholder
M. Adam Berezowski


2004 03 10

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Date and signature

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OPERATIONAL BULLETINS RECORD

1. GENERAL

Revision 11 is a complete reissue of O.B. N°: 170-LOT-1000. Previous issue of this bulletin must be discarded.

For the sake of accountability, first editions of the Operational Bulletins are sequentially numbered on a yearly basis. The Operational Bulletin revisions carry both the first edition and the revision dates, and the original number remains the same.

The BULLETIN STATUS column in the BULLETIN RECORD sheets is intended to be filled in with the conditions stated below as applicable:

IN EFFECT

Means that the bulletin contains current and pertinent information which is not otherwise covered in other operational publication or was revised to update its content. In both situations, the operational bulletin should remain in the manual.

INCORPORATED

Means that appropriate information has been incorporated in the pertinent publications, and the Operational Bulletin may be removed from manual.

CANCELLED

Means that the bulletin is no longer in effect and should be removed from manual.

The BULLETIN INDEX sheets present the title of all bulletins published by EMBRAER up to the date of this issuing.

For your easier control, complete the BULLETIN RECORD and the BULLETIN INDEX sheets upon receipt the Operational Bulletins.



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2. BULLETIN INDEX

O.B.170-001/04 -	FLIGHT CONTROLS SYSTEM – PREFLIGHT AND AFTER LANDING PROCEDURES
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O.B.170-003/04 -	FMS INFORMATION NOT BEING DISPLAYED DURING FLIGHT
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O.B.170-005/04 -	ENG 1 (2) REV PROT FAULT AND ENG 1 (2) REV TLA FAIL MESSAGES BEING PRESENTED UNDER SOME CONDITIONS
O.B.170-009/04 -	EMBRAER 170 AIRPLANES TECHNICAL DELIVERY STATUS
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O.B.170-001/05 -	FLIGHT CONTROLS REVERSION TO DIRECT MODE AND THE ASSOCIATED RECOVERY PROCEDURES
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(continued)

O.B.170-006/05 -	DEACTIVATION OF AURAL WARNING AFTER AUTOPILOT DISCONNECTION
O.B.170-007/05 -	MODE S TRANSPONDER REVERSION TO STANDBY MODE
O.B.170-008/05 -	RADIO ALTIMETER MISBEHAVIOR

* **CANCELLED Operational Bulletins**

** **INCORPORATED Operational Bulletins**

NOTE: OB's not listed above are not applicable for LOT Airlines.



3. BULLETIN RECORD

BULLETIN NUMBER	BULLETIN DATE	BULLETIN STATUS	REMARKS
O.B.170-001/04	Mar 05, 2004 (Mar 09, 2004)	IN EFFECT (Revision 1)	NONE
O.B.170-002/04	Mar 20, 2004 (Apr 15, 2004)	IN EFFECT (Revision 1)	NONE
O.B.170-003/04	Mar 20, 2004 (Mar 21, 2004)	IN EFFECT (Revision 1)	NONE
O.B.170-004/04	Mar 20, 2004 (Apr 16, 2004)	IN EFFECT (Revision 2)	NONE
O.B.170-005/04	Apr 30, 2004	IN EFFECT	NONE
O.B.170-006/04	Oct 07, 2004	IN EFFECT	NOT APPLICABLE
O.B.170-007/04	Oct 07, 2004	IN EFFECT	NOT APPLICABLE
O.B.170-008/04	Oct 07, 2004	IN EFFECT	NOT APPLICABLE
O.B.170-009/04	Oct 20, 2004	IN EFFECT	NONE
O.B.170-010/04	Dec 01, 2004 (Feb 02, 2005)	IN EFFECT (Revision 1)	NOT APPLICABLE
O.B.170-011/04	Dec 14, 2004 (Feb 02, 2005)	IN EFFECT (Revision 3)	All applicable airplanes have incorporated LOAD 15.3
O.B.170-012/04	Dec 14, 2004	IN EFFECT	NONE
O.B.170-013/04	Dec 27, 2004 (Jan 10, 2005)	IN EFFECT (Revision 1)	NONE
O.B.170-001/05	Jan 19, 2005	IN EFFECT	NONE
O.B.170-002/05	Feb 02, 2005 (Feb 24, 2005)	IN EFFECT (Revision 1)	NONE
O.B.170-003/05	Feb 24, 2005 (Sep 12, 2005)	IN EFFECT (Revision 1)	NONE
O.B.170-004/05	May 06, 2005	IN EFFECT	NONE
O.B.170-005/05	Aug 25, 2005	IN EFFECT	NONE
O.B.170-006/05	Aug 25, 2005	IN EFFECT	NONE
O.B.170-007/05	Sep 08, 2005	IN EFFECT	NONE
O.B.170-008/05	Sep 28, 2005	IN EFFECT	NONE



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**I - DOCUMENT EFFECTIVITY: ALL EMBRAER 170 AIRPLANES**

THIS REVISION CANCELS AND SUPERSEDES THE EDITION DATED MARCH 05, 2004.

This bulletin is issued by Embraer Flight Operations Engineering Section, DSF/GSO/SEO, as the need arises to quickly transmit technical and operational information. It is distributed to EMBRAER 170 operators and to any personnel who need early advice of this information.

The matter published in this bulletin may not be approved by Airworthiness Authorities at the time of issuance. In the event of a conflict with the approved publications (AFM, WB, MMEL, or CDL) the approved information shall prevail.

II - SUBJECT: FLIGHT CONTROLS SYSTEM – PREFLIGHT AND AFTER LANDING PROCEDURES

III - REASON: To inform the operators about the possibility of FLT CTRL NO DISPATCH Caution EICAS Message be displayed during preflight and after landing procedures.

REVISION 1: To improve clarification about the possibility of some flight controls system messages appearance during preflight and after landing procedures.

IV - BACKGROUND INFORMATION:

EMBRAER is issuing this Operational Bulletin in order to inform the operators about the possibility of FLT CTRL NO DISPATCH Caution EICAS Message remain displayed if control wheel is moved while airplane is electrically powered and hydraulic systems are depressurized.

This Operational Bulletin presents the guidelines to avoid the above scenario to happen, improving airplane dispatchability.

V - OPERATING INFORMATION:

Roll control is provided simultaneously by the ailerons and the multifunction spoilers.

The multifunction spoiler control system consists of 6 panels numbered from inboard to outboard as:

- L3, L4, L5 (left wing) and
- R3, R4, R5 (right wing).

The roll spoiler function drives all six multifunction spoiler panel deployment asymmetrically as a function of control wheel position.

During the pre flight and after landing procedures, with airplane electrically powered, if any control wheel is moved left or right while hydraulic systems 1 and 2 are depressurized, the respective multifunction spoilers will not deflect. In that case, a dedicated Spoiler Command Response Monitor detects a command but with no response from the control surfaces, then the monitor interprets this as failure and SPOILER FAULT Caution EICAS Message is displayed. For that reason, as soon as hydraulic systems 1 and 2 are pressurized, FLT CTRL NO DISPATCH Caution EICAS Message will remain displayed.

Therefore, in order to avoid the appearance of these messages, flight crew should not do any roll command (control wheel manual movement or roll trim actuation) while airplane is electrically powered and hydraulic systems 1 and 2 are depressurized.

Anyway, if a roll command is required or is accomplished inadvertently, resulting on the displaying of SPOILER FAULT Caution EICAS Message, flight crew may, with control wheels at neutral position, accomplish the procedure below before pressurizing hydraulic systems 1 and 2:

Flight Controls Mode Spoilers Button PUSH IN
THEN OUT

Make sure that SPOILER FAULT Caution EICAS Message has disappeared. If it is still displayed, maintenance action is required before flight.

VI - TECHNICAL PUBLICATION INFORMATION:

None.

**I - DOCUMENT EFFECTIVITY: ALL EMBRAER 170 AIRPLANES**

THIS REVISION CANCELS AND SUPERSEDES THE EDITION DATED MARCH 20, 2004.

This bulletin is issued by Embraer Flight Operations Engineering Section, DSF/GSO/SEO, as the need arises to quickly transmit technical and operational information. It is distributed to EMBRAER 170 operators and to any personnel who need early advice of this information.

The matter published in this bulletin may not be approved by Airworthiness Authorities at the time of issuance. In the event of a conflict with the approved publications (AFM, WB, MMEL, or CDL) the approved information shall prevail.

II - SUBJECT: EMER BRK FAULT AND LG NO DISPATCH EICAS MESSAGES APPEARANCE UNDER CERTAIN CIRCUMSTANCES

III - REASON: To inform the operators about the possibility of EMER BRK FAULT and LG NO DISPATCH EICAS Messages being presented under some certain specific scenarios.

REVISION 1: To include a possibility of de-energizing the airplane and trying a new Power Up if LG NO DISPATCH EICAS Message is displayed after landing only in case this message was not displayed in the previous flight.

IV - BACKGROUND INFORMATION:

EMBRAER is issuing this Operational Bulletin in order to inform the operators about the possibility of EMER BRK FAULT Advisory EICAS Message being displayed after landing and LG NO DISPATCH Caution EICAS Message being displayed after airplane Power Up and after landing.

This Operational Bulletin presents the guidelines to understand the most probable causes that would make these messages to be displayed frequently and how to deal with that, improving airplane dispatchability.

V - OPERATING INFORMATION:

EMER BRK FAULT ADVISORY EICAS MESSAGE

The EMBRAER 170 emergency/parking brake system is fully independent from the main brake system and is actuated by a handle, located in the cockpit central pedestal, which is connected to the emergency/parking brake dual valve through a push-pull cable. Two accumulators, pressurized by hydraulic systems 1 and 2, hydraulically power this system. The accumulators are pre-charged with nitrogen through dedicated charging valves. Pressure transducers are installed to monitor the system pressure, which is displayed on the MFD Status Page. Check valves in the emergency/parking brake dual valve return lines avoid interaction from other systems. Thermal relief valves are installed in the emergency/parking brake lines in order to preclude over pressure in the system due to ambient temperature variations. Pressure switches are installed downstream of the emergency/parking brake dual valve and their signals are responsible to provide indication of emergency/parking brake application to flight crew in the cockpit main panel by means of the EMERG/PRKG BRAKE ON light. The emergency/parking brake system accumulators charge alone provide 6 full stroke handle actuation or remains effective to keep the aircraft parked during 12 hours.

If the system is exposed to low ambient temperature, the nitrogen inside the accumulators gets cold and then reduces its volume, allowing more hydraulic fluid to enter the accumulators. As soon as ambient temperature increases, nitrogen expands. Since the check valves do not allow the hydraulic fluid to go out of the lines, it causes an increment in accumulators pressure. In the event that pressure increases so much that it reaches the thermal relief valve set point, this valve should open allowing fluid to escape thus reducing the pressure.



The scenario described above is more likely to occur when operating the airplane at high altitudes with low ambient temperatures for a long period of time, allowing the accumulators to get cold. As soon as the airplane begins to descend to lower altitudes, ambient temperature increases causing nitrogen expansion and pressure increment.

If the pressure sensed by the transducer surpasses 4,000 psi, which is the upper limit for signal validity, the associated accumulator pressure indication displayed on MFD Status Page should become amber dashed. If this condition remains after 5 seconds passed the landing touchdown (transition from K5 to K1 message inhibition phase), EMER BRK FAULT Advisory EICAS Message would be displayed.

In this case, flight crew should proceed normally to park the airplane. After stopping the airplane, flight crew should proceed with normal use of emergency/parking brake system, by pulling the handle to the set position after making sure that the airplane is static.

As soon as the chocks are on, emergency/parking brake handle may be cycled (pulled then released) 2 or 3 times while verifying that accumulators pressure indication displayed on MFD Status Page comes to the green (normal operating) range and EMER BRK FAULT Advisory EICAS Message goes out of view. They should verify brake temperature and if hot, leave the emergency/parking brake released. If problem persists after accomplishing this procedure, maintenance action is required before flight.

LG NO DISPATCH CAUTION EICAS MESSAGE

The LG NO DISPATCH Caution EICAS Message indicates that the airplane is not able to be dispatched due to failures concerning landing gear position system, weight-on-wheels information, nose wheel steering over travel, brake temperature monitoring system, among others.

Embraer has noticed that this message may appear erroneously after airplane Power Up and, in this case, would recommend the operators to de-energize the airplane and try another Power Up.

Embraer has also noticed that this message is sometimes being erroneously displayed after landing and would recommend the operators to assure that it was not presented after the preceding flight landing (i.e., no report in the Airplane Maintenance Log Book of this message appearing at the end of the previous flight), and, in this case, de-energize the airplane and try another Power Up.

It is important to emphasize that before each flight the pilot in command shall ascertain the status of each irregularity entered in the log at the end of the preceding flight.

In both cases, if message persists after a new Power Up is attempted, maintenance action is required before flight.

VI - TECHNICAL PUBLICATION INFORMATION:

None.

**I - DOCUMENT EFFECTIVITY: ALL EMBRAER 170 AIRPLANES**

THIS REVISION CANCELS AND SUPERSEDES THE EDITION DATED MARCH 20, 2004.

This bulletin is issued by Embraer Flight Operations Engineering Section, DSF/GSO/SEO, as the need arises to quickly transmit technical and operational information. It is distributed to EMBRAER 170 operators and to any personnel who need early advice of this information.

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II - SUBJECT: FMS INFORMATION NOT BEING DISPLAYED DURING FLIGHT

III - REASON: To inform the operators about the possibility of FMS nav aids not being displayed in the MFD.

REVISION 1: To update the procedures that can be followed in case of FMS nav aids is not being displayed in the MFD.

IV - BACKGROUND INFORMATION:

EMBRAER is issuing this Operational Bulletin in order to inform the operators about the possibility of FMS nav aids not being displayed in the MFD.

V - OPERATING INFORMATION:

The Flight Management System (FMS) manages navigation sensors to present airplane position. The FMS serves as aid to flight planning, navigation, performance, database and redundancy management. The FMS information are displayed in MCDU and in the MFD.

A FMS Selection button is located in each side of the Display Controller Panel. The FMS Selection button selects FMS as the primary navigation source for the on side PFD and toggles between FMS 1 and FMS 2.

During some flights it was observed that the nav aids are not being displayed in the MFD.

In this case one of the following procedures may be applied:

- On the affected side the Display Selector Knob of Reversionary Panel should be set in the following sequence: AUTO>PFD>MFD>AUTO. After selecting any position on the Display Selector Knob, pilots must hold on that position for 8 seconds to effectively perform the reversion. The nav aids should reappear in the MFD, or
- While the nav aids information on the affected side are still blinking, select the off side FMS.

VI - TECHNICAL PUBLICATION INFORMATION:

None.

**I - DOCUMENT EFFECTIVITY: ALL EMBRAER 170 AIRPLANES**

THIS REVISION CANCELS AND SUPERSEDES THE EDITION DATED MARCH 21, 2004.

This bulletin is issued by Embraer Flight Operations Engineering Section, DSF/GSO/SEO, as the need arises to quickly transmit technical and operational information. It is distributed to EMBRAER 170 operators and to any personnel who need early advice of this information.

The matter published in this bulletin may not be approved by Airworthiness Authorities at the time of issuance. In the event of a conflict with the approved publications (AFM, WB, MMEL, or CDL) the approved information shall prevail.

II - SUBJECT: EMBRAER 170 DU's MANUAL REVERSION PROCEDURE

III - REASON: To provide additional information on manual reversion of airplane Display Units.

REVISION 2: An additional unexpected behavior regarding the Display Units (DU's) system logic is being covered on this issue.

IV - BACKGROUND INFORMATION:

It was noticed that DU's 2 and 4 are not accomplishing their reversion logic in some circumstances. Additionally, there is a DU failure mode not detected by the system, which does not permit the logic to be accomplished. These cases turn necessary the use of manual reversion. The informations contained herein provide additional details to the AFM and AOM publications.

V - OPERATING INFORMATION:

EMBRAER 170 has an Electronic Display System (EDS) that displays to the flight crew primary flight, navigation and systems information. The EDS comprises a total of 5 Display Units (DU's) numbered 1 to 5 from left to right. DU's 1 and 5 are always PFD's and DU 3 is always EICAS, but DU's 2 and 4, that in normal operation present MFD information, may present either PFD or EICAS. PFD and EICAS information have, respectively, priority over MFD information. This feature provides the essential PFD or EICAS informations in case of loss of the respective DU's.

The MFD can be reverted either manually, through the Display Selector Knob, or automatically. On both cases, reversions depend on the system logic (the whole system logic is presented on AOM, Airplane General – EDS description).

It was noticed in some cases that MFD DU information, after an automatic or manual reversion, is not following the system logic in two situations:

- The first one occurs when all DU's are available, and MFD display selector knob is inadvertently set to PFD/EICAS.
- The second one follows a PFD/EICAS DU loss, with a later recovering of the lost PFD/EICAS DU.

In any case, to return the MFD information presentation in any MFD DU, the pilots must proceed as follows:

Both Sides Display Selector Knob.....MFD

Both Sides Display Selector Knob.....AUTO

- NOTE:** - After selecting any position on the Display Selector Knob, pilots must hold on that position for 8 seconds to effectively perform the reversion.
- Before the 8 seconds are completed, MFD DU may cycle among different screens.



Another behavior that may require manual reversion is caused by a non-detectable DU failure mode. This failure mode turns the affected DU blank (no red cross), and does not generate any CAS message. When this failure occurs with a PFD/EICAS DU, there is no automatic reversion, since system is unable to recognize the failure condition. In this condition, PFD/EICAS lost information may be presented in MFD DU positioning the Display Selector Knob to PFD/EICAS according with the case.

VI - TECHNICAL PUBLICATION INFORMATION:

None.

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**I - DOCUMENT EFFECTIVITY: ALL EMBRAER 170 AIRPLANES**

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II - SUBJECT: ENG 1 (2) REV PROT FAULT AND ENG 1 (2) REV TLA FAIL MESSAGES BEING PRESENTED UNDER SOME CONDITIONS

III - REASON: To inform the operators about the possibility of ENG 1 (2) REV PROT FAULT and ENG 1 (2) REV TLA FAIL Messages appear under some conditions.

IV - BACKGROUND INFORMATION:

EMBRAER is issuing this Operational Bulletin in order to inform the operators about the possibility of ENG 1 (2) REV PROT FAULT and ENG 1 (2) REV TLA FAIL Caution EICAS Messages being displayed under certain specific scenarios.

This Operational Bulletin presents the guidelines to understand the most probable causes that would make these messages to be displayed frequently and how to deal with that, improving airplane dispatchability.

V - OPERATING INFORMATION:

The EMBRAER 170 Thrust Reverser System is hydraulically actuated and controlled from the cockpit via the thrust levers. Reversers 1 & 2 operate independently, and are actuated by the respective hydraulic system.

The FADEC provides an interlock function to protect against inadvertent thrust reverser deployment.

A locking system consists of two actuator locks and the independent cowl lock that prevents inadvertent deployment of the thrust reverser.

Moving the thrust lever to IDLE enables the lifting of the thrust reverser trigger if the airplane is on the ground and the associated engine is running. Moving the thrust lever to the reverse position commands thrust reverser deployment, which occurs only if the airplane is on the ground. The trigger can be lift up to 30 seconds after an engine failure condition is detected. After that, the trigger is locked down, so the respective thrust lever cannot be moved below IDLE position.

The MIN REV thrust is commanded while thrust reverser cowl is not totally deployed. After total deployment, the MAX REV thrust is commanded if thrust levers are held in this position.

The thrust reverser is not designed to operate in flight, so that uncommanded thrust reverser deployment limits engine thrust to idle.

ENG 1 (2) REV PROT FAULT

The ENG 1 (2) REV PROT FAULT Caution EICAS message is normally displayed due to a failure in one line of defense against inadvertent thrust reverser deployment. One of these conditions is related to an integrity check of a thrust reverser command switch located inside the thrust control quadrant (thrust levers box).

When the thrust levers are in the reverse thrust range (from MIN REV to MAX REV), this switch should be closed. On the other hand, when they are in the forward thrust range (from IDLE to MAX), this switch should be open.

In case the thrust lever angle (TLA) signal does not agree with the switch position, the message is displayed.



Field reports have indicated some cases of this message being erroneously displayed during thrust reverser application.

It was identified that this message is more likely to appear when the pilot keeps the thrust levers between the MIN REV and IDLE detents for more than 5 seconds.

Having the thrust levers positioned this way is a condition not expected by the FADEC and may result in a discrepancy between TLA and switch position.

In order to avoid the above scenario to occur, pilots should not keep the thrust levers between the MIN REV and IDLE detents for more than 5 seconds.

Anyway, if that happens, the message should disappear after the associated engine is shutdown. In this case, flight crew may restart the engine, command the thrust reverser to MIN REV then to IDLE, taking care to do not keep the thrust levers between these detents for more than 5 seconds.

If the message remains presented after this procedure is accomplished, maintenance action is required before flight.

ENG 1 (2) REV TLA FAIL

As explained before, moving the thrust lever to IDLE enables the lifting of the thrust reverser trigger if the airplane is on the ground and the associated engine is running, because the idle lock solenoid will be released. There is also a delay in the system logic in order to allow the solenoid to remain released for 30 seconds after engine shutdown, therefore the trigger can be lift up to 30 seconds after an engine failure condition is detected. After that, the trigger is locked down, so the respective thrust lever cannot be moved below IDLE position.

The ENG 1 (2) REV TLA FAIL Caution EICAS message is normally displayed when the idle lock solenoid is locked when it should be released and vice-versa.

Embraer identified that this message may appear erroneously in two scenarios:

- During landing, if the pilot pulls the thrust reverser triggers before the touchdown is accomplished, before the Weight-on-Wheels signal is true, indicating airplane on the ground, that is a condition more likely to occur when accomplishing a soft touchdown at a very light airplane weight, the idle lock system is not released and as a consequence the message may be displayed. The system is released as soon as the pilot leaves the trigger and the message should disappear.
- During engine shutdown, the message appears for about 30 seconds, because during this period the logic detects idle lock system released while the engine is not running.

In case the message is presented and does not goes out of view, maintenance action is required before flight.

VI - TECHNICAL PUBLICATION INFORMATION:

None.

**I - DOCUMENT EFFECTIVITY: ALL EMBRAER 170 AIRPLANES
OPERATED BY LOT POLISH
AIRLINES**

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**II - SUBJECT: EMBRAER 170 AIRPLANES TECHNICAL
DELIVERY STATUS**

III - REASON: To provide operational information related to the current technical delivery status of EMBRAER 170 airplanes.

IV - BACKGROUND INFORMATION:

EMBRAER has been requested to provide operational information related to the current technical delivery status of EMBRAER 170 airplanes, because there were found some peculiar system characteristics that may happen or be noted during airplane operation.

This Operational Bulletin addresses the following subjects:

- Aural alarm “THROTTLE” sounding during automatic Autothrottle disengagement after landing;
- FUEL 1 (2) LO LEVEL Warning EICAS Message appearing under certain circumstances;
- Inverted Aft Service and Aft Cargo Compartment Doors indication on MFD Status Page.

V - OPERATING INFORMATION:

AURAL ALARM “THROTLLE” SOUNDING DURING AUTOMATIC AUTOTHROTTLE DISENGAGEMENT AFTER LANDING

The Autothrottle system disengages automatically after landing when Weight-on-Wheels (WOW) signal is true or Wheel Speed (WS) signal goes high, and the RETARD mode is active, with Thrust Levers Angle (TLA) at IDLE.

In this condition, no aural alarm should sound.

However, with the current implementation, aural alarm “THROTTLE” inhibition logic uses only WOW signal. Therefore, every time the WS signal goes high before WOW signal becomes true, the Autothrottle system will disengage automatically, but the aural alarm “THROTTLE” will not be inhibited.

This unwanted annunciation is more likely to occur when accomplishing a soft touchdown at a very light airplane weight.

The “AT” indication flashes green on the Flight Mode Annunciation (FMA) for normal disengagement. Pressing either one of the AT Quick Disconnect buttons one time cancels the aural alarm “THROTTLE”. The visual information will always flash for at least 5 seconds.

FUEL 1 (2) LO LEVEL WARNING EICAS MESSAGE BEING PRESENTED ON SOME SPECIFIC SCENARIOS

The fuel system comprises two integral fuel tanks, with one tank located in each semi wing and stub. Each tank incorporates a collector box. Dedicated scavenge jet pumps, operated by motive flow supplied by the associated engine, transfer fuel to the collector box, what keeps it full, thus ensuring a constant flow of fuel to the engine during normal flight. Flapper valves are also present as a secondary path, allowing fuel flow from the tip of the wing tank into the collector box in case of loss of the transfer system.



The fuel quantity gauging system provides a highly accurate measure of the fuel mass in the wing tanks, as well as low level indication. Thirteen electrical sensors measure the fuel quantity in each tank. One additional independent fuel low level sensor installed inside each collector tank detects the fuel low level condition.

In normal conditions, the low level warning activation point is set at 300 kg of fuel in the associated tank.

In case of loss of the transfer flow from the scavenge pumps (engine failure, loss of motive system or scavenge pumps failure/blockage), the fuel contained in the collector box will flow out to the stub, so that the fuel inside the collector box and the fuel inside the rest of stub tank would reach the same level.

In this condition, if there is up to 1800 kg of fuel inside that tank it is possible that the level equivalent to the low level warning activation point could be reached as the fuel level inside the collector box decreases, then FUEL 1 (2) LO LEVEL Warning EICAS Message would be displayed indicating that fuel level is up to or below the low level sensor.

Therefore, pilots must be aware that, in case of loss of the transfer system, what might happen if an engine fails, FUEL 1 (2) LO LEVEL Warning EICAS Message may be displayed even though fuel quantity indication on EICAS or MFD Fuel System Page display up to 1800 kg in that tank. If this happens, pilots must monitor fuel quantity indications on EICAS or MFD Fuel System Page during the flight. The Flight crew must also avoid attitudes in excess of 15° nose up or down, uncoordinated maneuvers and negative g's. In the event that fuel quantity indication on EICAS or MFD Fuel System Page in any tank reaches 300 kg, they must perform QRH FUEL 1 (2) LO LEVEL procedure.

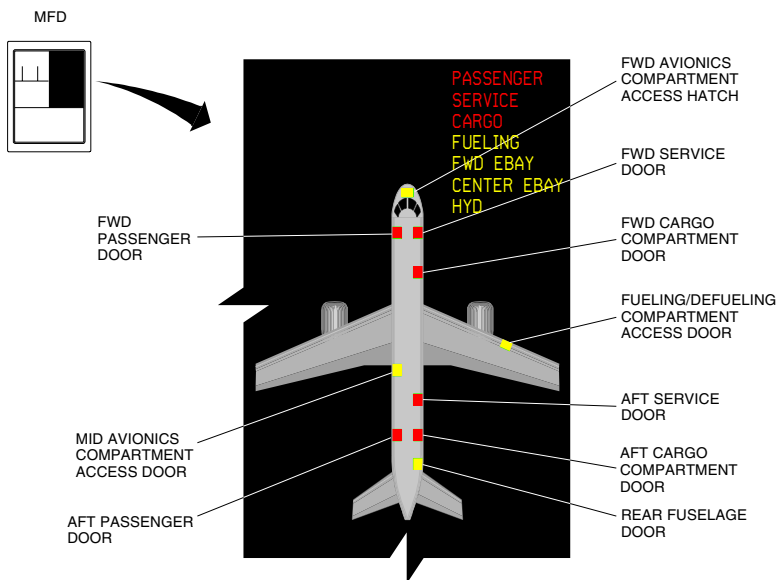
INVERTED AFT SERVICE AND AFT CARGO COMPARTMENT DOORS INDICATION ON MFD STATUS PAGE

Pilots must be aware of the inversion of pictorial indications for Aft Cargo Compartment and Aft Service doors on MFD Status Page.

The status of each door is correctly represented by the written messages on MFD and EICAS.

DOOR CRG AFT OPEN and DOOR SERV AFT OPEN Warning EICAS Messages are displayed only when any engine is running or Weight-on-Wheels (WOW) signal is not true.

The picture below shows the current status of doors indication on MFD:



VI - TECHNICAL PUBLICATION INFORMATION:

None.

**I - DOCUMENT EFFECTIVITY: ALL EMBRAER 170 AIRPLANES**

This bulletin is issued by Embraer Flight Operations Engineering Section, DSF/GSO/SEO, as the need arises to quickly transmit technical and operational information. It is distributed to EMBRAER 170 operators and to any personnel who need early advice of this information.

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**II - SUBJECT: FLT CTRL NO DISPATCH MESSAGE DISPLAY
AT LOW TEMPERATURE OPERATIONS**

III - REASON: To inform the operators of a procedure to improve airplane dispatchability in cases of FLT CTRL NO DISPATCH message display at low temperatures.

IV - BACKGROUND INFORMATION:

EMBRAER is issuing this Operational Bulletin in order to inform the operators about the possibility of FLT CTRL NO DISPATCH Caution EICAS message to be displayed in some circumstances associated with low temperatures.

This Operational Bulletin presents the informations to understand the message appearance and address an operational procedure that might dispatch the airplane.

V - OPERATING INFORMATION:

EMBRAER 170 hydraulic system is the power source for the airplane primary control surfaces. Pilots' inputs in the cockpit controls and FCM inputs are routed to the P-ACE's. The P-ACE's, control the hydraulic flow through PCU's, which, then, commands the surface movement.

There are several monitors, which assess the flight control system parameters to run tests and to provide information to the various airplane systems, including the Warning System. One of these monitors runs a Hydraulic Power Up Built-In-Test and is intended to detect actuator latent faults during the Hydraulic System pressurization. If the read pressures in the PCU's are different from an expected pattern, some system fault may be present and the FLT CTRL NO DISPATCH Caution EICAS message displays.

It was found recently that at low temperatures, the Hydraulic PBIT test may detect a failure in a fully functional rudder and/or elevator actuator resulting in a spurious FLT CTRL NO DISPATCH EICAS message.

The conditions when the FLT CTRL NO DISPATCH message may display for the given reasons are only when two events occur simultaneously:

- 1) At least one of the Hydraulic Reservoir temperatures is below 0 °C.
- 2) Hydraulic Systems 1, 2 and 3 have been pressurized.

To cope with the message display in such cases, is necessary to warm the Hydraulic System up to temperatures that do not affect the Hydraulic P-BIT.

The following procedure meets this purpose:

Electric Hydraulic Pumps:

Sys 1, 2 and 3B ON

Wait until the three reservoirs temperatures are higher than 0 °C.

- NOTE:** - Elevator Control Column and Rudder Pedal full cycles during this phase significantly reduce the Warm Up time.
- Move the surfaces controls slowly.



Flight Controls Mode:

Elevators Button..... PUSH IN, then
OUTRudder Button..... PUSH IN, then
OUT

Perform 8 elevator control column full cycles and 4 rudder pedals full cycles. Move the surfaces controls slowly.

Electric Hydraulic Pumps:

Sys 1, 2 and 3B OFF

After hydraulic pressure fall below 300 psi, wait 30 seconds.

Electric Hydraulic Pumps:

Sys 1, 2 and 3B ON

At this point, if the FLT CTRL NO DISPATCH message remains, the reason for its display is other than the one addressed in this OB and maintenance action is required.

Engines must be started with the Electric Hydraulic Pumps Sys 1, 2 and 3B ON.

After Engine Start:

Electric Hydraulic Pumps:

Sys 1, 2 and 3B AUTO

VI - TECHNICAL PUBLICATION INFORMATION:

None.

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**I - DOCUMENT EFFECTIVITY: ALL EMBRAER 170 AIRPLANES****THIS REVISION CANCELS AND SUPERSEDES THE EDITION
DATED DECEMBER 27, 2004**

This bulletin is issued by Embraer Flight Operations Engineering Section, DSF/GSO/SEO, as the need arises to quickly transmit technical and operational information. It is distributed to EMBRAER 170 operators and to any personnel who need early advice of this information.

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**II - SUBJECT: ENGINE BLEED VALVE RESET IN CASE OF
BLEED LEAK EICAS MESSAGE DUE TO
OVERPRESSURE PEAKS**

III - REASON: To inform the operators about BLEED 1 (2) LEAK EICAS message being also triggered by overpressure peaks and the associated mitigation actions taken by Embraer.

REVISION 1: To address three editorial corrections. Two in body of OB and a third in the attached AFM Revision Proposal.

IV - BACKGROUND INFORMATION:

The EMBRAER 170 BLEED 1 (2) LEAK CAS message might refer to two different failures: a real leak in bleed ducts or a bleed overpressure, for both failures would require similar system/crew actions. During EMBRAER 170 operations, it has been reported cases of instant overpressures in the bleed manifold triggering the BLEED 1 (2) LEAK EICAS message, specially in icing conditions.

EMBRAER has proposed an AFM revision to the certification authorities introducing an Engine Bleed Valve reset, which might be effective in overpressure peaks cases while is working on two system's modifications:

- 1) Reduction of the peak overpressure occurrences, which is scheduled for AMS software BLACK LABEL 4.
- 2) A dedicated overpressure CAS message, which is scheduled for MAU LOAD 17.

V - OPERATING INFORMATION:

The EMBRAER 170 Air Management System (AMS) integrates and controls various airplane's subsystems such as Bleed System, Anti-Ice System and Environmental Control System (ECS). The Engines are the primary bleed source, providing air from the 6th and 10th engine stages to the other AMS subsystems. The AMS also provides fault detection and isolation for the Bleed System.

Some of the events monitored in the Bleed Subsystem have the same annunciation to the crew, which is the BLEED 1 (2) LEAK EICAS message. These events are:

- 1) Manifold Leak in the respective engine side.
- 2) Manifold Overpressure due to a control failure.
- 3) Leak in the opposite side affecting the onside manifold.
- 4) Manifold overpressure due to failed open Engine Bleed Valve.

In these cases, AMS controller automatically commands the bleed valves of the affected side off. AFM procedure asks the pilots to limit airplane altitude, due to single bleed condition, and to avoid icing conditions due to the loss of the onside wing anti-ice protection. Even though the annunciation is via the same EICAS message, the internal system logic differs leak conditions from overpressure ones. In leak cases, the affected Engine Bleed Valve is reset only on ground via maintenance action. The overpressure case due to a control failure allows an in-flight reset.

During airplane operation, it was recorded overpressure peaks due to bleed regime changes, which is a particular case of the second failure condition. As the system does not differ a long lasting overpressure of an instantaneous one, it triggers the automatic protections and displays the BLEED 1 (2) LEAK EICAS message. However, as this overpressure is instantaneous, the



automatic protections are not necessary.

EMBRAER proposed to the authorities an AFM revision that, prior to close the affected bleed valve, asks pilots to attempt an Engine Bleed Valve reset and check if the EICAS message BLEED 1 (2) LEAK extinguishes.

The AFM revision proposal that addresses this issue is attached to this document.

VI - TECHNICAL PUBLICATION INFORMATION:

AFM revision proposal that addresses Engine Bleed Valve reset prior to take the additional actions related to single bleed condition.

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BLEED 1 (2) LEAKAGE

Push the affected Bleed Button OUT, then IN.

If the BLEED 1 (2) LEAK message persists, turn the affected bleed off and the crossbleed off. For Bleed 1 Leak, turn also the APU bleed off. Exit and avoid icing conditions. Limit the altitude to 31000 ft maximum and wait 3 minutes.

If the BLEED 1 (2) LEAK message persists and the respective BLEED 1 (2) OFF message is also displayed, turn the opposite side bleed off, the APU bleed off and limit the altitude to 10000 ft or MEA (whichever is higher) maximum. At 10000 ft push the pressurization dump button in.

If the BLEED 1 (2) LEAK message persists and the respective BLEED 1 (2) OFF message is not displayed, reduce the associated thrust levers to idle and, when applicable, accomplish the One Engine Inoperative Approach and Landing Procedure.

NOT APPROVED YET



I - DOCUMENT EFFECTIVITY: ALL EMBRAER 170 AIRPLANES

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II - SUBJECT: FLIGHT CONTROLS REVERSION TO DIRECT MODE AND THE ASSOCIATED RECOVERY PROCEDURES

III - REASON: To inform the operators about a flight controls failure mode that might cause the spoilers, the elevators and the rudder to be reverted to the direct mode and the associated procedures that shall be effective for recovering the normal mode and removing the associated messages.

IV - BACKGROUND INFORMATION:

EMBRAER is issuing this Operational Bulletin in order to inform the operators about the possibility of the Spoilers, the Elevators and the Rudder to be reverted to the direct mode, simultaneously or in any combination of them, due to MAU PRIMUS EPIC LOAD 15.3 misbehavior. In this event, the SPOILER FAULT EICAS message always displays, probably accompanied by ELEVATOR FAULT and RUDDER FAULT EICAS messages. A spurious PITCH TRIM FAIL EICAS message may also trigger.

This Operational Bulletin presents the guidelines to understand the failure most probable causes and the associated recovery procedure.

V - OPERATING INFORMATION:

In the EMBRAER 170, when the flight controls are operated in normal mode, the pilots' commands in the cockpit are augmented by the FCM (Flight Controls Module). FCM processes the inputs to provide high level control functions, resulting in an optimized actuation of the flight controls surfaces. In direct mode, the FCMs are removed from the control loop, resulting in fixed spoiler deflection schedule, and elevator and rudder deflection schedules based on flap position (extended or retracted).

The FCM commands are computed in two different channels. Prior to commanding the surfaces, a monitor compares the output signals from both channels and calculates the error between them. If this error exceeds a specified value, this monitor removes the affected FCMs from the control loop.

A new characteristic introduced by MAU PRIMUS EPIC LOAD 15.3 might cause an increment in the error between the channels. This fact might have caused events of SPOILER FAULT accompanied, in most cases, by events of ELEVATOR FAULT and RUDDER FAULT, and a spurious PITCH TRIM FAIL annunciation.

The current AFM/QRH procedures already cope suitably with these events. However, EMBRAER decided to transmit to the operators' additional information that enhances the procedure effectiveness for this new characteristic of MAU PRIMUS EPIC LOAD 15.3, while maintaining the effectiveness for the other events that might result in these messages.

In case only the SPOILER FAULT EICAS message displays, the pilots must do as follows in order to recover the spoilers' normal mode and to remove this message:

Flight Controls Mode Spoilers Button PUSH IN
..... Wait 10 seconds.....

Flight Controls Mode Spoilers Button PUSH OUT
If the message persists, accomplish the associated AFM/QRH procedures.



In case the EICAS message ELEVATOR FAULT or RUDDER FAULT (or both) display simultaneously with SPOILER FAULT, the pilots must do as follows, in order to recover the normal mode and to remove these messages:

Flight Controls Mode Buttons (mandatory sequence):

Elevators Button PUSH IN

Rudder Button..... PUSH IN

Spoilers Button PUSH IN

..... Wait 10 seconds.....

Flight Controls Mode Buttons (mandatory sequence):

Spoilers Button PUSH OUT

Rudder Button..... PUSH OUT

Elevators Button PUSH OUT

If any message persists, accomplish the associated AFM/QRH procedures.

VI - TECHNICAL PUBLICATION INFORMATION:

None.

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**I - DOCUMENT EFFECTIVITY: ALL EMBRAER 170 AIRPLANES**

This bulletin is issued by Embraer Flight Operations Engineering Section, DSF/GSO/SEO, as the need arises to quickly transmit technical and operational information. It is distributed to EMBRAER 170 operators and to any personnel who need early advice of this information.

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II - SUBJECT: AUTOFLIGHT HIGH COMMANDS DURING ILS CAPTURES

III - REASON: To inform the operators about an unexpected Flight Director behavior when capturing some runways ILS under specific conditions.

REVISION 1: To address specifically that the condition is avoided when the identifier of the runway being approached is set in the FMS PROGRESS PAGE and that the event may occur in airplanes Pre LOAD 15.3.

IV - BACKGROUND INFORMATION:

EMBRAER is issuing this Operational Bulletin to provide information regarding an unexpected Auto Flight behavior when performing ILS captures. The problem occurs when the FMS tunes a DME of a different ILS station that has the same frequency of the ILS being approached.

This characteristic is present since MAU PRIMUS EPIC SOFTWARE LOAD 13.3. However, a modification introduced in LOAD 15.3 made this behavior more evident. The final fix is scheduled for software version LOAD 19. In this interim, this OB is issuing a mitigation procedure that avoids the abnormality.

V - OPERATING INFORMATION:

Under normal EMBRAER 170 operations, from the departure until prior the approach, the airplane navigation is mainly automatically performed by the FMS, which selects the more accurate positional source and sends inputs to the Autoflight system. For the precision approaches (ILS), the FMS is not the navigation source. In such cases, the navigation logic resides within the Autoflight system. However, since the ILS does not provide means to determine the airplane's distance to the runway, the FMS is still used as the airplane's distance primary source. The FMS logic for determine the distance to the runway respects the following priority:

- 1) Flight plan distance: the FMS determines airplanes' position and calculates the flight plan distance to the runway.
- 2) DME distance: FMS searches for the nearest DME associated with an ILS station with the same frequency of the ILS state being approached.

The ILS Approach logic is such that, the greater the distance to the ILS being approached, the larger are the commands to capture the ILS path.

There have been some events in the fleet that, when performing ILS approaches toward some runways that were not in the FMS Flight Plan, the FMS tuned a DME in another locality with the same frequency of the ILSs being approached, despite the fact that those DMEs were far from the real destination. This caused the Autoflight system to execute large commands during the ILS capturing phase.

This condition is avoided if the flight crew assures that the DME tuned is the one associated with the correct localizer. It can be done verifying the DME identifier in PFD HSI Indication window. Whatever the case, setting the ILS identifier on the FMS PROGRESS PAGE 1/3, lines 5L and 5R, completely avoids this mismatch.

VI - TECHNICAL PUBLICATION INFORMATION:

None.

**I - DOCUMENT EFFECTIVITY: ALL EMBRAER 170/175/190
AIRPLANES**

This bulletin is issued by Embraer Flight Operations Engineering Section, DSF/GSO/SEO, as the need arises to quickly transmit technical and operational information. It is distributed to EMBRAER 170/175/190 operators and to any personnel who need early advice of this information.

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**II - SUBJECT: UNWARRANTED STEER FAIL EICAS MESSAGE
DISPLAYED UNDER SOME CONDITIONS**

III - REASON: To inform the operators about the possibility of unwarranted STEER FAIL messages under some conditions.

REVISION 1: To address the possibility of a spurious engine correlated EICAS message due to the MAU 2 power reset.

IV - BACKGROUND INFORMATION:

Embraer is issuing this Operational Bulletin to inform operators about the possibility of unwarranted STEER FAIL EICAS message displayed under certain specific scenarios.

This Operational Bulletin presents the guidelines to understand the most probable causes that would lead to the display of this message and how to deal with this event, thus improving airplane dispatchability.

V - OPERATING INFORMATION:

The Embraer 170/175/190 nose landing gear has a steer-by-wire control powered by hydraulic system 2. Steering control is provided by the steering handwheel or pedal. A free wheel steering mode is also possible, which permits towing operations.

Besides real failures in the steering system, the STEER FAIL message can also occur in the following specific scenarios:

1. If the handwheel steering is inadvertently engaged by the crew, when towing the airplane with hydraulic power.

This will cause the nose landing gear alignment, but it will encounter the resistance provided by the towing bar, triggering the message.

This event will not happen if the external switch is previously set to disengage as recommended in the AOM Ground Servicing section.

2. If hydraulic power is provided when steering is active.

When the engine is shut down with the steering engaged, but a power down is not performed, the steering is considered active according to the system's logic. If hydraulic power is provided again, the steering will meet the requirements to automatically reengage and will align as in the previous case. If the towing bar is connected, the message will be triggered.

This event will not happen if the external switch is previously set to disengage as recommended in the AOM Ground Servicing section.

3. If the steering is engaged during a period of approximately 8 seconds after hydraulic system 2 is commanded OFF for airplane prior to SB 170-32-0013.

When the hydraulic is commanded OFF, the steering system will sense a residual pressure until it drops from 3000 psi to 1500 psi. This will take around 8 seconds to occur. During this period the steering may be engaged, but as the pressure drops below 1500 psi the fail message will be triggered.

**4. Other causes due to malfunctions related to the nose wheel steering control module.**

In this case, the fail message will be triggered due to an internal fault of the steering module.

In order to restore the system in the cases described previously, accomplish the following when on the ground with engines not running and the airplane stopped:

MAU 2 Pwr 1 CB (B-25)..... PULL

The following EICAS messages will be displayed while the CB remains pulled: AVNX MAU 2A FAIL, STEER FAIL, FMS 1 FAIL and AFCS FAULT.

MAU 2 Pwr 1 CB (B-25)..... PUSH

The messages described previously must not be displayed on EICAS.

NOTE: The engines must not be running to avoid the ENG EXCEEDANCE EICAS spurious message.

If the STEER FAIL message persists after cycling the CB, maintenance is required before the flight.

VI - TECHNICAL PUBLICATION INFORMATION:

None.

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**I - DOCUMENT EFFECTIVITY: ALL EMBRAER 170 AIRPLANES**

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II - SUBJECT: MISMATCH OF ALL AIRSPEED INDICATIONS

III - REASON: To inform the operators a procedure for airspeed erratic indication identification.

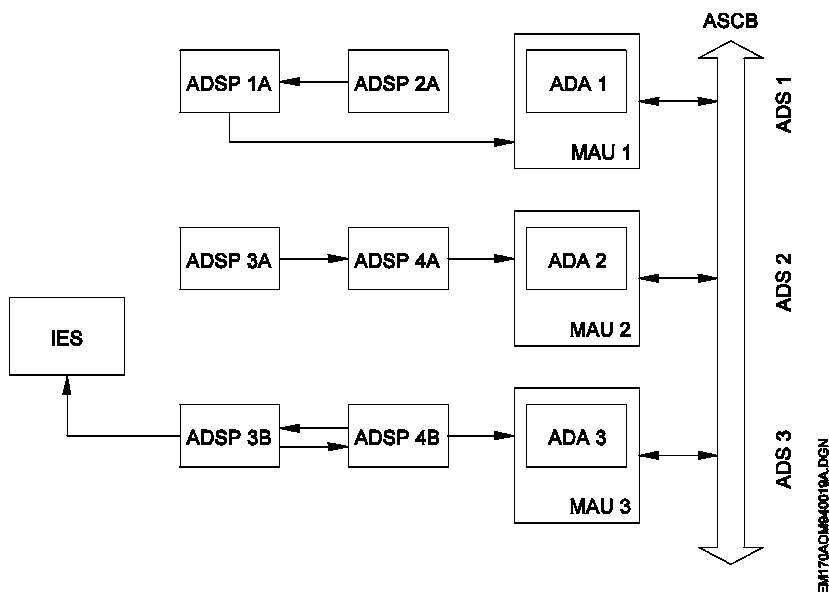
IV - BACKGROUND INFORMATION:

EMBRAER is issuing this Operational Bulletin to present a possibility of airspeed mismatch and the procedure to identify an erroneous system and to select the reliable ones.

V - OPERATING INFORMATION:

EMBRAER 170 Air Data System (ADS) is comprised of four Air Data Smart Probes (ADSP). The ADSP senses and transmits static pressure, total pressure and angle of attack to the Air Data Application (ADA) hosted in the Modular Avionics Unit (MAU) and the Integrated Electronic Standby System (IESS).

An ADSP 3 failure affecting channel A and B may cause airspeed mismatch between ADS 1 (normally on PFD 1), ADS 2 (normally on PFD 2) and the pair ADS 3/IESS. The ADS 3 and IESS share the same pressure sensors but each one performs its airspeed/altitude calculation, according to figure below:





In order to deal with an airspeed erratic indication, accomplish the following:

Condition: Mismatch of all 3 airspeed indication (ADS 1, ADS 2 and IES) by more than 5 knot and IAS flag on PFDs.

Set ADS 1 on PFD 1, ADS 2 on PFD 2. Crosscheck ADS 1, ADS 2 and IES, if the failure is identified only on ADS 1 or ADS 2, revert the unreliable side to the next reliable system, otherwise if all 3 airspeed indication mismatch:

Consider diversion.

NOTE: The information that may be affected on PFD and IESS are altitude, airspeed and vertical speed.

Autothrottle DISENGAGE

Autopilot..... DISENGAGE

Altitude..... MAINTAIN LEVEL
FLIGHT

Use FPA and attitude indicator to level off.

Refer to the N1 table to adjust the speed.

N1 TABLE

ALTITUDE	WEIGHT (LB)												
(FT)	62000	64000	66000	68000	70000	72000	74000	76000	78000	80000	82000	84000	86000
40000 N1 %	85.3	86.3	87.7	-	-	-	-	-	-	-	-	-	-
35000 N1 %	81.6	82.0	82.5	83.0	83.5	84.0	84.5	85.0	85.5	86.2	86.9	88.0	89.3
30000 N1 %	77.9	78.3	78.6	79.0	79.3	79.7	80.0	80.5	81.0	81.5	82.0	82.5	83.0
25000 N1 %	74.2	74.5	74.8	75.1	75.3	75.6	75.9	76.3	76.7	77.1	77.4	77.8	78.2
20000 N1 %	69.9	70.4	70.9	71.3	71.7	72.1	72.5	72.9	73.2	73.6	74.0	74.4	74.8
15000 N1 %	65.9	66.2	66.5	66.8	67.1	67.4	67.7	68.2	68.7	69.3	69.8	70.3	70.7
10000 N1 %	62.3	62.6	62.9	63.2	63.5	63.8	64.0	64.3	64.7	65.0	65.4	65.8	66.1

ALTITUDE	WEIGHT (KG)											
(FT)	28000	29000	30000	31000	32000	33000	34000	35000	36000	37000	38000	39000
40000 N1 %	85.2	86.3	87.8	-	-	-	-	-	-	-	-	-
35000 N1 %	81.5	82.0	82.6	83.1	83.6	84.2	84.7	85.2	86.0	86.7	87.9	89.3
30000 N1 %	77.9	78.3	78.7	79.0	79.4	79.8	80.2	80.8	81.3	81.9	82.4	83.0
25000 N1 %	74.2	74.5	74.8	75.1	75.4	75.7	76.1	76.5	76.9	77.4	77.8	78.2
20000 N1 %	69.9	70.4	70.9	71.4	71.8	72.2	72.7	73.1	73.5	73.9	74.4	74.8
15000 N1 %	65.9	66.2	66.5	66.8	67.2	67.5	67.9	68.5	69.1	69.7	70.2	70.7
10000 N1 %	62.3	62.6	62.9	63.2	63.5	63.9	64.2	64.5	64.9	65.3	65.7	66.1



If operating in or planning to operate in RVSM airspace, advise ATC.

To isolate the affected system:

Set N1 10% higher or lower of the table. Check that airspeed indication on IESS is frozen.

Pull CB D-30 (right CB panel – ADS 3/STBY PROBE 3B) and set ADS 3 on PFD 2.

Relevant Inoperative Items:

Altitude and IAS on IES.
ADS 3 sideslip compensation.
ADS 4 sideslip compensation.

If necessary refer to QRH to revert flight controls to Normal Mode.

Autothrottle AS REQUIRED

Autopilot..... AS REQUIRED

Report to maintenance “Airspeed erratic indication on ADS 2 and ADS 3 in flight”.

VI - TECHNICAL PUBLICATION INFORMATION:

None.

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**I - DOCUMENT EFFECTIVITY: ALL EMBRAER 170/175 AIRPLANES**

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**II - SUBJECT: TEMPERATURE ADJUSTMENT WITH SINGLE
PACK OPERATION**

III - REASON: To inform the operators about procedures to adjust the air temperature in the flight deck and passenger cabin when operating with single pack.

IV - BACKGROUND INFORMATION:

EMBRAER is issuing this Operational Bulletin to provide information regarding temperature adjustment in the flight deck and passenger cabin when operating with single pack. Some operators have reported difficulties in temperature control when one of the packs is disabled.

This OB is issuing a guidance to avoid flight crew and passengers discomfort.

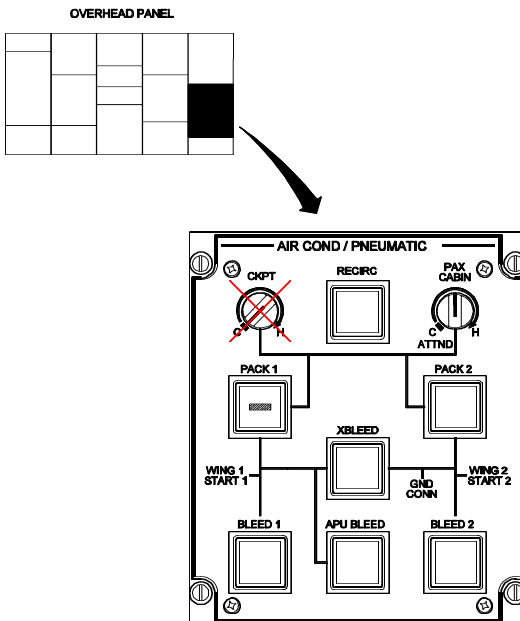
V - OPERATING INFORMATION:

During normal operation, pack 1 adjusts the airflow according to the CKPT temperature selector knob position to control flight deck temperature. On the other hand, pack 2 adjusts the airflow to control passenger cabin temperature according to PAX CABIN selector knob position.

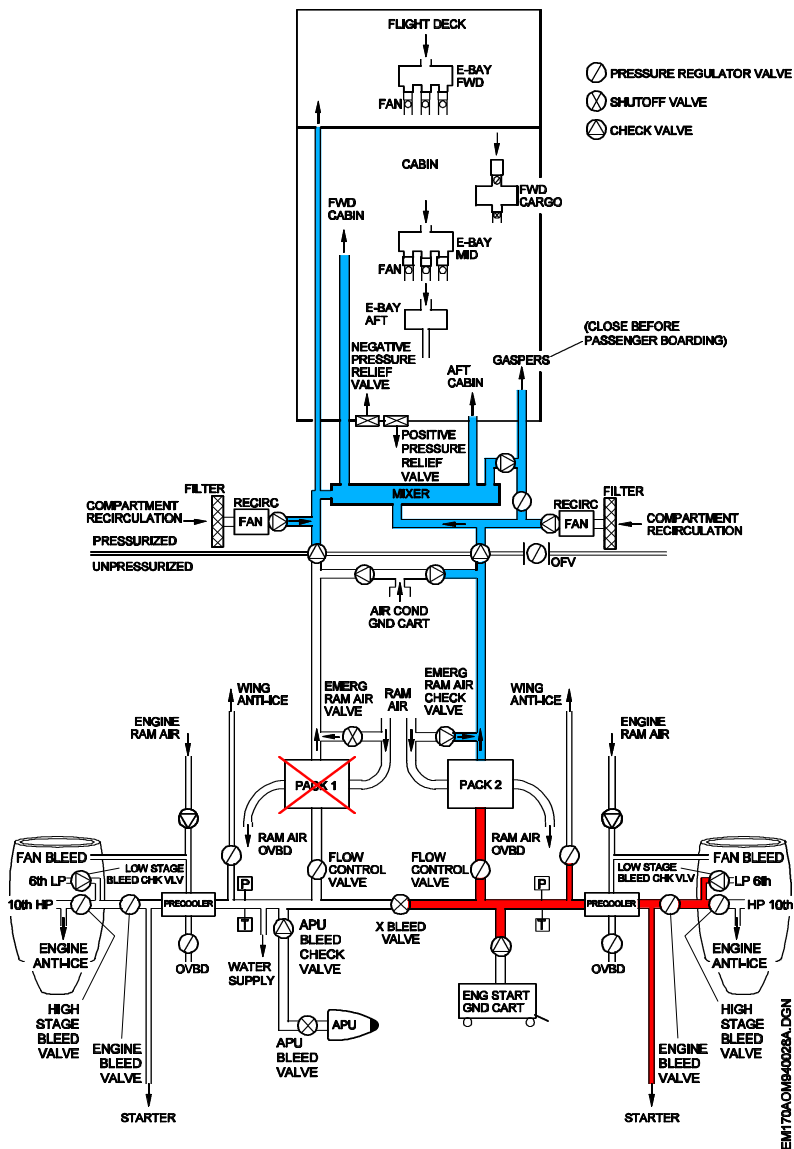
When operating with a single air conditioning pack, the zone related to the disabled pack will receive air from the operational pack through the mixer. The temperature selector knob associated to the disabled pack will have no effect on the temperature of the disabled pack zone. For example:

PACK 1 DISABLED:

Cockpit and passenger cabin zones are supplied by pack 2. Temperature control on both zones is only adjusted through the PAX CABIN selector knob.



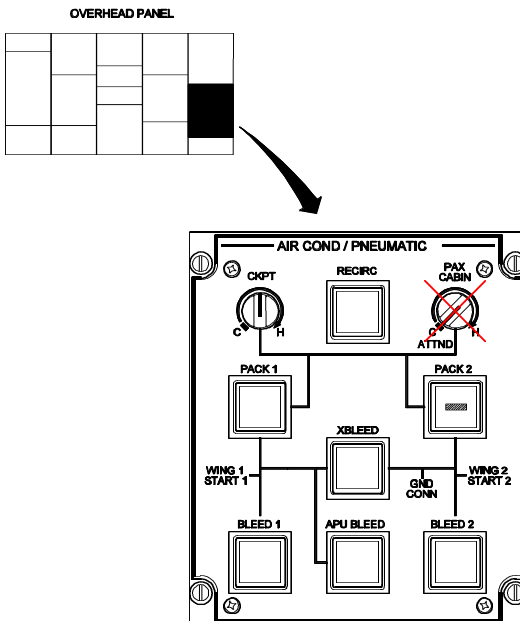
EM170COM40029A.DGN



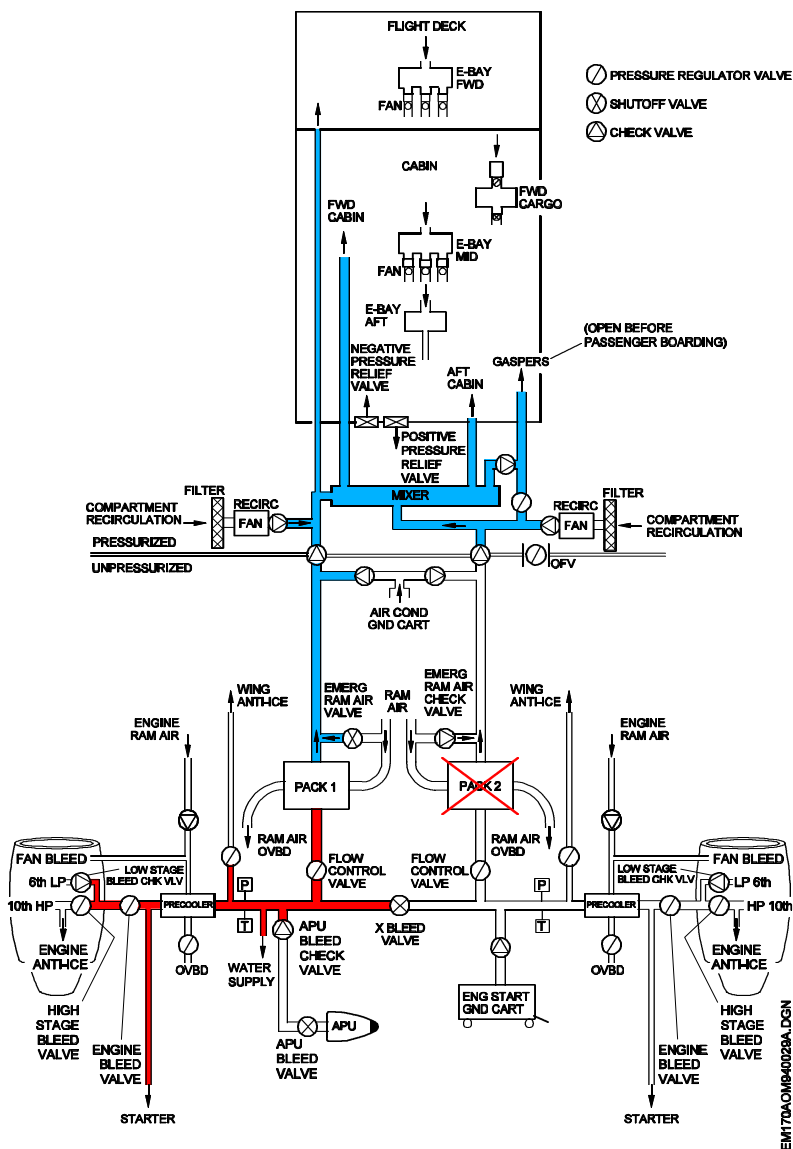
AIRFLOW FOR PACK 1 DISABLED

PACK 2 DISABLED:

Cockpit and passenger cabin zones are supplied by pack 1.
Temperature control on both zones is only adjusted through the CKPT selector knob.



EMB170COM90027A.DGN



AIRFLOW FOR PACK 2 DISABLED

In order to improve cabin temperature control, the following procedures are also recommended:

Keep the operative temperature selector knob at 12 o'clock position on ground;

Between temperature selection changes, wait 10 minutes for temperature system stabilization;

Keep the operative temperature selector knob between 12 and 14 o'clock position during climb;

During cruise make slight temp changes as required, observing the 10 minutes interval between selections;

During descent, increase the temperature of the operative selecting knob between 14 and 16 o'clock position to compensate the reduced airflow to the cabin.

NOTE: AMS Controller – Dual Zone Auto Biasing Logic: If the temperature in one zone goes out of the range from 18°C to 30°C, the pack automatically takes over control in both zones to maintain the temperature in the entire passenger cabin within limits. In this case, the temperature in healthy zone (18°C to 30°C) may undergo some variations until the unhealthy zone temperature is put back between limits.

Monitor cabin temperature and, if necessary, make slight adjustments, respecting the 10 minutes interval among them for system stabilization.

VI - TECHNICAL PUBLICATION INFORMATION:

None.

**I - DOCUMENT EFFECTIVITY: ALL EMBRAER 170/175 AIRPLANES**

This bulletin is issued by Embraer Flight Operations Engineering Section, DSF/GSO/SEO, as the need arises to quickly transmit technical and operational information. It is distributed to EMBRAER 170/175 operators and to any personnel who need early advice of this information.

The matter published in this bulletin may not be approved by Airworthiness Authorities at the time of issuance. In the event of a conflict with the approved publications (AFM, WB, MMEL, or CDL) the approved information shall prevail.

**II - SUBJECT: DEACTIVATION OF AURAL WARNING AFTER
AUTOPILOT DISCONNECTION**

III - REASON: To inform the operators about the "AUTOPILOT" aural warning that could not be deactivated after the auto pilot disconnection.

IV - BACKGROUND INFORMATION:

EMBRAER is issuing this Operational Bulletin to provide information about the "AUTOPILOT" aural warning that could not be deactivated after autopilot disconnection.

V - OPERATING INFORMATION:

The autopilot provides automatic pitch and roll control of the airplane by commanding dedicated servos.

The autopilot is engaged pushing the AP button on the guidance panel. Manual disconnection of the autopilot is established by means of:

- AUTOPILOT QUICK DISCONNECT BUTTON located on the airplane control wheels.
- AP BUTTON, located on the guidance panel.

During airplane normal operation, disconnection of the autopilot by means of AUTOPILOT QUICK DISCONNECT BUTTON or AP BUTTON is followed by an "AUTOPILOT" aural warning. Pressing the AUTOPILOT QUICK DISCONNECT BUTTON again cancels the aural, which sounds at least once.

An event was reported in which, after a normal autopilot disconnection, the "AUTOPILOT" aural warning could not be cancelled by pressing the AUTOPILOT QUICK DISCONNECT BUTTON. After engagement/disengagement of the autopilot by pressing/depressing the AP BUTTON on the guidance panel, the "AUTOPILOT" aural warning could then be canceled by pressing the AUTOPILOT QUICK DISCONNECT BUTTON.

Also, there was no associated EICAS message.

Therefore, the event of an "AUTOPILOT" aural warning runaway can be by-passed through reconnection of the autopilot, followed of a disconnection, and then pressing the AUTOPILOT QUICK DISCONNECT BUTTON.



VI - TECHNICAL PUBLICATION INFORMATION:

None.

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**I - DOCUMENT EFFECTIVITY: ALL EMBRAER 170/175/190 AIRPLANES**

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**II - SUBJECT: MODE S TRANSPONDER REVERSION TO
STANDBY MODE**

III - REASON: To inform flight crews about events of Mode S Transponder reverting to Standby mode and means to avoid that.

IV - BACKGROUND INFORMATION:

It was detected the reversion of Transponder to Standby mode right after flight crew changes the ATC code by the MCDU Tuning Knob.

This behavior has been analyzed and reproduced by Embraer and Honeywell, and only the Mode S Elementary Surveillance Transponders are susceptible.

This occurs when the flight crew changes the ATC code on the MCDU by turning either the inner or outer Tuning Knob continuously for more than 5 seconds, without a pause of at least 500 ms. When this happens, the Transponder System inadvertently goes to Standby mode. The MCDU Radio page and the PFD annunciate that the Transponder system is in Standby mode and TCAS is OFF, respectively.

A solution to this nuisance is available through a service Bulletin issued by Honeywell.

V - OPERATING INFORMATION:

To avoid unexpected reversion of the Transponder system into Standby mode, when an ATC code change is required, the flight crew should select the new code by turning the inner and/or outer MCDU Tuning Knob with momentary stops less than 5 seconds apart.

The Transponder will not make this uncommanded mode change when the MCDU keyboard is used to change the code.

Otherwise, after selecting the new ATC code, the flight crew should verify the status of the TCAS/Transponder system and if the reversion to Standby mode is confirmed, the desired mode have to be selected.

VI - TECHNICAL PUBLICATION INFORMATION:

None.

**I - DOCUMENT EFFECTIVITY: ALL EMBRAER 170/175/190
AIRPLANES**

This bulletin is issued by Embraer Flight Operations Engineering Section, DSF/GSO/SEO, as the need arises to quickly transmit technical and operational information. It is distributed to EMBRAER 170/175/190 operators and to any personnel who need early advice of this information.

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II - SUBJECT: RADIO ALTIMETER MISBEHAVIOR

III - REASON: To inform flight crews about radio altimeter misbehavior for altitudes above 2500 ft.

IV - BACKGROUND INFORMATION:

EMBRAER is issuing this Operational Bulletin to inform operators about the possibility of EGPWS and landing gear aural warnings when flying at altitudes above 2500 ft AGL - Above Ground Level.

Investigation is currently ongoing and solution will be provided accordingly.

V - OPERATING INFORMATION:

The radio altimeter system provides accurate altitude above terrain, decision height annunciation and low altitude awareness up to 2500 ft AGL, which are displayed in green color on both PFDs.

The same altitude is displayed on both PFDs for single radio altimeter installation. In a dual radio altimeter installation, the PFD 1 displays the system 1 radio altitude and the PFD 2 displays the system 2 radio altitude.

In case of a dual installation, when there is a failure in a unit the information of the available one will be shown in amber in both PFDs, and an EICAS message will be displayed indicating the failed system. Other systems (eg: EGPWS, TCAS, Landing Gear) that use radio altimeter data will continue to work normally.

When both modules fail or in case of a single installation and a failed unit, a –RA– flag in amber will be displayed in lieu of an radio altitude, associated with the EICAS message “RALT FAIL”. There will be other messages associated with other systems.

RADIO ALTIMETER MISBEHAVIOR

It was detected that the radio altimeter may display spurious altitude data when flying at altitudes above 2500 ft AGL. The signal is sent to the landing gear system and to the EGPWS and may generate aural warnings.

For airplanes with dual radio altimeter installation, the spurious altitude data is being generated by only one radio altimeter and is displayed on PFD in green color, instead of amber color. The RA flag is not displayed.

This misbehavior has been analyzed and reproduced by Embraer and the spurious altitude data displays occur only for altitudes above 2500 ft AGL. The radio altimeter works normally for altitudes below 2500 ft AGL.

Under certain conditions of flight with no visual reference to the surrounding terrain, especially when below Minimum IFR Altitude or on departure and arrival, prompt and decisive action is required for an aural warning generated by the landing gear system or EGPWS. Do NOT ignore short duration warnings.



VI - TECHNICAL PUBLICATION INFORMATION:

None.

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REVISION RECORDS

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Revision 05 15 APR 2005	15 APR 2005	INCORPORATED
Revision 06 01 AUG 2005	01 AUG 2005	INCORPORATED
Revision 07 01 OCT 2005	01 OCT 2005	INCORPORATED
Revision 08 01 DEC 2005	01 DEC 2005	INCORPORATED

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This document, containing revision number **08**, according to following specified List Of Effective Pages has been accepted by **POLISH CIVIL AVIATION AUTHORITY**.

Date 01.12.2005

Inspektorat Operacyjny
Naczelnik Wydziału
Podpis złożony na oryginale
Waldemar Królikowski

signature

NOTE: Acceptance of successive revisions by CAO are recorded in CAO and LOT master copies.

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5.2.b	2	01 OCT 2004
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6.1.a	2	01 OCT 2004
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11.1.a	11	15 MAR 2004
11.1.a	12	15 MAR 2004

11.2.a	1	15 MAR 2004
11.2.a	2	15 MAR 2004

* Asterisk indicates pages revised, added or deleted by the current revision.

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SECTION 0

GENERAL INFORMATION AND DEFINITION OF TERMS

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LIST OF EFFECTIVE AD / SB / FCIB

AD/SB/FCIB NUMBER	EFFECTIVE DATE AD/SB/FCIB	AD/SB/FCIB STATUS	REMARKS

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APPLICABILITY

FLEET SERIAL NUMBER	MANUFACTURER'S SERIAL NUMBER	REGISTRATION NUMBER	MODEL
GL001	170-000-23	SP-LDA	STD
GL002	170-000-24	SP-LDB	STD
GL003	170-000-25	SP-LDC	STD
GL004	170-000-27	SP-LDD	STD
LOT-01	170-000-29	SP-LDE	LR
LOT-02	170-000-35	SP-LDF	LR
LOT-03	170-000-65	SP-LDG	LR
LOT-04	170-000-69	SP-LDH	LR
LOT-05	170-000-73	SP-LDI	LR
LOT-06	170-000-74	SP-LDK	LR

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GENERAL INFORMATION

CREW RESPONSIBILITIES (JAR-OPS 1.085)

The commander shall ensure that all operational procedures and check lists are complied with in accordance with the Operations Manual.

COMMON LANGUAGE (JAR-OPS 1.025)

- An operator must ensure that all crew members can communicate in a common language.
- An operator must ensure that all operations personnel are able to understand the language in which those parts of the Operations Manual which pertain to their duties and responsibilities are written.

OPERATIONS MANUAL STRUCTURE AND CONTENTS (JAR-OPS 1.1045)

Main structure of the Operational Manual is as follows.

PART A

This part comprises all non type-related operational policies, instructions and procedures needed for safe operation.

PART B

This part comprises all type-related instructions and procedures needed for safe operation. It takes account of any differences between types, variants or individual airplanes used by operator.

PART C

This part comprises all instructions and information needed for the area of operation.

PART D

Presents training information.

This part comprises all training instructions for personnel required for safe operation.

LOT AIRPLANE OPERATIONS MANUAL

This particular LOT Airplane Operations Manual covers only Part B.

This LOT Airplane Operations Manual has been prepared by the Polish Airlines PLL LOT SA Flight Operations Department, information contained herein covers the Airplane Flight Manual, Weight and Balance Manual and the Master Minimum Equipment List.

The LOT Airplane Operations Manual philosophy and structure are described below.

OPERATIONAL REQUIREMENTS AND THE AIRPLANE OPERATIONS MANUAL

The existence of fleets composed of airplanes or other kind of aircraft made by different manufacturers, has led the Airworthiness Authorities to require operators' certification, in addition to the airplanes' certification.

The idea is to adapt manuals due to the differences in performed modifications and differences in equipment, so as to make it easier for the pilot to understand.

Some Operations requirements just define the main subjects that must be presented in an Airplane Operations Manual matter. However, even detailing the Airplane Operations Manual at that level, all the requirements give the operators a free hand in using different Airplane Operations Manual structures, depending on the manuals that have been already issued. Therefore, PLL LOT S.A. has developed this Airplane Operations Manual covering the most currently used requirements.

LOT AIRPLANE OPERATIONS MANUAL STRUCTURE

The LOT Airplane Operations Manual is organized in 3 volumes, with the following contents:

- Volume 1:
 - 0 General
 - 1 Limitations
 - 2 Normal Procedures
 - 3 Emergency and Abnormal Procedures
 - 4 Performance
 - 5 Flight Planning
 - 6 Weight and Balance
 - 7 Loading
 - 8 Configuration Deviation List
 - 9 Minimum Equipment List

- 10 Emergency Information
- 11 Emergency Evacuation
- Volume 2:
 - 12.06 Dimensions And Areas
 - 12.12 Servicing
 - 12.21 Air Conditioning
 - 12.22 Auto Flight
 - 12.23 Communication
 - 12.24 Electrical Power
 - 12.25 Equipment And Furnishings
 - 12.26 Fire Protection
 - 12.27 Flight Controls
 - 12.28 Fuel
 - 12.29 Hydraulic Power
 - 12.30 Ice And Rain Protection
 - 12.31 Indication And Recording System
 - 12.32 Landing Gear
 - 12.33 Lights
 - 12.34 Navigation
 - 12.35 Oxygen
 - 12.36 Pneumatics
 - 12.38 Water And Waste
 - 12.49 Auxiliary Power Unit
 - 12.71 Powerplant
- Volume 3 (QUICK REFERENCE HANDBOOK):
 - QRH-0 Introduction
 - QRH-1 General
 - QRH-2 Normal Procedures
 - QRH-3 Emergency/Abnormal Procedures
 - QRH-4 Performance Data

Each of the above sections may be divided into smaller parts. Such parts are identified by the number of the section followed by one letter.

For example:

Section 1 can be divided as follows:

- 1.1.0 Introduction
- 1.1.a Certification status

- 1.1.b Passenger seating configuration
- 1.1.c Kinds of operation
- 1.1.d Crew composition
- 1.1.e Weight and center of gravity
- 1.1.f Airspeeds
- 1.1.g Operational envelope

The page numbering of each part is independent from the remaining parts. Each page number is presented immediately under the block number.

As an example, there could be:

Block	Page number
1.1.a	2
1.1.f	8

REVISIONS

PLL LOT may revise this manual periodically as required to update information or to provide information not available at the time of printing of the original issue. Revised data may result from PLL LOT approved airplane modifications or from improved techniques gained through operational experience. They are either replacements or additional pages. A vertical line in the outside margin indicates changes to the text.

A vertical line adjacent to the page number indicates relocated or rearranged text or illustrations.

The basic issuance date of this Manual is presented on the title page. The revisions affecting this Manual to be issued from the basic issuance date onwards, will be numbered sequentially (Rev. 1, 2, 3 etc.), even for such pages bearing those earlier revision-denoting symbols.

TEMPORARY REVISIONS

In cases when time required for updating information as permanent revision is too short, it will be issued very fast as temporary revision on yellow pages. This revision will be valid until issuance of next permanent revision, which should cover it.

LIST OF EFFECTIVE PAGES

A list of Effective Pages for all Sections is located at the beginning of this Manual in Volume 1 and separately in Volume 2. This list presents the issuance date of each page and it is revised together with the Manual.

DEFINITION OF TERMS

The following definitions apply to the terms below:

WARNING: OPERATING PROCEDURES, TECHNIQUES AND OTHER RELATED INFORMATION WHICH MAY RESULT IN PERSONAL INJURY OR LOSS OF LIFE, IF NOT FOLLOWED. WARNING MESSAGES ARE RED COLOURED AND REQUIRE IMMEDIATE CREW ACTION. WARNING MESSAGES ARE ALWAYS PRESENTED AT THE TOP OF THE LIST, IN THE SAME ORDER, AS THEY WERE GENERATED.

CAUTION: OPERATING PROCEDURES, TECHNIQUES AND OTHER RELATED INFORMATION WHICH MAY RESULT IN DAMAGE OR DESTRUCTION OF EQUIPMENT, IF NOT FOLLOWED. CAUTION MESSAGES ARE AMBER COLORED AND REQUIRE IMMEDIATE CREW AWARENESS. THEY FOLLOW WARNINGS IN CRITICALITY LEVEL AND IN DISPLAY PRESENTATION

ADVISORY: ADVISORY MESSAGES ARE CYAN AND ARE DEDICATED TO MINOR FAILURES. ADVISORY MESSAGES ARE PRESENTED AFTER CAUTION MESSAGES

NOTE: Operating procedures, techniques and other related information which are considered essential to be emphasized.

AIRSPPEEDS

INDICATED AIRSPEED – KIAS

The reading on the airspeed indicator (knots), as installed in the airplane, uncorrected for static source position error. Zero instrument error is assumed.

CALIBRATED AIRSPEED – KCAS

The indicated airspeed (knots), corrected for static source position error.

TRUE AIRSPEED – TAS

The equivalent airspeed corrected for atmospheric density effects.

CRITICAL ENGINE FAILURE SPEED - V_{EF}

The speed at which, if one engine fails, the failure is recognized at V_1 .

1-G STALL SPEED – V_{S1G}

The minimum speed at which the lift provided by the airplane is capable of supporting its weight.

REFERENCE STALL SPEED - V_{SR}

The stall speed used as the reference in determining the various airplane speeds. V_{SR} may not be less than V_{S1G} .

TAKEOFF DECISION SPEED – V_1

The speed at which, following a failure of one engine at V_{EF} , pilot's decision to continue or not the takeoff will result in:

- a takeoff distance to the screen height at V_2 speed, that will not exceed the available takeoff distance; or
- the distance to bring the airplane to a full stop that will not exceed the available accelerate-stop distance.

V_1 must not be greater than the rotation speed (V_R).

ROTATION SPEED - V_R

The speed at which rotation is initiated during takeoff, to attain the takeoff safety speed at or before a height of 35 ft above runway surface.

TAKEOFF SAFETY SPEED – V_2

The target speed to be attained at a 35 ft height, during a takeoff with an engine failure.

AIR MINIMUM CONTROL SPEED - V_{MCA}

The minimum flight speed at which the airplane is controllable with a maximum 5° bank, when one engine suddenly becomes inoperative with the remaining engine operating at takeoff power. The value presents the most critical combination of power, weight, and center of gravity.

GROUND MINIMUM CONTROL SPEED - V_{MCG}

The minimum speed on the ground at which takeoff can be continued, utilizing aerodynamic controls alone, when one engine suddenly becomes inoperative and the remaining engine is operating at takeoff power. The value presented represents the most critical combination of power, weight, and center of gravity.

LANDING REFERENCE SPEED - $V_{REF XX}$

The speed at a 50 ft height in a normal landing. This speed is equal to 1.23 V_{SR} in the landing configuration (gear down and specific landing flaps XX).

MANEUVERING SPEED - V_A

The maximum speed at which application of full available aileron or rudder will not overstress the airplane.

Maneuver involving pitching control must not exceed the limit load factor defined in Section 1 – Limitations.

MINIMUM CONTROL SPEEDS DURING LANDING AND APPROACH - V_{MCL}

V_{MCL} is the minimum control speed in the landing configuration.

FINAL TAKEOFF SEGMENT SPEED - V_{FS}

It is the speed to be achieved during final takeoff segment, with landing gear and flaps retracted.

HEIGHTS**MINIMUM USE HEIGHT - MUH**

The Minimum Use Height is the height below which the Autopilot must be disengaged.

MINIMUM ENGAGEMENT HEIGHT - MEH

The Minimum Engagement Height is the height above which the Autopilot may be engaged.

METEOROLOGICAL

INTERNATIONAL STANDARD ATMOSPHERE – ISA

As accepted by the International Civil Aviation Organization.

STATIC AIR TEMPERATURE – SAT

Outside air temperature as indicated on the MFD.

TRUE OUTSIDE AIR TEMPERATURE

The free air static (ambient) temperature.

WIND VELOCITY

The actual wind velocity at a 10 m (32,8 ft) height, reported from the tower and corrected by the wind component chart to a headwind or tailwind component parallel to the flight path.

ISA International standard atmosphere, as accepted by the international civil aviation organization.

OAT Outside air temperature the free air static (ambient) temperature.

SAT Static air temperature . Outside air (ambient) temperature as computed from TAT.

TAT Total air temperature. Static air temperature plus adiabatic compression rise as indicated on the total air temperature indicator.

NOTE: - Total air temperature and static air temperature depend on Mach number. You must see temperature conversion table.

TAKEOFF

The takeoff path extends from a standing start to a point in takeoff at which the airplane is at least 1.500 ft above the takeoff surface or has achieved the enroute configuration and final segment speed. The takeoff path is divided into segments related to the distinct changes in the configuration, power and speed.

Some of the terms used in the takeoff path are defined below.

SCREEN HEIGHT

The altitude to be attained above the takeoff surface at the end of takeoff distance (35 ft for dry runways and 15 ft for wet runways).

TAKEOFF DISTANCE

The greater of the distance from the start of the takeoff to the point at which the airplane is at the screen height, with a failure of one engine at V_{EF} ; or 115 percent of the distance with all engines operating, from the beginning of the takeoff to the screen height.

TAKEOFF RUN

When a clearway exists:

- the greater of the distance from the start of the takeoff to a point equidistant between liftoff and the point at which the airplane is at screen height, with a failure of one engine at V_{EF} ; or 115 percent of the distance from the beginning of the takeoff to a point equidistant between liftoff and the point at which the airplane is at screen height, with all engines operating.

When a clearway does not exist:

- the greater of the distance from the start of the takeoff to the point at which the airplane is at screen height, with a failure of one engine at V_{EF} ; or 115 percent of the distance from the start of the takeoff to the point at which the airplane is at screen height, with all engines operating.

ACCELERATE-STOP DISTANCE AVAILABLE (ASDA)

The length of the take-off run available plus the length of stopway, if such stopway is declared available by the appropriate Authority and is capable of bearing the mass of the aeroplane under the prevailing operating conditions.

CONTAMINATED RUNWAY

A runway is considered to be contaminated when more than 25% of the runway surface area (whether in isolated areas or not) within the required length and width being used is covered by the following:

- Surface water more than 3 mm (0.125 in) deep, or by slush, or loose snow, equivalent to more than 3 mm (0.125 in) of water;
- Snow which has been compressed into a solid mass which resists further compression and will hold together or break into lumps if picked up (compacted snow); or
- Ice, including wet ice.

DAMP RUNWAY

A runway is considered damp when the surface is not dry, but when the moisture on it does not give it a shiny appearance.

DRY RUNWAY

A dry runway is one which is neither wet nor contaminated, and includes those paved runways which have been specially prepared with grooves or porous pavement and maintained to retain 'effectively dry' braking action even when moisture is present.

LANDING DISTANCE AVAILABLE (LDA)

The length of the runway which is declared available by the appropriate Authority and suitable for the ground run of an aeroplane landing.

MAXIMUM APPROVED PASSENGER SEATING CONFIGURATION

The maximum passenger seating capacity of an individual aeroplane, excluding pilot seats or flight deck seats and cabin crew seats as applicable, used by the operator, approved by the Authority and specified in the Operations Manual.

TAKEOFF DISTANCE AVAILABLE (TODA)

The length of the take-off run available plus the length of the clearway available.

TAKEOFF MASS

The takeoff mass of the aeroplane shall be taken to be its mass, including everything and everyone carried at the commencement of the takeoff run.

TAKEOFF RUN AVAILABLE (TORA)

The length of runway which is declared available by the appropriate Authority and suitable for the ground run of an aeroplane taking off.

WET RUNWAY

A runway is considered wet when the runway surface is covered with water, or equivalent, less than specified in subparagraph above or when there is sufficient moisture on the runway surface to cause it to appear reflective, but without significant areas of standing water.

CLEARWAY

An obstacle free area beyond the end of the runway which can be taken into account for takeoff distance calculation.

STOPWAY

An area extending beyond the end of the runway which may be used in decelerating the airplane in case of a refused takeoff.

PAVED RUNWAY

A surface such as concrete or tarmac.

NET TAKEOFF FLIGHT PATH

The net flight path is the gross (actual) path diminished by the gradient required by regulation.

TAKEOFF FLIGHT PATH

The takeoff flight path begins 35 ft above the takeoff surface at the end of the takeoff distance and extends to a point at which the airplane is at least 1500 ft above the takeoff surface or has achieved the enroute configuration and final segment speed, whichever occurs last.

REFERENCE ZERO

This is the reference to which the coordinates of the various points in the takeoff are referred to. It is defined as the end of the takeoff distance and 35 ft below the flight path at this point.

LEVEL OFF HEIGHT

The height at which the third segment is performed (400 ft minimum).

FIRST SEGMENT

Extends from the liftoff to the point at which the landing gear is fully retracted, using takeoff power and takeoff flaps, at a speed not less than V_2 .

SECOND SEGMENT

Extends from the point at which gear is fully retracted to the level off height (400 ft minimum), using takeoff power and takeoff flaps at a constant V_2 .

THIRD SEGMENT

The horizontal distance required to accelerate, at constant altitude, using takeoff power to the final segment speed while retracting flaps.

FINAL SEGMENT

Extends from the end of the third segment to a gross height of at least 1500 ft, with flaps up, takeoff power during five minutes and maximum continuous power after that, and at final segment speed.

NOTE: The flight path data given in the charts contained in this manual is such that all heights have been reduced by 35 ft for convenience in use; the obstacle height should, therefore, be compared directly with the flight path.

GROSS CLIMB GRADIENT

The ratio, expressed as a percentage of the change in geometric height divided by the horizontal distance (both in the same unit) travelled in a given time. The gradients shown on the charts are true gradients, i.e., they are derived from geometric (not pressure) rates of climb.

NET CLIMB GRADIENT

The demonstrated gross gradient reduced by 0.8% during takeoff phase and 1.1% enroute.

GROSS HEIGHT

The geometric height attained using gross climb gradient in a given time.

NET HEIGHT

The geometric height attained using net climb gradient in a given time. Net height is used to determine a net flight path which will clear any obstacle by at least 35 ft to comply with the regulations.

ENROUTE AND LANDING

ENROUTE CLIMB

Climb in the enroute configuration and speed.

APPROACH CLIMB

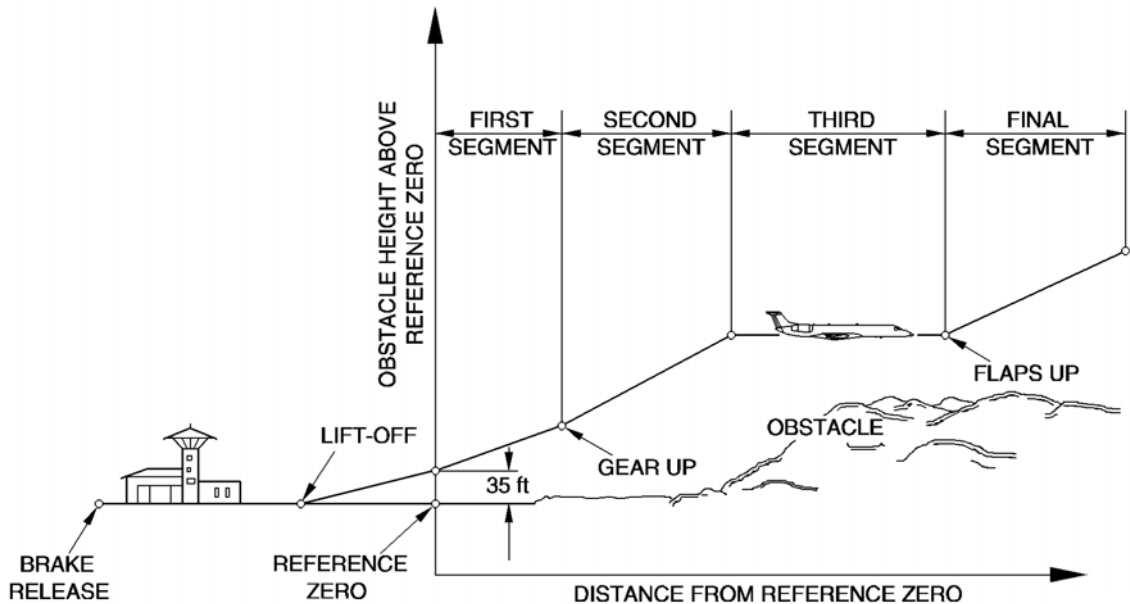
Climb from a missed or aborted approach, with approach climb configuration and speed.

LANDING CLIMB

Climb from an aborted landing with landing climb configuration and speed.

TRUE MACH NUMBER - M

Machmeter reading as installed in the airplane, corrected for static source position error.



TAKEOFF PROFILE

NORMAL, ABNORMAL AND EMERGENCY PROCEDURES

ABNORMAL

When the word abnormal is used to describe a procedure or checklist, it refers to a non-routine operation in which certain procedures or actions must be taken to maintain an acceptable level of airworthiness for a continued safe flight and landing. When it is associated with a **caution condition** message, it will indicate procedures that may result in damage to equipment if such procedures are not followed. The abnormal procedures have been written assuming oxygen masks will be donned and communications established between crewmembers whenever oxygen deficiency or contamination is suspected.

ACCELERATION ALTITUDE

It is defined as Level off Altitude on the Runway Analysis performance chart. It is the takeoff 3RD segment and is used for level flight, acceleration and flap retraction. The acceleration altitude varies between 400 ft and 1500 ft according to the takeoff path, obstacles and engine limitations.

ADVISORY

Used to indicate a condition that requires crew awareness and may require subsequent or future crew action.

AFE

Above field elevation.

AFTER LANDING SEQUENCE

Actions to be performed by the RSP upon the request of the LSP after the rollout phase.

AREAS OF RESPONSIBILITY

Cockpit areas operated by a specific pilot. These areas exist to improve crew coordination and a pilot must always advise the other pilot if he is intending to operate something outside his Area of Responsibility.

Refer to the Normal Procedures Chapter 2.1.1 to determine what areas are assigned to which pilot.

ASAP

Aviation Safety Action Program encourages voluntary reporting of mistakes and incidents by promising no reprisals.

AUTOMATION COMPLACENCY

Failure to monitor airplane systems due to overconfidence in automation.

CABIN CREW

Crewmembers that report to the Pilot-in-Command and are in charge of assuring the safety of the occupants that are not crewmembers in all circumstances. The cabin crew is composed of Flight Attendants.

CALLOUTS

Callouts are aids in maintaining awareness of the crew as to the status of given tasks. They are extremely important in aiding the crew to maintain situational awareness. Made to indicate that a system has deviated from the assigned parameters or to describe tasks or events requiring a high level of monitoring on highly dynamic and unstable events.

CAPTAIN OR PILOT IN COMMAND

Pilot legally responsible for the operation of the airplane and who commands the operation of the airplane. He has the authority to take actions, to request or to delegate any crewmember to execute any action as he finds appropriate to improve the safety of the flight.

CAUTION

Used to indicate a hazard which if ignored could result in damage to an airplane component or system which would make continued safe flight improbable (Immediate crew awareness and subsequent corrective or compensatory crew action required).

CLIMB SEQUENCE

Actions to be performed by the Pilot Not-Flying upon Pilot Flying request during initial climb phase.

CRITICAL PHASES OF FLIGHT

High workload phases of flight. Flight phases below FL 100 (not including cruise flights), Takeoffs, Landings, Taxi procedures and all parts of the flight operation considered as critical by the flight crew.

CRM

Crew Resource Management. The effective use of all resources to include human and other aviation system resources.

ACRM: Advanced Crew Resource Management - a package including CRM procedures, training of the instructor/evaluators, training of the crews, a standardized assessment of crew performance, and an ongoing implementation process providing an integrated form of CRM by incorporating CRM practices with normal and emergency SOP.

DARK AND QUIET COCKPIT

A concept used to design and operate an airplane based on the assumption that in flight all systems are normal when the overhead, main, glare-shield and control pedestal panels have no lights on, and no aural warnings are taking place. This concept enforces the need of a quiet environment inside the cockpit during most phases of flight.

DERATED TAKEOFF THRUST

A takeoff thrust level less than the maximum takeoff thrust approved for which a separate and specific set of data exists. When operating with a de-rated takeoff thrust, the thrust setting parameter used to establish thrust for takeoff is presented in the AFM and is considered an operating limit for that takeoff.

DO AND VERIFY

A checklist usage technique that consists of completing all the checklist actions by memory and verifying them afterwards by reading and replying.

EMERGENCY

When emergency is used to describe a procedure or Checklist, it refers to a non-routine operation (warning) in which certain procedures or actions must be taken to protect the crew and the passengers, or the airplane, from a serious hazard or potential hazard. When associated with a **warning EICAS** message, will indicate procedures that may result in personal injury or loss of life if not followed. The emergency procedures have been written assuming oxygen masks will be donned and communications established between crewmembers whenever their use is required.

EXPANDED PROCEDURES

A description of sequential procedural steps with detailed explanatory descriptions and/or instructions accompanying each step.

FIRST OFFICER (FO) OR SECOND IN COMMAND (SIC)

A pilot that is not in command but can carry out the duty of flying the airplane under the circumstances established by company rules.

FLIGHT ATTENDANT

Crewmember that reports to the Pilot-in-Command and is in charge of assuring the safety of the occupants that are not crewmembers in all circumstances. The **Purser** is the flight attendant responsible for coordinating with other flight attendants the efficient handling of non-crewmember occupants. The **Purser** must handle all relevant matters needing coordination with the flight crew.

FLIGHT CREW

Crewmembers that conduct the airplane's flight operation. The flight crew will be composed of Captain and First Officer.

FOQA

Flight Operations Quality Assurance, monitors flight data recorder in order to monitor safety issues. New generation airplanes flight recorder data are monitored for airplane performance exceeding specific limits. There is no jeopardy to flight crews' jobs.

IMMEDIATE ACTION

An action that must be taken in response to a non-routine event so quickly that reference to a checklist is not practical because of a potential loss of airplane control, incapacitation of a crewmember, damage to or loss of an airplane component or system, which would make a continued safe flight improbable.

INSTRUCTOR PILOT

Pilot that acts as Flight Instructor to a not-yet qualified pilot or to a qualified pilot undergoing flight instruction for refreshment or for any other reason.

LAND AT THE NEAREST SUITABLE AIRPORT

Some checklists require landing at the nearest suitable airport. This statement may be presented below the associated emergency/abnormal characterization or at the beginning of a task that requires so. When the crew determines that significant threat to safety is present, they should always accomplish the earliest possible descent, land at the nearest suitable airport regardless of having this statement present in the checklist.

LOFT

Line Oriented Flight Training: simulator training session where the focus is on reproducing an environment as similar as possible to the airline operating environment with similar workload and routine. The objective of these sessions is to identify areas of difficulty related to crew coordination and ergonomics. LOFT sessions may include abnormal and emergency situations that require knowledge-based actions by the crew.

LOSA

Line Operations Safety Audit: provides a process for analyzing the safety of normal line operations. Rather than focusing on events and finding fault, it offers a systemic and non-punitive assessment by trained observers of everyday operational flights. The LOSA process consists of a family of methodologies. In addition to the observations, crewmembers are interviewed and complete questionnaires on safety practices, organizational culture and cockpit management.

NON-ANUNCIATED

When Non-Annunciated is used to describe a procedure or checklist, it refers to a non-routine operation requiring flight crew action, due to a condition not capable to be sensed by the airplane avionics system (e.g.: Smoke, Emergency Descent, etc.).

OBSERVER

Person (crewmember or check airman) seating at the jump seat.

PILOT FLYING (PF)

Pilot who is controlling the path and thrust setting of the airplane in flight (it is the primary responsibility of each pilot to monitor the airplane).

PILOT INCAPACITATION

Situation where one of the pilots is not able to perform his duties.

PILOT NOT FLYING (PNF)

Pilot who is actively assisting/monitoring Pilot Flying during operation of the airplane. The active monitoring concept must be implemented, trained, practiced and must have its effectiveness evaluated in order to provide benefits. It is the primary responsibility of each pilot to monitor the airplane and the other pilot.

PRECISION-LIKE APPROACH

Technique to fly all non precision approaches with a stabilized vertical descent path to the runway end.

READ AND DO

A checklist usage technique that consists of reading and accomplishing each of the checklist items. The Checklist items will follow the sequence corresponding to the sequence of actions required.

RECALL ITEMS

Items of the checklist that must be memorized by the flight crew and whose execution must be carried out immediately should the corresponding checklist become applicable (immediate action). Recall items should be verified after completion.

REDUCED TAKEOFF THRUST

A takeoff thrust level less than the maximum (or de-rated) takeoff thrust. When operating with a reduced takeoff thrust, the thrust setting parameter used to establish thrust for takeoff is not considered an operating limit; thrust may be restored to the maximum (or de-rate) level as appropriate for the conditions of the flight at any time during the takeoff.

This method is also known as assumed takeoff thrust.

REJECTED TAKEOFF

A takeoff that is discontinued after takeoff thrust is set and initiation of the takeoff roll has begun.

SILENT CHECKLIST

Performed during high workload periods. The procedure reduces the amount of activity on the flight deck that the pilots normally have to contend with. The crewmember executing the checklist should announce "_____ Checklist completed" when all checklist items have been accomplished.

The only silent checklist on the EMBRAER 170 is the After TakeOff.

SITUATIONAL AWARENESS

Refers to the fact that the crew should be conscious of the airplane's condition under specific operational and environmental circumstances.

SPEEDS

- Approach Climb Speed (V_{AC}) – It is the speed to be used in case of go-around with Go-around Flaps.
- Approach Speed (V_{AP}) – It is the speed on the final approach, in landing configuration.
- Landing Reference Speeds (V_{REF}) – It is a reference for V_{AP} calculation. It is the minimum recommended speed at 50 ft over the threshold. It is the speed used in the landing distance calculations.
- Final Segment Speed (V_{FS}) – It is the speed to be achieved during the final takeoff segment, with landing gear up and flaps retracted.

STABILIZED APPROACH

Criteria used to judge an approach according to the capability of the airplane to perform a safe landing after a determined point at the approach procedure (on the Approach Speed plus applicable additives, on the proper flight path, on the proper sink rate and with the thrust stabilized no lower than 1000 ft AFE.

STATUS

Used to indicate a condition that requires cockpit indications, but not necessarily as part of the integrated warning system.

STERILE COCKPIT

Sterile Cockpit is the establishment of an environment at the cockpit in which the crewmembers can concentrate on airplane operation during certain phases of the flight.

SUPPLEMENTARY PROCEDURES

Used to describe a non-routine procedure that may be employed in addition to a normal procedure. Infrequently used procedures should be performed by reference (read and do).

WARNING

Used to indicate a hazard that if ignored could result in injury, loss of airplane control, or loss of life (immediate corrective or compensatory crew action required).

ABBREVIATIONS AND ACRONYMS USED

ABBREVIATIONS OR ACRONYMS	MEANING
°C	Degree Celsius
°F	Degree Fahrenheit
ft	Feet
g	Gravity Acceleration
h	Hour
Hz	Hertz
in.Hg	Inches of Mercury
kg	Kilogram
km	Kilometer
kt	Knot
ℓ	Liters
lb	Pounds
m	Meter
mb	Millibar
min	Minute
mm	Millimeter
nm	Nautical Mile
psi	Pound per Square Inch
sec	Second
Δ Gust	Increase in airspeed due to gust
A	
A	Ampere
ABCM	Auto Brake Control Module
A/C	Aircraft
AC	Alternating Current

ABBREVIATIONS OR ACRONYMS	MEANING
ACARS	Aircraft Communication Addressing and Reporting System
ACE	Actuator Control Electronics
ACM	Air Cycle Machine
ACMP	AC Motor Pump
ACOC	Air Cooled Oil Cooler
ACP	Audio Control Panel
ACT	Actuation, Active
ADA	Air Data Application
ADC	Air Data Computer
ADF	Automatic Direction Finder
ADI	Attitude Direction Indication
ADJ	Adjustment
ADV	Advance
ADS	Air Data System
ADSP	Air Data Smart Probe
AFCS	Automatic Flight Control System
AFE	Altitude Field Elevation
AFM	Airplane Flight Manual
AFT	Aftward
AFU	Artificial Feel Unit
AFS	Autoflight System
AGB	Accessory Gear Box
AGL	Above Ground Level
AHC	Attitude and Heading Computer
AHRS	Attitude and Heading Reference System
AICC	Auxiliary Integrated Control Center
AIL	Aileron

ABBREVIATIONS OR ACRONYMS	MEANING
ALC	APU Line Contactor
ALT	Altitude
ALTN	Alternate
AM	Amplitude Modulation
AMS	Air Management System
ANR	Automatic Navigation Realignment
ANT	Antenna
AOA	Angle of Attack
AOC	Airline Operational Communications
AP	Autopilot
API	Antenna Position Indicator
APM	Aircraft Personality Module
APPR	Approach
APPV	VOR Approach Mode
APR	Automatic Power Reserve
APU	Auxiliary Power Unit
ASC	APU Starting Contactor
ASCB	Avionics Standard Communication Bus
ASEL	Altitude Preselect
ASTM	American Society of Testing Material
AT	Auto Throttle
ATC	Air Traffic Control
ATIS	Automatic Terminal Information Service
ATS	Air Turbine Starter, Air Traffic Services
ATTND, ATDT, ATTD	Attendant
ATOA	Above Takeoff Altitude
ATS	Air Turbine Starter
ATT	Attitude

ABBREVIATIONS OR ACRONYMS	MEANING
ATTCs	Automatic Takeoff Thrust Control System
ATTND	Attendant
AUTO	Automatic
AUX	Auxiliary
AVAIL	Available
AWU	Aural Warning Unit
AZFW	Actual Zero Fuel Weight
B	
B/C	Back Course
BACV	Bleed Air Check Valve
BAGG	Baggage
BATT	Battery
BBC	Backup Battery Contactor
BC	Battery Contactor
BCM	Brake Control Module
BCN	Beacon
BCS	Brake Control System
BCU	Brake Control Unit
BCV	Brake Control Valve
BEW	Basic Empty Weight
BFO	Beat Frequency Oscillator
BIT	Built In Test
BKUP INPH	Back-Up Interphone
BLD	Bleed
BRG	Bearing
BRT	Bright
BTC	Bus Tie Contactor
BTL	Bottle

ABBREVIATIONS OR ACRONYMS	MEANING
C	
CAB	Cabin
CAFM	Computerized Airplane Flight Manual
CAN	Controller Area Network
CAS	Calibrated Airspeed, Crew Alerting System
CAT II	Category II Operation
CB	Circuit Breaker
CBV	Cross Bleed Valve
CCD	Cursor Control Device
CCDL	Cross-Channel Data Link
CCW	Counterclockwise
CDH	Clearance Delivery Head
CDL	Configuration Deviation List
CFIT	Controlled Flight Into Terrain
CG	Center of Gravity
CGD	Corrected Ground Distance
CHR	Chronometer
CIS	Cabin Interphone System
CKPT	Cockpit
CL	Climb
CLB	Climb
CLK	Clock
CLR	Clear
CLSD	Closed
CMC	Central Maintenance Computer
CMD	Command
CMF	Communication Management Function
COMM, COM	Communication

ABBREVIATIONS OR ACRONYMS	MEANING
CON	Continuous
CONN	Connection
CPAM	Cabin Pressure Acquisition Module
CPC	Cabin Pressure Controller
CPCS	Cabin Pressure Control System
CR	Cruise
CRFL	Cruise Flight Level
CRG	Cargo
CRZ	Cruise
CTRL	Control
CVR	Cockpit Voice Recorder
CVG	Compressor Variable Geometry
CVR	Cockpit Voice Recorder
CW	Clockwise
D	
DAP	Digital Audio Panel
DAU	Data Acquisition Unit
DC	Direct Current, Digital Controller
DCTC	Direct Current Tie Contractor
DDPM	Dispatch Deviation Procedures Manual
DEC	Decrease
DEOS	Digital Engine Operating System
DET	Detector
DFDR	Digital Flight Data Recorder
DG	Directional Gyro
DGRAD	Degraded
DH	Decision Height
DISC	Disconnect

ABBREVIATIONS OR ACRONYMS	MEANING
DIM	Dimmer
DLK	Datalink
DME	Distance Measurement Equipment
DMU	Data Management Unit
DN	Down
DOW	Dry Operating Weight
DR	Dead Reckoning
DU	Display Unit
DVDR	Digital Voice Data Recorder
E	
EADI	Electronic Attitude Director Indicator
E-BAY	Electronic Bay
EBC	Essential Bus Contactor
EBV	Engine Bleed Valve
ECAFM	Electronic Computerized AFM
ECCB	Electronic Control Circuit Brake
ECM	Electronic Control Module
ECS	Environmental Control System
ECU	Environmental Control Unit
EDL	Electrical Distribution Logic
EDP	Engine Driven Pump
EDS	Electrical Distribution System
EEW	Equipped Empty Weight
EFIS	Electronic Flight Instrument System
EGPWS	Enhanced Ground Position Warning System
EGPWM	Enhanced Ground Position Warning Mode
EGT	Exhaust Gas Temperatur
EHSI	Electronic Horizontal Situation Indicator

ABBREVIATIONS OR ACRONYMS	MEANING
EIC	Essential Interconnection Contactor
EICAS	Engine Indication and Crew Alerting System
EICC	Emergency Intergrated Control Circuit
ELEC	Electrical
ELEV	Elevator
EBV	Engine Bleed Valve
ELPU	Emergency Lights Power Unit
ELT	Emergency Locator Transmitter
EMG, EMERG	Emergency
EMER PILOT	Emergency Pilot
ENG	Engine
ERR	Error
ESU	Electronic Sequence Unit
ET	Elapsed Time
ETC	Essential Tie Contactor
EXT	External
EXTG	Extinguish
F	
FAA	Federal Aviation Authority
FADEC	Full Authority Digital Electronic Control
FAF	Final Approach Fix
FAP	Flight Attendant Panel
FBW	Fly By Wire
FCOC	Fuel Cooled Oil Cooler
FCM	Flight Control Module
FCU	Flight Control Unit
FCV	Flow Control Valve
FD	Flight Director

ABBREVIATIONS OR ACRONYMS	MEANING
FDAU	Flight Data Acquisition Unit
FDRS	Flight Data Recorder System
FECU	Flap Electronic Control Unit
FGCS	Flight Guidance Control System
FLCH	Flight Level Change
FLS	Flap Selector Lever
FLV	Flow Limiter Valve
FLX	Flexible
FMA	Flight Mode Annunciator
FMS	Flight Management System
FMU	Fuel Metering Unit
FPA	Flight Path Angle
FPDU	Flap Power and Drive Unit
FPLN	Flight Plan
FPMU	Fuel Pump and Metering Unit
FPR	Flight Path Reference
FPV	Flight Path Vector
FR	Fuel Remaining
FSBY	Forced Standby
FSBY OVRD	Forced Standby Override
FSL	Flap Selector Lever
FSTN	Fasten
FTB	Flap Transmission Brake
FU	Fuel Used
FVS	Flap Velocity Sensor
FWD	Forward
G	
GA	Go-Around

ABBREVIATIONS OR ACRONYMS	MEANING
GBST	Ground Based Software Tool
GCU	Generator Control Unit
GD	Ground Distance
GEN	Generator
GI	Ground Idle
GLC	Generator Line Contactor
GMAP	Ground Mapping
GMT	Greenwich Mean Time
GND	Ground
GP	Guidance Panel, Glide Path
GPC	Ground Power Contactor
GPS	Global Positioning System
GPU	Ground Power Unit
GPWS	Ground Proximity Warning System
G/S, GS	Glide Slope
GSTC	Ground Service Transfer Contactor
H	
H	Hot
HDG	Heading
HDPH	Headphone
HF	High Frequency
HI	High
HP	High Pressure
HPT	High Pressure Turbine
hPa	HectoPascal
HSA	Horizontal Stabilizer Actuator
HS-ACE	Horizontal Stabilizer Actuator Controls Electronics
HSCU	Horizontal Stabilizer Control Unit

ABBREVIATIONS OR ACRONYMS	MEANING
HSI	Horizontal Situation Indicator
HSV	High Stage Valve
HPSOV	High-Pressure Shut-Off Valve
HYDR	Hydraulic
I	
IAF	Initial Approach Fix
IAS	Indicated Airspeed
IATA	International Air Transport Association
IC	Integrated Computer
ICAO	International Civil Aviation Organization
ICC	Integrated Control Center
ICU	Integrated Communication Unit Interphone Control Unit
ID	Identification
IDG	Integrated Driver Generator
IESS	Integrated Electronic Standby System
IFR	Instrument Flight Rules
IFOG	Interferometer Fiber Optic Gyros
IGN	Ignition
ILS	Instrument Landing System
INBD	Inboard
INC	Increase
INHIB	Inhibition
INOP	Inoperative
INSP	Inspection
INT	Initialization
INTPH	Interphone
INU	Integrated Navigation Unit
I/O	Input/Output
IPS	Inches Per Second
IR	Inertial Reference
IRS	Inertial Reference System

ABBREVIATIONS OR ACRONYMS	MEANING
IRU	Inertial Reference Unit
ISA	International Standard Atmosphere
ISIS	Integrated Standby Instrument System
ITT	Interturbine Temperatur
J	
JAR	Joint Aviation Regulation
K	
KCAS	Calibrated Airspeed in Knots
KEAS	Equivalent Airspeed in Knots
Khz	Kilohertz
KIAS	Indicated Airspeed in Knots
KPH	Kilograms per Hour
L	
L/D	Lift/Drug
LAV	Lavatory
LCD	Liquid Crystal Diaplay
LDA	Localizer Directional Aid
LEI	Local Engine Inoperative
LEMAC	Leading Hedge Aerodynamic Chord
LFE	Landing Field Elevation
LG	Landing Gear
LGEU	Landing Gear Electronic Unit
LH	Left Hand
LICC	Left Integrated Control Circuit
LIM	Limited Thrust
LNAV	Lateral Navigation
LOC	Localizer
LOGO	Logotype
LP	Low Pressure
LPT	Low Pressure Turbine

ABBREVIATIONS OR ACRONYMS	MEANING
LPU	Low Pressure Unit
LRC	Long Range Cruise
LRM	Line Replaceable Module
LRN	Long Range
LRU	Line Replaceable Unit
LSA	Low Speed Awareness
LSB	Lower Sideband
LSK	Line Select Key
LSS	Lightning Sensor System
LT	Light
LVDT	Linear Variable Differential Transducer
LX	Lightning Detection
M	
M	Mach
MAC	Mean Aerodynamic Chord
MAN	Manual
MAU	Modular Avionics Unit
MAX	Maximum
MB	Marker Beacon
MCDU	Multifunction Control Display Unit
MDA	Minimum Decision Altitude
MEA	Minimum Enroute Altitude
MFD	Multifunction Display
MFDU	Magnetic Flux Detector Unit
MFP	Multifunction Probe
MFS	Multifunction Spoiler
MGT	Management
Mhz	Megahertz

ABBREVIATIONS OR ACRONYMS	MEANING
MIN	Minimum
MinAT	Minimum Assumed Temperature
MKR	Marker
MLG	Main Landing Gear
MLS	Microwave Landing System
MLW	Maximum Design Landing Weight
MMEL	Master Minimum Equipment List
M _{MO}	Maximum Operating Mach
MOW	Maximum Design Operating Weight
MP	Motive Pump
MPP	Maintenance Practices and Procedures
MRC	Modular Radio Cabinet
MRW	Maximum Design Ramp Weight
MSA	Minimum Safety Altitude
MSU	Mode Select Unit
MTOW	Maximum Design Takeoff Weight
MWF	Master Warning Function
MZFW	Maximum Design Zero Fuel Weight
N	
N1	Fan Speed
N2	High-Pressure-Rotor Shaft Speed
NAPRSOV	Nacelle Pressure Regulating and Shut-Off Valve
NAV	Navigation
NB	Narrow Bandwidth
NLOW	Nose Lowering
NM	Nautical Miles
NOTAM	Notice to Airmen
NPRM	Notice of Proposed Rule Making

ABBREVIATIONS OR ACRONYMS	MEANING
NRV	Negative Relief Valve
NWSCM	Nose Wheel Steering Module
O	
OAT	Outside Air Temperature
OBV	Operating Bleed Valve
ODS	Overheat Detection System
OEI	Operating Empty Index
OEW	Operating Empty Weight
OFV	Outflow Valve
OM	Operations Manual
OUTBD	Outboard
OVHT	Overheating
OVLD	Overload
OVPRESS	Overpressure
OVRD	Override
OVSP	Overspeed
OXY	Oxygen
P	
PA	Passenger Address
P-ACE	Primary Actuator Controls Electronics
PAS	Passenger Address System
PAST	Pilot Activated Self Test
PAX	Passenger
PBE	Protective Breathing Equipment
PCU	Power Control Unit
PDSV	Pressure Drop Spill Valve
PDU	Power Drive Unit
PERF	Performance

ABBREVIATIONS OR ACRONYMS	MEANING
PF	Pilot Flying
PFD	Primary Flight Display
PLI	Pitch Limit Indicator
PMA	Permanent Magnet Alternator
POST	Power On Self Test
PPH	Pounds per Hour
PRCS	Process
PRESN	Pressurization
PRESS	Pressure
PROX	Proximity
PRSOV	Pressure Regulating Shut-Off Valve
PRV	Pressurizing Valve
PSEM	Proximity Sensor Evaluation Module
PSI	Pressure per Square Inches
PSU	Passenger Service Unit
PTT	Press To Transmit
PTU	Powe Transfer Unit
PUV	Pump Unloader Valve
PV	Priority Valve
PWR	Power
Q	
QFE	Question Field Elevation
QNE	Question Normal Elevation
QNH	Question Normal Height
QRH	Quick Referance Handbook
QTY	Quantity
R	
RA	Radio Altimeter

ABBREVIATIONS OR ACRONYMS	MEANING
RAIM	GPS Receiver Integrity Monitoring
RAR	Radio Altimeter Receiver
RAT	Radio Altimeter Transmitter, Ram Air Turbine
R/D	Rate of Descent
RTA	Receiver/Transmitter/Antenna
REACT	Rain Echo Attenuation Compensation Technique
RECIRC	Recirculation
REF	Reference
REI	Remote Engine Inoperative
REV	Reverse
RH	Right Hand
RICC	Right Integrated Control Center
RLY	Relay
RMI	Radio Magnetic Indicator
RMS	Radio Management System
RMU	Radio Management Unit
RNAV	Area Navigation System
RNG	Range
ROL	Roll Mode
RWY	Runway
RPM	Revolution Per Minute
RSB	Radio System Bus
RSV	Reserve
RTA	Receiver/Transmitter/Antenna
RVDT	Rotary Variable Differential Transducer
S	
SAD	Still Air Distance

ABBREVIATIONS OR ACRONYMS	MEANING
SAT	Static Air Temperature
SAV	Starter Air Valve
SBC	Shed Bus Contactor
SCV	Startier Control Valve
SDF	Simplifield Directional Monitoring
SEC	Seconds
SELCAL	Selective Call
SERV	Service
SF-ACE	Slat/Flap Actuator Controls Electronics
SFCL	Slat Flap Control Lever
SL	Sea Level
SLD	Supercooled Large Droplets
SLV	Slave
SLVD	Slaved
SMK/SMKG	Smoke, Smoling
SMPL	Sample
SOV	Shutoff Valve
SPC	Stall Protection Computer
SPDA	Secondary Power Distribution Assembly
SPD-E	Speed on Elevator
SPD-T	Speed on Thrust
SPKR	Speaker
SPLT	Split
SPM	Stabilizer Position Module
SPS	Stall Protection System
SRC	Source
SQ	Squelch
SSPC	Solid State Power Controller

ABBREVIATIONS OR ACRONYMS	MEANING
STAB	Stabilizer
STBY	Stand By
SRN	Short Range
SSB	Single Sideband
SV	Safety Valve
SVC	Service
SW	Switch
T	
TA	Traffic Advisory
TAC	Thrust Asymmetry Compensation
TA/RA	Traffic Advisory / Resolution Advisory
TAS	True Airspeed
TAT	Total Air Temperature
TC	Turn Coordination
TCAS	Traffic and Collision Avoidance System
TCF	Terrain Clearance Floor
TCS	Touch Control Steering
TDR	Transponder
TDS	Takeoff Data Set
TACAN	Tactical Air Navigation Aid
TEMP	Temperature
TERR	Terrain
TGT	Target
THR	Thrust
TKNB	Turn Knob
TK SEL	Tank Selector
TLA	Thrust Lever Angle
TMS	Thrust Management System

ABBREVIATIONS OR ACRONYMS	MEANING
TO	Takeoff
TOGA	Takeoff/Go-Around
TORA	Takeoff Runway Available
TR	Thrust Reverser
TRB	Turbulence
TRK	Track
TRS	Thrust Rating Selection
TST	Test
TRU	Transformer Rectifier Unit
TWIP	Terminal Weather Information for Pilots
U	
UNLK	Unlock
UTC	Universal Time Coordinated
V	
V	Volt
V ₁	Decision Speed
V ₂	Takeoff Safety Speed
VA	Volt-Ampere
VAPP	VOR Approach Mode
V _A	Design Maneuvering Speed
VDR	VHF Digital Radio
V _{EF}	Critical Engine Failure Speed
V _{FE}	Maximum Flaps Extended Speed
V _{FS}	Final Segment Speed
VFR	Visual Flight Rules
VHF	Very High Frequency
V _{LE}	Maximum Landing Gear Extended Speed
VLF	Very Low Frequency

ABBREVIATIONS OR ACRONYMS	MEANING
V _{LO}	Maximum Landing Gear Operating Speed
V _{LOF}	Lift Off Speed
VLV	Valve
V _{MCA}	Air Minimum Control Speed
V _{MCG}	Ground Minimum Control Speed
V _{MO}	Maximum Operating Speed
VNAV	Vertical Navigation
VOR	VHF Omnidirectional Range
V _R	Rotation Speed
V _{REF}	Landing Reference Speed
V _{REFXX}	Landing Reference Speed associated to the flap setting XX
V _S	Stall Speed
V _{SR}	Reference Stall Speed
VS	Vertical Speed
W	
W/S	Windshield
WB	Weight and Balance
WG	Wing
WHCU	Windshield Heating Control Unit
WML	Windmilling
WOW	Weight on Wheels
WRN	Warning
WSHR	Windshear
WX	Weather Detection
X	
X	Cross
XBLEED	Cross Bleed



ABBREVIATIONS OR ACRONYMS	MEANING
XCHECK	Cross Check
XFEED	Cross Feed
XFR	Transfer
XPDR	Transponder
Y	
YD	Yaw Damper

SYMBOLS AND NOTATIONS

SYMBOL	MEANING
 OR 	SHUTOFF VALVE, PRIORITY VALVE
	CHECK VALVE
	RESTRICTOR
	RELIEF VALVE
	OPTIONAL EQUIPMENT
	SYSTEM MODULE
	COMMUNICATION LINE
	ELECTRIC PUMP
	MECHANIC PUMP
	ACCUMULATOR

SYMBOL	MEANING
	ELECTRIC CONTACTOR (OPEN POSITION)
	SWITCH
	NACA AIR INLET

UNITS CONVERSION

TO CONVERT	INTO	MULTIPLY BY	AND ADD
Degree Celsius (°C)	Degree Fahrenheit (°F)	1.8000	+32
Degree Fahrenheit (°F)	Degree Celsius (°C)	0.5556	-17.7778
Feet (ft)	Meter (m)	0.3048	-
Inches (In)	Millimeter (mm)	25.4000	-
Inches of Mercury (in.Hg)	Millibar (mb)	33.8636	-
Kilogram (kg)	Pounds (lb)	2.2046	-
Kilogram force per Square meter (kgf/cm ²)	Pound per Square Inch (psi)	14.2247	-
Kilometer (km)	Nautical Mile (nm)	0.5396	-
Kilometer per hour (km/h)	Knot (kt)	0.5396	-
Knot (kt)	Kilometer per hour (km/h)	1.8532	-
Pounds (lb)	Kilogram (kg)	0.4536	-
Meter (m)	Feet (ft)	3.2808	-
Millibar (mb)	Inches of Mercury (in.Hg)	0.0295	-
Millimeter (mm)	Inches (In)	0.0394	-
Nautical Mile (nm)	Kilometer (km)	1.8532	-
Pound per Square Inch (psi)	Kilogram force per Square meter (kgf/cm ²)	0.0703	-

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FMS HONEYWELL PRIMUS EPIC FLIGHT MANAGEMENT SYSTEM

NAVIGATION OPERATIONAL APPROVALS

The dual Honeywell PRIMUS EPIC Flight Management System, with the software version NZ.7.0 has been demonstrated to be capable of and has been shown to meet the requirements for the following operations:

- **Required Navigation Performance (RNP) Operations** – The FMS has been demonstrated compliant with the requirements of RTCA DO-283, Minimum Operational Performance Specification for Required Navigation Performance. The FMS has been demonstrated to provide a minimum RNP level of RNP 0.3, when operated according to the limitations and procedures described in this OM. Refer to the PERFORMANCE section for more details regarding RNP operation.
- **Navigation using GPS** – The FMS has been demonstrated compliant with the requirements of FAA AC90-94, regarding the use of GPS for IFR navigation in en-route, terminal and non-precision approach operations.
- **Navigation using IRS** – The FMS has been demonstrated compliant with the requirements of AC25-4, AC121-13 and FAR121, Appendix G, regarding the use of IRS as a long range navigation system. Pilot qualification is required to comply with operation under AC121-13.
- **Remote/Oceanic Operation** - The FMS has been demonstrated compliant with the requirements of AC120-130A, regarding multi-sensor system operation in remote/oceanic flight, when operated as a dual system, with dual installed FMS, GPS, and IRS operational prior to the start of flight.

The FMS has been demonstrated compliant with the requirements of AC121-13, and FAR121, Appendix G, regarding use of IRS as a primary means of navigation in remote/oceanic flight, with dual installed FMS and IRS operational prior to the start of flight.

The FMS has been demonstrated compliant with the requirements of FAA Notice 8110.60 regarding use of GPS as a primary means of navigation in remote/oceanic flight, with dual installed FMS and GPS operational prior to the start of flight. Compliance with Notice 8110.60 also requires the operator to use the Honeywell Sure Flight Off Line RAIM and FDE prediction program prior to flight.

- **North Atlantic (NAT) Minimum Navigational Performance Specification (NAT-MNPS) Airspace** – The FMS has been demonstrated compliant with the requirements of AC120-33 when operated as a dual system, with dual installed FMS, GPS, and IRS operational prior to the start of flight.

- **The RNP 10 Airspace** - The FMS has been demonstrated compliant with the requirements of FAA Order 8400.12A when operated as a dual system, with dual installed FMS, GPS, and IRS operational prior to the start of flight.
- **Enroute and Terminal Operation** - The FMS has been demonstrated compliant with the requirements of AC 20-130A and AC 25-15, regarding multi-sensor system IFR operation in enroute/terminal flight, with at least a single PFD, MFD, FMS, VOR, DME, and IRS in NAV mode operational prior to the start of flight.
- **Barometric Vertical Navigation** - FMS has been demonstrated compliant with the requirements of AC20-129, regarding the barometric vertical navigation in en-route, terminal, and non-precision approach operations, when used in accordance with the limitations and operational procedures contained in this Operational Manual part B.
- **European Basic RNAV (B-RNAV) Airspace**- The FMS has been demonstrated compliant with the requirements of TGL-2, regarding operations in B-RNAV airspace, with at least a single FMS.
- **European Precision RNAV (P-RNAV) Airspace**- The FMS has been demonstrated compliant with the requirements of TGL-10, regarding operations in P-RNAV airspace, with at least a single FMS and Flight Director.
- **Approach Operation** – The FMS has been demonstrated compliant with the requirements of AC 20-130A and AC 25-15, regarding multi-sensor system instrument non-precision approach operation. The FMS has been demonstrated compliant with AC 90-94, regarding the use of GPS for non-precision approaches. The FMS must be operated as at least a single system with a minimum of one PFD, MFD and FMS operational prior to commencing the approach. The signal source(s) used to define the approach and on-board equipment must be verified operational prior to commencing the approach, as explained in the LIMITATION section of this manual.

The FMS supports the following non-precision approach types:

- GPS only (type III FAA vverlay definition)
- RNAV (including type II or type III FAA overlay definition)
- VOR
- VOR/DME
- NDB
- NDB-DME

NOTE: VOR and NDB based approaches include FAA type II GPS overlays. AC 90-94 deals with the use of GPS in the US National Airspace System (NAS) and in oceanic areas. The general approval to use GPS to fly overlay instrument approaches as described in the AC, is initially limited to the NAS. Refer to Chapter I - LIMITATIONS, for use of GPS for non-precision approaches outside the NAS.

COMPUTERIZED AIRPLANE FLIGHT MANUAL

SOFTWARE PRESENTATION

The Computerized Airplane Flight Manual - CAFM performance calculation software has been developed employing a modular concept and in a manner that allows the user to run only the specific configuration applicable to his/her airplane.

Among the many modules that compose the software three kinds are worth emphasizing:

- The Main Computer Interface - it is a user friendly calling program that makes it possible to input data and to obtain outputs from the calculation
- The Calculation Module - the core of the software, which obtains the inputs from the Calling Program and performs the required calculations.
- The Database - a set of files read by the Calculation Module, to obtain engine and airplane data. The Database files are presented in the specific engine Supplements.

Each one of the modules above is approved by the Certification Authority and bears a dedicated part number. When using the software, a cross-reference to configuration table in the limitations Section must be made.

Although the user interface is very friendly, a dedicated User's Guide is also issued, as a separate document, providing detailed information on software usage. In addition, the Man Computer Interface provides a Help feature with useful on line information.

The latest Software Configuration Media incorporates all capabilities of the previous media.

STATUS DEFINITIONS:

Valid: Means a current Software or Database part number version.

Superseded: Means a Software or Database part number version still valid but improved by another current version.

Cancelled: Means a Software or Database part number version no longer valid and must not be used.

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SECTION 1

LIMITATIONS

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INTRODUCTION

The airplane must be operated in accordance with the limitations presented in this Section. These limitations also apply to operations in accordance with an approved Supplement or Appendix to the AFM, except as modified by such Supplement or Appendix.

The information contained in this section is derived from the Approved Airplane Flight Manual.

Flight crewmembers should have all limitations committed to memory (except tables and charts). Some items may not be included herein, as they may be identified in a panel/placard or annunciated by some kind of alarm/warning. Compliance to the Emergency and Abnormal Procedures will also assure that certain limitations are complied with.

In the event that a placard or instrument marking disagrees with the limitations shown in this manual, the more restrictive limitation must prevail

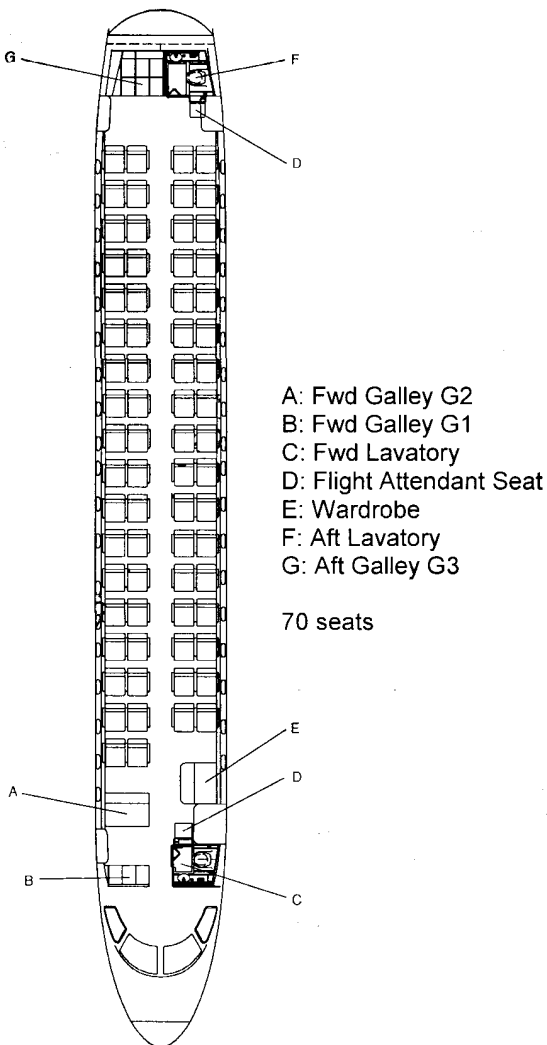
CERTIFICATION STATUS

This airplane is certificated in the Transport Category, JAR Part 25.

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PASSENGER SEATING CONFIGURATION

The number of available seats is 75 on the EMB-170. It includes 2 seats for pilots, 2 for attendants, 1 for cockpit observer and 70 passenger seats.



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TYPES OF OPERATION

This airplane may be flown day and night in the following conditions, when the appropriate equipment and instruments required by airworthiness and operating regulations are approved, installed and in operable condition:

- Visual (VFR);
- Instrument (IFR);
- Icing conditions.
- Category I and II
- RVSM

CAT II OPERATION

MINIMUM EQUIPMENT REQUIRED

The performance of Category II approaches requires that the following equipment and instruments be in proper operating condition:

- 2 Inertial Reference Systems.
- 2 Flight Director Systems.
- 2 Primary Flight Displays (PFD).
- Windshield Wipers.
- 2 VOR/ILS NAV Systems.
- 1 VHF/COMM System
- Cat II Engagement Logic.
- 1 Radio Altimeter.
- 1 Ground Proximity Warning System (EGPWS).
- 2 Air Data Systems (ADS).
- 1 Autopilot System Channel.
- Rudder in Normal Mode.
- SPOILER FAULT message not presented.

NOTE: Flight Director Manual Category II approaches are prohibited.



AUTOPILOT SYSTEM

Minimum Use Height (MUH).....	50 ft
Maximum Headwind	25 kt
Maximum Tailwind.....	15 kt
Maximum Crosswind	20 kt

NOTE: Coupled go-around height loss may be 50 ft.

APPROACH AND LANDING FLAPS

CAT II approach and landing must be performed with flaps 5°.

RVSM OPERATION

LIMITATIONS

MINIMUM EQUIPMENT REQUIRED

During RVSM operation it is necessary that the following equipment and instruments be in proper operating condition:

- 2 RVSM Compliant Air Data Systems;
- 1 Autopilot with Altitude Hold Mode operative;
- 1 Altitude Alerter;
- 1 Transponder.

- NOTE:**
- The ADS 1 and ADS 3 are compliant with RVSM operation.
 - The ADS 2 must not be used for RVSM operation.
 - The ADS 3 is not considered RVSM compliant in case of loss of sideslip compensation, EICAS message ADS 3 SLIPCOMP FAIL displayed.
 - Airspeed is limited to Mach 0.8.
 - The IESS must not be used for RVSM operation.
 - Should any of the required equipment fail prior to the aircraft entering RVSM airspace, the pilot must request a new clearance to avoid entering this airspace.

RVSM ALTIMETER CROSS CHECK LIMITS

The maximum allowable in-flight difference between Captain and First Officer altitude displays for RVSM operation is 200 feet.

The maximum allowable on-the-ground differences between Captain and First Officer altitude displays for RVSM operation are:

Field Elevation	Max Difference Between Captain & F/O	Max Difference Between Captain or F/O & Field Elevation
SEA LEVEL	40 feet	75 feet
5.000 feet	45 feet	75 feet
10.000 feet	50 feet	75 feet

OPERATION IN ICING CONDITIONS

There is no temperature limitation for anti-icing system automatic operation.

On ground:

- The TO DATASET MENU on the MCDU must be set to ENG when SAT is between +5°C and +10°C included, with visible moisture.
- The TO DATASET MENU on the MCDU must be set to ALL when SAT is +5°C or below with visible moisture.

In flight:

- The engine and wing anti-ice systems operate automatically, in case of ice encounter when the ice protection mode selector is in the AUTO position. If either one or both ice detectors are failed, the crew must set the mode selector to ON when icing conditions exist or are anticipated below +10°C or below TAT with visible moisture.

NOTE: Icing conditions may exist whenever the Static Air Temperature (SAT) on the ground or for takeoff, or Total Air Temperature (TAT) in-flight, is +10°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 may also exist when the SAT on the ground and for takeoff is +10°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.

CAUTION: ON GROUND, DO NOT RELY ON VISUAL ICING EVIDENCE OR ICE DETECTOR ACTUATION TO TURN ON THE ANTI-ICING SYSTEM. USE THE TEMPERATURE AND VISUAL MOISTURE CRITERIA AS SPECIFIED ABOVE. DELAYING THE USE OF THE ANTI-ICING SYSTEM UNTIL ICE BUILD-UP IS VISIBLE FROM THE COCKPIT MAY RESULT IN ICE INGESTION AND POSSIBLE ENGINE DAMAGE OR FLAME-OUT.

WINDSHIELD WIPER OPERATION

Maximum Airspeed for Windshield Wiper Operation 320 KIAS

CREW COMPOSITION

MINIMUM CREW

Minimum Flight Crew PILOT AND COPILOT

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WEIGHT AND CENTER OF GRAVITY

WEIGHT

AIRPLANE MODELS	MAXIMUM WEIGHT (kg)			
	Max. Ramp Weight (MRW)	Max. Takeoff Weight (MTOW)	Max. Landing Weight (MLW)	Max. Zero Fuel Weight (MZFW)
EMBRAER 170 STD	36150	35990	32800	29600 (up to -DD)
EMBRAER 170 LR	37360	37200	32800	29600 (-DE and -DF)
EMBRAER 170 LR	37360	37200	32800	30140 (-DG and on)

NOTE: In Polish Airlines LOT S.A. for airplanes **-DE** and on, MTOW=35990 kg is approved.

To comply with the performance and operating limitations of the regulations, the maximum allowable takeoff and landing operational weights may be equal to, but not greater than design limits.

The take off weight (weight at brake release or at a start of takeoff run) is the lowest between MTOW and the following weights:

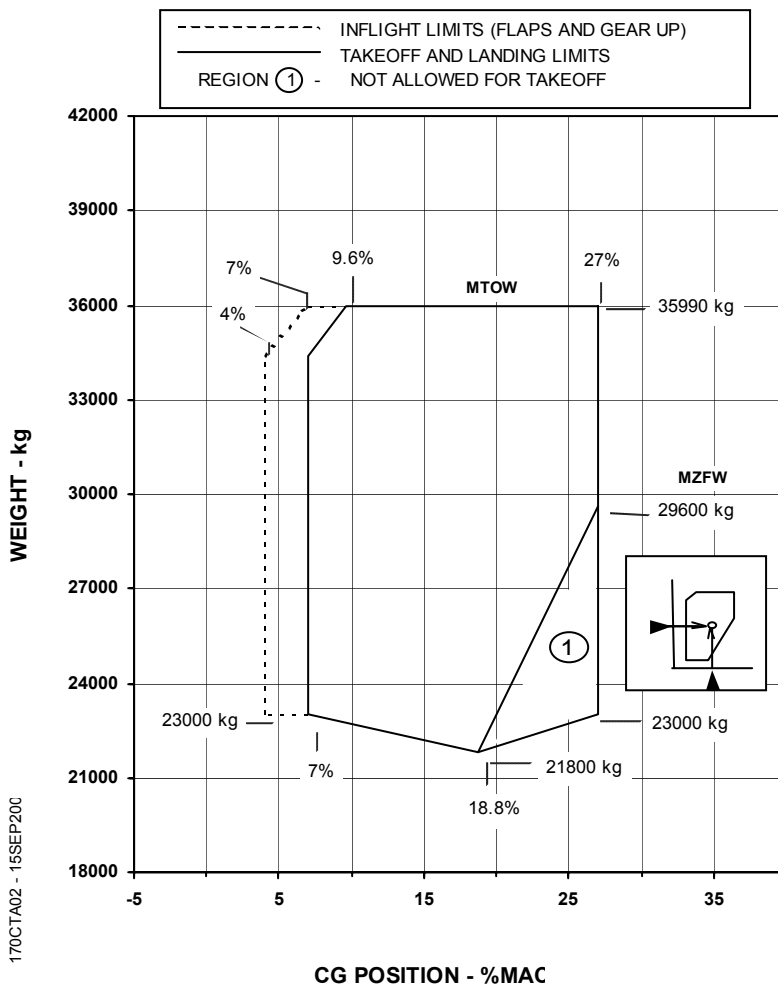
- Maximum takeoff weight as calculated using the approved software, and as limited by field length, climb and brake energy.
- Maximum takeoff weight, as limited by (enroute and landing operating requirements.

The landing weight is the lowest among MLW and the following weights:

- Maximum approach and landing weight as limited by runway length, altitude and temperature and calculated using the approved software.

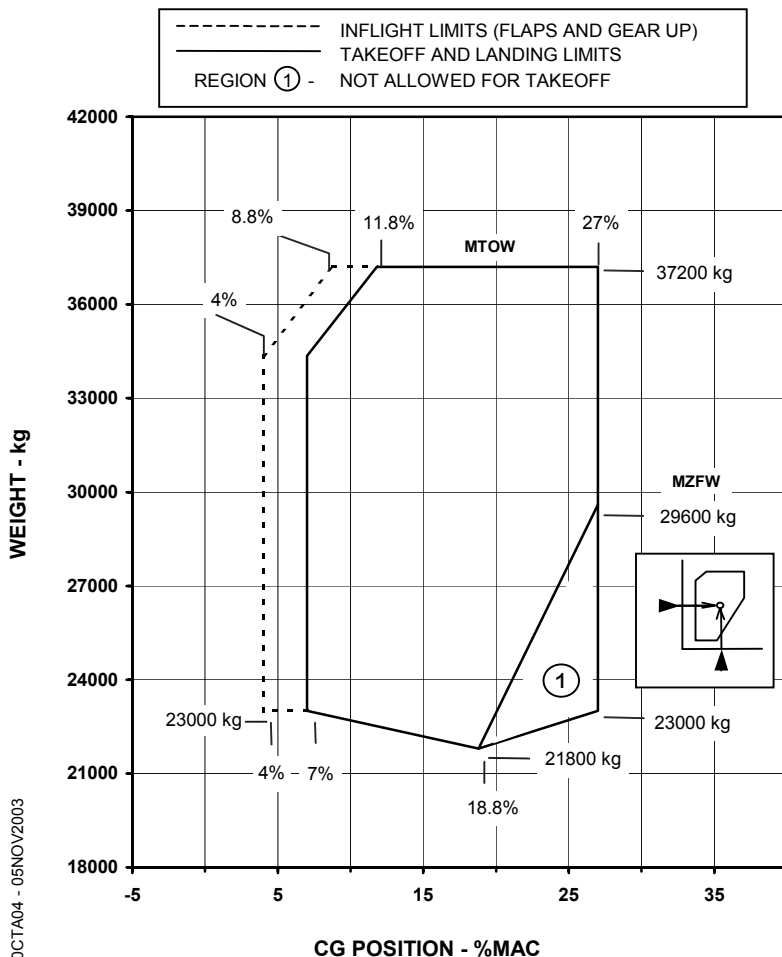
CENTER OF GRAVITY ENVELOPE

EMBRAER 170 STANDARD MODEL (up to -DD)



CENTER OF GRAVITY ENVELOPE

EMBRAER 170 LR MODEL(-DE and on)



LOADING

The airplane must be loaded in accordance with the information contained in the OM part B Chapter 6 – Mass And Balance.

SPEED LIMITATIONS

LANDING GEAR OPERATION/EXTENDED SPEED (V_{LO} AND V_{LE})

V_{LO} for retraction	250 KIAS
V_{LO} for extension	250 KIAS
V_{LE}	250 KIAS

- NOTE:** - V_{LO} is the maximum speed at which the landing gear can be safely retracted.
- V_{LE} is the maximum speed at which the airplane can be safely flown with the landing gear extended and locked.

CAUTION: IN STRUCTUAL FAILURES AT ANY SPEED, EVEN BELOW V_A .

MAXIMUM FLAP EXTENDED SPEED (V_{FE})

Flaps 1	230 KIAS
Flaps 2	215 KIAS
Flaps 3	200 KIAS
Flaps 4	180 KIAS
Flaps 5	180 KIAS
Flaps Full	165 KIAS

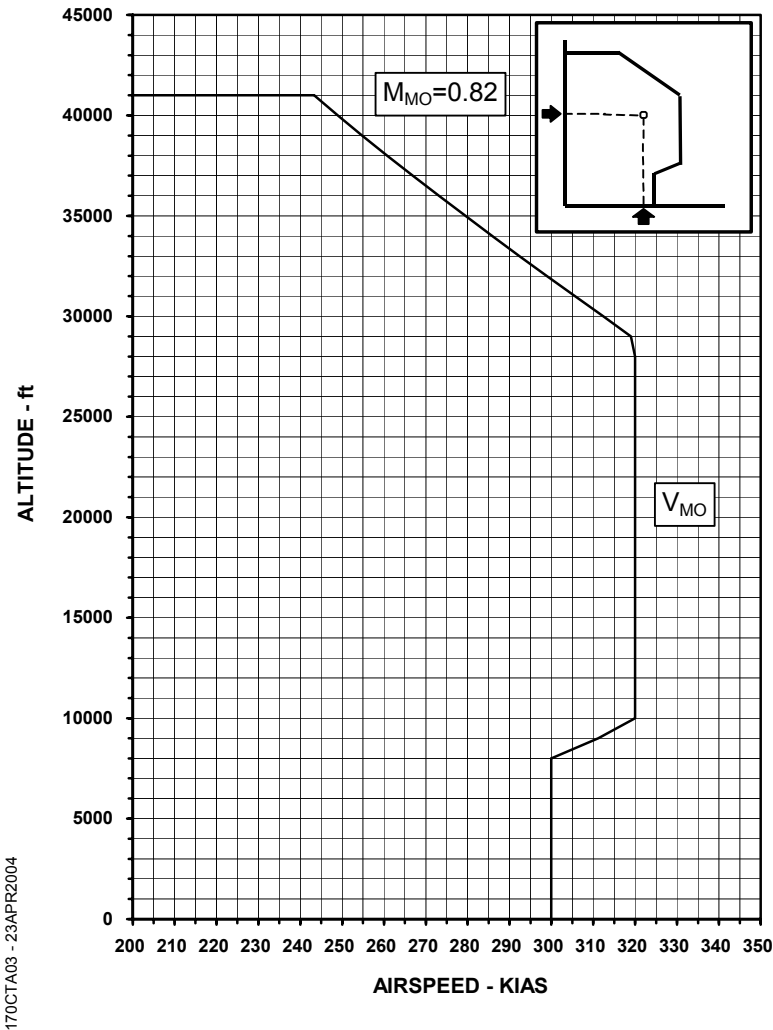
MINIMUM CONTROL SPEED

Refer to OM part B Chapter 4 – Performance.

MAXIMUM TIRE GROUND SPEED

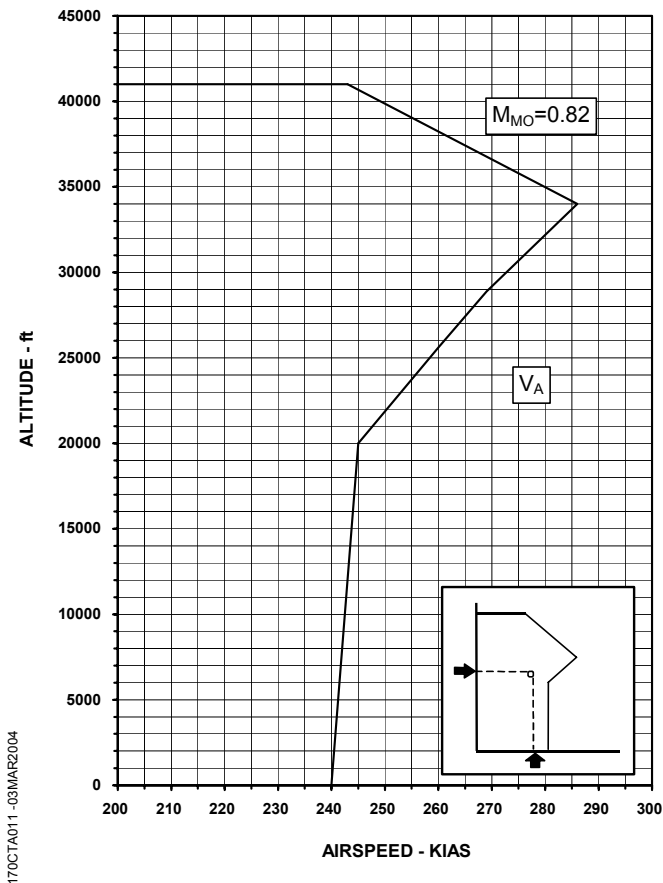
Maximum Tire Ground Speed	225 mph

MAXIMUM OPERATING SPEED



NOTE: The V_{MO}/M_{MO} may not be deliberately exceeded in any regime of flight (climb, cruise, or descent).

MANEUVERING SPEED (V_A)

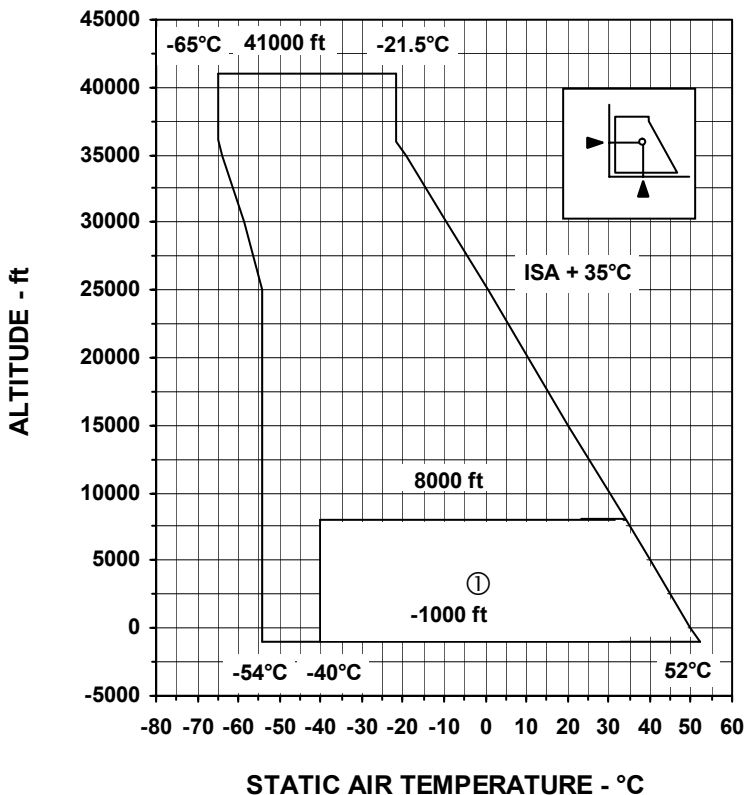


NOTE: Maneuvers that involve angle of attack near the stall or full application of rudder, elevator, and aileron controls should be confined to speeds below V_A . In addition, the maneuvering flight load factor limits, presented in this Section, should not be exceeded.

CAUTION: RAPID AND LARGE ALTERNATING CONTROL INPUTS, ESPECIALLY IN COMBINATION WITH LARGE CHANGES IN PITCH, ROLL, OR YAW (E.G. LARGE SIDE ANGLES) MAY RESULT IN STRUCTURAL FAILURES AT ANY SPEED, EVEN BELOW V_A .

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OPERATIONAL ENVELOPE



TAKEOFF, LANDING & GROUND START



①

NOTE: - In the event of a landing below -40°C, the airplane may not takeoff without further maintenance inspection.

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WIND LIMITATIONS

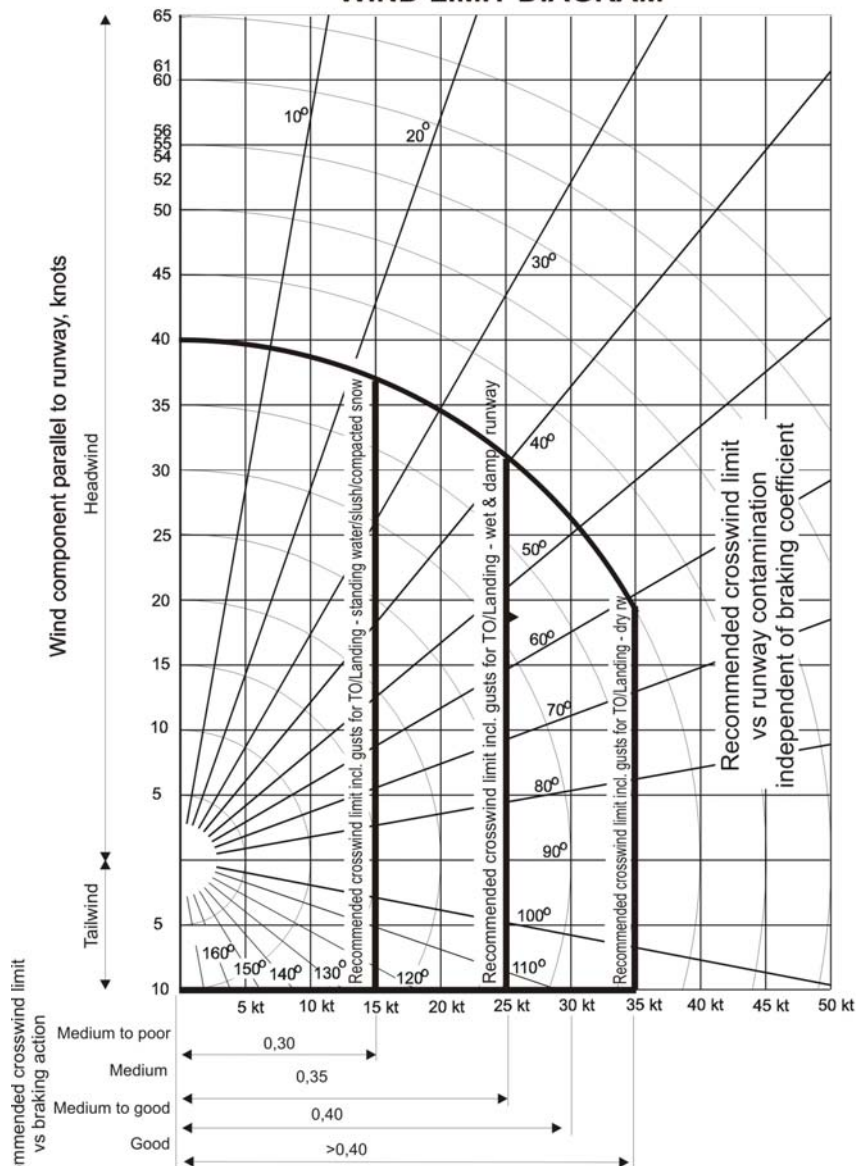
Maximum Takeoff and Landing Tailwind Component 10 kt

Maximum Static Takeoff Headwind Component 40 kt

DEMONSTRATED CROSSWIND

The maximum demonstrated crosswind component for landing is 28 kts. This maximum demonstrated value is not considered to be limiting.

EMBRAER 170 WIND LIMIT DIAGRAM



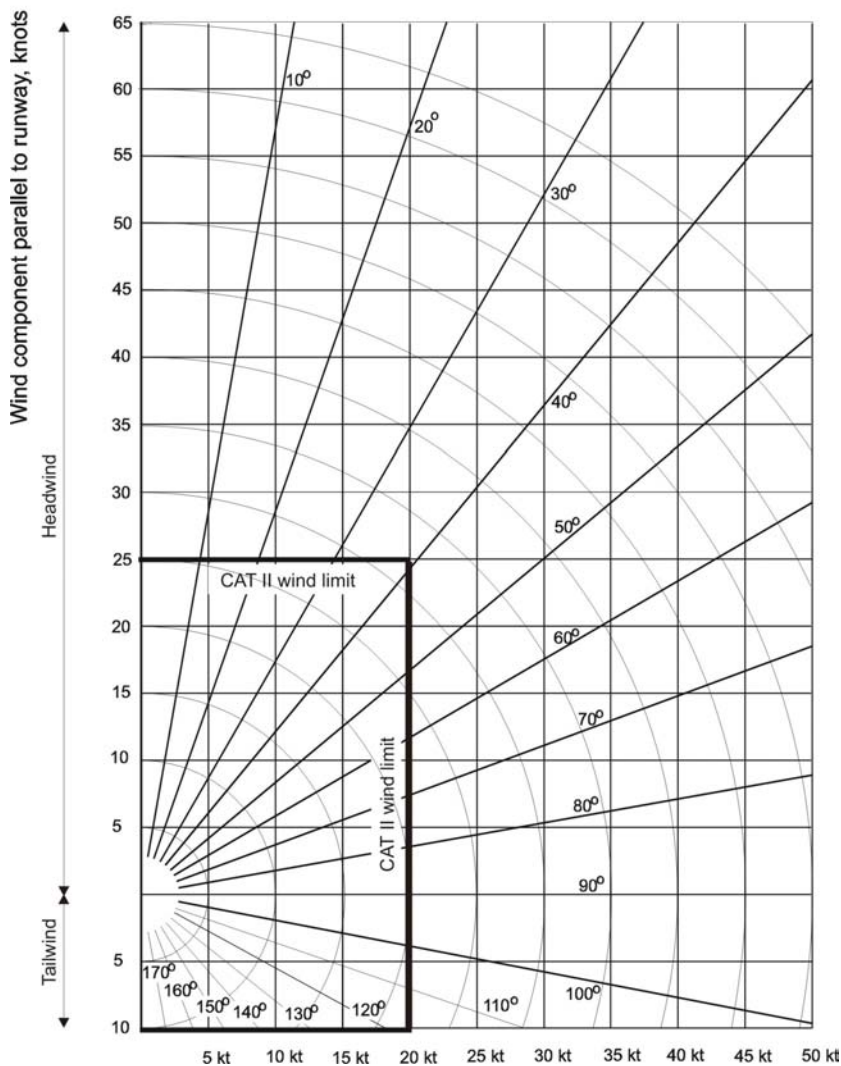
RECOMMENDED MINIMUM BRAKING COEFFICIENT

FOR TAKEOFF AND LANDING

0,3 (B/A: MEDIUM)

CAT II WIND LIMIT FOR ERJ170

ERJ170 WIND LIMIT DIAGRAM



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PERFORMANCE LIMITATIONS

MANEUVERING FLIGHT LOAD FACTORS

These corresponding accelerations limit the bank angle during turns and limit the pull-up maneuvers.

LOAD FACTOR LIMIT	FLAPS UP	FLAPS DOWN (1, 2, 3, 4, 5 and FULL)
Positive	2.50 g	2.00 g
Negative	- 1.00 g	0 g

TOWING

Towbarless towing is prohibited, unless the towbarless towing operations are performed in compliance with the appropriate operational requirements using towbarless towing vehicles that are designed and operated to preclude damage to the airplane nose wheel steering system, or which provide a reliable and unmistakable warning when damage to the steering system may have occurred.

Towbarless towing vehicles that are specifically accepted for this type of airplane are listed in the documentation provided by the airplane manufacturer.

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RUNWAY

Runway Slope-2% TO +2%
Runway Surface Type PAVED

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LIMITATIONS ON WET OR CONTAMINATED RUNWAYS

LIMITATIONS

A runway is considered to be contaminated when it is covered with:

- Standing water to a depth exceeding 3 mm.
- Slush or loose snow to a depth equivalent to more than 3 mm of water.
- Compact snow or ice (including wet ice).

MAXIMUM CONTAMINANT DEPTH

The maximum allowable water equivalent depth of contaminant for takeoff operation is 19 mm.

When using the CAFM to calculate performance in contaminated runways and the contaminant depth option is WED (Water Equivalent Depth), the Precipitation Specific Gravity window must be set at 1.0.

When using the precipitation depth feature with surface contaminants, the following Precipitation Specific Gravities should be used:

Standing Water	1.00
Slush	0.85
Wet Snow	0.50
Dry Snow	0.20

WEIGHT

The takeoff weight (weight at brake release or at beginning of takeoff run) on contaminated runways is the lowest among MTOW and the following weights:

- Maximum takeoff weight, as limited by runway length and determined from Takeoff Distance on Contaminated Runway and Accelerated Stop Distance on Contaminated Runway charts.
- Structural limit of the associated model.
- Maximum takeoff weight for altitude and temperature determined from Maximum Takeoff Weight – Climb Limited chart.
- Maximum takeoff weight, as limited by obstacle clearance, enroute, and landing operating requirements.

The landing weight is the lowest among MLW and the following weights:

- Maximum landing weight as limited by runway length and determined from Landing Distance on Contaminated Runway charts.
- Maximum approach and landing weight for altitude and temperature determined from Maximum Landing Weight – Climb Limited charts.
- Maximum landing weight, as limited by runway length and determined from Maximum Landing Weight – Field Length Limited chart for wet conditions.

AIRFRAME CONTAMINATION

JAR-OPS 1.345 ICE AND OTHER CONTAMINANTS

- NOTE: -** An operator shall establish procedures to be followed when ground de-icing and related inspections of the airplanes are necessary.
- A commander shall not commence take-off unless the external surfaces are clear of any deposit which might adversely affect the performance and/or controllability of the airplane except as permitted in the Airplane Flight Manual.
 - A commander shall not commence a flight under known or expected icing conditions unless the airplane is certificated and equipped to cope with such conditions.

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SYSTEM LIMITATIONS

FUEL

AIRPLANE MODEL	ALL
Maximum usable quantity per tank	5812 ℓ (4714 kg)
Unusable quantity per tank	42 ℓ (34 kg)

NOTE: Maximum fuel capacity is 11709 ℓ (9496 kg).

Maximum Permitted Imbalance Between Tanks 360 kg

NOTE: The weights above have been determined for an adopted fuel density of 0.811 kg/ℓ. Different fuel densities may be used provided the volumetric limits are not exceeded.

FUEL SPECIFICATION AND TEMPERATURE

STANDARD	FUEL TYPE	LOW TEMP. LIMIT
ANP 1/2003	QAV-1	-44 °C
ASTM D1655	JET A	-37 °C
ASTM D1655	JET A1	-44 °C
MIL-T-83133A	JP-8	-44 °C
STAGNAG 3747 ED5	F-34	-44 °C
STAGNAG 3747 ED5	F-35	-37 °C

CROSSFEED OPERATION

Crossfeed Selector Knob must be set OFF during takeoff and landing.



AUXILIARY POWER UNIT

SUNDSTRAND APS 2300

OPERATIONAL LIMITS

PARAMETER	MIN	MAX
Start:	-	-
TEMPERATURE	-54°C	ISA +35°C
ALTITUDE	-	30.000 ft
OPERATION:	-	-
TEMPERATURE	-62°C	ISA +35°C
ALTITUDE	-	-
ELECTRICAL GEN	-	33.000 ft
BLEED	-	15.000 ft
TO ASSIST ENGINE START:	-	21.000 ft
ROTOR SPEED	-	108 %
EGT	-	-
START	-	1.032°C
CONTINUOUS	-	717°C

APU STARTER LIMITS

Starting Cycle:

First and Second Cycles 60 SECONDS ON,
60 SECONDS OFF

Third Cycle..... 60 SECONDS ON,
5 MINUTES OFF

POWER PLANT

ENGINES

Two General Electric CF34-8E.

OPERATIONAL LIMITS

PARAMETER	MIN	MAX
N1	-	99.5%
N2	58.5	99.4%
ITT:	-	-
START	-	815°C
NORMAL TAKEOFF and GO AROUND	-	965°C (1) 949°C (2)
MAXIMUM TAKEOFF and GO AROUND	-	1006°C (1) 990°C (2)
MAXIMUM CONTINUOUS	-	960°C
OIL PRESSURE:	25 psi	95 psi
OIL TEMPERATURE	-	-
CONTINUOUS	-	155°C
TRANSIENT:	-	163°C (3)

- NOTE:**
- 1) Time limited to the first 2 minutes of the total 5 minutes limit.
 - 2) Time limited to the remaining 3 minutes of the total 5 minutes limit.
 - 3) Transient operation above 155°C limited to 15 minutes.



STARTER LIMITS

DRY MOTORING DUTY CYCLE LIMITS:

Motoring Number	Maximum Time	Cool-Down Time
1	90 Seconds	5 Minutes
2 through 5 (1)	30 Seconds	5 Minutes

NOTE: (1) After five sequential motorings, the cycle may be repeated following a 15-minute cool-down period.

STARTING DUTY CYCLE LIMITS:

Motoring Number	Maximum Time	Cool-Down Time
1 and 2	90 Seconds (On ground) 120 Seconds (In-flight)	10 Seconds
3 through 5	90 Seconds (On ground) 120 Seconds (In-flight)	5 Minutes

NOTE: - For ground starts, the maximum cumulative starter run time per start attempt is 90 seconds (monitoring plus start time)
- For in-flight starts, the maximum cumulative starter run time per start attempt is 120 seconds (monitoring plus start time).

ENGINE THRUST

Operation at reduced takeoff thrust based on the assumed temperature higher than the actual ambient temperature is permissible if the airplane meets all applicable performance requirements at the planned takeoff weight and reduced thrust setting. The total thrust reduction must not exceed 25 % of the full takeoff thrust. As a condition to the continuous use of the reduced thrust procedures, operators must periodically check system to ensure that engines are capable of producing full takeoff thrust by performing a not reduced thrust takeoff, in regular intervals. Use of reduced takeoff thrust procedures is not allowed on runways contaminated with standing water, slush, snow, or ice, and are not allowed on wet runways unless suitable performance accountability is made for the increased stopping distance on the wet surface.

NAVIGATION/COMMUNICATION EQUIPMENT

- TAS, TAT and SAT information are only valid above 60 KIAS.
- While transmitting in VHF1 the standby magnetic compass indication is not valid.
- Baro altimeter minimums must be used for all Cat I approaches.
- Back course approaches using IESS is prohibited.
- Weather radar auto tilt (ACT) fine adjustment is inoperative.

INERTIAL REFERENCE SYSTEM

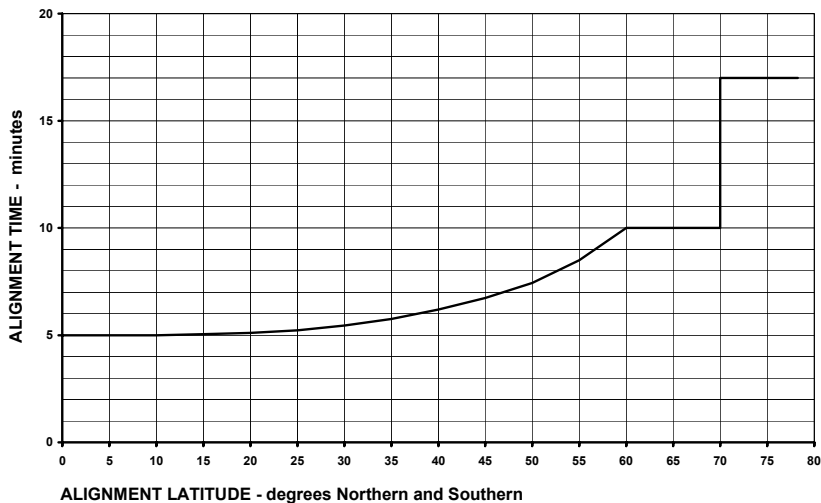
- The airplanes may be operated within the North and South magnetic polar cut-out regions specified in the table below, but IRS magnetic heading and track angle magnetic data will not be available.

MAGNETIC CUT-OUT REGIONS	LATITUDE	LONGITUDE
North	Between 73.125°N and 82°N	Between 80°W and 130°W
	North of 82°N	Between 0° and 180°W/E
South	Between 60°S and 82°S	Between 120°E and 160°E
	South of 82°S	Between 0° and 180°W/E

NOTE: Whenever operating within North or South magnetic polar cut-out regions, current airplane heading must be referenced to true heading, if not already selected. Otherwise, the Heading Failure Indication flag will be displayed.

Maximum latitude for stationary alignment:..... 78.25° Northern and Southern

- IRS stationary alignment will complete only after a valid aircraft present position (latitude and longitude) is received from the FMS.
- Time to stationary alignment completion:



ENHANCED GROUND PROXIMITY WARNING SYSTEM (EGPWS)

The following limitations are applicable to the Enhanced Ground Proximity Warning System (EGPWS):

- The Terrain Awareness Display is not designed to be used as an independent navigation aid.
- The use of predictive EGPWS functions should be manually inhibited when landing at an airport that is not in the airport database to avoid unwanted alerts.
- Pilots are authorized to deviate from their current Air Traffic Control (ATC) clearance to the extent necessary to comply with an EGPWS warning.
- The Terrain Display is intended to be used as a situational tool only and may not provide the accuracy and/or fidelity on which to solely base terrain avoidance maneuvering.
- The use of predictive EGPWS functions should be manually inhibited during QFE operations if GPS data is unavailable or inoperative.

TRAFFIC ALERT AND COLLISION AVOIDANCE

The following limitations are applicable to the Traffic Alert and Collision Avoidance System (TCAS):

- Deviation from the ATC assigned altitude is authorized only to the extent necessary to comply with a TCAS Resolution Advisory (RA).
- Maneuvers must not be based solely on information presented in the traffic display.



PNEUMATIC, AIR CONDITIONING AND PRESSURIZATION

PRESSURIZATION

Maximum differential pressure

Up to 37000 ft	7.8 psi
Above 37000 ft	8.3 psi
Maximum differential overpressure	8.6 psi
Maximum differential negative pressure	-0.5 psi
Maximum differential pressure for Takeoff and Landing	0.20 psi

FLIGHT CONTROLS

FLAPS

Maximum Altitude for Flaps Extension 20.000 ft

AUTOPILOT

The following limitations are applicable to the Autopilot:

Minimum Engagement Height 400 ft

Minimum Use Height (MUH):

Cruise and Descent 1000 ft

Approach 50 ft

The VOR Flight Director is prohibited.

CAUTION:

BEFORE INITIATING AN APPROACH TO LANDING WITH AUTOPILOT ENGAGED MAKE SURE THE CORRECT ILS IDENTIFIER HAS BEEN INSERTED ON THE FMS PROGRESS PAGE 1/3, LINES 5L AND 5R.



COMPUTERIZED AIRPLANE FLIGHT MANUAL

CONFIGURATION

Each Software Configuration constitutes a specific Software Module P/N's collection and must be used in conjunction with the Configuration Database table presented in each specific engine Supplement:

WARNING: **SOFTWARE PART NUMBER AND DATABASE PART NUMBER MUST MATCH THE AIRPLANE'S CONFIGURATION.**

SOFTWARE CONFIGURATION TABLE

The valid or supersedes Software Module P/N's presented following must be use in conjunction with the Database P/N's presented in the applicable Supplement.

MEDIA P/N's	CAFM-JAA-001 Version 3.0 CAFM-JAA-002 Version 3.0 CAFM-JAA-003 Version 3.0	
ASSOCIATED CONDITIONS	Airplane models: EMBRAER 170 STD and LR	
SOFTWARE MODULE	PART NUMBER	STATUS
Main Computer Interface	170-29720-254	Valid
Takeoff Calculation Module	170-29723-254	Valid
Enroute Calculation Module	170-29721-253	Valid
Landing Calculation Module	170-29722-254	Valid

WARNING: **FOR AIRPLANES WITH PRIMUS EPIC SYSTEM SOFTWARE LOAD 17 THE USE OF PERFORMANCE CALCULATION WITH CAFM VERSIONS PRIOR TO VERSION 4.0 IS PROHIBITED.**

FOR AIRPLANES WITH PRIMUS EPIC SYSTEM SOFTWARE LOAD 15 THE USE OF PERFORMANCE CALCULATION WITH CAFM VERSIONS 4.0 IS PROHIBITED.

MEDIA P/N's	CAFM-JAA-001 Version 4.0 CAFM-JAA-002 Version 4.0 CAFM-JAA-003 Version 4.0	
ASSOCIATED CONDITIONS	Airplane models: EMBRAER 170 STD and LR	
SOFTWARE MODULE	PART NUMBER	STATUS
Main Computer Interface	170-29720-257	Valid
Takeoff Calculation Module	170-29723-257	Valid
Enroute Calculation Module	170-29721-255	Valid
Landing Calculation Module	170-29722-256	Valid

WARNING: FOR AIRPLANES WITH PRIMUS EPIC SYSTEM SOFTWARE LOAD 17 THE USE OF PERFORMANCE CALCULATION WITH CAFM VERSIONS PRIOR TO VERSION 4.0 IS PROHIBITED.

FOR AIRPLANES WITH PRIMUS EPIC SYSTEM SOFTWARE LOAD 15 THE USE OF PERFORMANCE CALCULATION WITH CAFM VERSIONS 4.0 IS PROHIBITED.

FOR WING AND ENGINE ANTI-ICE ON PERFORMANCE CALCULATION WITH CAFM VERSION 4.0, A DRAG INDEX OF 136 MUST BE USED.

PRIMUS EPIC FLIGHT MANAGEMENT SYSTEM

GENERAL LIMITATIONS

- Honeywell Primus Epic FMS software version NZ7.0 (or later approved version) must be installed.
- The Honeywell Flight Management System (FMS) Pilot's Operating Manual, P/N A28-1146-179, or other approved manual must be immediately available to the flight crew in the cockpit whenever navigation is predicated on the use of the FMS. The software version stated in the Pilot's Operating Manual or other approved manual must match that displayed on the Multi Control Display Unit (MCDU) NAV IDENT page.
- Honeywell Primus Epic FMS software version NZ7.01 or later approved version must be installed.
- Honeywell Primus Epic FMS Airplane Database version 170-C6 170 or later must be installed.
- RNP-0.3 operations require the use of the Flight Director or Autopilot.

NOTE: This applies to operations where RNP 0.3 is mandatory. Approach charts that contain the note "RNP 0.3 or GPS" do not constitute mandatory RNP operation.

- RNP-1 operations, including P-RNAV, require the use of the Flight Director or Autopilot.

NOTE: This applies to operations where RNP 1 is mandatory, including P-RNAV.

- **Use of speed mode in FMS is prohibited for one engine inoperative conditions.**
- The use of FMS Speed guidance is prohibited when the FD vertical mode is standby.
- The use of VNAV guidance is prohibited when the FD vertical mode is standby.
- The use of VNAV guidance when the FD mode is other than VNAV is prohibited unless pilots set the ALT SEL to each waypoint altitude constraint required by the FMS entered procedure.
- Use of GPS is limited to areas where GPS is approved. De-selection of GPS should be performed in other non-approved areas.
- Prior to flight using the FMS for IFR navigation, a minimum of one VOR, DME, and IRS must be verified to be installed and operational. Also, any appropriate ground facilities (VOR, DME) that are utilized by the procedures to be flown must be verified as operational using an approved method (NOTAM, etc.).

- If GPS RAIM is annunciated as not available during terminal, en-route, or remote/oceanic operation, the pilot must monitor FMS guidance data and crosscheck against raw data from an alternate source (i.e. VOR, DME, or IRS).
- Due to priority use of GPS by the FMS, IFR Navigation using the FMS is limited to use with procedures that are referenced to the WGS-84 or NAD-83 datum, unless other appropriate authorized procedures are used.
- IFR Navigation using the FMS is prohibited unless the pilot verifies the currency of the selected navigation database cycle on the NAV IDENT page.
- IFR Navigation using the FMS is limited to geographic regions contained within the navigation database that is installed in the aircraft.
- Operation above 72° 30.0' north latitude and below 59° 30.0' south latitude is prohibited due to unreliable magnetic heading, unless at least one Inertial Reference System (IRS) is verified operational as a sensor to the FMS.
- FMS performance management calculations have not been certified by the JAA. FMS performance management information is advisory information only, and may not be used as a basis for fuel load planning or airplane range predictions.
- Selection of FMS Position Update is prohibited during RNP operations, including RNP-10 operations.
- Selection of the FMS Disable through the Enable/Disable prompt on MCDU Radio Tune NAV page is prohibited.
- Use of the Step Climb function is prohibited.
- Selection of course interception to a conditional waypoint is prohibited.
- For takeoff and go around, LNAV and VNAV must not be armed below 400 ft AGL.
- For takeoff and go around in one engine condition, LNAV and VNAV must not be armed below the level off. Additionally, LNAV must not be armed until there is no more turn considerations.

APPROACH LIMITATIONS

- ILS, LOC, LOC-BC, LDA, SDF, GLS, MLS, Visual, and Radar approaches, using the FMS as the navigation source for guidance, are prohibited.
- FMS instrument approaches must be accomplished in accordance with approved instrument approach procedures that are retrievable from the FMS navigation database (as displayed on the APPROACH page on the MCDU). The pilot must review the complete procedure, comparing the waypoints, speeds, and altitudes displayed on the FMS with those on the published procedure charts. If any doubt exists about the integrity of the coded procedure, the procedure should not be used.

- Prior to commencing and during the final approach, the APPR annunciator must be visible on the PFD. If the APPR annunciator is not visible, and the appropriate runway visibility indications are not observed, the pilot must declare a missed approach.
- When using FMS guidance to conduct an instrument approach procedure that does not include GPS in the title of the published procedure, the flight crew must verify that the procedure specified nav aids(s) and associated avionics are operational (i.e. VOR, DME, ADF). If GPS RAIM is annunciated as not available during the approach, the pilot must monitor FMS guidance data and crosscheck against raw data from the alternate source(s).
- When a GPS Only Approach is planned (GPS only in title or GPS required by operational rules), prior to dispatch, the crew is required to verify that the predictive RAIM at the destination ETA is within the approach criteria. This information (RAIM AVAILABLE), is displayed on the PREDICTIVE RAIM page on the MCDU.
- When an alternate airport is required by the applicable operating rules, the alternate airport must be served by an approach based on a navigation aid other than GPS.
- If an alternate airport is not required by the applicable operating rules, the destination airport must be served by an approach based on a navigation aid other than GPS.
- When the reported station temperature exceeds the limits published in the approach chart, the use of VNAV barometric procedures are prohibited unless the pilot uses the VNAV temperature compensation function.
- Use of VNAV guidance below the published approach minimums is prohibited.
- VNAV path guidance is supplementary guidance information. The flight crew must rely on the altimeter as the primary altitude reference during the final approach segment, including step down fixes.

GENERAL INFORMATIONS 0

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SECTION 2

NORMAL PROCEDURES

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INTRODUCTION

The operating procedures described in this section have been defined with the purpose of providing expanded normal procedures that shall be used by flight crew to ensure that the airplane is in a proper condition and correctly configured for each phase of flight.

The source document for all procedures contained herein is the approved Airplane Flight Manual (AFM).

The normal procedures established are based on the assumption that all equipment is operating normally. It is the crew's responsibility to verify proper system response. In case improper indications are observed, verification of the appropriate controls position, checking of circuit breakers and testing of the related system should be performed to determine whether the condition affects dispatch or compliance with the MMEL, and whether any maintenance action is required.

Efficient operation requires pilots to stay ahead of the airplane and use normal checklist as a follow-up confirmation. The crew is required to proceed with all vital preparations for the next phase of flight prior to calling for a suitable checklist.

The basic philosophy for normal operation of the airplane is to use the checklist as a safety check of actions already performed. These actions are defined by *flows* and *memory items*. The overall operating efficiency depends much on the crew following certain operational patterns and then confirming the correct actions with a suitable checklist. Most ground and in-flight operations are based on this principle.

The normal checklists are to be read by PNF in flight and FO on ground. The normal checklists require the so-called challenge/response method.

The challenge/response means that the answer - response must come from the pilot who is not reading the checklist. It is obvious, however that the response must be checked by the pilot reading the checklist before going to the next item.

If the crew has been distracted from a normal checklist for any reason, the checklist should be started from the beginning except when it is absolutely clear that no item is missing. If the checklist is relatively long and the crew stops the checklist for some reason, going back by two items is sufficient if not starting from the beginning.

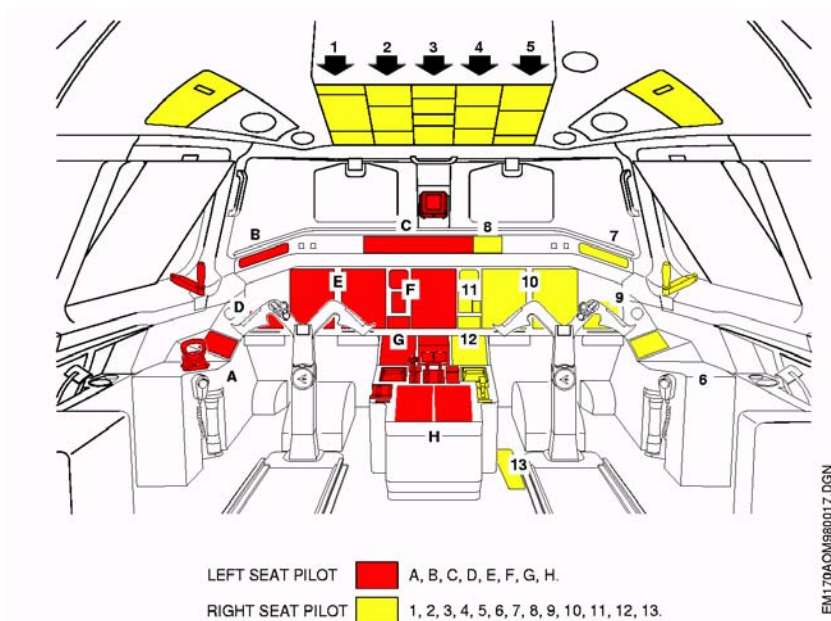
Every checklist should be initiated as early as possible to stay ahead of the airplane and reduce workload of the next phase of the flight/ground preparations.

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AREAS OF RESPONSIBILITY - TASK SHARING

ON GROUND

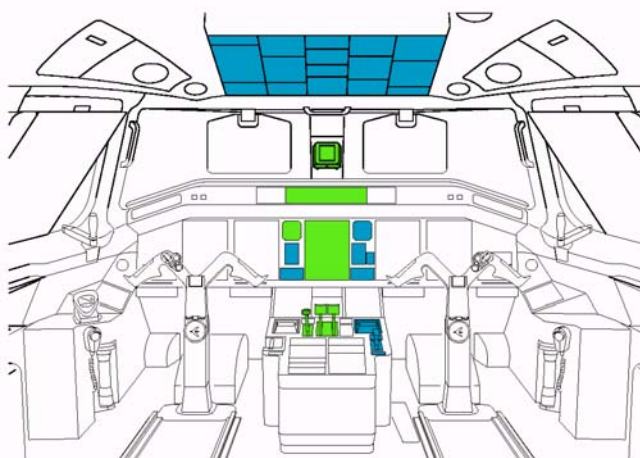
Flow sequence and areas of responsibility for ground procedures. Unshaded areas are under the responsibility of the pilot seated on the respective side. The Left Seat Pilot will handle Communications with ground personnel while the Right Seat Pilot communicates with ATC. Checklists refer to LSP and RSP. Due to the low workload concept, no major actions are expected during taxi. If necessary the pilot not taxiing will perform the required actions.



The numbers and arrows indicate the recommended flow sequence. The LSP must follow the letters, and the RSP must follow the numbers.

IN-FLIGHT

Flow sequence and areas of responsibility for in-flight procedures with the autopilot engaged. Unshaded areas are under the responsibility of the pilot seated on the respective side. The PNF should handle communications. He/she should operate the Flight Guidance Panel, at the discretion of the PF, when the airplane is manually flown. Checklists refer to PF and PNF.



PF AIRCRAFT THRUST SETTING AND FLIGHT PATH

PNF CHECKLIST READINGS
COMMUNICATIONS

EM170AOM990016 DGN

COMMUNICATIONS AND NAVIGATION

COMMUNICATIONS

Normal communications between the airplane and ATC should be performed by the PNF. Whenever the PNF is performing a read and do checklist, ATC communications should be performed by the PF in order to minimize interruptions.

Communications from the flight crew to the passengers and between the flight and cabin crews can be performed by any flight crewmember at the Captains discretion.

Whenever the Captain deems that an emergency situation can develop into an accident, he will order the flight attendants preparing the cabin for emergency landing over land or water in order to assure maximum safety of the airplane's occupants. Should there be enough time, the Captain will brief the cockpit crew, the Purser, and when applicable, cabin supervisors.

CAPTAIN → PURSER → FLIGHT ATTENDANTS

In this briefing, the Captain will give the following information:

Time available.

Emergency (type)

Signals conventioned.

Transmit additional instructions (structural damages, restricted exits, loss of landing gear, etc).

BRIEFINGS

Briefings should be conducted with casual language and personal style to prevent the repetitious use of sentences and terms. Preflight briefings are recommended on the first flight of the day and with any crew changes. Briefings to the cabin crew should include:

- Significant weather.
- Status of relevant airplane systems.
- Refueling.
- Information on the terrain/water to be over flown.
- Flight Routes/Cruising Altitudes/Flight Time/Alternate Airports.

Takeoff and approach briefings are detailed in the normal procedures.

The Captain must make sure the passengers receive a briefing covering procedures for all flight phases. The cabin crew usually makes that briefing. All special, non-routine operations have to be briefed.

A debrief allows feedback of crew performance and planning of non-critical issues such as airplane servicing. Debriefs also allow closer interaction among crewmembers on future common assignments.

FLIGHT DECK ACCESS

See OM part A Chapter A.8.3 point 12.

MEALS

Each flight crewmember should try to have his/her meal separately. It is recommended that they choose different menus.

SHOULDER HARNESS

Must be ON from engine start to FL 100 and from the start of descent until the engines shut down procedures have been finished. Its use is also recommended in the presence of moderate or severe turbulence and any time at crews' discretion.

HEADPHONES

Use of headphones is mandatory from engine start to the top of climb and from the top of descent until engine shut down.

LIGHTS

NAVIGATION Lights must be ON whenever the airplane is energized. **LOGO** lights must be on from sunset to sunrise and during low visibility procedures on the ground and up to FL 100.

RED BEACON must be on whenever one or more engines are running or during airplane movement.

TAXI (NOSE) lights must be ON during airplane ground movement. **TAXI (SIDE)** lights must be used to assist taxi and should be on to FL 100 and from FL 100 to the stand.

STROBE lights must be on from the moment the airplane enters the runway for takeoff to the point where the airplane leaves the runway after landing.

LANDING lights must be ON for takeoff and landing, when below FL 100 and inside congested areas.

INSPECTION lights must be used when visual inspection of the wing surfaces is required.

PILOT INCAPACITATION

Pilot incapacitation is a possibility in all age groups and during all flight phases, ranging from sudden death to partial loss of mental or physical performance. Proper crew coordination involves checks and crosschecks using verbal communications and standard operating procedures to detect this problem.

Failure of any crewmember to respond to a second request or a checklist will be considered a pilot incapacitation condition and crew action is immediately required.

CREW ACTION

If one pilot confirms that the remaining pilot is incapacitated, he/she shall take over checking the position of essential controls and switches. An emergency should be declared and the autopilot used to reduce crew workload.

After the autopilot is engaged and the airplane is under control, notify and utilize the cabin crew. If practicable, try to restrain the incapacitated pilot and slide the seat to the full back position. The shoulder harness lock may be used to restrain the incapacitated pilot.

Request assistance from any medically qualified passenger and consider using help from other pilots or crewmembers who may be among the passengers.

Consider landing at the nearest suitable airport.

APPROACHES

The airplane must be on a stabilized approach, that is, on the Approach Speed plus applicable additives, on the proper flight path, with the proper sink rate and with the thrust stabilized no lower than 1000 ft AFE.

BRAKES USAGE

In order to reduce carbon brake wear, avoid applying the brakes too often during taxiing "cold brakes" procedures. Wear is far more related to the number of applications than to the energy applied. Carbon brakes wear less when operated at high temperatures.

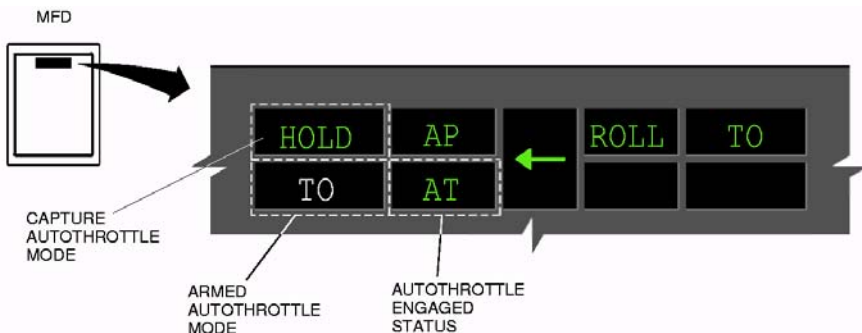
THRUST REVERSER

Upon landing, reverser should be set to MIN REV at 60 kt, and be closed by 30 kt. During RTO the thrust reverser can be used until the airplane comes to a complete stop.

NAVIGATION

AUTOMATIC FLIGHT

Plan to be synchronized with the airplane's automation. Being "ahead" of the airplane is essential for smooth operation of the automated systems, since auto-flight systems may receive faulty inputs from the flight crew or may contain database errors. When the airplane does not perform as expected, the autopilot must be disconnected and a manual flight promptly established.



The FMA must be monitored at all times by both pilots.

USE OF THE FLIGHT DIRECTOR

Flight director should be used and updated at all times. The PF can request the PNF to perform the tasks required to maintain the Flight director updated with the maneuvers performed.

If the flight director is not synchronized with the actual aircraft's maneuver it must be updated or turned off.

USE OF THE MCDU

MCDU usage must be coordinated in all flight phases (VHF frequency tuning and navigation, performance, progress monitoring and changes). Whenever entering a new route, it is the crew's responsibility to check all the waypoints for correct coordinates and associated navigation aids. It is recommended that one pilot enter the flight plan and the other pilot check the data entered.

Below FL 100, MCDU changes should be made by the PNF and executed only after confirmation by the PF. If necessary, revert to basic Autopilot/FD modes to avoid heads down time during high workload flight phases.

USE OF THE AUTOPILOT

Pilots should use the autopilot as much as possible, allowing effective monitoring of the flight.

It's recommended the engagement of the autopilot at minimum engagement height and disengagement at traffic pattern altitude for a visual approach or at MDA/DA/DH during an instrument approach (if not performing an auto land or a go around).

The amount of automation to be used during each phase of flight should be determined by the PF.

Pilots must always be alert and monitor the autopilot. Normally high level of automation induces crews to stay out of the loop, with excessive confidence on auto flight systems.

USE OF THE AUTO THROTTLE

The auto throttle should be used during the entire flight, engaged just prior to takeoff and disengaged after touch down at the PF's discretion.

Pilots must always be alert and monitor the auto throttle. Normally high level of automation induces crews to stay out of the loop, with excessive confidence on auto flight systems.

WEATHER RADAR

The weather radar should always be used for night operations and anytime it is necessary at the crew's judgment.

During slaved weather radar operations, the pilot operating the radar should inform any change before its execution, since it will affect the other pilot's presentation as well. If the radar is to be operated in any mode other than STBY while the airplane is on the ground, some restrictions listed in the AOM apply.

PFD/EICAS

Precision approaches should be flown with ILS indications on both sides. VOR and NDB approaches should use some form of raw data to cross check FMS information. RNAV and GPS approaches should always be done after making sure equipment performance is within limits and local regulations were considered.

EICAS messages should always be announced when displayed. When more than one message is displayed careful consideration should be applied in order to prioritize actions.

TCAS

Compliance with TCAS resolution advisory is required unless the pilot considers it unsafe to do so. Maneuvers that are in the opposite direction of the RA are extremely hazardous, especially RAs involving altitude crossing, and thus are prohibited unless it is visually determined to be the only means to assure safe separation.

- WARNING:** IT IS POSSIBLE IN SOME CASES TO HAVE INSUFFICIENT AIRPLANE PERFORMANCE TO FOLLOW THE TCAS COMMAND WITHOUT FLYING INTO STALL WARNING OR BUFFET. CONDITIONS WHERE THIS MAY OCCUR INCLUDE:
- BANK ANGLE IN EXCESS OF 15°.
 - OPERATIONS AT AIRPORTS ABOVE 5300 FT MSL OR TEMPERATURES GREATER THAN ISA + 28°C (58°F).
 - ENGINE INOPERATIVE.
 - FAILURE TO CONFIGURE THE AIRPLANE TO GO-AROUND FOLLOWING A CLIMB RA IN LANDING CONFIGURATION.
 - FAILURE TO ADVANCE THRUST TO MAXIMUM CONTINUOUS THRUST FOLLOWING A CLIMB RA AT REDUCED THRUST.
 - SPEEDS LESS THAN NORMAL OPERATION SPEEDS.
 - ABNORMAL CONFIGURATIONS, WHICH REDUCE PERFORMANCE (E.G. GEAR DOWN).
 - TCAS COMMAND REVERSAL TO A "CLIMB-CLIMB NOW".
 - BUFFET MARGIN LESS THAN 0.3 G.

USE OF CHECKLISTS

There are three basic types of checklists: NORMAL, ABNORMAL and EMERGENCY.

In general, the recommended sequence when executing different types of checklists is: EMERGENCY/ABNORMAL and NORMAL. In case of engine fire inflight shortly after the airplane is airborne the sequence is:

- ENGINE FIRE, SEVERE DAMAGE OR SEPARATION CHECKLIST; then
- AFTER TAKE OFF CHECKLIST; then
- ONE ENGINE INOPERATIVE APPROACH AND LANDING CHECKLIST.

If it is necessary to perform ONE ENGINE INOPERATIVE APPROACH AND LANDING checklist, do not read APPROACH and BEFORE LANDING checklist. The ONE ENGINE INOPERATIVE APPROACH AND LANDING checklist should be used instead of these two checklists.

During ground operations, CAPT is responsible for calling out for a particular normal, abnormal or emergency checklist.

When in flight, PF is responsible for calling out for a particular normal, abnormal or emergency checklist.

When the crewmember responsible for calling out a checklist fails to do so, it is the other pilot's responsibility to remind him of the correct procedure. This recall should be kind and specific at the same time, for example: I AM READY FOR APPROACH CHECKLIST.

When the last item of the checklist has been read out, this should be confirmed by a statement ... CHECKLIST COMPLETED, for example: AFTER TAKE-OFF CHECKLIST COMPLETED.

Whenever checklist refers to items described by figures, for example FUEL QUANTITY, FLAPS, TRIMS, etc., exact figures should be given.

Example:

CAPT	FO
Response:	challenge:
3200 kg	FUEL QUANTITY

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NORMAL CHECKLIST

BEFORE START

GEAR PINS, COVERS ON BOARD
COCKPIT EMERGENCY EQUIPMENT CHECKED
ALL CREW MOBILE PHONES OFF

PARKING BRAKE.....SET
PASSENGER SIGNS PANEL.....ON & ARMED
PRESSURIZATION PANEL.....SET
FLIGHT INSTRUMENTS SET & X-CHECKED
THRUST LEVERS IDLE
TRIM PANEL CHECKED

-----LOADSHEET-----
FUEL QUANTITY.....__CHECKED
MCDU SET
PITCH TRIM __SET/ CWC FULL NOSE DOWN

-----PUSH BACK & STARTUP-----
DOORS & WINDOWS CLOSED
BEACON.....ON
TRANSPONDER AS REQUIRED
PARKING BRAKE.....AS REQUIRED

AFTER START

GROUND EQUIPMENT.....REMOVED
FLAPS __SET / CWC UP
FLIGHT CONTROLS CHECKED / CWC AS REQUIRED

BEFORE TAKEOFF

BRAKES TEMPERATURE CHECKED
TAKE OFF CONFIGURATION CHECKED
EICAS CHECKED
TRANSPONDER TA/RA

AFTER TAKEOFF

LANDING GEAR UP
FLAPS 0
AIR CONDITIONING & PRESS CHECK
ALTIMETERS SET & X-CHECKED

APPROACH

ALTIMETERS SET & X-CHECKED
LANDING DATA SET & X-CHECKED
PASSENGER SIGNS PANEL SET

BEFORE LANDING

LANDING GEAR DOWN, 3 GREEN
FLAPS SET

SHUTDOWN

PARKING BRAKE AS REQUIRED
FLAPS 0
THRUST LEVERS IDLE
START/STOP SELECTORS STOP
TRANSPONDER STANDBY
FASTEN BELTS OFF
TAXI LIGHTS OFF
BEACON OFF
ELECTRIC HYDRAULIC PUMP SYS 3A OFF

LEAVING THE AIRPLANE

PASSENGER SIGNS PANEL OFF
EXTERNAL LIGHTS OFF
GPU/APU OFF
BATTERIES 1 AND 2 OFF

(CWC) COLD WEATHER CONDITIONS

BEFORE START

EXTERNAL DEICE INSPECTION DONE
 BATTERIES (min. temp. -20°, 22.5 V) CHECKED
 HYDRAULIC SYSTEM WARM-UP (below -18°C) DONE

BEFORE DE-ICING

PITCH TRIM FULL NOSE DOWN
 FLAPS UP
 APU (recommended) OFF
 ENGINE & APU BLEED BUTTONS.....PUSHED OUT
 PACKS BUTTONS.....PUSHED OUT

AFTER DE-ICING

DE-ICE REPORT OBTAIN
 FLAPS SET
 FLIGHT CONTROLS & TRIMS.....CHECKED
 PITCH TRIM SET
 ENGINE & APU BLEED BUTTONS (after 1 min.) PUSHED IN
 PACKS BUTTONS (after 3 min.) PUSHED IN
 ICE ACCUMULATION CHECKED
 ENGINE RUN-UP AS REQUIRED

USE OF (CWC) COLD WEATHER CONDITION CHECKLIST

COLD WEATHER CONDITION CHECK LIST (CWC CL) has been prepared on the basis of LOT OM part B 2.1.n. It is assumed that pilots are know the OM procedures and use them. The CWC CL is supplement to the NORMAL CL which is the basis and it serves only for checking whether the most important elements of the CWC have been executed. So in "cold weather condition" both check lists ought to be used simultaneously. The Captain decides on the use of the CWC CL. The construction of the CWC CL assumes that deicing takes place on the deicing ramp with engines running, which is standard operation at most airports.

The following sequence of calling out CWC CL is assumed:

- CWC BEFORE START CL prior to NORMAL BEFORE START CL – with one remark that later while reading NORMAL BEFORE START CL, at the "pitch trim" point the trim should be set at "full nose down". There is no need to return to this point later, because it is already included in the CWC AFTER DEICING CL.
- The CWC BEFORE DEICING CL should be called out following NORMAL AFTER START CL - with two remarks: at the "flaps" point, the flaps ought to be set at 0, and at the "flight controls" point the crew check only if there are any messages on the EICAS. The movement of flight controls should be checked only when the crew are sure that there no restriction on the movable surfaces (e.g. frozen snow or ice). The crew will not have to return to these two points either, because they are included in the CWC AFTER DEICING CL.
- CWC AFTER DEICING CL is called out by the crew following deicing completion and execution of all accompanying procedures, but prior to BEFORE TAKEOFF CL.
- CWC AFTER LANDING CL is called out by the Captain in cases when the existing conditions at the destination airport justify the executions of such. One more mark: while executing SHUT DOWN CL, at the "flaps" point the crew takes once more the decision about flaps inspection prior to their retraction.

Following the above sequence the crew maintains seamless flow of procedures without the need of returning to any of check list points.

NORMAL PROCEDURES

PRE-FLIGHT PROCEDURES

PRE-FLIGHT DUTIES

The pre-flight duties start one hour before scheduled departure, unless the specific kind of operation requires longer preparation. Pilots should wear their uniforms and have personal documents on them. The CAPT receives a work readiness report from the FO and cabin crew.

The CAPT informs the whole crew about the time and place of pre-flight briefing.

Next, a pre-flight medical check shall be carried out.

The FO completes documentation required for the flight: meteo information (TAFs, METARs, Significant Weather Chart, wind charts, SIGMETs) and NOTAM bulletin from the AIS office.

At Operations Centre pilots receive updated information regarding the flight: Flight Plan, Jeppesen charts, "slot" time, MEL limitations and all other data.

The CAPT is responsible for briefing the whole crew at a previously assigned time and place (refer to LOT POLISH AIRLINES OPERATIONS MANUAL part A) as follows:

- crew introduction – the CAPT and all other crew-members are introduced to each other;
- exchange of information regarding additional crew members: trainees, instructors, inspectors and other persons assigned to the flight;
- inform about any persons other than crew-members for this flight agreed to occupy jumpseat in the cockpit;
- exchange of information about estimated number of passengers, including UMs, VIPs etc.;
- the CAPT informs about possible delay – "slot" time, probability of de-icing, estimated taxi and flight time, meteorological conditions en-route and at destination, forecast turbulence etc.;
- reminding of basic rules for cockpit - cabin communication especially this used in distress and emergency situations;
- make arrangements concerning meals served to the cockpit;
- state additional requirements if necessary for a specific flight;
- ask for questions and suggestions to make sure the briefing is clear to the crew.

This pre-flight briefing has a significant influence on crew efficiency in all sorts of situations. Therefore, it shall be carried out carefully while at the same time being short and precise.

From the CRM point of view this is the initial contact between the crew members. Its purpose is to exchange some vital information as well as get to know each other to improve further communication. It is essential for the CAPT to create a professional, open atmosphere allowing the crew members to express their opinions freely and without hesitation.

EXTERNAL SAFETY INSPECTION

When approaching the airplane, take time to inspect the area where the airplane is parked. Evaluate if there is room for the taxi-out or push back maneuver. Make sure that there will be enough clearance throughout the maneuver.

Also take time to have a look at the airplane as a whole, from a reasonable distance. Check visually if the airplane looks good, level and normal. Experience shows that this "initial look" can reveal details that will otherwise go unnoticed such as fluid spots on the ground, unexpected objects attached to the airplane, bent or unaligned airframe components, etc.

Make sure that the airplane has the chocks and safety pins on as required. If not, advise the ground staff immediately.

Before starting any cabin and cockpit checks and preparations, the walk-around must be performed before each leg. It is the CAPT's duty to perform the walk-around by himself or to delegate this duty to the FO as convenient.

The inspection can be done according to the list below:

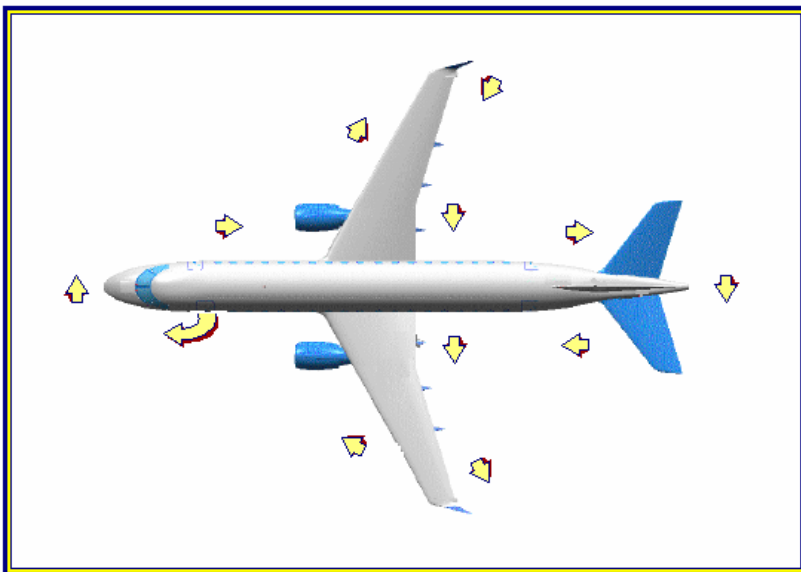
Prior to starting the external inspection, apply the Emergency/Parking Brake.

NOTE: Check if there is sufficient hydraulic pressure to active the Emergency/Parking brake and to perform the Brake Wear Indicator check.

External Lights.....AS REQUIRED

If was not performed by the maintenance staff turn the external lights on and check them. Turn the lights OFF immediately after checking them.

Recommended walk-around sequence:



Left Fwd Passenger Door.....CHECK

External Power Receptacle.....CHECK

Left Smart Probes/TAT Sensor/Ice Detector.....CHECK

Verify condition with no obstructions or covers.

Windshield Wipers CHECK

Radome.....CHECK

Forward Avionics Compartment.....SECURED

Lower Fwd Antenna CONDITION

Nose Gear.....CHECK

Nose Gear Wheels and Tires	CONDITION
Nose Gear Up Lock Hook.....	UNLOCKED
Nose Gear Strut/Wheel Well/Doors	CONDITION, NO LEAKS
Ground Locking Pin	REMOVED
Landing and Taxi Lights	CONDITION
Right Smart Probes/TAT Sensor/Ice Detector	CHECK
Verify condition with no obstructions or covers.	
Rat Safety Lock Pin	REMOVED
Right Fwd Passenger Door	CHECK
Oxygen Discharge Indicator	GREEN DISC
Lower Fwd Antennas/Fwd Drain Mast.....	CONDITION
Fwd Cargo Door	CHECK
Wing Inspection Light	CONDITION
Landing and Taxi Lights	CONDITION
Right Ram Air Inlet	NO OBSTRUCTION
Air Inlets and Outlets	NO OBSTRUCTION
Lower Red Beacon Light	CONDITION
Right Water Drain Valve Door	SECURED
Wing Water Drain Valve	CHECK, NO LEAKS
Right 1 Magnetic Level Indicator	PUSHED IN, NO LEAKS
Wing Leading Edges	CONDITION
Pylon	CONDITION
Thrust Reverser Cowl.....	FLUSH WITH NACELLE
Right Engine.....	CHECK
Check engine for leaks and obstructions in the air inlets.	
Refueling Compartment Door.....	SECURED
Access Panels.....	SECURED
Right 2 and 3 Magnetic Level Indicators.....	PUSHED IN, NO LEAKS
Pressure Relief Valve	CHECK
Wing Vents	NO OBSTRUCTION
Navigation and Strobe Lights	CONDITION
Static Dischargers	NUMBER AND CONDITION
Verify 3 static dischargers on the aileron and 6 static dischargers on the winglet. Refer to the CDL for dispatch with missing items.	

Flight Control Surfaces and Fairings	CONDITION
Right Main Gear	CHECK
Wheels and Tires	CONDITION
Right Main Gear Up Lock Hook.....	UNLOCKED
Right Gear Strut/Wheel Wells	CONDITION, NO LEAKS
Right Ground Locking Pin	REMOVED
Brake Wear Indicators.....	CHECK
Access Doors and Panels	SECURED
Drain Mast.....	CONDITION
Aft Cargo Door	CHECK
Right Aft Service Door.....	CHECK
Right Lower Aft Antennas/Aft Drain Mast.....	CONDITION
Battery Air Outlet.....	NO OBSTRUCTION
Access Door and Panels	SECURED
Drain Mast.....	CONDITION
Flight Control Surfaces.....	CONDITION
Static Dischargers	NUMBER AND CONDITION

Verify 4 static dischargers on the rudder and 4 static dischargers on each elevator. Refer to the CDL for dispatch with missing items.

APU.....	CONDITION
APU External Power Receptacle.....	CHECK
Overboard Vent.....	NO OBSTRUCTION
Pressurization Static Port.....	NO OBSTRUCTION
Left Aft Passenger Door.....	CHECK
Left Lower Aft Antennas.....	CONDITION
Access Doors and Panels	SECURED
Flight Control Surfaces and Fairings.....	CONDITION
Static Dischargers	NUMBER AND CONDITION

Verify 3 static dischargers on the aileron and 6 static dischargers on the winglet. Refer to the CDL for dispatch with missing items.

Navigation, Strobe Lights and Upper Beacon Lights.....	CONDITION
Upper Antennas	CONDITION
Wing Leading Edges	CONDITION
Wing Vents.....	NO OBSTRUCTION
Pressure Relief Valve.....	CHECK

Access Panels.....	SECURED
Left 2 and 3 Magnetic Level Indicators	PUSHED IN, NO LEAKS
Pylon	CONDITION
Thrust Reverser Cowl.....	FLUSH WITH NACELLE
Left Engine	CHECK
Check engine for leaks and obstructions in the air inlets.	
Left 1 Magnetic Level Indicator.....	PUSHED IN, NO LEAKS
Wing Water Drain Valve	CHECK NO LEAKS
Left Main Gear.....	CHECK
Left Main Gear Wheels and Tires	CONDITION
Left Main Gear Up Lock Hook	UNLOCKED
Left Gear Strut/Wheel Wells	CONDITION, NO LEAKS
Left Ground Locking Pin	REMOVED
Brake Wear Indicators	CHECK
Left Water Drain Valve Door.....	SECURED
Air Inlets and Outlets	NO OBSTRUCTION
Left Ram Air Inlet.....	NO OBSTRUCTION
Air Conditioning Connection Access Door.....	CHECK
Landing and Taxi Lights	CONDITION
Wing Inspection Light	CONDITION

COCKPIT SAFETY INSPECTION

After entering the airplane, specific safety checks must be performed by the Cockpit Crew. APU may be started if reasonable. Normally it is the CAPT's duty to start the APU and monitor the start-up.

All documents required for dispatch must be checked by the CAPT. All technical restrictions and extra procedures according to MEL etc., shall be discussed by the Cockpit Crew.

It is the CAPT's duty to check all necessary documents and manuals, while the FO starts checks and tests in his areas of responsibility. When ready, the CAPT starts his checks and tests.

Parking Brake ON LSP

Maintenance Status CHECK PIC

Cockpit Emergency Equipment CHECK RSP

Check for the availability, status and proper location of the following equipment:

- Protective Breathing Equipment (PBE).
- Fire Extinguishers.
- Crash Axe.
- Life Vests.
- Escape Ropes.
- Flashlights.

GPU Button PUSHED OUT RSP

Do not push out the GPU button if the airplane is powered up by the GPU.

APU Generator Button PUSH IN RSP

Fuel Panel CHECK RSP

Verify all fuel pumps knobs in AUTO position and crossfeed in the desired position.

Windshield Wiper OFF RSP

Hydraulic Panel CHECK RSP

Verify:

- SYSTEM 1 and 2 Electrical Pumps AUTO
- SYSTEM 3 Electrical Pump A OFF.
- SYSTEM 3 Electrical Pump B AUTO
- PTU AUTO

Air Conditioning/Pneumatic Panel CHECK RSP

- Verify all buttons pushed in and no striped bars illuminated.

Passenger Oxygen Panel..... CHECK RSP
 Verify Masks Deploy Selector Knob in Auto.
Landing Gear Lever..... DOWN.....RSP
Start/Stop Selectors STOP RSP
RAT Command..... STOWED RSP
Slat/Flap Lever VERIFY POSITION RSP
Gear Pins, Covers ON BOARD LSP & RSP
 Verify that the safety pins are on board, behind the RSP seat.
Circuit Breakers..... CHECK
 Verify both sidewall panels to ensure agreement with maintenance status.
Photoluminescent Escape Path Strips System
 (Passenger Cabin)..... CHARGED

PASSENGER CABIN

Cockpit Crew must receive report from Cabin Crew that cabin has been checked, follow the Cabin Crew Manual.

PRINCIPLES IMPROVING THE OPERATIONAL EFFICIENCY OF PASSENGER BOARDING

See Operational Manual part A Chapter A 1.0 point 6.1.

PRE-DEPARTURE PROCEDURES

POWER UP

Battery 1 ON RSP

Battery 2 AUTO RSP

CAUTION: - VERIFY THAT ONLY DISPLAYS 2 AND 3 ARE AVAILABLE AND THAT NO EICAS MESSAGES ARE DISPLAYED FOR THE FIRST 5 SECONDS.
- IF MORE THAN DISPLAYS 2 AND 3 ARE AVAILABLE, THE AIRPLANE MUST NOT BE DISPATCHED.

Batteries Voltage CHECK RSP

Check the batteries voltage in the MFD status page as follows:

- Set battery 1 to ON, set battery 2 to OFF and check the battery 1 voltage is above 22.5V.
- Set battery 2 to AUTO, set battery 1 to OFF and check the battery 2 voltage is above 22.5 V.
- Set battery 1 to ON.

CAUTION: EACH BATTERY VOLTAGE MUST BE AT LEAST 22,5 VOLTS..

NOTE: - The Electrical PBIT is automatically performed after the airplane is powered by any AC source and takes 3 minutes to complete. The Electrical PBIT will be interrupted if any electric hydraulic pump is running or if the Flight Control Mode Panel switches are cycle or if AC source is interrupted while the test is running.
- If the displays 2 and/or 4 are configured as PFD, set the respective reversionary panel selector knob to MFD then to AUTO. After 8 seconds, the affected display configuration will return to MFD.

GPU Button (if applicable) PUSH IN

Verify AVAIL light illuminated inside before pushing in. When GPU is not available, maintain GPU button pushed out.

EICAS Messages CHECK DISPLAYED ..RSP

Fire Extinguisher Panel CHECK RSP

Verify there are no fire protection fail messages displayed on the EICAS.

Press and hold the Fire Detection Test button and observe the following EICAS messages, lights and warnings:

- Aural warning.
- Fire handles illuminated.
- Cargo fire extinguishing buttons illuminated.
- APU Fire-Extinguishing button and the upper half of the APU Emergency Stop Button illuminated.
- WARNING lights flashing.
- “CARGO FWD SMOKE” EICAS message.
- “CARGO AFT SMOKE” EICAS message.
- “APU FIRE” EICAS message.
- “ENG 1 FIRE” EICAS message.
- “ENG 2 FIRE” EICAS message.
- “FIRE” warning annunciation displayed inside ITT indicators.

APU Selector Knob AS REQUIRED LSP

- The CPT can order the FO to start up the APU as convenient.
- Verify the APU Emergency Stop Button is guarded.
- To start the APU turn the APU MASTER selector to ON then to OFF. After that select it to ON, then to START.

NOTE: If AC source is lost, power down the airplane and perform the power up procedure.

MCDU Electronic CBs OUT..... CHECK RSP

- Select CB OUT/LOCK page on the MCDU and check the CBs status to ensure agreement with maintenance status.
- Press the NEW TRIP prompt on the MCDU to check the electronic CBs status.

DVDR Panel CHECK RSP

Press test button and verify no fail messages displayed on EICAS.

Navigation Light..... ON.....RSP

If the FLT CTRL BIT EXPIRED EICAS message is displayed perform the Hydraulic PBIT as follows:

- Do not move any flight control surface;
- Turn the Electrical Hydraulic Pumps 1, 2 and 3A to ON;
- Wait 1 minute. At this point the FLT CTRL BIT EXPIRED EICAS message should extinguish.
- Turn Electrical Hydraulic Pumps 1 and 2 to AUTO and 3A to OFF.

If the FLT CTRL BIT EXPIRED EICAS message is displayed power down the airplane, wait 1 minute and perform a power up procedure.

BEFORE START

- All Crew Mobile Phones OFF
- Airplane Manuals & Documents ON BOARD LSP
- Approved Operating Manual part B with required operational information that must be on board.
- The Company QRH must be on board.
- Make sure that documents which are legally required to be on board are really in place.
- Jump Seat Oxy Masks & Regulators CHECK RSP
- The RSP must verify the observer's masks.
 - Carry out the test as follows:
 - Set the regulator control knob to "100%".
 - Press and hold the "TEST/RESET" button.
 - Verify a short illumination or "blink" of the flow indicator.
 - Verify audible oxygen flow in the headset or loudspeakers
 - Once the mask fully pressurizes the indicator must go out, showing that the system is leak free.
 - Release the "TEST/RESET" button..
- Electrical Panel SET RSP
- IDG selectors AUTO.
 - AC Bus Ties selector in AUTO.
 - GPU push button as required.
 - APU Gen button pushed in.
 - TRU 1 AUTO.
 - TRU Essential AUTO.
 - TRU 2 AUTO.
 - DC Bus Ties AUTO.
 - Battery 1 selector ON.
 - Battery 2 selector AUTO.
- Cockpit Lights Panel AS REQUIRED LSP & RSP
- Adjust Main Panel, Overhead Panel and Pedestal lights.
 - Push Annunciators Test button and verify all associated lights.
 - Set DOME light as required.
- Engine 1 Fire Handle STOWED RSP
- Fuel Panel SET RSP
- FUEL XFEED selector knob on the desired position.
 - DC Pump selector AUTO.
 - AC Pumps 1 & 2 selectors ON.
- Passenger Signs Panel SET RSP
- Set Emergency Lights selector ON and verify the EMER LT ON and EMER LT NOT ARMED messages displayed on the EICAS.
 - Emergency lights selector ARMED.
 - NO SMKG & FSTN BELTS ON.
 - STERILE light as required.

- Fire Extinguisher Panel CHECK RSP
- Cargo Smoke FWD/AFT buttons guarded.
 - APU Fire Extinguishing button guarded.
- APU Control Panel AS REQUIRED RSP
- Emergency stop button guarded.
- External Lights Panel..... AS REQUIRED RSP
- Engine 2 Fire Handle..... STOWED RSP
- Hydraulic Panel CHECK/SET.....RSP
- Verify engine driven pump 1 and 2 shutoff buttons with no lights and guarded.
 - Set PTU selector to AUTO.
 - Set the hydraulic system 1 and 2 electrical pumps and the hydraulic system 3 electrical pump B to AUTO.
 - Set the hydraulic system 3 electrical pump3A to OFF.
- Pressurization Panel SET RSP
- CABIN ALT selector STOP.
 - MODE selector AUTO.
 - LFE selector STOP.
 - DUMP button, no lights and guarded.
- Ice Protection Panel SET RSP
- WINDSHIELD/ENGINE buttons pushed in.
 - MODE selector AUTO.
 - WING button pushed in.
 - TEST selector OFF.
- Air Conditioning/Pneumatic Panel SET RSP
- Cockpit and passenger cabin temperature control as required.
 - Recirculation Fan, Pack 1 and 2, X Bleed, APU Bleed, Bleed 1 and 2 buttons pushed in.
 - If Hot Weather Operation Conditions occur the following points on the ground will improve the cabin cooling:
Recirculation Fan Button PUSHED OUT
Cockpit/Passenger Temperature Controllers..... FULL COLD
 - Whenever possible apply cool air from the air conditioning cart when engine is shutdown.
 - All doors and windows must be kept closed as much as possible.
 - Open all passenger cabin gasper and cockpit outlets.
 - Close all window shades on the sun-exposed side of the cabin.

Passenger Oxygen Panel..... SET RSP

- Passenger Oxygen selector AUTO.
- MASK DEPLOYED indicator no light.

Oxygen Masks & Regulators..... CHECK/100% LSP & RSP

- Check masks for supply of oxygen and for microphone functionality. Verify also the observer's mask.
- The MFD Status page must be checked and the available oxygen supply and pressure must be adequate for use.
- Carry out the test as follows:
 - Set the regulator controller to "100%".
 - Press and hold the "TEST/RESET" button.
 - Verify a short illumination or "blink" of the indicator.
 - Verify audible pressurization in the headset.
 - When the mask fully pressurizes the indicator must go out, showing that the system is leak free.
 - Switch the controller to the "EMER" position and depress the "TEST/RESET" button to verify indicator continuously showing oxygen flow until the "TEST/RESET" button is released and/or the "EMER" mode is turned OFF.
 - Return the regulator controller to 100%.

Glareshield Lights Control Panel..... AS REQUIRED LSP & RSP

Display Control Panel..... SET LSP & RSP

- Set BARO SET knob to actual pressure.
- Check the maximum difference between both primary altimeters and airport elevation according to RVSM requirements.
- Push HSI button for Full Compass or Arc.
- Select the appropriate NAV source.
- BRG circle (O) for Off, VOR1, ADF1, FMS1.
- BRG diamond (◇) for Off, VOR2, ADF2, FMS2.
- Minimums knob for desired minimums reference.

Reversionary Panel..... SET LSP & RSP

- Displays selectors in AUTO.
- Sensors selectors (ADS/IRS) as required.

Flight Instruments..... SET/XCHECKED LSP & RSP

Verify:

- AIRSPEED TAPES not showing speed.
- EADIs leveled and flag-free.
- Initial assigned altitude on the ALT SEL.

CAUTION: THE INITIAL ASSIGNED ALTITUDE MUST BE SET TO AN ALTITUDE 400 FT OR HIGHER ABOVE FIELD ELEVATION.

- Altitude tape indications within limits.
- Both VSIs showing zero.
- EHSIs with the courses selected according to the intended departure procedure and NAV source selected.
- EHSIs and magnetic compass flag free and showing the same magnetic heading.
- Heading bug set according to the proposed departure procedure.
- Check IESS and adjust the altimeter setting.
- Weather set on PFD and/or MFD's MAP page as required.
- Set the MFD's MAP page menu as required.
- TCAS should be always displayed on both MFD's.

Status Page CHECK LSP & RSP

Verify Oil quantity and Hydraulic Brake Accumulator.

GND PROX TERR INHIB CHECK LSP

Verify button pushed in and no striped white bar illuminated.

EICAS CHECK LSP & RSP

Check EICAS messages to ensure agreement with airplane status.

Clock SET RSP

Select GPS on the GPS/INT/SET selector. If the clock displays dashes (---), adjust the clock choosing SET position, SET button and, after set, INT position.

ELT ARMED RSP

GND PROX G/S INHIB CHECK RSP

Verify button pushed in and no striped white bar illuminated.

LG WRN INHIB CHECK RSP

Verify button pushed out, guarded and no striped white bar illuminated.

Flight Control Mode Panel CHECK LSP

Shaker 1 and 2 Cutout Buttons CHECK LSP

Verify Shaker 1 and 2 CUTOFF buttons pushed out and no striped white bars illuminated.

Start/Stop Selectors STOP LSP

Ignition Selectors AUTO LSP

EICAS FULL CHECK LSP

SpeedBrake Lever CLOSED LSP

Thrust Levers IDLE LSP

GND PROX FLAP OVRD CHECK RSP

Verify button pushed out, guarded and no striped white bar illuminated.

Audio Control Panel AS REQUIRED LSP & RSP

Trims CHECK LSP

- Verify that roll, yaw and pitch (main and backup) trims are operating properly both ways. Verify the 3 seconds protection system is working properly. Adjust yaw and roll trims to the neutral position and pitch trim to the green band.
- Check Pitch Trim SYS 1 and 2 CUTOUT buttons with no lights and guarded.

Flight Controls Disconnect Handles CHECK RSP

Alternate Gear Extension Compartment CHECK RSP

Verify the alternate gear extension lever is fully down and the electrical override switch is in the "NORMAL" position.

MCDU SET LSP & RSP

- Select NAV IDENT page and check its content.
- In both MCDUs select POSITION INIT page and load the present position.
- Insert route in the FMS according to the flight plan.
- In both MCDUs select the Flight Summary page and reset the fuel used.
- Insert performance data.
- Insert DLK data.

Takeoff Briefing COMPLETED

The briefing should describe the departure procedures, taxi out routes, power reductions, weather, terrain/MSA, noise abatement procedures, low visibility procedures, inoperative airplane components, runway in use/condition, return alternate airports, NOTAMs and any required operational procedures that differ from the normal procedures. It is recommended to perform the takeoff briefing before engine start.

The following elements shall be included in the take-off briefing:

- who is PF;
- runway for departure and runway conditions;
- specific system handling if any;
- weight limitation;
- SID name with chart number and date of effectiveness;
- normal departure including vertical profile;
- transition altitude;
- action in case of emergency including vertical profile (engine flame out and engine fire must be discussed).

When discussing action in an emergency it is required to talk about engine flame out as well as engine fire at speed above V1. This is due to different actions for those two types of emergencies. The discussion about the engine fire is to be made for the case when no significant thrust loss is associated with the engine on fire.

-----AFTER OBTAINED LOADSHEET-----

Fuel Quantity CHECK LSP & RSP

MCDU..... SET LSP & RSP

- Complete and cross check FMS data.
- Select TAKEOFF DATASET MENU page on the MCDU and set the data below:
 - Thrust Rate Mode (TO-1, TO-2).
 - TO TEMP (___ °C).
 - ATTCS (ON).
 - REF ECS (ON or OFF).
 - REF A/I (OFF, ENG or ALL).
 - FLEX T/O (ON or OFF).
 - FLEX TEMP (___ °C).
- Select TAKEOFF page 3/3 on MCDU and set takeoff speeds.
- Select LANDING page 3/3 on MCDU and set landing speeds for the takeoff weight.
- Set the $V_2 + 10$ kt on the speed window.
- Select RADIO page 1/2 and insert assigned transponder code.

NOTE: The EICAS message ENG REF ECS DISAG will be always displayed when the following conditions apply simultaneously on ground: the REF ECS is set to ON, the APU is running and the engine thrust levers are set to idle.

Speed Selector Knob SET LSP

Set the Speed Selector Knob to manual and $V_2 + 10$ on the speed window.

TOGA Button..... PRESS.....LSP

Pitch Trim SET LSP

Set according to loadsheet.

STAB TRIM SETTING FOR TAKEOFF

All Weights	CG POSITION (% MAC)										
	7	9	11	13	15	17	19	21	23	25	27
Flap 1	-6.0	-6.0	-5.5	-5.0	-5.0	-4.5	-4.0	-3.5	-3.0	-3.0	-2.5
Flap 2	-6.0	-6.0	-5.5	-5.0	-4.5	-4.0	-3.5	-3.5	-3.0	-2.5	-2.0
Flap 4	-6.0	-5.5	-5.0	-4.5	-4.0	-3.5	-3.0	-2.5	-2.0	-1.5	-1.0

-----SHORTLY BEFORE PUSHBACK & START UP-----

- Doors and Windows CLOSED LSP & RSP
 Verify that the cockpit door is closed and locked, the cockpit windows are closed and check all airplane doors closed indications on MFD status page.
- Red Beacon ON LSP
- Electric Hydraulic Pump Sys 3A..... ON LSP
- Ground Equipment AS REQUIRED LSP & RSP
- Emergency/Parking Brake..... AS REQUIRED LSP
 Verify if the Emergency/Parking brake is set in accordance with the engine start procedures.
- Steering Disengage Switch PRESS..... LSP
 If a pushback is to be performed simultaneously with the engine start, press and release the steering disengage switch to disengage the nosewheel steering even if the message STEER OFF is presented on the EICAS.
- Power Up Procedure.....CONFIRM
 COMPLETED

ENGINE START

- NOTE:**
- Normally LSP starts both engines – one at a time.
 - Engine start can be done simultaneously with push back, requiring the parking brake released and disengagement of the steering (verify EICAS message STEER OFF). In case of a static engine start be sure that the parking brake is set.
 - Check if the jet way and stairs are removed and the doors are closed.
 - Obtain ATC and ground clearance.
 - Confirm nose gear green light prior to start pushback.

Associated Start Stop Selector..... START, then RUN.....LSP

Engine Parameters..... MONITOR LSP & RSP

Repeat the sequence for the other engine.

ABNORMAL ENGINE START INDICATIONS

Although FADEC provides automatic ITT over-temperature protection on ground and will automatically abort the start in the event of a hot start or hung start, it is the Captain's responsibility to monitor engine parameters and manually abort the start in the cases described below:

- N_1 and/or N_2 failing to accelerate to stable idle speed (hung start).
- N_1 rotation is not confirmed or decreases.
- ITT rapidly increasing or exceeding start limit (815°C - Hot Start).
- No ITT indication within 5 seconds (on ground) or 30 seconds (in flight) after fuel is applied.
- If oil pressure stabilizes below the engine minimum limits.
- No positive oil pressure 10 seconds after N_2 indication.
- An intermittent electrical pneumatic or starter malfunction occurs before the starter disengagement.

NOTE: In case an automatic abort occurs, its cause must be investigated and corrected before further attempts to start.

The Captain must call for the ENGINE ABNORMAL START checklist.

ENGINE START - ACTIONS and CALLOUTS		
ENGINE START SEQUENCE	LSP	RSP
	“STARTING ENGINE 2 (1)” Turn the start selector to START momentarily and release it to RUN.	
	- Check N2 rising – “N2”. - Start Clock.	Check N2 rising.
	- Monitor IGN A (B) - At 7% N2: “IGNITION” - Fuel flow at approximately 20% N2: “FUEL”	- Start Clock with fuel flow indication and verify ITT rise within 5 seconds. “ITT” or “NO ITT”
	- Make sure that N2 and N1 accelerate normally: “N1”. - Check that positive oil pressure is indicated in 10 seconds after N2 indication: OIL PRESSURE - The LSP must keep his hand on the START selector to abort the engine start if necessary.	Verify the annunciation IGN A (B) goes out at approximately 50% N2.
	Verify that the engine stabilizes at idle, stop clock and call out “STABILIZED”.	

NOTE: Callouts are shown in bold text.

ENGINE GROUND PNEUMATIC START

It is recommended to start the engine 2 first. Consider an engine crossbleed start to avoid hazard to the ground personnel.

BEFORE START

PACKS PUSHED OUT

Before connecting the ground pneumatic cart, the packs must be pushed out in order to avoid any cabin air contamination.

Minimum duct pressure 33 PSI

The minimum bleed duct pressure is 33 minus 0.5 psi for each 1000 ft above sea level. With the ground cart connected, check on ECS status page (MFD) the required minimum bleed duct pressure.

AFTER START

PACKS PUSHED IN

ENGINE CROSSBLEED START

ON GROUND

Operating Engine Thrust Lever ADVANCE AS
REQUIRED

The minimum bleed duct pressure is 33 minus 0.5 psi for each 1000 ft above sea level. Check on ECS status page (MFD) the required minimum bleed duct pressure.

Engine Start..... ACCOMPLISH

AFTER CROSSBLEED START

Thrust Levers AS REQUIRED

MANUAL STARTER VALVE OPERATION

ENGINE START

Accomplish an engine start with the following differences:

Prior to turning the start selector to START coordinate with the ground crew to keep the Starter Control Valve (SCV) in open position.

When N2 reaches 50% ask the ground crew to close the SCV.

SECOND ENGINE START

The start should be preferably performed with the airplane static. Paying attention to the engine start while taxiing may lead to distractions and dangerous situations.

AFTER START

N1 Target CHECK RSP

The N1 target indication on the EICAS must be equivalent to the N1 target indication available via performance calculation.

APU AS REQUIRED LSP

Set APU ON or OFF according to the electrical and pressurization systems. APU should remain ON for flights shorter than 30 minutes.

Ground Equipment REMOVED LSP & RSP

Slat/Flap SET__ RSP

Adjust slat/ flap to a setting consistent with the intended takeoff configuration and performance. The position is from 1 to 4, provided by the runway analysis, and must be indicated on the EICAS.

Autobrake (if installed) RTO LSP

Flight Controls CHECK LSP & RSP

Check ailerons and elevator for free travel and check the rudder moving the pedals from full right to full left while pressing the steering handle.

NOTE: - LSP should select MFD Flight Control Synoptic Page and check the ailerons and elevator for free travel, check the rudder by moving the pedals from full left to full right while pressing the steering handle.

- The LSP should select MAP on the MFD prior to starting the taxi.

AFTER START- ACTIONS and CALLOUTS		
AIRPLANE STOPPED	LSP	RSP
	“FLAPS __, FLIGHT CONTROLS CHECK”.	Move flap lever to the desired position and verify EICAS indication. “FLAPS __ SET”.
	- Select the Flight Controls Synoptic Page on MFD. - LSP checks the flight controls before taxi. RUDDER, AILERON and ELEVATOR should be checked for free travel to their full deflection stops. Hold and push down steering handle when checking the RUDDER. - Selects MAP on MFD.	- Check flight controls free travel to the fully deflected position on the MFD synoptic page and call out any discrepancy. - RSP must perform a rudder check following the LSP movement.
	Verify left side of the airplane. “LEFT SIDE CLEAR”.	Verify right side of the airplane. “RIGHT SIDE CLEAR”.
	- Taxi lights (nose and side) ON. - After brake release checks the normal brakes.	

NOTE: Callouts are shown in bold text.

ALTIMETER SETTING AND CHECKING

ACCURACY CHECKS AND IN-FLIGHT TRANSITIONS

Altimeters should be checked for correct setting and accurate indications both on ground and in flight as described by specific regulations and checklists.

LSP is responsible for adjusting the stand-by altimeter. This is simply required, not to distract PF from his duties.

Both pilots are responsible for cross-checking indications of all three altimeters. Acceptable deviations are described in ICAO Doc.8168 and the appropriate operation manual.

Whenever a change of altimeters setting is required, cross-checking indications is necessary. PF is supposed to adjust his altimeter first, while PNF is responsible for monitoring attitude, other basic parameters of flight, outside lookout and monitoring of PF action. After completion of altimeter adjustment made by PF and reporting this, PNF commences his altimeters adjustment, while PF shall watch attitude, other basic flight parameters, check the outside if possible and monitor action of PNF.

Both pilots are required to visually check the reference setting (1013 or QNH) of remaining pressure altimeters.

NOTE: The idea of this procedure is to prevent both pilots from focusing on altimeters at the same moment and forgetting about flying the airplane.

During climb change of altimeters setting shall be initiated when passing Transition Altitude.

On descent change of altimeters setting should be initiated when cleared to descend to certain altitude according to the ATC clearance, not later however than when passing Transition Level.

Changes in altimeters setting is a transition phase on climb/descent and is announced by PNF calling: TRANSITION. PF response is call-out: ALTIMETERS, then the crew starts to change altimeters setting.

QFE AS REFERENCE

Basically, QNH is used as a reference to determine the aircraft vertical position below Transition Altitude when climbing and Transition Level when descending. Some countries however use QFE instead of QNH.

It must be treated as company policy to set the QNH on all available pressure altimeters and ensure that the aircraft is flying on the altitude equivalent to the assigned height. To do this, some simple conversions may be necessary.

On all JEPPESEN Instruments Approach Charts, where QFE is indicated as a reference, the ALT/HEIGHT CONVERSION table is presented to find proper altitude easily. If the QNH is not available from ATIS or ATC, it shall be calculated based on the airport elevation and given QFE. The airport elevation is available on the Airport Chart. This elevation may be converted to hPa using a conversion table from JEPPESEN TABLES AND CODES Chapter. The correction based on Elev, found in JEPPESEN TERMINAL Chapter, with given QFE results in QNH to be used by the crew. That QNH shall be cross-checked with the QNH from the latest METAR that must be available on board.

The importance of using the QNH instead of QFE is associated with EGPWS Terrain Caution And Warning feature. It is operational only with QNH. If QFE is used for the approach, this function must be deselected. Otherwise false alerts may be generated.

Since EGPWS Terrain Caution And Warning feature helps in avoiding CFIT accidents/incidents, this system must be used to the most extent.

ALTIMETER SETTING TO STATION PRESSURE

QNH TO PRESSURE ALTITUDE

QNH		CORRECTION TO ELEVATION FOR PRES. ALT. (FT)
IN HG	HPA	
28.81 to 28.91	976 to 979	1000
28.92 to 29.02	980 to 983	900
29.03 to 29.12	984 to 986	800
29.13 to 29.23	987 to 990	700
29.24 to 29.34	991 to 994	600
29.35 to 29.44	995 to 997	500
29.45 to 29.55	998 to 1001	400
29.56 to 29.66	1002 to 1004	300
29.67 to 29.76	1005 to 1008	200
29.77 to 29.87	1009 to 1012	100
29.88 to 29.97	1013 to 1015	0
29.98 to 30.08	1016 to 1019	-100
30.09 to 30.19	1020 to 1022	-200
30.20 to 30.30	1023 to 1026	-300
30.31 to 30.41	1027 to 1030	-400
30.42 to 30.52	1031 to 1034	-500
30.53 to 30.63	1035 to 1037	-600
30.64 to 30.74	1038 to 1041	-700
30.75 to 30.85	1042 to 1045	-800
30.86 to 30.96	1046 to 1048	-900
30.97 to 31.07	1049 to 1052	-1000

Example: Elevation = 2000 ft

QNH = 29.60 in Hg

Correction = 300 ft

Pressure Altitude = 2300 ft

QFE TO STATION PRESSURE

QFE		PRESSURE ALTITUDE (ft)	QFE		PRESSURE ALTITUDE (ft)
in Hg	hPa		in Hg	hPa	
31.01	1050	-989	25.55	865	4313
30.86	1045	-856	25.40	860	4468
30.71	1040	-723	25.25	855	4625
30.57	1035	-589	25.10	850	4781
30.42	1030	-454	24.96	845	4939
30.27	1025	-319	24.81	840	5097
30.12	1020	-184	24.66	835	5257
29.98	1015	-48	24.51	830	5417
29.83	1010	89	24.36	825	5579
29.68	1005	227	24.21	820	5740
29.53	1000	364	24.07	815	5903
29.38	995	503	23.92	810	6065
29.23	990	641	23.77	805	6230
29.09	985	781	23.62	800	6394
28.94	980	921	23.48	795	6561
28.79	975	1062	23.33	790	6727
28.64	970	1202	23.18	785	6895
28.50	965	1344	23.03	780	7063
28.35	960	1486	22.89	775	7233
28.20	955	1630	22.74	770	7402
28.05	950	1773	22.59	765	7574
27.91	945	1918	22.44	760	7745
27.76	940	2062	22.30	755	7920
27.61	935	2208	22.15	750	8095
27.46	930	2353	22.00	745	8269
27.32	925	2500	21.85	740	8442
27.17	920	2647	21.71	735	8619
27.02	915	2796	21.56	730	8796
26.87	910	2944	21.41	725	8975
26.73	905	3094	21.26	720	9154
26.58	900	3243	21.12	715	9335
26.43	895	3394	20.97	710	9516
26.28	890	3545	20.82	705	9699
26.14	885	3698	20.67	700	9882
25.99	880	3850	20.53	695	10068
25.84	875	4004	20.38	690	10253
25.69	870	4157	20.19	685	10439

GEOMETRIC HEIGHT TO PRESSURE HEIGHT

Pressure altimeters are calibrated to indicate true altitude under International Standard Atmosphere (ISA) conditions. Any deviation from ISA will therefore result in an erroneous reading on the altimeter. When the temperature is higher than ISA, the true altitude will be higher than the figure indicated by the altimeter. When the temperature is lower than ISA, the true altitude will be lower than the figure indicated by the altimeter. The altimeter error may be significant under conditions of extremely cold temperature (ICAO PANS-OPS Vol I 3.5.4.5.2).

AERODROME TEMP. (°C)	HEIGHT ABOVE THE ELEVATION OF THE ALTIMETER SETTING SOURCE						
	(feet)						
	(ft)	200	300	400	500	600	700
0	0	20	20	20	20	20	40
-10	20	20	40	40	40	60	60
-20	20	40	40	60	80	80	100
-30	40	60	60	80	100	120	140
-40	40	60	80	100	140	160	180
-50	60	80	100	140	160	200	220

AERODROME TEMP. (°C)	HEIGHT ABOVE THE ELEVATION OF THE ALTIMETER SETTING SOURCE (feet)							
	(ft)	900	1000	1500	2000	3000	4000	5000
	0	40	40	60	80	120	160	200
-10	80	80	120	160	240	320	400	
-20	100	120	180	240	360	500	620	
-30	160	160	260	340	500	680	860	
-40	200	220	320	440	660	880	1100	
-50	240	280	400	540	820	110	1380	

The tables above are based on an aerodrome elevation of 2000 ft. However, they can be used operationally at any aerodrome elevation.

Example:

Airport Elevation: 1500 ft

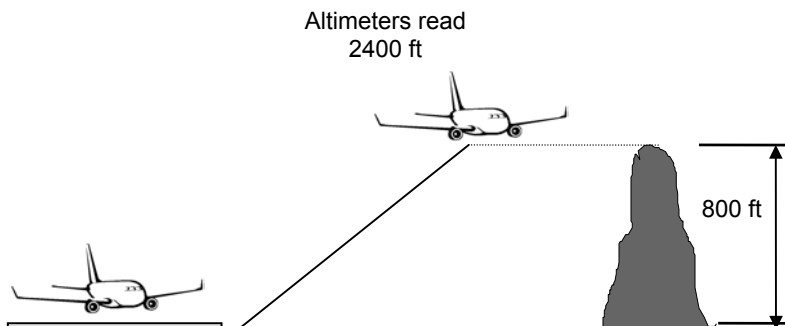
Airport Temperature-20 °C

Obstacle Height above airport elevation.....800 ft

Altimeter adjusted to airport QNH (on ground altimeter reads 1500 ft).

Refer to table at 800 ft and -20 °C and read 100 ft.

Therefore, when the airplane reaches the obstacle geometric height, the altimeter will read $1500 + 800 + 100 = 2400$ ft.



Elevation = 1500 ft

T = -20 °C

Altimeters read 1500ft

ALTIMETERS MISCOMPARE TOLERANCE

The EMBRAER 170 Air Data System (ADS) relies on a total of four Air Data Smart Probes (ADSP's) and two Total Air Temperature probes (TAT's) to determine air total pressure, static pressure and total temperature. Three Air Data Applications (ADA's) compute this information to provide air data to PFDs and other airplane systems. IESS (Integrated Electronic Standby System) performs both the functions of computing air information and presenting air data to flight crew.

There are four ADSs, which interact with the flight crew. In normal operation, ADS 1 provides information to the captain's PFD, ADS 2 provides information to co-pilot's PFD and ADS 3 is the backup source for both PFDs whereas ADS 4 is the IESS.

Differences between pilot and co-pilot altitude readings may occur due to a number of reasons. Altitude, airspeed, airplane configuration and the ADSPs' locations influence the altitude reading miscompare. As long as the miscompare is within a certain tolerance, it is acceptable.

To verify if altimeter difference is within tolerance, the flight crew should proceed as follows:

Altitude STABILIZE

Maintain variation within +/- 50 ft.

Air Speed STABILIZE

Maintain variation within +/- 5 kt.

Wait a minimum of 15 seconds in straight and leveled flight, preferably with Autopilot engaged, to compare the difference between altitudes using the following table:

AIRCRAFT ALTITUDE	MAXIMUM DIFFERENCE BETWEEN ALTITUDES (1)
	ADS 1 to ADS 2
	ADS 1 to ADS 3/IESS (2)
	ADS 2 to ADS 3/IESS (3)
ft	ft
-2000 up to 10000	50
10000 up to 20000	120
20000 up to 41000	180

NOTE: These are comparative, not absolute values.

- Message ADS 3 (4) SLIPCOMP FAIL must not be displayed.
- ADS 3 and IESS use the same pressure sensors. Comparison between them is not applicable.

If a difference above the tolerance is noticed, report to the maintenance personnel.

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TAXI, TAKEOFF AND CLIMB

TAXI

Before taxiing, the pilots' seats and rudder pedals should be adjusted so that it is possible to apply maximum braking with full rudder deflection.

Before taxiing, the crew must check if no obstacles prevent the aircraft movement and receiving the CLEAR TO TAXI signal from ground staff. This must be confirmed by the CAPT's call: CLEAR ON THE LEFT and associated FO's call: CLEAR ON THE RIGHT. The same method shall be used when crossing an active runway and in any other situation when one of the pilots gives this CLEAR call.

When crossing an active runway, strobe lights must be selected ON and when the runway is vacated they shall be switched OFF.

When taxiing, the airplane is controlled by the CAPT, but the FO must pay close attention to the traffic around. If the situation so requires, the FO shall brake the airplane to avoid collision - this is why the FO shall keep his feet on the brake pedals during the whole taxi.

Taxiing Lights..... ON LSP

Do not start taxiing before receiving confirmation from the ground crew that the airplane is free to taxi. Then, acknowledge and switch OFF the cockpit dome lights.

The taxiing light must be ON whenever the airplane is taxiing.

Cabin Report.....RECEIVED

This item is checked after the cabin attendant has reported that the cabin is ready for departure.

SINGLE ENGINE TAXIING

A single engine start can be applied in order to save fuel, delaying the start of the second engine prior to takeoff and/or shutting off one engine after landing when taxiing in.

Some consideration should be given to evaluate the viability of this procedure, such as:

- Ramp gradient: positive ramp gradients demand more power.
- Ramp weight: heavier aircraft demand more power.
- Taxi time to active runway.

NOTE: - If shutting down engine 2 for the single engine taxi, switch the Electric Hydraulic Pump System 2 Selector Knob to the ON position, before shutting down the engine.

- The Electric Hydraulic Pump 2 should be kept on for at least 30 seconds after engine shutdown.
- When appropriate, turn Electric Hydraulic Pump 2 Selector Knob back to auto.

TAXING TECHNIQUE

After brake release check normal brakes.

Taxing can normally be initiated without increasing thrusts at light and medium weights. Do not use large amount of thrust to avoid FOD.

Do not maintain brakes partially applied during taxi to control the speed, let the airplane accelerate and reduce speed with a steady brake application. This technique reduces brake temperature and increase brake life.

Recommended taxi speed:

- Straight/DRY: 20 kts
- Straight/WET or CONTAMINATED: 10 kts
- Turns/DRY: 8 kts
- Turns/WET or CONTAMINATED: 5 kts

Taxing Light:

- Aircraft in movement – ON (LSP)
- Aircraft stopped – OFF (LSP)

The EMBRAER 170 cockpit concept was designed to reduce workload during taxi operations, but the process of getting to and from a runway has becoming increasingly complex, due to increased traffic and expansion of complex runways and taxiways at many airports.

The cockpit workload can be reduced if flight crew plan taxi operations and be alert when pre-taxi briefing differs from ATC instructions.

Pilots should use airport diagrams, check all chart notes, write down taxi instructions, use standard phraseology and read back ATC instructions.

ATC should be contacted anytime there is a concern about a potential conflict.

Flight crews should minimize “heads-down” activities such as entering data into the FMS, while the aircraft is moving.

BEFORE TAKEOFF

Takeoff Configuration CHECK RSP

Press the T/O CONFIG button and the "TAKEOFF OK" synthetic message shall be heard.

Brake Temperature CHECK LSP

RSP selects Status Page on MFD then MAP.

Brake temperature indication must be in the green range for takeoff.

EICAS CHECK LSP

Check:

- No Warning and Caution EICAS messages displayed.
- Thrust Rate Mode (TO-1, TO-2).
- ATTCS ON or OFF.
- FLEX TEMP (___ °C).

Cabin Crew ADVISE LSP

After receiving the "Cabin OK" report from the Purser, the LSP confirms this by turning FST BELTS switches OFF-ON twice.

Transponder TA/RA RSP

A/T ARM LSP

Strobe Lights ON RSP

Landing Lights ON LSP

NOTE: Landing lights should be turn on after takeoff clearance.



TAKEOFF

Thrust Levers TO/GA.....PF

Engine Parameters..... MONITOR PNF

At V_R rotate the airplane following the flight director guidance.

In case of flight director is inoperative, rotate the airplane according to following table:

FLAP POSITION	1	2	4
PITCH ANGLE	11°	10°	12°

With positive rate of climb:

Landing Gear UP PNF

Minimum Airspeed $V_2 + 10$ PF

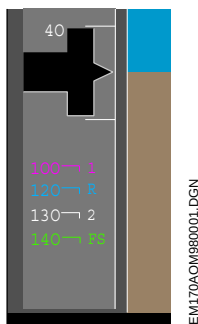
TAKEOFF TECHNIQUE

When the airplane is lined up and ready for takeoff, the CPT will arm the A/T. Equal power settings should be verified before releasing the brakes, especially on slippery runways. The A/T system will engage automatically when both throttles have been advanced beyond 50° TLA.

In case the RSP is the PF, he will remove his hand from throttles after T/O thrust has been checked. The LSP is always responsible for aborting the takeoff and will always hold the throttle levers from the moment takeoff thrust has been reached until V_1 is announced.

All abnormalities as foreseen in the SOP Emergency/Abnormal procedures must be called out in a loud and clear voice.

If the LSP decides to abort the T/O he must call out "REJECT, MY CONTROL"; if he decides to continue he must call out "CONTINUE".



SPEED READOUTS AND BUGS

Four speeds are displayed prior to takeoff:

V_1 1 MAGENTA

V_R R CYAN

V_2 2 WHITE

V_{FS} FS GREEN

Flight Director guidance must be used in all takeoffs.

CROSSWIND TAKEOFF

The EMBRAER 170 has a good crosswind control capability during takeoff. There is no special related procedure, just maintain directional control using positive rudder and small control wheel inputs.

Runway alignment and smooth symmetrical thrust application are quite important, especially when operating on contaminated runways.

Large control wheel inputs (more than 4° control wheel displacement) can increase drag due to spoiler extension.

Maintain wings level throughout the takeoff roll by control wheel into the wind. This control wheel input will decrease as speed increases.

NOISE ABATEMENT

There are different procedures for noise abatement, and the items listed below are just a guide to help pilots perform a takeoff with noise reduction:

- Set speed required for the procedure on Speed Selector Knob.
- Fly the airplane manually and select a Flight Director Vertical Mode when takeoff thrust is no longer required.
- At assigned altitude set 210 knots on Speed Selector Knob and retract flaps on schedule.
- If an engine failure occurs, the noise abatement procedure should be terminated. In this case an engine failure procedure and profile should be performed.

TAKEOFF – ACTIONS and CALLOUTS		
	PF	PNF
Airplane on the runway	- Advances thrust levers to 40% N1 to allow engines' stabilization. - Moves the throttles to the TOGA detent. "CHECK THRUST". (1)	- Verifies that the N1 reached is the target N1 and the engine parameters are normal. "THRUST CHECKED" - Verify that ATTCS is armed ATTCS ARMED". {2}
As soon as the speed tape starts indicating speed		"SPEED ALIVE"
Airplane accelerates past 80 KIAS	"XCHECKED".	"80 KT, THROTTLE HOLD".
Airplane passes V ₁ and V _R		"V1". "ROTATE".
Positive Rate of Climb	Confirm positive rate of climb. "GEAR UP".	- Verifies positive rate of climb. "POSITIVE RATE". - Positions gear lever up.
At 400 ft AFE	"HDG/NAV SELECT"	"400". Select Lateral Mode
At acceleration Altitude between 800 and 1500 ft AFE	"CLIMB SEQUENCE". (3)	"ACCELERATION ALTITUDE". - Selects FLCH. - Selects 210 Knots. - Retracts flaps on schedule. "FLAP ZERO".

(Continued)

TAKEOFF – ACTIONS and CALLOUTS

Transition altitude	PF	PNF
	“ALTIMETERS”	“TRANSITION ALTITUDE”
	Both pilots set altimeters and x-check	
	“AFTER TAKE OFF CHECKLIST”	• Read in silence “AFTER TAKEOFF CHECKLIST COMPLETED”
FL 100	LSP: • External lights off • Fasten belts as required	“FL 100” and check in silence: • CAB pressure, altitude. • Passenger signs. • Altimeters STD. • External lights off (expect NAV, STROBE, and RED BCN). • APU – as required. • FUEL “FL 100 CHECK”

- NOTE: 1)** When the PF is the RSP, after both engines' parameters, have been established, the thrust levers are taken over by the LSP and the LSP calls out: “MY THROTTLES”; The RSP responds: “YOUR THROTTLES”. The LSP must keep his hand on throttles until V_1 is reached;
- 2)** Takeoff with ATTCS OFF is prohibited;
- 3)** At airports when “NOISE ABATEMENT TAKEOFF A” is required at 1500 ft AFE: select FLCH and maintain V_2+10 kt until 3000 ft AFE and set speed as required to retract flaps.

Callouts are shown in bold text.

Upon passing Acceleration altitude the PF shall call for “CLIMB SEQUENCE” which comprises:

- PNF selecting FLCH.
- PNF selecting and verifying speed 210 knots.
- PNF retracting the flaps on schedule.

The After Takeoff checklist should be done upon flap retraction or at transition altitude.

All the actions of the After Takeoff Checklist are to be performed before the checklist is called by the PF.

The After Takeoff Checklist should be read in silence by the PNF.

Upon completing the After Takeoff Checklist he must call out:

“AFTER TAKEOFF CHECKLIST COMPLETED”.

During climbing or descending at 1000 fi below/above assigned altitude/flight level:

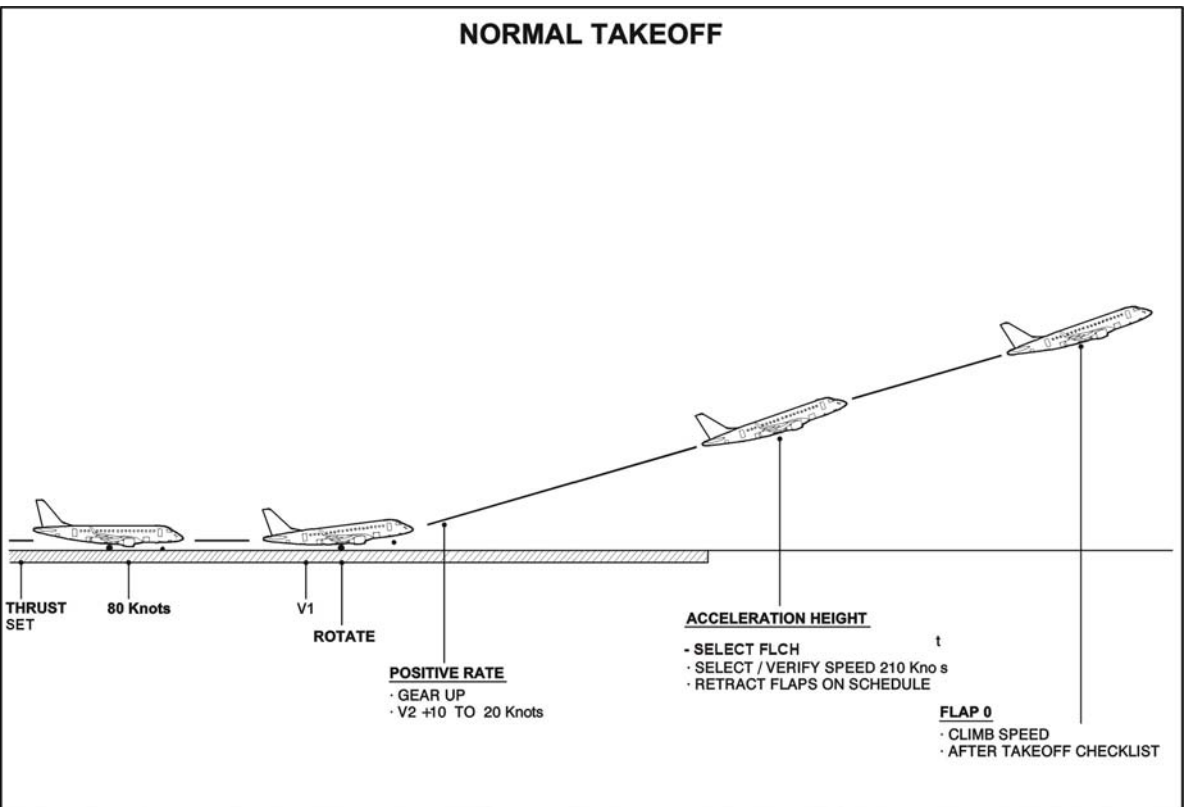
ACTIONS and CALLOUTS		
	PF	PNF
1000 ft below/above assigned altitude / flight level	“CHECK”	“1000 TO LEVEL OFF”

NOTE: Callouts are shown in bold text.

The recommended Climb Speeds are as follows:

- The recommended normal enroute climb speeds is:
 - Up to 10000 ft: 250 kt.
 - From 1000 ft to 12000 ft the speed increases linearly from 250 kt to 290 kt.
 - Between 12000 ft and 25400 ft: 290.
 - For an altitude grater than 25400 ft: Mach 0,70.
- The recommended maximum angle of climb speed is V_{FS} .
- The recommended maximum rate of climb speed is $V_{FS}+50$ kt / Mach 0,60.

PROFILES



AFTER TAKEOFF

Landing Gear CHECK PNF

Command landing gear up and confirm the three white UP indications on the EICAS.

Air Conditioning & Press CHECK PNF

Check for the proper air conditioning setting and parameters.

APU AS REQUIRED PNF

Set the APU ON or OFF according to the electrical and pressurization systems. APU should remain ON for flights shorter than 30 minutes.

Slat/Flap 0 PNF

Select slat/flap up following the flap retraction speed reference indication. For airplanes without this indication, select Slat/Flap up according to the following flap retraction schedule:

T/O SLAT / FLAP	SELECT SLAT / FLAP at SPEED			
	3	2	1	0
4	$V_2 + 10$	$V_2 + 20$	$V_2 + 30$	$V_2 + 50$
2			$V_2 + 10$	$V_2 + 30$
1				$V_2 + 20$

Altimeters SET & X-CHECK PF & PNF

Set the altimeters to standard (as required by local regulations). The IESS altimeter must be set also.

After the check list is finished the PNF must call out: "AFTER TAKEOFF CHECK LIST COMPLETED".

-----Above FL 100-----

External lights OFF LSP

Upon passing 10000 ft AFE switch off the external lights, except NAV, STROBE and RED BCN.

No Smoking AS REQUIRED PNF

Verify in accordance with local regulations.

Fasten belts AS REQUIRED PNF

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NOISE ABATEMENT

Many airports publish noise abatement procedures for departing aircraft. They are not to be used in a missed approach. Also, it is vital to remember that the noise abatement procedures are designed for normal departures. In case of any emergency, the crews are not required to follow them but act according to the situation.

In general, these procedures are designed as Type A and Type B - refer to ICAO DOC 8168 for details. For practical reasons, both procedures have been adopted to be applied by ERJ-170 crews as described below.

NOISE LEVELS

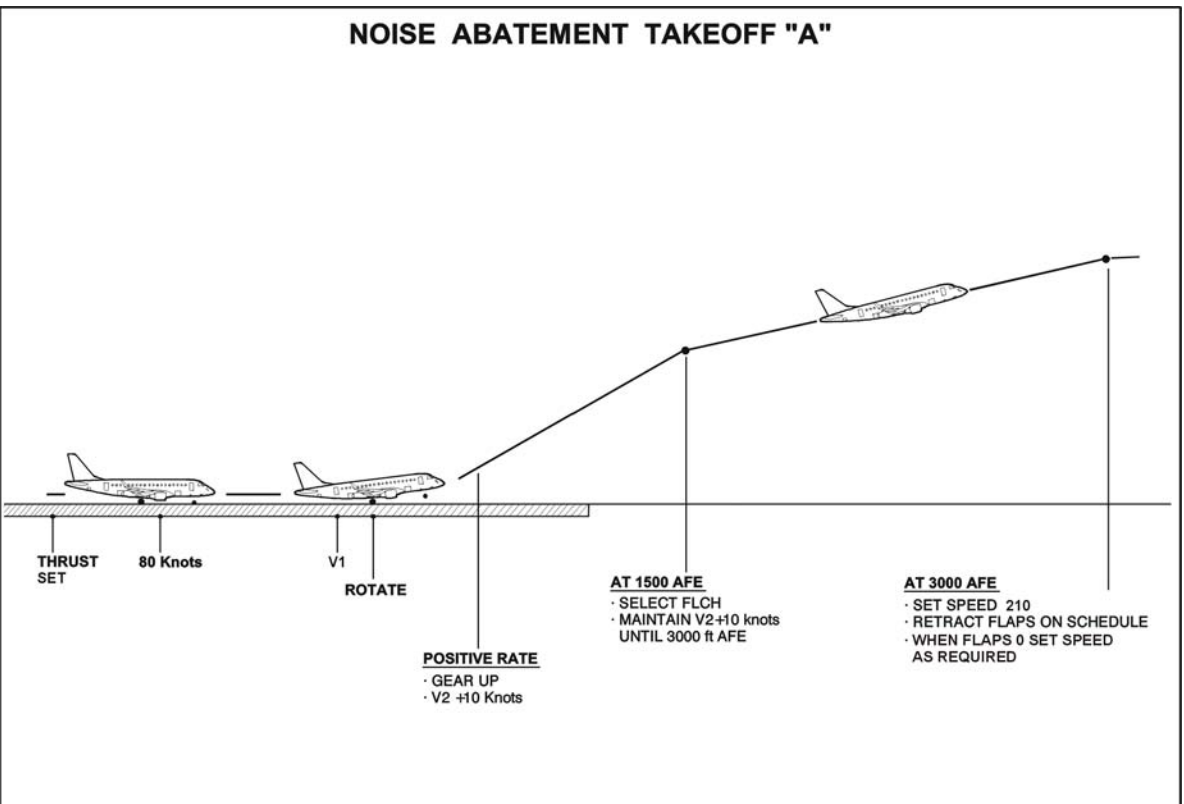
The following Effective Perceived Noise Levels (EPNL's) comply with, JAR 36 noise limits and were obtained by analysis of approved data from noise tests conducted under the provisions of ICAO Annex 16, Volume 1 Chapter 3 and JAR 36

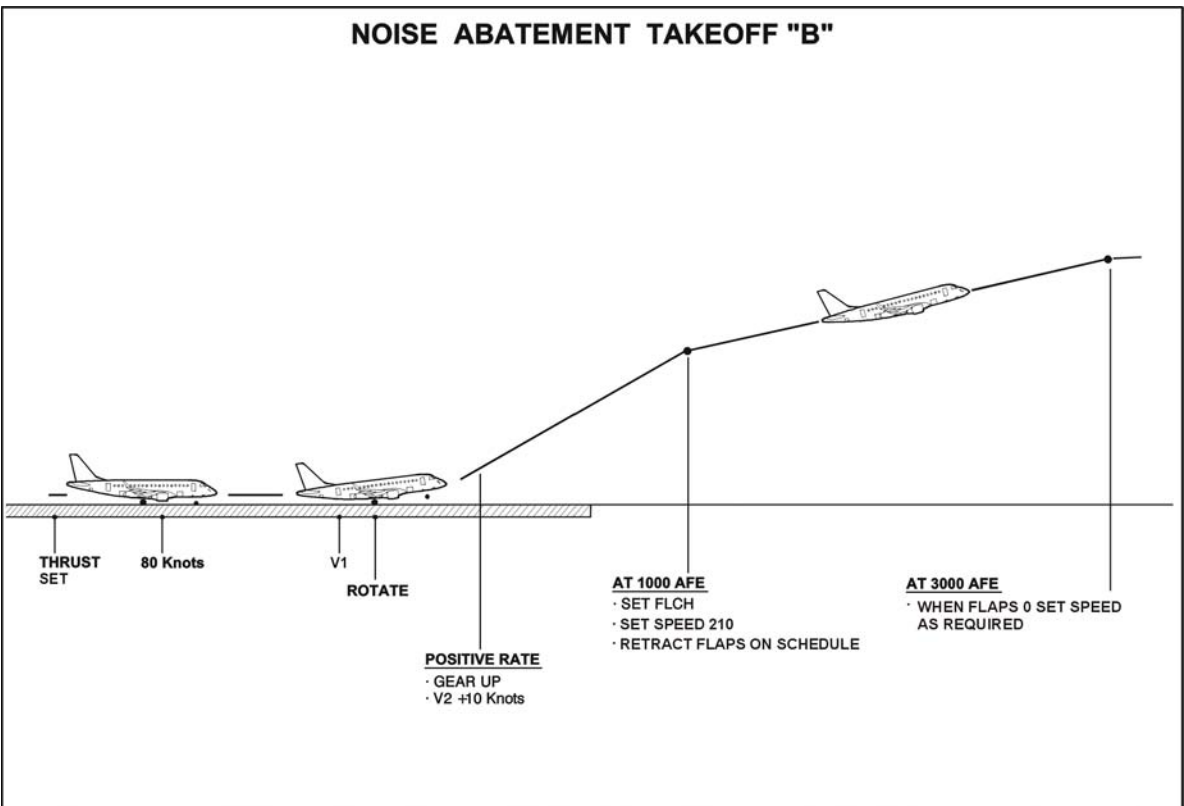
NOISE LEVEL IN EPNdb				
Airplane Model	Noise Level	CONDITION		
		Flyover	Lateral	Approach
EMBRAER 170 STD	Actual	83,0	92,3	94,9
	Maximum Allowable	89,0	94,1	98,1
EMBRAER 170 LR	Actual	84,1	92,3	94,9
	Maximum Allowable	89,0	94,2	98,2

Flyover, Lateral and Approach noise levels were established for the ERJ 170 equipped with two GE CF34-8E5 engines, with the chevron nozzle, at maximum takeoff weight, and all engines at maximum takeoff power setting and flaps 1. Approach noise levels were established from a 3° glide slope at the maximum landing weight r_{REF} , and flaps FULL.

NOTE: The flyover height is 2175 ft and 2041 ft for airplane models EMBRAER 170 STD and EMBRAER 170 LR, respectively.

No determination has been made by the Airworthiness Authority that the noise levels in this manual are or should be acceptable or unacceptable for operation at, into or out of any airport.





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CRUISE AND DESCENT

DESCENT

Approach Briefing..... COMPLETE PF & PNF

- It is recommended to perform the approach briefing before the start of descent.
- The items to be covered are: inoperative airplane components, weather at destination/alternate airports, fuel status/delays, runway conditions, low visibility procedures, terrain/MSA, descent profile and missed approach procedures.
- If any failure that affects the required landing distance occurs in the final approach, consider a missed approach in order to better evaluate the situation and an appropriate runway length. Failures that affect the landing distance are commonly
- A thorough understanding by the pilots of all the applicable approach charts and NOTAMS is essential, including taxi-in procedures.
- Both pilots should set RA/BARO minimums, pre-select radios and courses for the approach.
- With VNAV engaged select the Altitude Selector only to altitudes cleared by ATC.

Landing Data..... SET PF & PNF

- Verify on the PERF DATA page the expected landing weight. Select the LANDING page 3/3 on MCDU and set V_{REF} , V_{AP} , V_{AC} and V_{FS} .
- $V_{AP} = V_{REF} + \text{wind correction}$.
- Wind correction = $\frac{1}{2}$ steady headwind component + full gust increment.
- For Flaps FULL landing, the minimum wind correction is 5 KIAS and the maximum is 15 KIAS.
- For Flaps 5 landing, the minimum wind correction is 5 KIAS and the maximum is 20 KIAS.

DESCENT TECHNIQUE

For details see Operation Manual part A, 8.3.4

DESCENT SPEEDS

If the FMS speeds are in accordance with the desired the descent may be made on FMS speeds. Any change to these speeds must be made on the PERFORMANCE INIT page or on the PERF DESCENT page.

The recommended default descent speeds on the FMS are as follows:

- Between 41000 ft and the altitude to CAS/Mach transition: Mach 0.77.
- Between the altitude to CAS/Mach transition and 12000 ft: 290 knots.
- From 12000 ft down to 10000 ft the speed decreases linearly from 290 knots down to 250 knots.
- From altitudes lower than 10000 ft: 250 knots up to the deceleration to the approach speeds.

VNAV OPERATION

The FMS calculates the TOD based on the speeds and angle entered on the PERFORMANCE INIT page. The default angle is 3.0°. Any change can be made on the PERFORMANCE INIT page or PERF DESCENT page during the FMS initialization or in flight.

Approaching the TOD set the Altitude Selector to the cleared altitude and the FMS commands to descent upon reaching the TOD.

The FMS commands a VPATH descent unless a late descent is required or if the lateral mode is other than LNAV.

In VFLCH descents the altitude constraint may not be reached by the altitude constraint waypoint. VFLCH is similar to FLCH descents where the guidance is to maintain the selected speed with the engine thrust at idle.

In case of a late or early descent perform a vertical direct-to as follows:

- Set the altitude selector to the altitude cleared by ATC;
- Enter the direct-to altitude on the scratch pad and select it up on the right side of the desired waypoint. The FMS commands a descent if the selected altitude is equal to the one previously shown at the waypoint, if the selected altitude is a new one enter the new altitude on the scratch pad and select it again up on the right side of the desired waypoint.
- Press the ACTIVATE prompt;

If a holding pattern is entered on a VNAV descent the FMS transitions to VALT. To restart the descent set the altitude selector to a different altitude and press FLCH button on the Guidance Panel.

If the speed control is set to MANUAL the pilot is responsible for maintaining the proper speed limits and constraints. In this case is recommended to maintain the airspeed synchronized with the FMS speeds.

Under radar vector it is suggested to disengage VNAV and set Speed Selector Knob to MANUAL.

INITIAL DISTANCE TO DESCENT

Use this guidance when VNAV is not available.

The initial distance to descent can be found as follows:

If a descent angle of 3° is taken:

- Calculate the difference between actual flight level and the desired flight level. Divide this value by 10 and multiply by 3.

$$Dist = 3 \times \frac{FL_{Difference}}{10}$$

If descent is accomplished in idle:

1. Calculate the difference between actual flight level and the desired flight level. Divide this value by 10.
2. Multiply the value found in item 1 by 2 and add 15.

$$Dist = 2 \times \frac{FL_{Difference}}{10} + 15$$

NOTE: - For passenger comfort it is recommended to descent at 3° path.

- Deceleration from normal descent speed to 250 knots was considered.
- Deceleration segment and wind effects were not considered.

EXAMPLE:

Cruise flight level = 350.

Desired flight level = 070.

If a descent angle of 3° is taken:

$$Dist = 3 \times \frac{(350 - 70)}{10} = 84NM$$

If descent is accomplished in idle:

$$Dist = 2 \times \frac{(350 - 70)}{10} + 15 = 71NM$$

DISTANCE ON DECELERATION SEGMENT

Use this guidance when VNAV is not available.

The distance on deceleration segment can be found as follows:

If the segment is accomplished leveled:

- 1 NM for each 10 knots without speed brakes.
- 0.5 NM for each 10 knots with speed brakes.

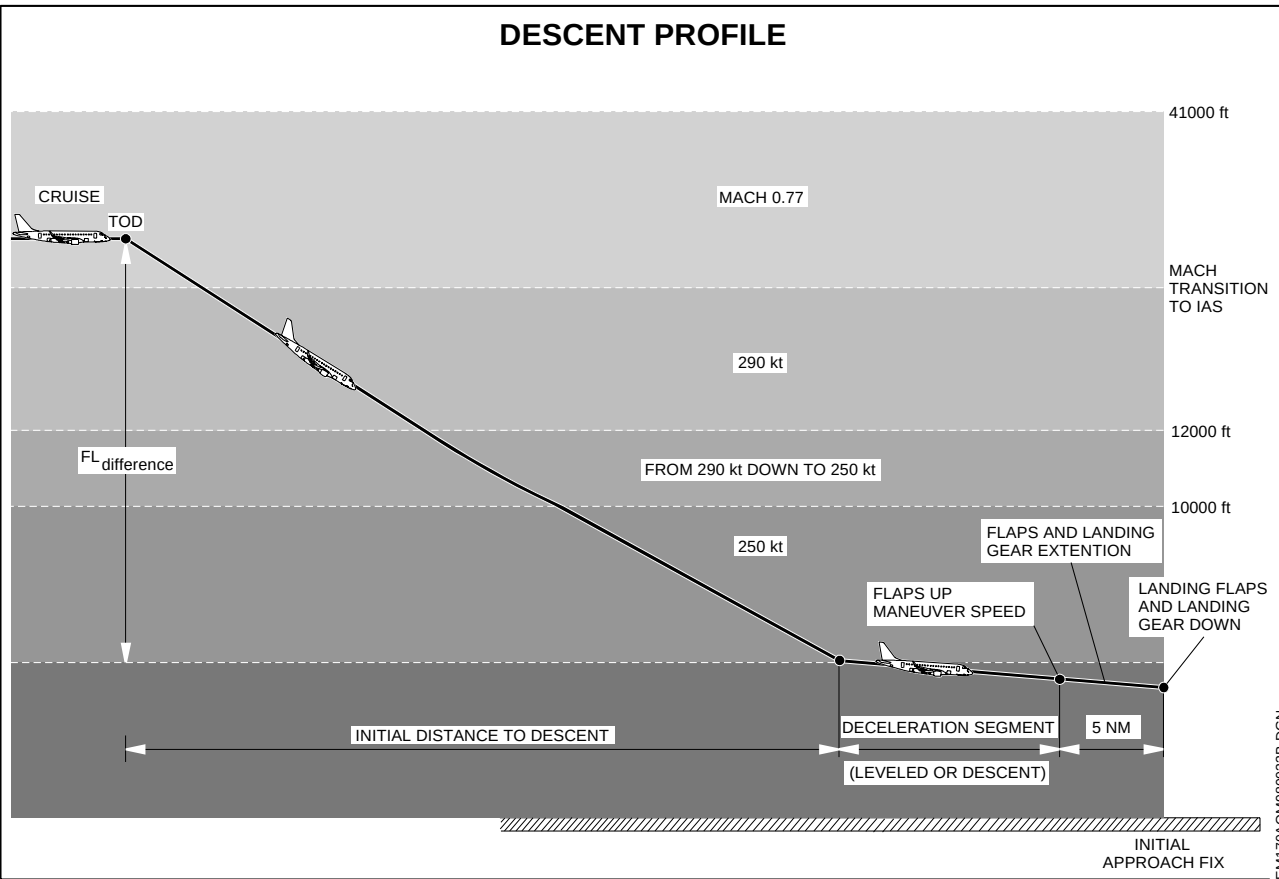
If the segment is accomplished with a rate of descent of 1000 ft/min:

- 2 NM for each 10 knots without speed brakes.
- 1 NM for each 10 knots with speed brakes.

In case of wind effects consider:

- Add 1 NM for each 10 knots of tailwind.

DESCENT PROFILE



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APPROACH AND LANDING PREPARATION

APPROACH

It is highly recommended to prepare for the approach and complete approach briefing before start of descent due to high workload in the descent/approach phase of flight. The approach briefing must be completed at the latest on descent and the landing data set by the crew.

Passenger Signs Panel SET LSP

Altimeters SET & XCHECK.....PF & PNF

If flight is being conducted in ICAO airspace, set the altimeters to QNH when passing the Transition Level. Otherwise, set as required by local regulations.

Autobrake (if installed) SET LSP

Approach Aids SET & XCHECK.....PF & PNF

- Verify that the frequencies and courses that were selected and pre-selected are correct for the intended approach. Ensure that both PFD's are displaying appropriate information.
- Also verify that the RA/BARO MINIMUMS alert (RA/DA) and the FMS are properly selected for the type of approach in use.

CAUTION: THE ASSIGNED ALTITUDE FOR A GO AROUND MUST BE SET TO AN ALTITUDE 400 FT OR HIGHER ABOVE FIELD ELEVATION.

DESCENT and APPROACH - ACTIONS and CALLOUTS		
FL 100	PF	PNF
	LSP: - External lights ON. - Fasten belts ON.	"FL 100".
Transition level	"SET ALTIMETERS" Sets and verifies altimeters. "APPROACH CHECKLIST" .	"TRANSITION LEVEL" . - Sets and verifies that all altimeters are set QNH /QFE. - Sets and verifies RA/BARO Minimums. - Check pre-selects final approach course. - Check pre-selects radios for approach. "APPROACH CHECKLIST COMPLETED" .
Approach: First positive inward motion of localizer	"RUNWAY HEADING"	"LOCALIZER ALIVE" or "RADIAL ALIVE" "LOCALIZER CAPTURED" Sets runway heading.
First positive motion of glide slope	"LANDING GEAR DOWN, FLAPS 3" "SET GO AROUND ALTITUDE"	"GLIDE SLOPE ALIVE" . - Sets Landing Gear down - Sets Flaps 3. "GLIDE SLOPE CAPTURED" . - Sets GA altitude.
Outer Marker or Equivalent Point	Check PFD. "CHECKED"	Verifies altimeters, instruments and flags. "OUTER MARKER, ___FT, QNH ___"/"___MILES, ___FT, QNH ___"
Between FAF and 1000 ft AFE	"FLAPS _____, BEFORE LANDING CHECKLIST"	- Sets flaps _____. - Performs the before landing checklist and calls. "BEFORE LANDING CHECKLIST COMPLETED"

(Continued)

DESCENT and APPROACH - ACTIONS and CALLOUTS (cont.)		
	PF	PNF
1000 ft AFE	“CHECKED” or correct if require.	Verifies instruments and flags. “1000 ft, STABILIZED” or “1000 ft, NOT STABILIZED”
Below 1000 ft AFE		- Callouts deviations if: - Airspeed (+10/-5 kt) - glide slope/localizer (1 dot) - rate of descent (>1250 fpm) - thrust at idle
500 ft AFE	“CONTINUE” or “GO AROUND, FLAPS____, CHECK THRUST” if not stabilized	“500 ft STABILIZED” or “500 ft NOT STABILIZED”
Approaching (DA) or missed approach point (Mapt)		“APPROACHING MINIMUM” “CONTACT” if established.
At DA/MDA – if visual reference is established at an adequate position for a safe landing by PF	“CONTACT” Proceed to landing	Call: “MINIMUMS” , “50” , “40” , “30” , “20” , “10” if not autocall.
At DA/Mapt – if no visual reference is established or visual contact is established at an inadequate position for a safe landing by PF	“GO AROUND, FLAPS____, CHECK THRUST” Perform the Go Around procedure as published	“MINIMUMS” if not autocall



BEFORE LANDING

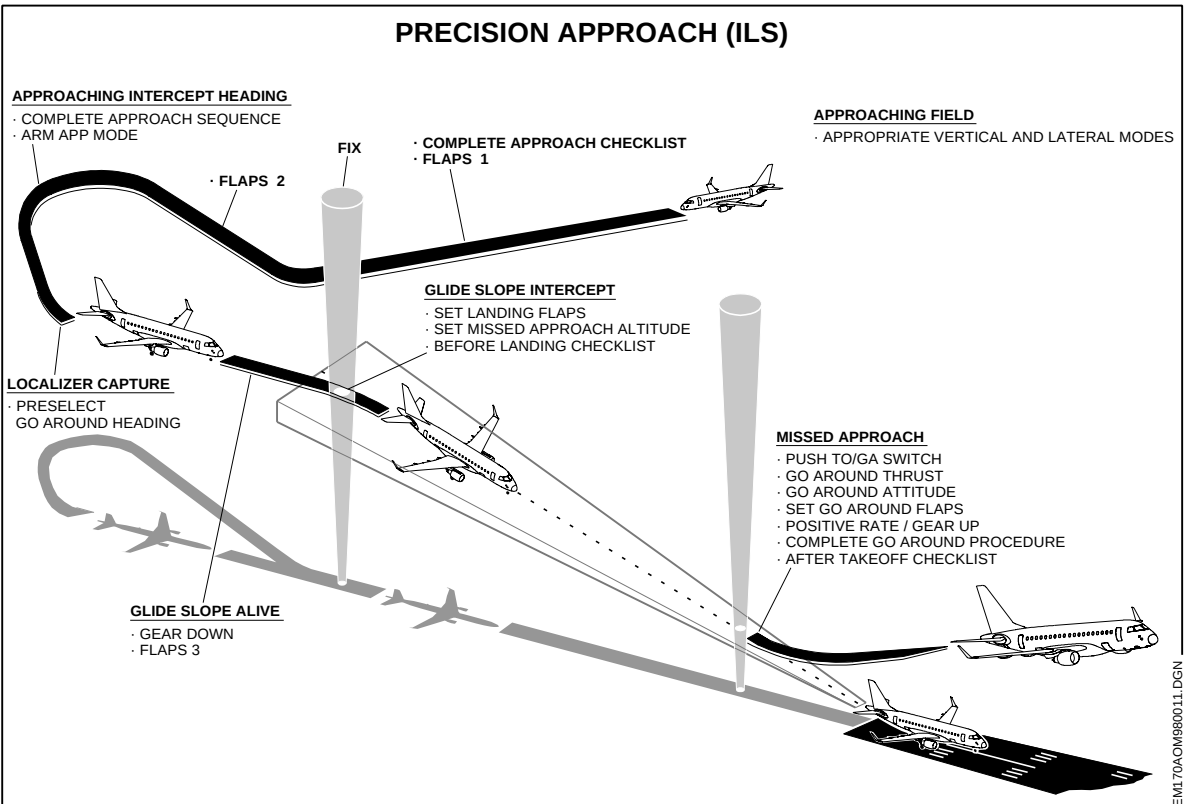
Landing Gear..... DOWN..... PNF
Slat/Flap SET__ PNF
Lights..... AS REQUIRED PNF

VFR APPROACH

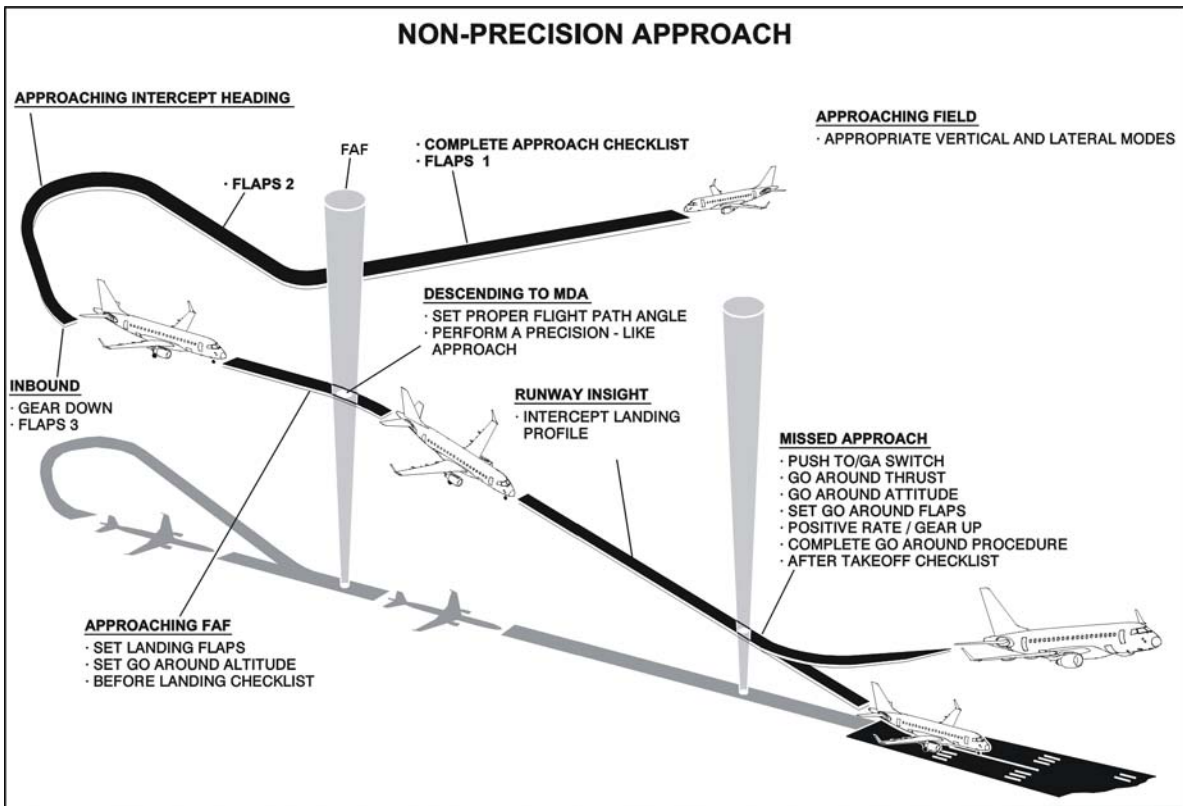
**PERFORM FLIGHTS ACCORDING TO VFR FLIGHT RULES FOR LOT
POLISH AIRLINES' AIRPLANES ACCORDING TO OPERATIONS
MANUAL PART A**

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INSTRUMENT APPROACH

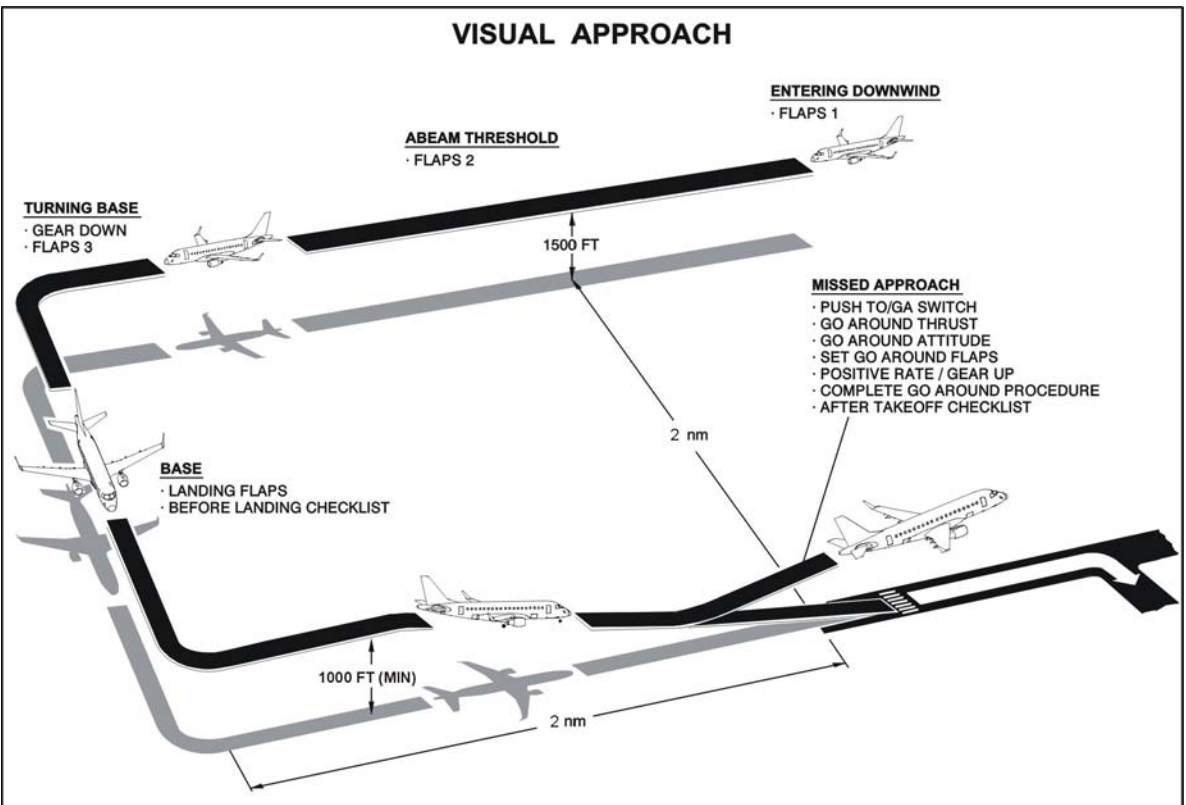


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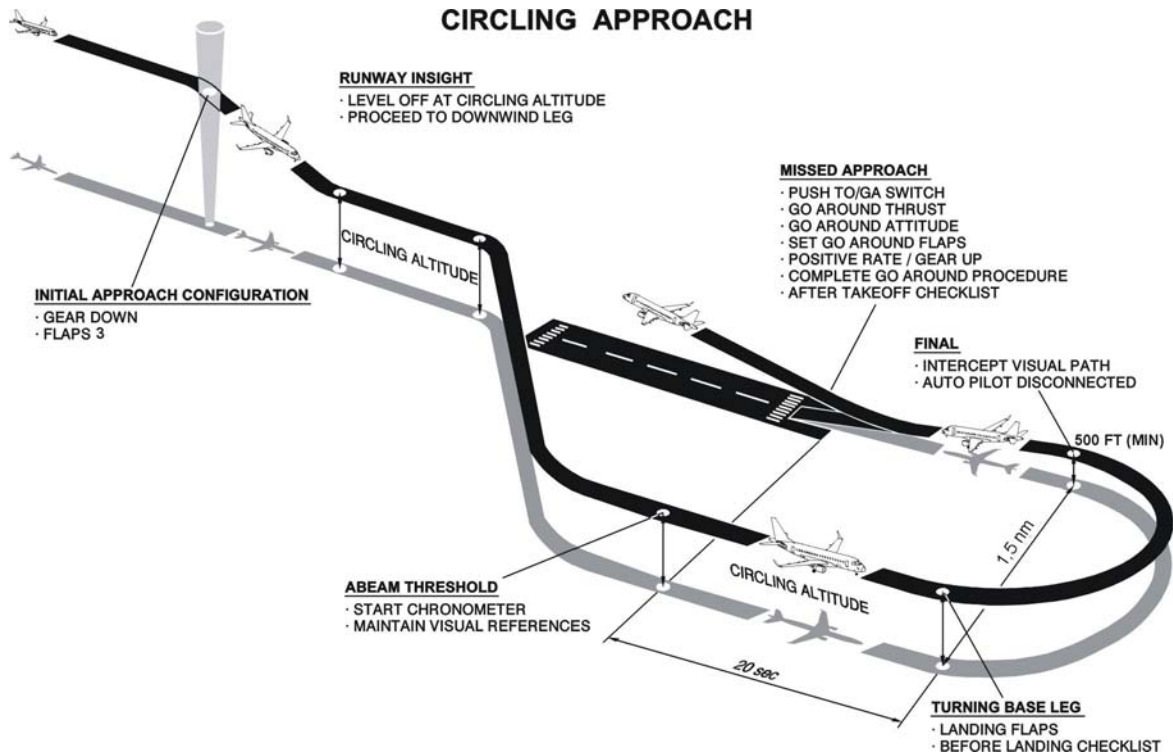
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VISUAL APPROACH AND CIRCLING



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CIRCLING APPROACH



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MISSED APPROACH

There have been many accidents in commercial aviation caused by the decision to land when all evidence signaled that the safest alternative was a missed approach. The approach must be planned with the missed approach in mind. In other words: the crew must always be ready for missed approach, not only for landing. This mentality must be emphasized during training and during normal operation. The missed approach must be briefed in detail and both pilots must be totally aware of what will happen if a missed approach is performed.

Whenever the approach or safety of the landing is threatened, a go-around or rejected landing procedure shall be initiated.

GO AROUND

Go Around button PRESS

Thrust Levers TO/GA

Rotate or verify that autopilot rotates the airplane following the flight director guidance.

NOTE: When of flight director is inoperative, rotate the airplane to 8° nose up.

Select flaps according to the table below:

Landing Slat/Flap	Go Around Slat/Flap
FULL	4
5	3

With positive climb:

Landing Gear UP

Minimum Airspeed $V_{REF} + 20$

If an engine failure occurs during the Go Around:

Minimum Airspeed V_{REF}

At the acceleration altitude select slat/flap up according to the slat/flap retraction speed reference.

NORMAL GO – AROUND/REJECTED LANDING - ACTIONS and CALLOUTS		
	PF	PNF
Go-around	“GO-AROUND, FLAPS____, CHECK THRUST” - Press either TOGA switches. - Verify or move thrust levers to GA power. - Verify or rotate towards GA pitch attitude.	- Select GA flaps. - Verify thrust levers move to GA power check thrust. - Verify GA annunciates.
Positive Rate of Climb	- Confirm positive rate of climb. “GEAR UP” . - Execute published missed approach or proceed as instructed by ATC.	- Verify positive rate of climb. “POSITIVE RATE” . - Position gear lever up. - Advise ATC. - Monitor missed approach procedures.
At 400 ft AFE	“HDG/NAV SELECT”	“400” - Select appropriate primary source - Select Lateral Mode
At acceleration altitude between 800 ft and 1500 ft AFE	“CLIMB SEQUENCE” .	“ACCELERATION ALTITUDE” - Select FLCH. - Select 210 Knots - Retract flaps on schedule. “FLAPS ZERO” .
If passing transition altitude	“ALTIMETERS”	“TRANSITION ALTITUDE”
	Both pilots set altimeters and x-check	
	“AFTER TAKEOFF CHECKLIST”	Read in silence “AFTER TAKEOFF CHECKLIST COMPLETED”

NOTE: Callouts are shown in bold text.

REJECTED LANDING

This procedure is identical to the missed approach procedure. See Normal Go-Around Procedures.

If a rejected landing is initiated after touchdown, the flight and ground spoilers should retract as thrust levers are advanced.

WARNING: AFTER REVERSE THRUST IS INITIATED, A FULL STOP LANDING MUST BE MADE.

NOTE: Once the airplane touches down (weight on wheels or wheel spin-up), thrust levers at idle and AT in Retard Mode the auto throttle automatically disengages.

NOTE: Following a landing, the TO MODE can be enabled after 5 seconds on ground (main gear weight on wheels)

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NORMAL LANDING

LANDING TECHNIQUE

The landing configuration (gear down and landing flaps) should be established early on the final approach or at the outer marker on an ILS approach.

Airspeed, power and descent rate should be stabilized early. Avoid power off approaches. Fly the airplane on a stable glide path towards the touch down point. Great changes in airspeed require great changes in thrust and attitude. Speed must be kept within +10 kt, -5 kt relative to the target approach speed.

Avoid excessive rates of descent during final approach, descent rates in excess of 1000 ft/min on short final should be avoided. If an excessive rate of descent develops, a missed approach must be performed immediately.

Make sure that the airplane is properly trimmed during the approach. This maximizes elevator authority for the flare or in the event of a missed approach.

The V_{AP} must be bled off in such a way that over the threshold, the target speed will be V_{REF} . Crossing the threshold with V_{REF} assures the performance values presented in the AFM.

As the airplane approaches the touch down point, reduce the rate of descent and slowly reduce thrust levers to idle so that they are at idle when the airplane touches down.

Plan to touch down as close as possible to the 1000-ft point. Do not allow the airplane to float in ground effect, which unnecessarily increases the landing distance.

Apply back pressure on the yoke after the main gear touches down to smoothly ease the nose wheel onto the runway.

CROSSWIND LANDING

Normal crosswind landing techniques can be applied and use with the wind correction for V_{REF} .

Four methods for crosswind landing can be used:

- Sideslip:** Downwind rudder combined with aileron applied into the wind. The upwind wheels touchdown before downwind wheels.
- Crab:** Proper rudder and upwind aileron. On very slippery runways the crab may be maintained to touchdown, reducing the drift toward the downwind when touching down.
- De-crab:** On final approach the crab is accomplished, just prior to touchdown while flaring, downwind rudder is applied to align the airplane with the runway centerline simultaneously with aileron control (to keep wings level) into the wind. Both main landing gear touchdown simultaneously.
- Crab and Sideslip:** The crab method is applied until touchdown. When the upwind wheels touchdown, a slight increase in downwind rudder simultaneously with aileron aligns the airplane with the runway centerline while keeping the wings level. This combined method may be used during strong crosswind.

POST LANDING

AFTER LANDING

Thrust reverser is more effective at high speeds; the use of reverse below 60 kt increases the chances of foreign object ingestion by the engine. During a landing the thrust reverser should be set to MIN REV at 60 kt and be closed at 30 kt. If necessary the thrust reversers can be used until the airplane come to a complete stop.

To maximize braking performance on dry or wet runways, if necessary, apply maximum continuous pressure on the brake pedals. The ANTI-SKID system will modulate the brakes for an optimum braking performance. DO NOT PUMP THE PEDALS.

Carbon brakes wear faster when they are cool so avoid sudden crisp braking with cool brakes.

After landing and if the LSP is not the PF, he takes over the airplane controls when normal taxiing speed is reached and calls out "MY CONTROLS". The RSP in this case hands the control to the LSP and responds "YOUR CONTROLS".

The strobe lights must be turned OFF as soon as the airplane leaves the runway. However LDG LIGHTS are switched off at the LSP's discretion. The nose taxi light must remain ON throughout the taxi regardless of the time of the day.

NOTE: In order to reduce engine wear, the engines should run at idle for at least 2 minutes before they are shut down.

On the LSP callout " AFTER LANDING SEQUENCE" the RSP should perform:

Flaps 0 RSP

APU..... AS REQUIRED RSP

External Lights AS REQUIRED RSP

Transponder..... AS REQUIRED RSP

Strobe Lights OFF RSP



COLD WEATHER CONDITION

During Cold Weather Condition when ice suspends from wings the LSP should callout “ICE CONDITION AFTER LANDING SEQUENCE” and the RSP should perform:

- Flaps..... LANDING RSP
- Pitch Trim FULL DOWN RSP
- APU AS REQUIRED RSP
- External Lights..... AS REQUIRED RSP
- Transponder AS REQUIRED RSP
- Strobe Lights OFF RSP

SHUTDOWN

Emergency/Parking Brake..... SET LSP

- Pull the Emergency/Parking Brake to the set position after the airplane has stopped. Make sure that the airplane is static before doing so.
- Verify brakes' temperature and if they are hot, release the Emergency/Parking Brake as soon as the chocks are on to reduce the brake cooling time.

Taxi Lights..... OFF LSP

Electric Hydraulic Pump System 3A..... OFF RSP

Electrical..... ON GPU/APU LSP

- If APU GEN is not available, an AC GPU should be plugged in.
- Check the AVAIL light illuminated before pushing in the GPU button.

Thrust Levers IDLE..... LSP

Following high power operation, such as use of maximum reverse thrust it is recommended to keep the engine running at idle during 2 minutes to permit engine thermal stabilization prior to shutdown the engine. Time of operation at or near idle, such as taxiing, is included in this 2 minutes period.

Start/Stop Selectors STOP LSP

NOTE: Do not press any rudder pedal up to 15 seconds after all hydraulic power is shut down.

Fasten Belts OFF..... LSP

Turn FASTEN BELTS switch to OFF after complete engine stop.

Red Beacon OFF..... LSP

ONE ENGINE SHUTDOWN AFTER LANDING

Respective Start/Stop Selector STOP

It is recommended to keep the engine running at idle during 2 minutes to permit engine thermal stabilization prior to shutdown of the engine.

Prior to shutdown ENG No 1 set Electric Hydraulic Pump System 1 to ON, and AUTO again after shutdown the second ENG on the parking stand.

Prior to shutdown ENG No 2 set Electric Hydraulic Pump System 2 to ON, and AUTO again after shutdown the second ENG on the parking stand.

LEAVING THE AIRPLANE

Passenger Signs Panel OFF RSP

Set the Emergency Lights and all switches to OFF.

External Lights..... OFF RSP

GPU/APU OFF RSP

- If APU is available turn the APU off by selecting the APU master selector knob to OFF and after the 2 minutes cooldown period, wait until the APU RPM drops below 3%, before turning off both batteries selectors.
- If only GPU is available push out the GPU button.

Batteries 1 & 2..... OFF RSP

OPERATION ON WET AND CONTAMINATED RUNWAYS

INTRODUCTION

A runway is considered to be contaminated when it is covered with:

- Standing water with a depth exceeding 3 mm.
- Slush or loose snow with a depth equivalent to more than 3 mm of water.
- Compacted snow or ice (including wet ice).

An acceptable overall level of safety will be ensured only if operations from contaminated runways are carried out on rare occasions.

Every effort should be made to ensure that the runway surface is cleared of any significant depth of contaminant before takeoff or landing.

Before making use of contaminated runway information contained in this manual, the pilot should be familiar with any general guidance on the necessary operational measures which may have been issued by the appropriate authority.

NOTE: Whenever operating in icing conditions, the OM part B Section 1 Limitations should be executed.

NOTE: - Icing conditions may exist whenever the Static Air Temperature (SAT) on the ground or for takeoff, or Total Air Temperature (TAT) in flight, is 10°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 may also exist when the SAT on the ground and for takeoff is 10°C or below when operating on ramps, taxi ways, 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.

CAUTION: EVEN SMALL ACCUMULATIONS OF ICE ON THE WING LEADING EDGE MAY CHANGE THE STALL CHARACTERISTICS OR THE STALL PROTECTION SYSTEM WARNING MARGIN

POWER UP

Wheel Chocks IN PLACE

Make sure nose wheel chocks are in place. If necessary, have chocks installed at main wheels too.

All Protective Covers REMOVE

Remove covers from engine air inlet/outlet, APU air outlet, APU oil cooler air inlet, smart probes, TAT probes and wheels. It might be necessary to leave engine covers installed until ready to start engines.

APU Area CLEAR OF ICE OR
SNOW

Check the APU air inlet, cooling air inlet and APU outlet to ensure that it is clear of ice or snow.

Air Conditioning Inlets and Outlets CLEAR OF ICE

Batteries INSTALLED

Certain temperatures require batteries removal to prevent cold soaking. Verify that batteries have been re-installed.

APU START

Observe the following limitations before APU start:

Minimum fuel temperature:

- Using Jet A fuel: -40°C (-40°F)
- Using Jet A1: -45°C (-49°F).
- Minimum oil temperature:
 - Using MIL-L-23699: -43°C (-45°F).
 - Using MIL-L-7808: -54°C (-65°F).
- Minimum battery temperature: -20°C (-4°F).
- Minimum battery 2 voltage: 22.5 volts.
- Minimum temperature using external electrical power: -54°C (- 65°F).

Accomplish a normal power up.

If APU cannot be started, apply heat from a ground cart directly into the APU compartment.

CAUTION: DO NOT ALLOW THE HOT AIR FROM THE GROUND CART TO EXCEED 100°C (212°F), IN ORDER TO PREVENT ANY DAMAGE TO THE COMPONENTS INSIDE THE COMPARTMENT.

EXTERNAL SAFETY INSPECTION

Operating regulations clearly state that no takeoff is allowed when snow, ice or frost is adhering to the airplane.

The captain has the final responsibility for ensuring that the airplane is clear of ice, frost or snow. The primary method for the flight crew to ensure a clean airplane is through close visual or physical inspection of the critical surfaces prior to takeoff. Even at intermediate stops, an external walk around is necessary due to the possibility of ice forming after landing from either cold soaking frost, conventional frost or precipitation freezing on the airplane.

During the pre-flight walk-around, ensure that the smart probes, TAT probes, pressurization static port, all inlets, outlets and vents are clear of ice and unobstructed.

If the airplane has become cold soaked as a result of flight at very cold temperatures, fuel might be at a subfreezing temperature. This can cause ice accretion if the airplane is subjected to high humidity, fog, drizzle or rain even when the outside air temperature is substantially above freezing.

At the completion of the walk-around, if ice, snow or frost is discovered, de-icing, and possibly anti-icing will be required. The check for ice accumulation should be done in a well-lit area.

NOTE: In case the cargo door vent panel is stuck due to cold soak, heating in the area should be applied.

Fuselage, Wing, Tail and Control Surfaces FREE OF FROST, ICE
OR SNOW

Check that the fuselage, wing upper and lower surfaces, tail and control surfaces are free of frost, ice or snow. Inspect control surfaces, gaps and hinges for signs of residual fluid or gel.

A thin layer of hoarfrost is permitted on the fuselage provided the layer is thin enough to distinguish surface features underneath, such as painting and markings.

No contamination is permitted on the lower surface of the horizontal stabilizer or the upper surface of the wing. If any degree of contamination is found, de-icing and/or anti-icing has to be requested by the pilot in command.

All snow and ice must also be cleared from nose radome and fuselage nose forward of windshield, as it is likely to blow back into windshields during taxi or takeoff.

Smart Probe/TAT CLEAR OF ICE
Engine CLEAR OF ICE OR
SNOW

Check that the engine inlet is clear of ice or snow, and that the fan is free to rotate. Ensure that all ice deposits are removed prior to engine starting.

Landing Gear CLEAR OF ICE,
UNOBSTRUCTED

Check that doors, gear locks and mechanisms are unobstructed and clear of ice and snow. Check that no leakage exists.

Fuel Tank Vents CLEAR OF ICE OR
SNOW
Pressurization Static Port CLEAR OF ICE

WARM-UP

Air Conditioning/Pneumatic Panel SET
Keep all pushbuttons pushed in, while bleeding air from the APU, or use a ground cart to warm up the interior of the airplane. Set Cockpit and Cabin rotating knobs to full hot for rapid cabin warm up in low ambient temperature. The warm-up, if possible, should be accomplished with all doors closed and the toilets doors open.

CAUTION: DO NOT LEAVE THE AIRPLANE UNATTENDED.

Hydraulic Systems Warm-Up DONE
The procedures below must be accomplished before starting the engines, in case of an overnight parking at temperatures below -18 °C:

Electric Hydraulic Pumps
Sys 1, 2, 3A and 3B ON

Steering ENGAGED
Keep the nosewheel steering engaged while the electric hydraulic pumps are running.

Flight Controls CHECKED
Check control wheel, control column and rudder pedals for freedom of movement and full travel. Control forces can be increased at low temperatures.

After reservoir temperatures are higher than -10°C for systems 1, 2 and 3:

Electric Hydraulic Pump Sys 2 OFF
PTU ON

After 30 seconds:

PTU AUTO
Electric Hydraulic Pump
Sys 1, 2 and 3B AUTO
Electric Hydraulic Pump
Sys 3A OFF

Slat/Flap CHECKED
Make sure the slat/flap are free from snow or ice. Extend and retract them. Leave them up if application of anti-icing/deicing fluids is expected.

BEFORE START

Make sure that, in the TO DATASET MENU page on the MCDU and Ice Protection Mode Selector, anti-ice reference is selected according to the following table.

In case of doubt of moisture presence, visible moisture should be assumed.

ON GROUND			
Static Air Temperature	Visible Moisture	MCDU (TAKEOFF DATASET MENU)	IceProtection Mode Selector
Higher than +10° C	YES	OFF	AUTO
Higher than +5° C; +10° C and below	YES	ENG	
+5° C and below	YES	ALL	
None	NO	OFF	

ENGINE START

Do not start the engine until it has been checked that all ice deposits have been removed from the air inlets.

Fuel and oil temperature limits for engine start are the same as those prescribed for APU start.

Start engine in normal manner. If the engine does not start, maintenance procedures may be required or ground heating may be necessary to warm the nacelle, Air Turbine Starter (ATS) and Starting Control Valve (SCV).

NOTE: In order to improve the chances of a successfully engine start, the oil temperature should be raised to at least -20°C.

CAUTION: • DO NOT ALLOW THE HOT AIR FROM THE GROUND CART TO EXCEED 100°C (212°F), IN ORDER TO PREVENT ANY DAMAGE TO THE COMPONENTS INSIDE THE NACELLE.

- DURING COLD WEATHER OPERATIONS, OIL PRESSURE PEAKS TO FULL SCALE MAY OCCUR DUE TO HIGH OIL VISCOSITY. OIL PRESSURE SHOULD DECREASE AS THE OIL TEMPERATURE INCREASES. IF THE OIL PRESSURE REMAINS ABOVE NORMAL OPERATING RANGE, THE ENGINE SHOULD BE SHUTDOWN AND THE CAUSE INVESTIGATED.



AFTER START

- Engine Instruments MONITOR
Continue to monitor engine instruments, mainly oil pressure and temperature.
Apply associated abnormal procedure if any failure arises.
- Main Panel CHECKED
Check proper operation of all instruments and systems. Confirm engine anti-ice system is operating normally.
- Electric Hydraulic Pumps Sys 1, 2 & 3B ON
- Steering ENGAGED
In case the steering had been disengaged for push-back procedure, reengage it and keep it engaged while the electric hydraulic pumps are running.
- After reservoir temperatures are higher than 10°C for systems 1, 2 and 3:

Electric Hydraulic Pumps Sys 1, 2 & 3B AUTO

AIRPLANE ANTI-ICING/DEICING FLUID APPLICATION WITH ENGINES/APU RUNNING

CAUTION: APU OPERATION IS NOT RECOMMENDED DURING THE AIRPLANE DEICING/ANTI-ICING PROCEDURE. IF APU OPERATION IS ABSOLUTELY NECESSARY, MAKE SURE DEICING/ANTI-ICING FLUID IS NOT APPLIED DIRECTLY TO OR NEAR THE APU AIR INLET. THAT THE APU BLEED AIR VALVE IS CLOSED, AND THAT PACKS ARE SET TO OFF.

Parking Brake.....	ON
Doors	CLOSED
Thrust Levers	IDLE
Slat/Flap.....	UP
Pitch Trim.....	FULL NOSE DOWN
Engine Bleed Buttons.....	PUSHED OUT
APU Bleed Button	PUSHED OUT
Packs Buttons	PUSHED OUT

Packs should be off to avoid contamination of cabin air with fumes generated from ingestion of fluids into engine/APU.

After Deicing/Anti-icing Procedure is complete:

APU Bleed Button (after 1 minute).....	PUSHED IN
Wait at least 1 minute to push in APU bleed button.	
Engine Bleed Buttons (after 1 minute).....	PUSHED IN
Wait at least 1 minute to push in engine bleed buttons.	
Packs Buttons (after 3 minutes).....	PUSHED IN
Wait at least three minutes to push in the air conditioning packs pushbuttons, to avoid contaminating the airframe air conditioning system with deicing/anti-icing fluid gases.	
Pitch Trim.....	TAKEOFF SET

TAXI

Use minimum thrust for breakaway and taxiing, to avoid blowing snow or slush on personnel or airplanes nearby. Maintain ground speed below 10 kt, when taxiing in snow covered or icy runways. Anti-skid protection is not provided below this speed, so apply brakes carefully.

During taxi, “cold set” (the condition where the tire retains the flat shape it had while parked) may induce vibration in the airplane. Vibration should disappear as the tires recover their elasticity during taxi. Do not initiate your takeoff run before the “cold set” disappears.

Turns should be performed at the largest turning radius, preferably at a speed which does not require braking during the turn.

Maintain a greater than normal distance behind other airplanes while taxiing on snow or slush-covered runways, to avoid contamination by snow blown by jet blasts.

Engine Run-Up AS REQUIRED

During ground operations of more than 30 minutes (including taxi in and taxi out) in icing conditions, it is recommended that the engine thrust level be increased at 30 minute intervals to approximately 54 percent N1 and held at that thrust level for 30 seconds. If airport surface conditions and the concentration of aircraft do not permit the engine thrust level to be increased to 54 percent, then set a thrust level and time at that thrust level as high as practical.

Do not apply reverse thrust during taxi, unless it is strictly necessary.

Slat/Flap AS REQUIRED

When taxiing through slush or standing water, slat/flap should be retracted to avoid snow and slush contamination from the main gear wheels.

WARNING: IF FLAPS/SLATS WERE LEFT UP DURING TAXI, COMPLETE AFTER START CHECKLIST BEFORE TAKING OFF.

CAUTION: TAXI AT REDUCED SPEED ON ICE-COVERED RUNWAYS TO AVOID SKIDDING THE AIRPLANE. REDUCE SPEED FOR ALL TURNS AND USE CAUTION WHEN TAXING WITH HIGH CROSSWINDS.

BEFORE TAKEOFF

- Takeoff Briefing COMPLETE
- Flight Controls CHECK
- Check freedom of movement and full travel of all flight controls (including trims).
- Slat/Flap SET
- Set slat/flap to takeoff setting (if flaps were left up after starting the engines).
- Takeoff Configuration CHECK
- Ice Accumulation CHECK
- A pre-takeoff contamination check should be performed prior to takeoff and within the holdover time. Aerodynamic surfaces must be confirmed free of all forms of frost, ice, snow and slush prior to entering the takeoff runway or initiating takeoff. This check is particularly important when the published holdover times are about to run out. When contamination is in evidence, the de-icing/anti-icing operation must be repeated.

TAKEOFF

- Engine Run-Up AS REQUIRED
- For takeoff in icing conditions, it is recommended that takeoff power be set to approximately 54 percent N1 and held at that thrust level for 30 seconds just before or in conjunction with the final takeoff power setting.

CLIMB/CRUISE

Operation in moderate to severe icing conditions may allow ice to build up on the fan spinner and/or blades. If allowed to accumulate, asymmetrical ice shedding may result in high fan vibration. For operations in moderate to severe icing conditions, reduce one thrust lever at a time towards idle, then advance to a minimum of 70 percent N1 for 10-30 seconds, then return thrust lever to position required for flight conditions. Accomplish the periodic engine run up every 15 minutes if fan ice build up is suspected (high indicated or perceived vibration). Operation of the ignition system is not required for this procedure provided the FADEC automatic relight system is operating normally.

HOLDING

Landing Gear..... UP
Slat/Flap UP
Minimum Airspeed..... 210 KIAS

CAUTION: EVEN SMALL ACCUMULATIONS OF ICE ON THE WING LEADING EDGE MAY CHANGE THE STALL CHARACTERISTICS OR THE STALL PROTECTION SYSTEM WARNING MARGIN.

DESCENT

If engine vibration increases reduce to thrust to idle, advance thrust levers to obtain 70% N1 and then return to the desired setting.

When using the autopilot, monitor pitch attitude and speed continuously.

CAUTION: EVEN SMALL ACCUMULATIONS OF ICE ON THE WING LEADING EDGE MAY CHANGE THE STALL CHARACTERISTICS OR THE STALL PROTECTION SYSTEM WARNING MARGIN.

APPROACH AND LANDING

Observe normal (including operation in icing conditions) approach/landing procedures contained in the approved AFM.

LANDING ON WET OR SLIPPERY RUNWAYS

Wet runways can cause airplane hydroplaning, the technical term used to express slipperiness. The factors that influence the occurrence of this phenomenon are high speed, standing water and poor runway macrotexture. When hydroplaning occurs, it causes a substantial loss of tire friction and wheel spin-up may not occur.

Icy runways can be very slippery at all speeds depending on temperature.

Stopping the airplane with the least landing run must be emphasized when landing on wet or slippery runways.

- Anticipate the approach procedures and speeds: a well-planned and executed approach, flare and touchdown minimize the landing distance.
- Immediately after touchdown, check the ground spoiler automatic deployment when thrust levers are reduced to IDLE.
- Lower nose wheel immediately to the runway. It will decrease lift and will increase main gear loading.
- Apply thrust reversers judiciously to observe how the airplane responds before full reverse is used. Normal procedure is to move the thrust levers out of reverse when ground speed is reduced to 60 knots. In a emergency, reverse thrust may be used to bring the airplane to a full stop.
- Do not use asymmetric reverse thrust on slippery and icy runways.
- Apply brakes with moderate-to-firm pressure, smoothly and symmetrically, and let the anti-skid do its job.
- If no braking action is felt, hydroplaning is probably occurring. Do not apply Emergency/Parking Brake, as it will cut anti-skid protection. Maintain runway centerline and keep braking until airplane is decelerated.

TAXI-IN AND PARKING

Flaps..... AS REQUIRED

NOTE: Make sure the slat/flap are free from snow, ice or slush before retracting them.

CAUTION: TAXI AT REDUCED SPEED IN ICE-COVERED RUNWAYS TO AVOID SKIDDING THE AIRPLANE.

THROUGH-FLIGHTS

Doors and Windows CLOSED

Whenever possible, to maintain the cabin warm, keep the passenger, cargo and service doors closed at intermediate stops.

APU ON

APU should be on to provide bleed air to the air conditioning packs in order to maintain the cabin warm.

Walk around the airplane and check the following items:

Wing, Tail and Control Surfaces FREE OF FROST, ICE
OR SNOW

Air Data Smart and TAT Probes CLEAR OF ICE

Engine/APU Air Inlet..... CLEAR OF ICE OR
SNOW

Landing Gear CLEAR OF ICE,
UNOBSTRUCTED

Air Conditioning Inlets and Outlets CLEAR OF ICE

Fuel Tank Vents CLEAR OF ICE OR
SNOW

Pressurization Static Port CLEAR OF ICE

In case of deice/anti-ice fluid application is necessary, perform "Airplane anti-icing/de-icing fluid application with engines/APU running".

LEAVING THE AIRPLANE - SECURING FOR COLD SOAK OR AN EXTENDED PERIOD

Anti-icing fluid can be applied to the airplane surfaces at the time of arrival, on short turnarounds during freezing precipitation, and on overnight stops. This will minimize ice accumulation before departure and usually makes subsequent deicing easier.

The procedures below should be performed in the event of extended airplane exposure at low temperatures. In the event that the airplane is off the maintenance base, the crew should ensure that all actions have been accomplished.

Slat/Flap UP
Pitch Trim FULL DOWN
Wheel Chocks IN PLACE
Emergency/Parking Brakes.....AS REQUIRED

For an icy ramp, leave Emergency/Parking Brakes applied. Otherwise, Emergency/Parking Brakes must not be applied to avoid brakes freezing. Wheels and tires may melt snow or ice by the heat retained in the brakes. Parking main tires in a layer of sand or on a mat may prevent tires from freezing to pavement surfaces.

Protective Covers INSTALLED
Install protective covers at engines and APU inlets/outlets, APU oil cooler air inlet, smart probes, TAT probes, and wheels.

Water and Waste System.....DRAINED
Drain water and waste from all water tanks if cold soak temperature is expected to be lower than 0°C (32 °F).

Batteries REMOVED
Remove the batteries if temperatures are expected to be below -20°C (-4°F). This protects the batteries and ensures starting capability of the APU upon installation.

Doors and Windows CLOSED
All doors and windows must be closed to prevent snow and humidity from entering into the airplane.

GENERAL REMARKS WHEN FLYING IN ICING CONDITIONS

- Continuously monitor engine parameters, airplane pitch attitude and airspeed.
- Be careful for any mistrimed condition that may be masked by the autopilot - keep the airplane trimmed at all times. Consider turning autopilot off if you suspect you are flying in severe icing conditions.
- Monitor anti-ice systems for proper operation. Apply the associated AFM abnormal procedure in case of system failure. If the failure persists, exit and avoid icing conditions. Make the air traffic controller know you are requesting a change due to icing conditions and keep him informed about it.
- Strictly follow AFM Operation In Icing Conditions normal procedures.
- Avoid landing at an airport where icing conditions exist or are anticipated if anti-ice system, brakes, thrust reverse, ground spoilers, nosewheel steering or flight controls have failed.
- Do not hesitate to leave icing conditions when icing cannot be handled, even with anti-ice system operating properly.

FREEZING RAIN AND FREEZING DRIZZLE

Atmospheric conditions involving freezing rain or freezing drizzle associated with supercooled large droplets (SLD), may present a condition that is beyond those for which the airplane was certified. Both freezing rain and freezing drizzle can exist down to ground level and cause ice to form quite rapidly on all surfaces even during short exposures and on areas not normally known to be subjected to ice accretion. This means that the aircraft is not designed to fly under freezing rain/drizzle (SLD) conditions.

If the crew notices abnormal ice formation on areas not usually affected by this phenomenon, or ice formation on the previously treated upper surface of the wings, they must consider to be flying under severe icing conditions. In this case, the anti-ice system is failing to reduce or control ice formation. The crew must then exit freezing rain/drizzle conditions as soon as possible since continuous flight under such conditions is, really, quite hazardous.

SUPPLEMENTARY PROCEDURES

This Chapter contains amplified procedures to RVSM Airspace Operations, CAT II Operations and Primus EPIC-FLIGHT Management System Operations.

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RVSM OPERATIONS

The RVSM operation reduces the EMBRAER 170 minimum vertical separation from 2000 ft to 1000 ft between FL 290 and FL 410.

Airworthiness approval alone does not authorize flight into airspace for which an RVSM operational approval is required by an ICAO Regional Navigation Agreement.

The procedures presented in the basic OM part B Normal Procedures remain unchanged, except as amended herein.

Minimum equipment requirements see Section 01 LIMITATION Chapter 1.1.c page 3.

Before the flight, check the aircraft technical log and other documents to make sure the aircraft is certified and technically fit to fly into RVSM airspace.

Before departure, check the maximum difference between both primary altimeters and airport elevation of 75 ft.

The maximum difference between Capt. and F/O altimeters indications is shown in the table below.

Field Elevation	Max. Difference Between Capt. & F/O	Max. Difference Between Capt. & Field Elevation
Sea Level	40 ft	75 ft
5000 ft	45 ft	75 ft
10000 ft	50 ft	75 ft

EXTERNAL SAFETY INSPECTION

NOSE SECTION

Air Data Smart Probes NO DAMAGE OR
OBSTRUCTION

Particular attention should be paid to the condition of the pressure ports and to the fuselage skin near each Air Data Smart Probe.

BEFORE TAKEOFF

Altimeters SET TO THE
AIRFIELD QNH

Altitude Indications CHECK

NOTE: - An alternative procedure using QFE may also be used;

CRUISE

Be sure that all required equipment is in proper operating condition.

Ensure that the aircraft is flown at the cleared flight level and that ATC clearances are fully understood and followed. Do not depart from cleared flight level without a positive clearance from ATC except for a contingency or emergency situation.

While changing flight levels, do not overshoot the cleared flight level by more than 45 m (150 ft).

The autopilot should be operative and engaged during level cruise, except for circumstances such as the need to re-trim the aircraft or when it must be disengaged due to turbulence.

When altitude difference between pilot and copilot displays exceeds 100 ft, use the PFD 1 as selected source for autopilot.

AFTER LANDING

In case of failure or malfunction, the following information should be recorded when appropriate:

- ADS 1, ADS 2, ADS 3 altimeter readings;
- Altitude selector setting;
- Baro Set value and Baro Set Unit (INHG/HPA);
- Flight Director used with the Autopilot to control the airplane and any differences when the other Flight Director was coupled;
- Use of air data system reversion for fault diagnosis procedure;
- The transponder selected to provide altitude information to ATC and any difference noted when an alternative transponder was selected.

CAT II OPERATIONS

GENERAL

CAT II ENGAGEMENT LOGIC

The Primus-Epic integrated Avionics has a CAT II logic which is automatically activated whenever the RA/BARO Minimums Selector knob is set to RA position. A green APPR 2 annunciator indicates the correct setting and a white or amber APPR 1 ONLY annunciator indicates an incorrect setting. The green APPR 2 annunciator is displayed in the Autopilot Approach Status Annunciator above each FMA.

NOTE: Although the radio altitude setting may be adjusted down to 80 ft, if requested by an ILS Cat II Approved Chart, the Decision Height (DH) is limited to 100 ft above ground level.

CAT II CONDITIONS OF OPERATION

CAT II operation is allowed only with the green APPR 2 annunciator enabled and the Autopilot coupled.

To obtain a green APPR 2 annunciator the following conditions must be met:

- Radio altitude below 1500.
- Flaps 5.
- NAV 1 on pilot's side and NAV 2 on copilot's side, both NAV's tuned to the same LOC frequency.
- An active approach GS/LOC mode selected. Both courses set to same value.
- Both Flight Directors operational.
- Attitude and Heading valid on both PFD's.
- Glide slope and Localizer deviation valid on both PFD's.
- No reversions (IRS and ADC) modes selected on both PFD's.
- Valid Airspeed and Baro Altitude on both PFD's.
- No comparison monitors are tripped (FPA, Attitude, Heading, Airspeed, Baro Altitude, Localizer, Glide slope and Radio altitude) on both PFD's.
- No back course selected.
- The EICAS message APPR 2 NOT AVAIL not presented.
- CAT II Decision Height setting on both Display Control Panels (greater than 80 ft).

NOTE: If the CAT II Instrument Approach Landing chart does not authorize the use of RA, set the RA to OFF. In this case there is no EGPWS call outs "APPROACHING MINIMUMS" and "MINIMUMS, MINIMUMS".

- RA/BARO Minimums Selector knob set to RA.
- No TCAS Button pressed.

NOTE: When the green APPR 2 annunciator is enabled, the localizer lateral deviation scale is expanded with the external limits representing the excessive deviation points.

If one of these conditions is not met, the green APPR 2 annunciator will not appear.

If the green APPR 2 annunciation is displayed and one of the following conditions is achieved, the amber APPR 1 ONLY annunciation will flash active characters inverse video for 5 seconds then steady in conjunction with the RA Minimum Selected Digital Readout:

- No valid Radio Altitude displayed.
- Airplane no longer APPR 2 capable.
- Crew selects flaps position other than 5 below 800 ft.
- EICAS message SLAT-FLAP LEVER DISAG displayed.
- Either Minimums Selected Readouts change from RA to BARO.
- LOC frequency or inbound course mismatch.

CAT II WARNINGS

LOCALIZER, GLIDE SLOPE AND RADIO ALTITUDE COMPARATORS WARNINGS

A comparison between the localizer, glide slope and radio altitude deviation indications are performed when the following conditions are met:

- On-side radio altitude valid and below 1500 ft.
- APR mode selected on Flight Guidance Panel.
- Flaps 5.
- CAT II Decision Height setting on both Display Control Panels.
- On-side VOR/LOC active course valid.
- Cross-side data valid.
- Go-around not selected on either side.
- No back course selected.

For localizer, the following additional condition is required:

- Both LOC signals tuned and valid for at least 15 seconds.
If LOC indications differ by values above approximately 1/2 dot, an amber LOC annunciator will appear flashing (for 10 seconds) then steady on the left side of the PFD's between EADI and EHSI.

For glide slope, the following additional condition is required:

- Both glide slope signals valid and both LOC signals tuned and valid for at least 15 seconds.

If GS indications differ by values above approximately 2/3 dot, an amber GS annunciator will appear flashing (for 10 seconds) then steady on the left side of the PFD's between EADI and EHSI.

For radio altitude, the following additional condition is required:

- Both radio altimeters signals valid and on scale.
If radio altimeters indications differ more than 10 ft approximately, an amber RA annunciator will appear flashing (for 10 seconds) then steady in the ADI.

EXCESSIVE LOCALIZER AND GLIDE SLOPE DEVIATIONS WARNINGS

The on-side localizer and glide slope excessive deviations are compared to the Cat II limits and displayed when the following conditions are met:

- APR mode selected on Guidance Panel.
- Flaps 5.
- CAT II Decision Height setting on Guidance Panel.
- VOR/LOC is the active course is valid.
- On-side radio altitude between 500 and 80 ft.
- On-side localizer tuned and valid.
- On-side glide slope valid.
- No back course selected.
- Go-around not selected on either side.

Localizer excessive deviation:

If a localizer deviation greater than approximately 1/3 dot is detected, the HSI lateral deviation bar on the PFD's HSI will change from green to amber, the lateral deviation scale will change from white to amber, and flash.

NOTE: The on-side excessive deviation warning is also displayed when the cross-side system has detected an excessive deviation.

Glide slope excessive deviation:

If a glide slope deviation greater than approximately one dot is detected, the GS pointer on the PFD's ADI will change from green to amber, the GS scale will change from white to amber, and flash.

NOTE: The on-side excessive deviation warning is also displayed when the cross-side system has detected an excessive deviation

PRE-FLIGHT DUTIES IN PLANNING CAT II

Planning flights with the possibility of executing CAT II operations the Captain shall perform a briefing which should include:

- Checking crew qualifications – whether both pilots have with them certificates allowing for CAT II operations execution.
- Checking the a/c technical status paying special attention to LOT MEL.
- Verifying meteorological conditions at the alternate airport (minimums according to the LOT Operations Manual part A).
- Verifying NOTAMs for airports of planned operation in relation to CAT II operation requirements.
- Discussing special procedure for rejected Take Off where local low visibility procedure (LVP) exists.
- Checking possibility of additional refueling anticipating delayed holding pattern procedure.

LOW VISIBILITY APPROACH BRIEFING

Prior to commencing descent to land the Crew shall perform "*Low visibility approach briefing*", which should include:

- Analysis of weather situation at destination airport (CAT II minimums or higher).
- Checking crew qualifications – whether both pilots have with them certificates allowing for CAT II operations execution.
- Checking aircraft equipment for CAT II operations execution.
- Confirming authorization of planned runway for landing and its equipment for CAT II operations; announcement by ATC authority of LVP CAT II procedures.
- Verifying approach maps updating.
- Performing briefing for CAT II approach.
- Discussing Go Around procedure following aborted approach in CAT II.
- Discussing approach lights and lighting system elements, which the crew expect to see first.
- Discussing crew checks and callouts in CAT II operations.
- Checking minimum RVR.
- Checking wind limitations.
- Setting landing data: radio altimeters for published RA and speed bugs for CAT II flaps 5.
- Setting autobrake (App. For **-DG** an on).
- Preparing CAT I approach maps in case of the necessity of continuing approach with a failure for CAT I minimums.
- Performing briefing for CAT I approach.

- Discussing possible aircraft failures during approach, and appropriate crew actions.
- Performing briefing on taxi procedures.
- Adjusting cockpit seats for optimal visibility.
- Start up APU not later than at FL 100.

INSTRUMENT APPROACH AND LANDING TECHNIQUE

In CAT II operations the pilot flying (**PF**) will always be the RSP. The pilot non flying (**PNF**) will always be the LSP.

The approach procedure and crew callouts must be strictly executed. This is aimed at increasing effectiveness and better co-ordination of the crew actions, ensuring complete clarity and possibility of instant recognition of cases of pilot illness or his incapacitation. The basic principle of the crew concept is the constant readiness of each crewmember to supplement and assist the other crewmember in his duties. The **PNF** reports the readings of instruments and his observations of flight conditions according to accepted patterns. The **PF** confirms these using standard callouts after checking indicated flight conditions and aircraft position on his own instruments. If the **PNF** does not convey his report in accordance with the requirements, this duty falls on the **PF**.

- Approach will be executed using both Flight Directors FD. The pilot flying will hold the Controls and Thrust Levers. Both pilots monitor display readings. After the aircraft acquires the configuration fulfilling CAT II approach to landing requirements, a green CAT II message appears on the PFDs,
- During an OM overflight or equivalent DME position, both pilots monitor the barometric altimeters crosschecking them for the correct approach profile altitude.
- Reaching 1000ft AAL (compulsory callout) the aircrew verifies approach stabilization or verifies causes for instability.
- At 500ft AAL the final checking of approach stabilization is carried out. If stabilization is not established the Captain must execute Go Around procedure.
- At 100ft RA above minimum the LSP begins to try establish visual contact, the RSP (co-pilot) monitors approach informing only of important deviations or malfunctions of the automatic approach system. At RA+80ft (autocall: "Approaching Minimum"). At RA (autocall: "Minimums"):
 - If the Captain has established visual contact, he/she calls: 'CONTACT, MY CONTROL' which means he/she has decided to continue approach and to land,
 - if there is no visual contact, the Captain calls: "GO AROUND, FLAP 3, CHECK THRUST" and RSP executes go around procedure,
 - if there are no "CONTACT, MY CONTROL" or "GO AROUND..." callouts - **RSP** takes over controls and executes a go around.

- Following the decision to land and at RA not less than 80 ft the Captain disconnects the autopilot and performs a manual landing while maintaining visual contact with the lights, reacting instantly to any deviations by correcting them.
- After touchdown the Captain performs rollout effectively reducing speed. The crew should consider the possibility of not being able to see the remaining runway.

Every case of the aircraft PIC deciding to execute operations in CAT II, irrespective of whether it was successful or not, must be confirmed by the filling out of the adequate point of the LDP-60 form.

VISUAL CONTACT REFERENCES

According to JAA regulations visual contact is considered to be a situation, when one is able to see a segment of at least three consecutive lights which are components of:

- the centerline of the approach lights or,
- the touchdown zone lights or,
- the runway centerline lights or,
- the runway edge lights or,
- lighting which is a combination of the above.

Visual contact must contain transverse elements of the ground lighting system, such as: transverse lighting lines of the approach lights, threshold lights or transverse lighting lines of the touchdown zone.

LIMITATIONS

NOTE: During CAT II approach minimum equipment required, see Chapter 1.1.c Limitation.

AUTOPILOT COUPLED CAT II APPROACH

BEFORE INTERCEPTING LOCALIZER COURSE

- Set the RA/BARO Minimum Selector knob to RA.
- Perform the Approach checklists, as appropriate.
- Set the CAT II Decision Height on both Display Control Panels.
- Test Radio Altimeter if only one is available according to OM part B ATA Chapter 12.34.
- Select the same ILS frequency on both MCDU and runway courses.

NOTE: - If Radio Altimeter is checked not functioning properly the CAT II approach must be discontinued.
- A minimum distance of 4 NM to the Outer Marker is recommended for interception and stabilization along the approach course.

DURING INTERCEPTING THE GLIDE SLOPE

- Monitor altitude and radio altimeter information.
- Lower landing gear (one dot below GS interception) and set flaps to 3, then to 5.
- Set the CAT II Landing Reference Speed ($V_{REF 5}$).
- Stabilize and maintain the Landing Reference Speed ($V_{REF 5}$).
- Be sure that Marker Beacon audio is on.

AFTER PASSING FAF

- The pilot flying should maintain the CAT II Landing Reference Speed ($V_{REF 5}$).
- At 80 ft above the decision height setting the EGPWS will call out "APPROACHING MINIMUMS".

NOTE: If the CAT II Instrument Approach Landing chart does not authorize the use of RA, set the RA to OFF. In this case there is no EGPWS call outs "APPROACHING MINIMUMS".

- If visual contact is not made upon reaching the decision height or if any malfunction could not be promptly identified during approach, a missed approach must be immediately initiated.

BASIC STATEMENTS

- RSP will be the PF during the approach and will execute the go around if no visual contact is established at the approach minimums.
- LSP takes over control at the approach minimums if enough visual guidance is available, and performs the landing.
- Successful low visibility approach requires crew coordination.
- Any doubt about of the approach success must lead to a go around.
- To avoid confusion and misunderstandings, strict adherence to call-out procedures is required.

WORK DISTRIBUTION

CAUTION: DESPITE THE LSP NOT HANDLING CONTROLS UNTIL VISUAL CONTACT IS ESTABLISHED, HE/SHE HAS DECIDING AUTHORITY DURING ALL PHASES OF THE APPROACH AND SHOULD CONDUCT THE APPROACH BRIEFING.

- RSP should start acting as PF before top of descent (never later than Initial Approach Fix).
- RSP concentrates on instrument flying and LSP monitors the approach.
- From approximately 500 ft AFE, LSP concentrates on getting visual cues, making only quick crosschecks of instruments.

FINAL APPROACH PHASE

- At 100 ft to minimums LSP places his hands on control wheel preparing himself/herself to execute the landing, if visual contact is established by the time DH is reached.

APPROACH MINIMA

- LSP concentrates on getting visual clues.
- Approach may only be continued by the LSP if proper centerline tracking and correct altitude is assured.

LANDING HAND OVER

- LSP notifies the RSP and takes over the controls by clearly calling out: "CONTACT, MY CONTROL".
- RSP remains on instruments and takes over monitoring function, notifying of any observed discrepancy (rate of descent, speed or localizer tracking).

NOTE: The handover will be done at DH if visual contact is established.

MALFUNCTIONS

DISPLAY WARNINGS DURING FINAL APPROACH

Discontinue the approach if any of the following warnings occur:

- - APPR 1 ONLY displayed on Autopilot Approach Status Annunciator;
- - EICAS message APPR 2 NOT AVAIL presented;
- - RALT FAIL (cyan);
- - RA (amber);
- - GS (amber);
- - LOC (amber);
- - PIT (amber);
- - HDG (amber);
- - CAS (amber);
- - FPA (amber).

Perform a normal MISSED APPROACH Procedure, unless the approach is continued under visual conditions and the airplane position and attitude assure a safe landing.

ENGINE FAILURE ON FINAL APPROACH - perform go-around.

AUTOPILOT MALFUNCTION:

BEFORE REACHING FAF

If the autopilot disengages or has to be disengaged, try to reengage it.

If the autopilot disengages again:

MISSED APPROACH Procedure..... **PERFORM AS
REQUIRED**

AFTER REACHING FAF

If the autopilot disengages or has to be disengaged, do not reengage the autopilot.

MISSED APPROACH Procedure..... **PERFORM AS
REQUIRED**

NOTE: Consider the possibility of continuing and performing the landing if under visual conditions and the airplane position and attitude assure a safe landing.

HARDOVER If any unusual acceleration or motion is noticed on the airplane flight path the approach must be discontinued, and:

Autopilot **DISENGAGE**
MISSED APPROACH Procedure..... **PERFORM AS
REQUIRED**

Perform a normal MISSED APPROACH Procedure, unless the approach is continued under visual conditions and the airplane position and attitude assure a safe landing.

SLOWOVER consists in a smooth and slow airplane attitude change due to an autopilot system malfunction. It may be recognized if one of the following symptoms occurs during approach:

- Unusual glide slope small deviation.
- CHANGE IN THE RATE OF DESCENT (SMALL OR LARGE).
- EXCESSIVE GLIDE SLOPE DEVIATION AND THE GS INDICATIONS BECOMING AMBER.
- AUTOPILOT SELF DISCONNECTION.

If a Slowover tendency is confirmed:

Autopilot **DISENGAGE**
MISSED APPROACH Procedure..... **PERFORM AS
REQUIRED**

NOTE: Consider the possibility of continuing and performing the landing if under visual conditions and the airplane position and attitude assure a safe landing.

- Any airplane malfunction requiring action by the flight crew below 1000 ft AFE occurring while IMC, should lead to a Go Around.
- A new approach may only be performed when the appropriate action is accomplished and malfunction consequences properly evaluated.

NOTE: In case of a CATII aborted for technical reasons, the crew should fill in an appropriate report in the LDP-60 form specifying the kind of the malfunction or failure.

STABILIZED CRITERIA AND STD DEVIATION CALLOUTS FOR CAT II OPS

The following abnormalities are deviation from CAT II ILS tracking normal range and must be called out:

- Speed (+10/-5kt) - If speed is too high – **“SPEED HIGH”**
- If speed is too low – **“SPEED LOW”**
- LOC (1/3 dot) **“LEFT OF LOCALIZER”** or **“RIGHT OF LOCALIZER”**
- G/S (1 dot) **“ABOVE G/S”** or **“BELOW G/S”**
- Thrust at idle - If thrust is set at idle position – **“THRUST IDLE”**
- Vertical speed - If vertical speed exceeds 1200 fpm at descent – **“VERTICAL SPEED”**
- Roll angle (above 15 deg.)- **“ROLL”**
- Pitch angle deviation (above 5 deg.) – **“PITCH”**

NOTE: Callouts are shown in bold text.

ILS CAT II - ACTIONS and CALLOUTS		
	LSP (pilot landing)	RSP (pilot flying)
Approach: First positive inward motion of localizer	“LOCALIZER ALIVE” “LOCALIZER CAPTURED” Set runway heading.	“RUNWAY HEADING”
First positive motion of glide slope	“GLIDE SLOPE ALIVE” - Set landing gear down, flaps 3. “GLIDE SLOPE CAPTURED” - Set Go Around altitude. - Set flaps 5 and performs before landing check list and calls: “BEFORE LANDING CHECKLIST COMPLETED”	“LANDING GEAR DOWN, FLAPS 3” “SET GO AROUND ALTITUDE” “FLAPS 5, BEFORE LANDING CHECKLIST”
Outer Marker or Equivalent position	Verifies altimeters, instruments and flags. “OUTER MARKER, __FT, QNH__”/ “__MILES, __FT, QNH__”	Check PFD. “CHECKED”
Below 1500 ft AFE	“APP 2”	“CHECKED”
1000 ft AFE	“1000 ft”. Verifies instruments and flags. “STABILIZED” or “NOT STABILIZED”.	“CHECKED” or correct if require

(continued)

ILS CAT II - ACTIONS and CALLOUTS (cont.)		
	LSP (pilot landing)	RSP (pilot flying)
500 ft AFE	"500 ft". "STABILIZED" or "GO AROUND" if not stabilized Look out.	"CONTINUE" or "GO AROUND, FLAPS 3, CHECK THRUST" and initiate go around procedure.
100 ft to Minimums (EGPWS callout: "APPROACHING MINIMUMS").	Hands on Control Wheel.	
At Minimums: (EGPWS callout: "MINIMUMS MINIMUMS"). If visual contact is established at an adequate position for a safe landing.	"CONTACT, MY CONTROL" Take over controls and disengage A/P no lower than 80 ft.	"YOUR CONTROL" Hands off Control Wheel and Thrust Levers. Call: "MINIMUMS", "50", "40", "30", "20", "10" if not autocall.
At Minimums: (If no visual contact is established or visual contact is established at an inadequate position for a safe landing.	"GO AROUND" Make sure that RSP controls the plane - Select GA flaps 3. - Verify thrust levers move to GA power, check thrust - Verify GA annunciates.	"GO AROUND, FLAPS 3, CHECK THRUST" - Initiate and perform go around procedure. - Press either TOGA switches. - Verify or move thrust levers to GA power. - Verify or rotate towards GA pitch attitude.

NOTE: - Callouts are shown in bold text.

- RSP must call **"GO AROUND..."** and initiate go-around procedures at minimums if no callout **"CONTACT, MY CONTROL"** or **"GO AROUND"** from LSP.
- In case of go-around after LSP callout **"CONTACT, MY CONTROL"** go around must be performed by LSP.

PRIMUS EPIC-FLIGHT MANAGEMENT SYSTEM OPERATIONS

The FMS normal operating procedures are contained in the Honeywell Flight Management System Pilot's Operating Manual.

The airplane normal operating procedures are the same as those in the basic Normal Procedures except as follows:

PRIOR TO FLIGHT

FMS Identification	VERIFY NAVDB
FMS Version	VERIFY
Both FMS Position	INITIALIZE
Flight Plan	ACTIVATE
Departure Data (SID, if used).....	COMPARE TO CHART
ETD.....	ENTER ON FPL PAGE
Performance INIT	CONFIRM INIT
Predictive RAIM	VERIFY YES
Takeoff Speeds	ENTER
FMS Fuel Quantity	RESET
Fuel Used on Both FMS	RESET
PFD NAV Source.....	SELECT FMS
CDI	VERIFY VALID DEV INDICATION
FMS TUNE	AUTO

NOTE: FMS position must be initialized separately on each FMS in a dual FMS installation. When initializing FMS position to the runway threshold, the aircraft must be located on the threshold, as no offsets may be applied. Appropriate entries for fuel reserves should be made during performance initialization. Takeoff v-speeds do not have interlock controls. It is the pilot's responsibility to ensure the correct speeds are entered for the appropriate v-speed labels. Fuel used must be re-set separately on each FMS in a dual FMS installation. FMS Auto-tuning is selected by using the DEL key selection for each NAV radio frequency on the PROGRESS page on the MCDU.

BEFORE TAKE-OFF, TAKE-OFF AND AFTER TAKE-OFF

Flight Director VERIFY IN-VIEW

Alt Selector Knob SET

NOTE: - After an aborted take-off, the performance must be reinitialized in order the VNSV to become available.

AFTER TAKE-OFF

LNAV SELECT

Speed Selector Knob FMS

VNAV SELECT

CRUISE

AT TOC

Thrust Rating Selection (TRS) CRZ

With FMS Cruise Schedules in MXR SPD or MAX SPD, the TRS does not automatically transition to CRZ.

NOTE: The speed error vector on the ADI should be ignored if the FMS speed command is in Mach.

ARRIVAL

Arrival Data (STAR, if used) COMPARE TO
CHART

Flight Director VERIFY IN-VIEW

LNAV SELECT

FGCS Vertical Mode SELECT

COURSE REVERSAL

A course reversal may be defined as a transition to an approach procedure in the navigation database. The course reversal appears as a Hold pattern in the flight plan (H symbol). The FMS will provide automated guidance to perform the course reversal by performing the appropriate Hold entry, as determined by the Hold pattern entry geometry. The Hold fix will be automatically sequenced after the Hold entry is performed. If a course reversal is to be flown as a direct entry, the pilot may elect not to fly the course reversal. In this case, the pilot should select the EXIT prompt on the FPL page prior to sequencing the Hold fix.

- NOTE:** - It is advised to conduct course reversals at speeds less than 200 knots. If course reversals are conducted at higher speeds, the crew should monitor position throughout the maneuver, to ensure protected airspace is maintained.
- Do not follow VNAV Path Deviation Indicator on the PFD during Course Reversals.

PROCEDURE TURN

A procedure turn may be defined as a transition to an approach procedure in the navigation database. The procedure turn is indicated with a P symbol in the flight plan. The FMS will provide automated guidance to perform the procedure turn. Prior to sequencing the procedure turn fix, the pilot should confirm the outbound distance and turn angle. If desired, the pilot may elect to begin the turn early by selecting the TURN prompt on the FPL page.

- NOTE:** Procedure turns should not be performed at speeds above 200 knots. If procedure turns are conducted at higher speeds, the crew should monitor position throughout the maneuver, to ensure protected airspace is maintained.

APPROACH

The FMS may be used to provide primary guidance for the following non-precision instrument approach types: GPS, RNAV (non-GPS and GPS required types), VOR, VOR-DME, NDB, and NDB-DME.

ILS, LOC, LOC-BC, LDA, and SDF approaches can be retrieved from the navigation database and inserted into the flight plan, but cannot be used to provide primary guidance using the FMS. The FMS maps may be used during these approach types to provide supplemental data.

- NOTE:** Single FMS installation does not automatically tune NAV2 radio.

FMS APPROACH

Approach Data COMPARE TO CHART
Approach Speeds VERIFY
Go Around Speeds VERIFY

NOTE: FMS does not correct Approach and Go Around speeds for non-standard conditions.

Baro Altitude SET
Minimums SET
LNAV SELECT
VNAV SELECT
Speed Selector Knob FMS
Autopilot ENGAGED

AT THE FAF

Speed Selector Knob MAN
Speed AS REQUIRED
Approach on PFD CONFIRM AT FAF

AT 400 FT AGL:

Autopilot DISENGAGE

NOTE: - The APPR annunciator must be monitored throughout final approach. If the APPR annunciator is not visible, and the appropriate runway visibility indicators are not confirmed, then the pilot should declare a missed approach.
- During Approaches with VNAV engaged, the Altitude Pre Selector must be set to altitudes lower than current airplane altitude.

FMS TO NON-PRECISION LOC APPROACH

There is no procedure to use the FMS to transition automatically to a non-precision LOC based approach. This includes LOC Only, LDA, and SDF types. Refer to the FGCS section of this manual for non-precision LOC procedures.

FMS TO LOC-BC APPROACH

This procedure assumes LNAV is previously active.

FMS Tune CONFIRM AUTO
Approach Speeds.....VERIFY
Go Around Speeds.....VERIFY

NOTE: FMS does not correct Approach and Go Around speeds for non-standard conditions.

Preview LOC SELECT
Baro Altitude.....SET
Minimums.....SET

AT THE IAF

Localizer Frequency CONFIRM SET
Localizer Frontal Course.....CONFIRM SET
When established on intercept to final approach course:
Approach Mode on Guidance Panel.....SELECT

AT THE FAF

Speed Selector Knob MAN
Speed AS REQUIRED
Localizer on PFD VERIFY ACTIVE NAV
SOURCE
Lateral Deviation Indication VERIFY VALID
FGCS Back Course Mode CONFIRM ACTIVE

FMS TO CAT I ILS APPROACH

NOTE: This procedure assumes LNAV and VNAV are previously active.

FMS Tune CONFIRM AUTO
Approach Speeds.....VERIFY
Go Around Speeds.....VERIFY

NOTE: FMS does not correct Approach and Go Around speeds for non-standard conditions.

Localizer Preview SELECT
Minimums.....SET

AT THE IAF

Localizer Frequency..... CONFIRM SET

Localizer Frontal Course..... CONFIRM SET

When established on intercept to final approach course:

Approach Mode on Guidance Panel..... SELECT

AT THE FAF

Speed Selector Knob MAN

Speed AS REQUIRED

Localizer on PFD VERIFY ACTIVE NAV
SOURCE

FGCS Back Course Mode..... CONFIRM ACTIVE

FMS TO CAT II ILS APPROACH**NOTE:** This procedure assumes LNAV and VNAV are previously active.

FMS Tune CONFIRM AUTO

Approach Speeds..... VERIFY

Go Around Speeds..... VERIFY

NOTE: FMS does not correct Approach and Go Around speeds for non-standard conditions.

Localizer 1 Preview SELECT PFD1

Localizer 2 Preview SELECT PFD2

Comparator Flags on PFD..... NONE

Minimums SET DH ON
BOTH PFD**AT THE IAF**

Localizer Frequency..... CONFIRM SET

Localizer Frontal Course..... CONFIRM SET

When established on intercept to final approach course:

Approach Mode on Guidance Panel..... SELECT

AT THE FAF

Speed Selector Knob MAN

Speed AS REQUIRED

Localizer on PFD VERIFY ACTIVE NAV
SOURCE

FGCS APPR2 Mode CONFIRM ACTIVE

NOTE: Comparator flags on the PFD include those for Air Data source and Attitude source. The on-side ADS and IRS sources should be selected. If a miscompare occurs that results in lack of ability to select independent sources, APPR2 will not be possible.

LANDING

NOTE: If an emergency landing is necessary immediately after take-off, the pilot must first clear the take-off v-speeds from the TAKEOFF V-SPEEDS page on the MCDU, in order to clear the take-off v-speeds from the Airspeed tape on the PFD.

The system does not support landing v-speeds display for touch and go operations.

MISSED APPROACH

GO-AROUND Procedure APPLY

Navigation Source FMS

Altitude SET

With Altitude above 400 feet AGL:

LNAV SELECT

FGCS Vertical Mode.....SELECT

NOTE: Selection of the TO/GA switch will result in FGCS lateral mode of wings level ROLL and Go-Around vertical mode. The Go-Around mode results in 8° nose up, which will then change to speed hold mode if landing speeds are entered. With both engines operative, speed hold will be VREF + 20 KIAS. With only a single engine, speed hold will be Approach Climb Speed. If landing speeds are not entered, GA mode will provide continued fixed pitch.

HOLD PATTERN

If a Holding Pattern is defined, the pilot must perform the following prior to sequencing the Hold fix:

Speed.....AS REQUIRED

Hold Entry Type VERIFY

Hold Inbound Course.....VERIFY

Hold Turn Direction.....VERIFY

Hold Leg Time/Distance.....VERIFY

If the Hold is defined as a Hold to an Altitude, as part of a procedure from the navigation database, the pilot must select the EXIT prompt on the FPL page when the Hold Altitude termination point is reached.

NOTE: If Hold Patterns are conducted at speeds higher than 210 knots, the crew should monitor position throughout the maneuver, to ensure protected airspace is maintained. The Hold pattern may be exited at any time by selecting the EXIT prompt on the FPL page on the MCDU. If Hold exit is selected on the outbound leg, guidance will be provided to immediately turn and capture the inbound course to the Hold fix. If Hold exit is selected on the inbound leg, guidance will be provided to continue to the Hold fix. The Hold fix will then be automatically sequenced.

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SECTION 3

EMERGENCY AND ABNORMAL PROCEDURES

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INTRODUCTION

The emergency and abnormal procedures contained in this manual have been developed by the airplane manufacturer and approved by the certification authority for use in the operation of this airplane. The source document for all procedures contained herein is the approved Airplane Flight Manual (AFM).

This Section provides the emergency and abnormal procedures to be performed in case of a system malfunction or failure, in order to protect passengers and/or crew from serious harm and to maintain the airworthiness of the airplane.

Some EICAS messages do not have an associated procedure, when they comprise crew awareness alerts only. In those cases, a Crew Awareness wording identifies the EICAS message in the table of contents of each block.

The emergency/abnormal procedures have priority over the normal checklist.

Some procedures present a characterization below the title in case any relevant emergency/abnormal condition is present, such as aural warnings, lights, EICAS indications, flight instrument flags and the airplane condition itself.

The actions contained in a box are recall items. They must be performed expeditiously and from memory. Other actions should be performed as soon as the condition permits.

Some procedures require landing at the nearest suitable airport. This statement may be presented below the associated emergency/abnormal characterization or at the beginning of a task that requires so. When the crew determines that significant threat to safety is present, they should always accomplish the earliest possible descent and land at the nearest suitable airport regardless of having this statement present in the procedure.

Flying the airplane is always the priority in any emergency/abnormal situation. Checklists should only be called after the flight path is under control, critical phases of flight (takeoff and landing) have ended and all recall items have been accomplished.

The procedures contained herein assume that:

- Airplane systems were operating normally prior to the failure.
- All emergency/abnormal checklists are performed in the order they are presented in the procedure.
- Normal procedures have been properly accomplished.
- System controls were in normal condition prior to initiation of the associated procedure.
- Aural warnings are silenced as applicable. Master Warning/ Caution lights are reset as soon as the failure is recognized.
- In case of depressurization and presence of smoke, full-face oxygen masks have been donned and communication has been established.
- Circuit breakers must not be reset.

All tasks foreseen in the procedures have the indication END stating that the specific task for that condition is over. No task is over until END has been reached.

ABNORMAL AND EMERGENCY PROCEDURES HANDLING PHILOSOPHY

- The crewmember recognizing the malfunction calls it out.
- No action should be taken until the airplane flight path and configuration are properly established and a safe altitude (400 ft or above) has been attained.
- Procedures must be initiated of the pilot flying command.
- PF (pilot flying) is responsible for:
 1. Throttles
 2. Flight path and speed
 3. Airplane configuration
 4. Navigation
 5. Communication
- PNF (pilot not flying) is responsible for:
 1. Reading aloud the appropriate checklist
 2. Executing required actions
 3. Actively monitoring the airplane
- In case of engine failure, fire, damage or separation at or above V1 and should there be enough time, the Captain will brief the cockpit crew and Purser:

CAPTAIN → PURSER → FLIGHT ATTENDANTS

In this briefing, the Captain will give the following information:

Time available.

Emergency (type).

Signals agreed.

Transmit additional instructions (structural damages, restricted exits, loss of landing gear, etc).

- When airborne, recall items referring to throttles, fire handles and engine start/stop selectors should be confirmed by both pilots prior to their accomplishment.
- Exercise common sense and caution when accomplishing checklists for multiple failures.
- If more than one of the CAS messages appear at the same time, the crew should perform the required checklists following the message priority: WARNING (red), CAUTION (amber) and ADVISORY (cyan).
- If more than one of the CAS messages, within a category, appear at same time the crew should analyze and define which one should be performed first.
- In case of abnormal/emergency situation, both crew members systematically and without delay should accomplish all recall items in their area of responsibility.
- When the flight is under control and all recall items are completed, the PF calls for the appropriate abnormal/emergency procedure in the QRH.

CREW INCAPACITATION

Pilot incapacitation occurs more frequently than any other emergency that is routinely trained for as a part of normal training. It may occur in all age groups and during all phases of flight.

Incapacitation occurs in many forms ranging from sudden death to subtle, partial loss of mental or physical performance. Subtle incapacitation is the most dangerous. It occurs most frequently. Its effects can range from loss of function to unconsciousness or death.

The key to early recognition of pilot incapacitation is contained in regular use of the basic CRM concept in our operations. Proper CRM involves efficient communication, concentration on the other crewmember, crosschecks, etc. Routine adherence to standard operating procedures is a great aid in detecting the problem. Suspicion of some degree of gross or subtle incapacitation should also be considered when a crewmember does not respond to any verbal communication associated with a significant deviation from a standard procedure.

Failure of any crewmember to respond to a second request or a checklist response must trigger alert to the other crewmember.

During the flight, both crewmembers shall inform each other about approaching incapacitation if able to detect it. If you do not feel well - say so. Let the other pilot know and let him fly the aircraft.

Whenever:

- a flight deviation or a critical situation is observed by PNF; or
- reading any in-flight normal checklist; or
- giving a standard call; or
- trying to communicate with PF in any way, if there is no response of PF, a second challenge must be made by PNF.

If no response to the second challenge and upon confirming pilot incapacitation –

- PNF shall take over control of the aircraft and call twice:
- MY CONTROLS, MY CONTROLS.
- Use every effort to control the aircraft and make sure the AP is engaged.
- Declare emergency and notify the flight attendants.
- Restrain the incapacitated pilot, slide his seat and lock it in the full aft position or ask the flight attendants to get him out from the controls.
- Ensure first aid for the incapacitated pilot - call a flight attendant, find a doctor on board, administer oxygen, etc.
- Organize your work and prepare for landing.

NOTE: Response as applicable to given case means verbal response as well as appropriate action of PF

CONSIDER HELP FROM OTHER PILOTS WHO MAY BE AMONG THE PASSENGERS

To summaries, once the incapacitation is recognized:

- keep the aircraft flying;
- care for the incapacitated pilot;
- prepare for landing.

FIRE AND SMOKE DRILLS

CARGO COMPARTMENT FIRE

Associated Cargo Fire Extinguishing Button PUSH
After CRG AFT (FWD) FIREX HI ARM message is displayed and the associated
Cargo Fire Extinguishing Button is illuminated:

Associated Cargo Fire Extinguishing Button PUSH AGAIN
The associated Cargo Fire Extinguishing Button light will extinguish.
Confirm the CRG AFT (FWD) FIREX HI ARM message extinguishes and
the CRG AFT (FWD) FIREX LO ARM message is displayed.

.....Wait 1 minute.....

Confirm the CRG AFT (FWD) FIREX LO ARM message and the Cargo Fire
Extinguishing Button light extinguish.

NOTE: - The low rate fire-extinguishing bottle is not automatically discharged on
ground, unless the pilot pushes the associated cargo compartment fire-
extinguishing button once again.

LAND AT THE NEAREST SUITABLE AIRPORT.

END

CARGO FORWARD (AFT) SMOKE

EICAS WARNING: CRG FWD SMOKE or CRG AFT SMOKE
LIGHT: Associated Cargo Fire-Extinguishing Button illuminates.

Associated Cargo Fire Extinguishing Button PUSH

Confirm the CRG FWD (AFT) FIREX HI ARM message extinguishes and the CRG
AFT (FWD) FIREX LO ARM message is displayed.

.....Wait 1 minute.....

Confirm the CRG FWD (AFT) FIREX LO ARM message and the cargo fire-
extinguishing button light extinguish.

LAND AT THE NEAREST SUITABLE AIRPORT.

END

APU FIRE

EICAS WARNING: APU FIRE

LIGHT: APU Emergency Stop Button upper half illuminates in red.

APU Emergency Stop Button PUSH IN

APU OFF

APU FIRE MESSAGE EXTINGUISHES

No

Yes

END

APU Fire Extinguishing Button PUSH

WARNING: DO NOT ATTEMPT TO RESTART THE APU.

LAND AT THE NEAREST SUITABLE AIRPORT.

END

ENGINE 1 (2) FIRE

EICAS WARNING: ENG 1(2) FIRE

EICAS Indication: FIRE icon on the associated ITT indicator.

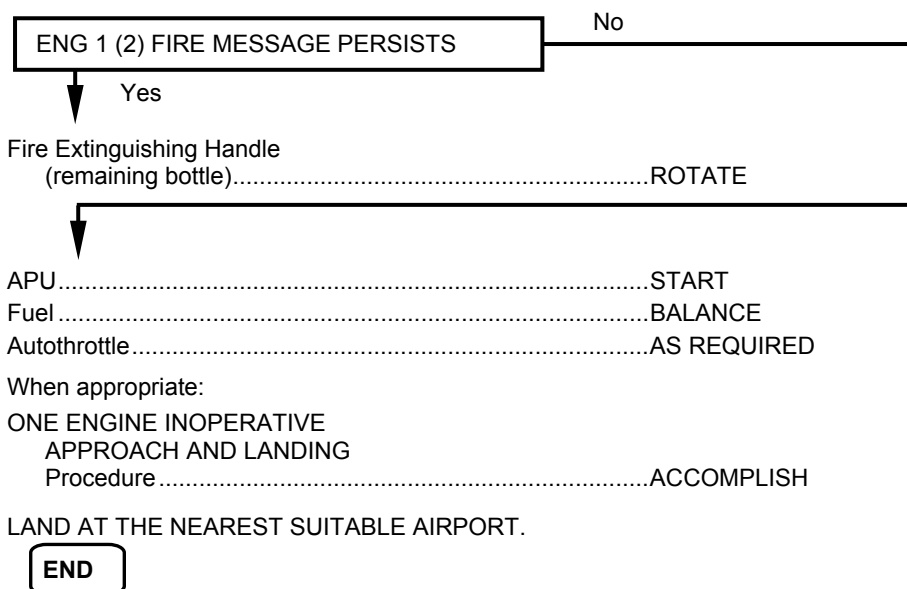
LIGHT: Associated fire handle illuminates.

Autothrottle	DISENGAGE
N1 (operative engine)	AT LEAST 5% ABOVE N1 IDLE
Affected engine:	
Thrust Lever	IDLE
Start/Stop Selector	STOP
Fire Extinguishing Handle	PULL

**WARNING: AFTER SELECTING THE START/STOP SELECTOR TO STOP,
DO NOT MOVE THE OPERATIVE ENGINE THRUST LEVER TO
IDLE FOR AT LEAST 1 MINUTE**

Fire Extinguishing Handle ROTATE (L or R)

..... Wait 30 seconds



AIR CONDITIONING SMOKE

Crew Oxygen Masks DON,100%
Crew Communication ESTABLISH

Recirc Fan Button..... PUSH OUT

SMOKE STOPS OR DECREASES

No

Yes

END

Pack 1 Button PUSH OUT

SMOKE STOPS OR DECREASES

No

Yes

Bleed 1 Button..... PUSH OUT

Altitude MAX 31000 FT

END

Pack 1 Button PUSH IN

Pack 2 Button PUSH OUT

Bleed 2 Button..... PUSH OUT

Altitude MAX 31000 FT

If necessary:

SMOKE EVACUATION Procedure..... ACCOMPLISH

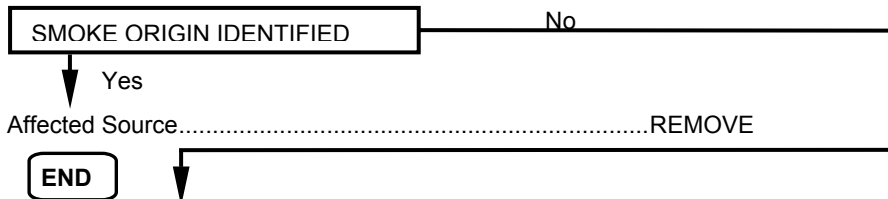
LAND AT THE NEAREST SUITABLE AIRPORT.

END

ELECTRICAL SYSTEM FIRE OR SMOKE

Crew Oxygen Masks	DON, 100%
Crew Communication	ESTABLISH

Recirc Fan Button PUSH OUT



Emergency Lights OFF

RAT Manual Deploy Lever PULL

Airspeed MIN 130 KIAS

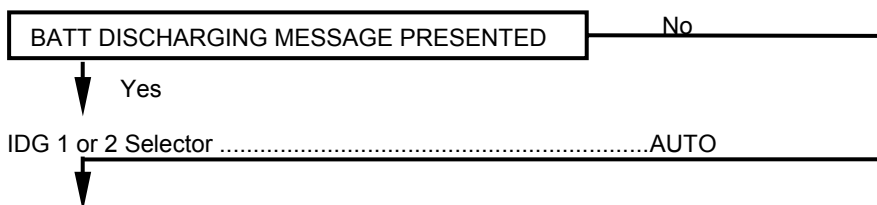
Altitude 10000 FT OR MEA,
WHICHEVER IS
HIGHER

IDG 1 Selector OFF

IDG 2 Selector OFF

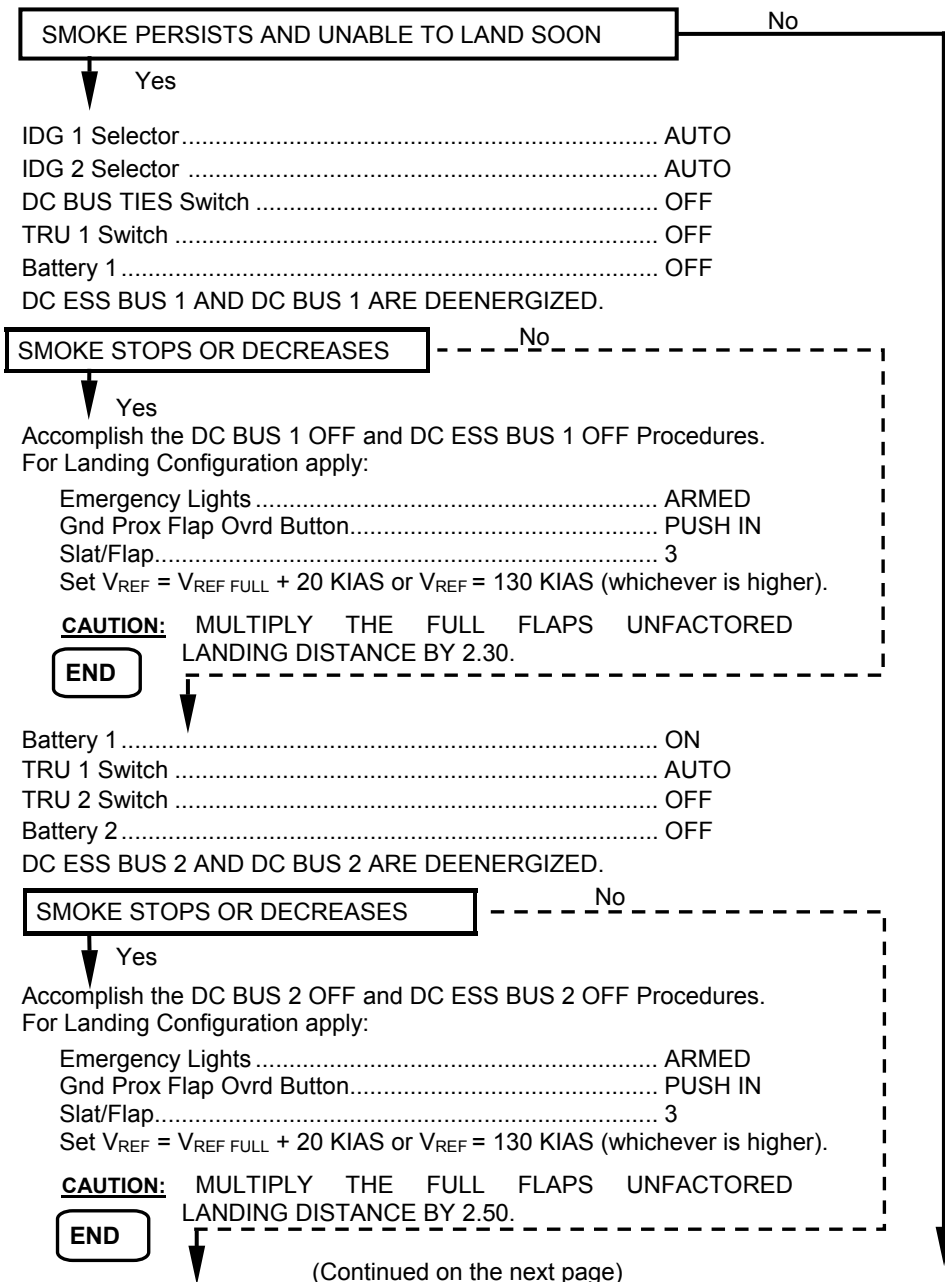
APU Generator Button PUSH OUT

NOTE: - Do not accomplish the ELEC EMERGENCY Procedure.
- Refer to ELEC EMERGENCY Procedure to be aware of relevant inoperative items.



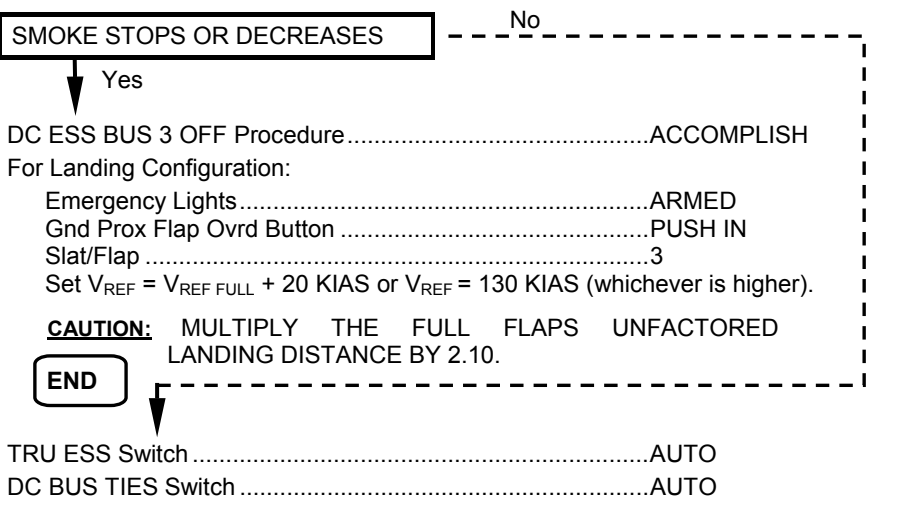
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Battery 2 AUTO
TRU 2 Switch AUTO
TRU ESS Switch OFF
DC ESS BUS 3 IS DEENERGIZED.



Landing configuration:
Emergency Lights ARMED
Gnd Prox Flap Ovrđ Button PUSH IN
Slat/Flap 3
Set $V_{REF} = V_{REF FULL} + 20 \text{ KIAS}$ or $V_{REF} = 130 \text{ KIAS}$ (whichever is higher).
CAUTION: MULTIPLY THE FULL FLAPS UNFACTORED LANDING DISTANCE BY 2.10.

If necessary:

Smoke Evacuation Procedure ACCOMPLISH
If a go around is required:
Slat/Flap 3
Approach Climb Speed..... $V_{REF FULL} + 20 \text{ KIAS}$
or 130 KIAS
(whichever is higher).

LAND AT THE NEAREST SUITABLE AIRPORT.

END

LAVATORY SMOKE

EICAS WARNING: LAV SMOKE

Establish contact with the cabin crew.

If necessary:

Diversion CONSIDER
SMOKE EVACUATION Procedure ACCOMPLISH

END

SMOKE EVACUATION

Crew Oxygen Masks	DON, 100%
Crew Communication	ESTABLISH
Pressurization Dump Button	PUSH IN

Cockpit Door CLOSE

Cabin Rate VERIFY

CABIN RATE IS LESS THAN 1000 FT/MIN

No

Yes

Pressurization Mode Selector	MAN
Pack 1 Button	PUSH OUT
Pack 2 Button	PUSH OUT
Recirc Fan Button	PUSH OUT

EMERGENCY DESCENT Procedure ACCOMPLISH

After smoke is cleared:

Pressurization Mode Selector	AUTO
Pressurization Dump Button	PUSH OUT
Pack 1 Button	PUSH IN
Pack 2 Button	PUSH IN
Recirc Fan Button	PUSH OUT

NOTE: - Identify the smoke origin and do the applicable procedure.

LAND AT THE NEAREST SUITABLE AIRPORT.

END

RECIRCULATION SMOKE

EICAS CAUTION: RECIRC SMOKE

Recirc Fan Button PUSH OUT

END

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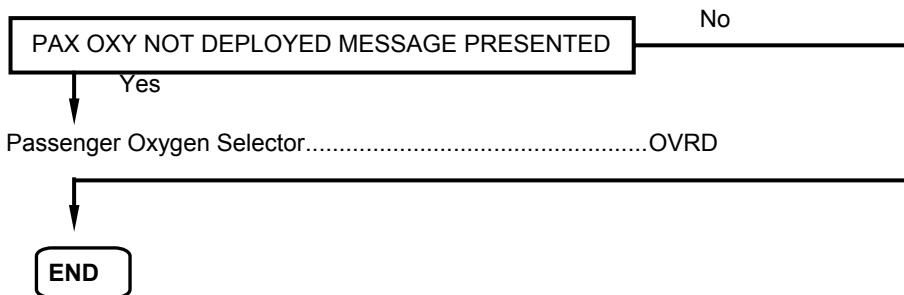
UNPRESSURISED AND PARTIALLY PRESSURISED FLIGHT

CABIN ALTITUDE HIGH

EICAS WARNING: CABIN ALTITUDE HI
INDICATION: Cabin Altitude indication in red.
AURAL WARNING: CABIN

Crew Oxygen Masks	DON, 100%
Crew Communication	ESTABLISH
Altitude	10000 FT or MEA, WHICHEVER IS HIGHER
Thrust Levers	IDLE
Speed Brake	FULL OPEN
Airspeed	MAX/APPROPRIATE
Transponder	7700
ATC	NOTIFY

Cabin Altitude MONITOR

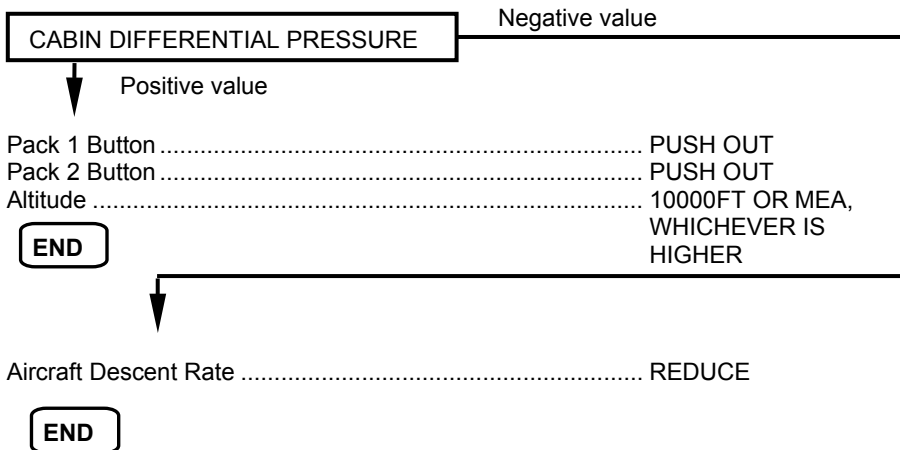


CABIN DIFFERENTIAL PRESSURE FAILURE

EICAS CAUTION: CABIN DIFF PRESS FAIL

INDICATION: Abnormal cabin altitude indication may be presented.

If Cabin Differential Pressure red limit is reached:



EXCEEDING STRUCTURAL LIMITS SUCH AS OVERWEIGHT LANDING

STRUCTURAL DAMAGE

Airspeed MAX 200 KIAS

Avoid high maneuvering loads.

FUSELAGE IS DAMAGED

No

Yes

Altitude 10000 FT OR MEA,
WHICHEVER IS
HIGHER

When reaching 10000 ft:

Pressurization Dump Button PUSH IN

LAND AT THE NEAREST SUITABLE AIRPORT.

Establish landing configuration early.

END

IMPAIRED OR CRACKED WINDSHIELD

Affected Windshield Heating PUSH OUT
Cockpit Door..... CLOSE

ONLY OUTER LAYER CRACKED

Inner and/or middle layer(s)

Outer layer only

END

Airspeed MAX 220 KIAS
Altitude 10000 FT OR MEA,
WHICHEVER IS
HIGHER

During Descent:

Pressurization Mode Selector MAN
Cabin Altitude INCREASE

NOTE: Maintain cabin altitude at 10000 ft while descending the airplane.

At or below 10000 ft:

Pack 1 Button PUSH OUT
Pack 2 Button PUSH OUT

FORWARD VISIBILITY

Both sides impaired

One side not impaired

Pilot flying must be on the non-impaired side.

END

Airspeed MAX 140 KIAS
Direct Vision Window..... OPEN

CAUTION: ACCOMPLISH THE DESCENT IN A MAXIMUM OF 15 MINUTES.

END

OVERWEIGHT LANDING

Overweight Landing may safely be accomplished by using normal landing procedures and techniques. There are no adverse handling characteristics associated with heavier than normal landing weights.

Landing distance is always less than takeoff distance and brake energy will not be exceeded for flaps 5 or 6 landing at all gross weights.

The brake energy limits may be exceeded when landing at high gross weights at speeds associated with non-normal procedures requiring flaps set at 5 or less.

Reduce the landing weight as much as possible, and at Captain's discretion this can be done using high drag configuration, as when holding at low altitude with landing gear down.

The maximum rate of descend is 360 ft/min at touchdown.

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EXCEEDING COSMIC RADIATION LIMITS

This Chapter is not applicable for ERJ-170.
No operational procedures are established.

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LIGHTING STRIKES

Even though the airplane is adequately protected against lightning strikes effects, operating procedures should be established in an attempt to avoid such phenomena.

Avoid penetration of thunderstorms. In-flight lightning avoidance is closely associated with thunderstorm avoidance. Maintain visual contact with thunderstorms during the daytime and with lightning at night.

Check the radar for precipitation, review all available types of weather information, examine other pilot reports and follow ATC instructions. Even with a good weather report received and understood, pay close attention to those storms that develop rapidly along the route in a given area and that cannot be predicted. While enroute, constantly update the previous weather briefing through radio contact and airborne equipment for actual storm avoidance.

Remember that radar detects only liquid droplets, not the cloud itself. Only rain suspended in the cloud will produce a radar echo, which may lead to occasional encounters with hail and lightning.

Avoid the detected thundercloud or area, if possible by more than 25 miles when traffic conditions permit.

Be aware that lightning can strike an airplane miles away from the extreme side of a developed thunderstorm. Reports of airplanes receiving strikes in clear air at 25 miles or more from the nearest storm are common.

The following paragraphs summarize the conditions in which strikes are most common:

Meteorological conditions: incident reports show that an airplane must be within or beneath a cloud to receive a strike, or in or near regions of precipitation. Incident reports show that in over 80% of the strikes, the airplane was within a cloud and experiencing some precipitation and turbulence. But other strikes may occur in a cloud where there is no precipitation nearby, in clear air reasonably distant from a thundercloud, during snowstorms and in clouds over erupting volcanoes. Flight through or in the vicinity of cold front, warm front, stationary front, unstable air or squall line are indicators of imminent lightning strikes. Incident reports also show that lightning strikes occur most commonly under light or heavy turbulence conditions.

- Flight regime: Takeoff, climb, level flight, descent or approach.
- Altitude: strikes are more common between 5000 and 15000 ft, but may occur at virtually all flight altitudes. Lightning strike incidents at lower altitudes are far more frequent since at higher altitudes airplanes can divert around thunderclouds with greater ease.
- Outside air temperature: most strike incidents have occurred when the airplane is flying in temperatures near or at freezing level. Strikes may also occur at temperatures as high as 25°C, or as low as -45°C.

Metal airplanes produce a phenomenon called the Faraday Cage effect, which distributes electrical charges along the airframe in such a manner that occupants and internal components will not receive the high current that causes injury and damage. There seems to be no record of any case of crew incapacitation due to lightning strike, although flash blindness can occur for a few seconds.

Direct effects which result from a lightning strike may be:

- Pit marks are often seen along the fuselage or holes in the trailing edge of wing and tail tips.
- Melting of rivets.
- Puncturing of nonmetallic structures.
- Puncturing and de-lamination of composites.
- Slight deformation of metal skins and structure.
- Welding or roughening of moveable hinges and bearings.
- Damage to other parts that may conduct lightning current other than the airframe, such as bonding or diverted straps and pitot tubes.

Effects caused by the flash-induced electromagnetic field and the increase of the voltage due to the current at the airplane structure are defined as indirect effects and may be:

- Interruption in the reliability of instruments and navigation equipment.
- Damage to electronic and electrical equipment.
- Popping of circuit breakers.
- Loss of electrical power.
- Engine flame-out.

IN FLIGHT OPERATIONS

IF IN FLIGHT LIGHTNING STRIKE IS SUSPECTED TO OCCUR

An imminent lightning strike event may be indicated to flight crews by the buildup of static discharge which causes interference on ADF indicators or noise in communication receivers. Another indication is St. Elmo's Fire, which is visible at night as small electrical discharges running across the windshields and sparking on the wings.

Consider wearing sunglasses to protect your eyes from the flash or have one pilot keep eyes downward.

All Cockpit Lights.....ON/FULL
BRIGHTNESS

IF THE AIRPLANE HAS BEEN HIT BY LIGHTNING

If situation is under control after a lightning strike, apply the following procedure to ascertain whether the flight may proceed.

Circuit Breakers.....CHECK
Compass/Heading System.....CHECK
Check magnetic compass and heading system for normal indication.

Engine Indication.....CHECK
Check engine for normal indication and apply associated procedure if any failure arises after airplane receives strike.
In case of engine shutdown, the flight crew shall analyze the circumstances of the event and consider an engine airstart.

Pressurization CHECK

Check pressurization system for normal indication.

Flight Controls CHECK
Check all flight controls for freedom of movement. Verify that slats/flaps and speed brakes are working properly (refer to slats/flaps and speed brakes operating limits).

Fuel System CHECK
Check fuel system for normal operation. Monitor fuel remaining and fuel consumption to ascertain that no fuel leak exists.

Altitude MAINTAIN
Never climb the airplane after a lightning strike, unless required by performance (climb or obstacle clearance) or operation contingencies. If any structural damage is suspected, apply EMERGENCY DESCENT procedure.

All Other Airplane Systems..... CHECK

Check all airplane instruments following a panel scan sequence to ascertain that flight safety prevails.

Apply the associated emergency/abnormal procedure if any failure arises after lightning strike. Consider discontinuing the flight and land at the nearest suitable airport if any unsafe condition is revealed after checking systems' operation.

ON GROUND OPERATIONS

ON THE GROUND

Approaching and landing an airplane during a thunderstorm is strongly not recommended. The human body may provide the grounding that is otherwise lacking. If you are in the cockpit, do not attempt to communicate with ground through a wire handset, and stay inside the airplane until the storm has passed.

IF THE AIRPLANE HAS BEEN HIT BY LIGHTNING

External safety inspection

Check for holes, punctures, discoloration and de-lamination throughout the whole airframe.

Verify for loose, melted or missing rivets.

Check that all static dischargers are in place or in accordance with the CDL.

Verify the integrity of the lights installed on tail, wing, fuselage and landing gear.

Verify all antennas, ice detectors, smart probes, TAT probes and pressurization static ports for condition.

Report the lightning strike to maintenance personnel, by filling in the LIGHTNING STRIKE INCIDENT REPORT form.

Make sure that the maintenance has performed the AMM MPP 05-50-01/ 601 before flying the airplane again.

ERJ-170 LIGHTNING STRIKE INCIDENT REPORT

Part I (to be completed by flight crew)

Conditions at time of strike:

- Operator: _____ Date of incident: _____
 • ACFT S/N: _____ Flight no.: _____
 • Route: From _____ To: _____
 • Altitude: _____ ft Airspeed: _____ kt
 • Flight phase: Approach ☐ Climb ☐ Level Flight ☐
 Other: _____
 • Weather: Cloud type _____ % Cover _____ Ceiling (ft) _____ Top at (ft) _____ OAT (°C) _____
 Rain ☐ Sleet ☐ Hail ☐ Snow ☐ None ☐
 • Was St. Elmo's fire visible before strike? Yes ☐ No ☐
 • Any effects on:
 DC power system: _____
 Flight controls: _____
 Engine: _____
 Avionics: _____
 Other (describe): _____
 • Any effects on personnel, such as: Flash blindness: _____
 Electrical shock: _____

Part I completed by: _____

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DISTRESS COMMUNICATIONS AND ALERTING ATC TO EMERGENCIES

In case of distress during flight and/or necessity of alerting ATC to emergencies, proceed to rules included in Raca Avionics Flight Information Supplement (02 Nov 2000).

RVSM AIRSPACE OPERATION

- In case of emergency or abnormal situation or contingencies (equipment failures, weather, etc.) which affect the ability to maintain the cleared flight level, notify ATC and co-ordinate an action plan that is appropriate to the airspace concerned;
- Notify ATC when encountering greater than moderate turbulence;
- If unable to notify ATC and obtain an ATC clearance prior to deviating from the cleared flight level, follow any established contingency procedures and obtain ATC clearance as soon as possible.

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ENGINE FAILURE – EMERGENCY PROCEDURES

DUAL ENGINE FAILURE

INDICATION: FAIL icon inside both N1 indicators.
Both oil pressure indications in red.

Airspeed	250 KIAS MIN
RAT Manual Deploy Lever	PULL

APU (max FL 300)	START
Emergency Lights	OFF
Thrust Levers	IDLE

BOTH ENGINES SUCCESSFUL AUTORELIGHT

No

Yes

Flight Controls Mode Buttons
(Spoilers, Elevators, Rudder).....PUSH IN, then OUT

Landing Configuration:

Emergency Lights	ARMED
Gnd Prox Flap Ovr Button	PUSH IN
Slat/Flap	3
Set $V_{REF} = V_{REF FULL} + 20 \text{ KIAS}$ or $V_{REF} = 130 \text{ KIAS}$ (whichever is higher).	

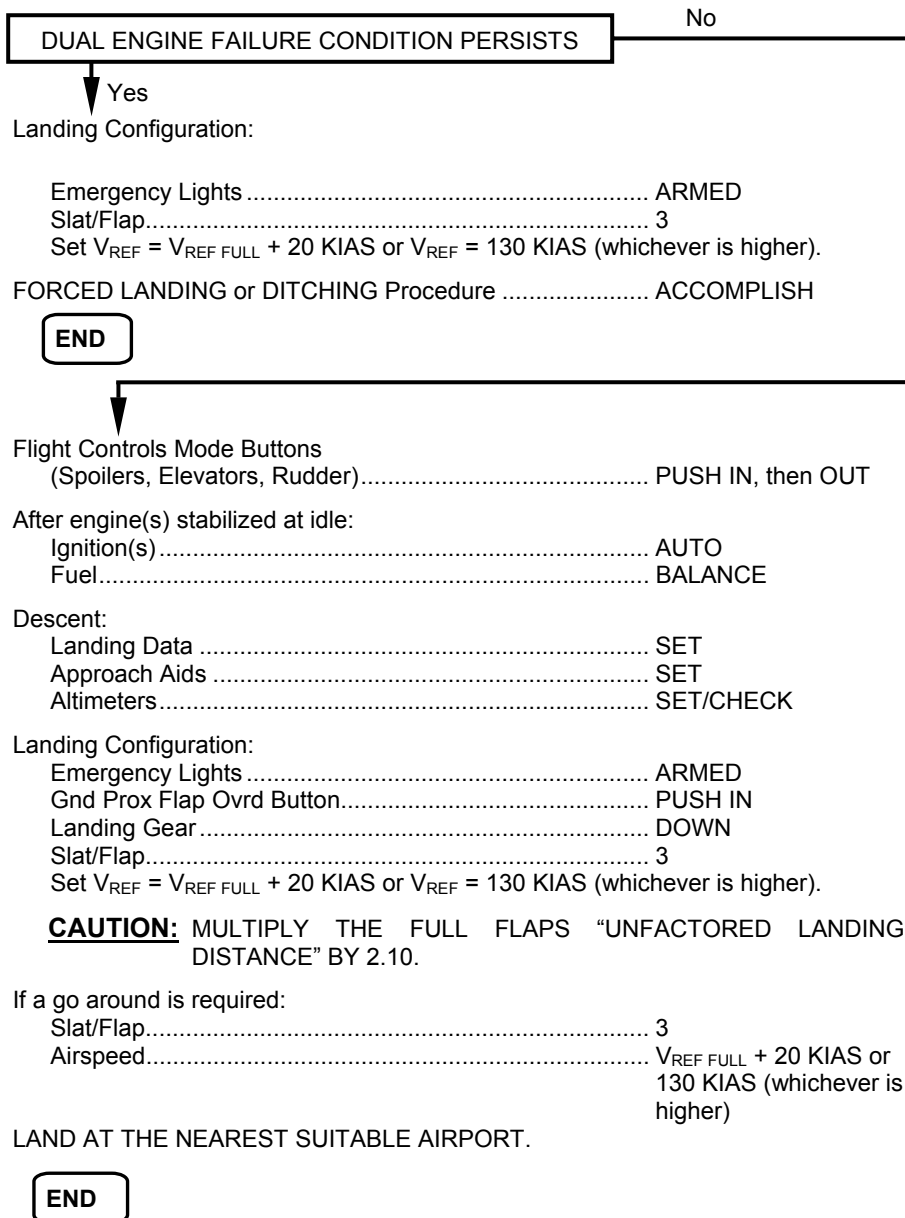
CAUTION: MULTIPLY THE FULL FLAPS “UNFACTORED LANDING
DISTANCE” BY 2.10.

END

Airstart Envelope	CHECK
Fuel Xfeed Selector.....	LOW 1
Inoperative Engine(s):	
Start/Stop Selector(s)	STOP
Ignition(s).....	OVRD
Start/Stop Selector(s)	START, then RUN

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ENGINE ABNORMAL START

Affected engine:

Start/Stop Selector STOP

ENGINE DRY MOTORING CONSIDERED

No

Yes

Affected engine:

Ignition OFF

Start/Stop Selector START, then RUN

..... Wait 30 seconds

Start/Stop Selector STOP

Ignition AUTO

If applicable:

ONE ENGINE INOPERATIVE
APPROACH AND LANDING

Procedure ACCOMPLISH

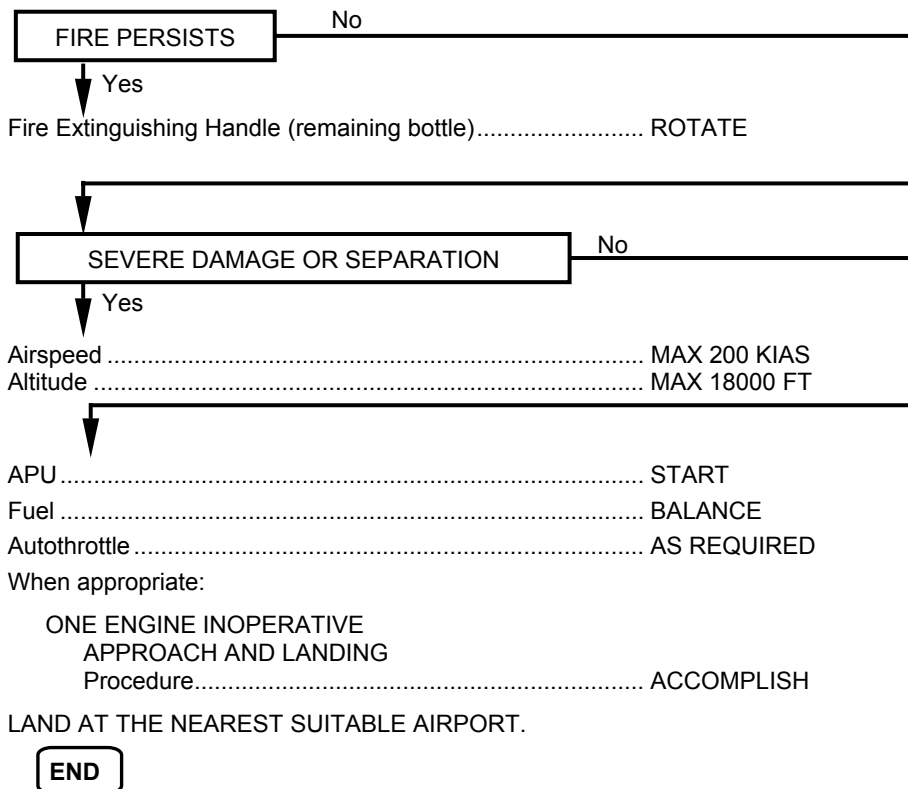
END

ENGINE FIRE, SEVERE DAMAGE OR SEPARATION

Autothrottle	DISENGAGE
N1 (operative engine)	AT LEAST 5% ABOVE N1 IDLE:
Affected Engine:	
Thrust Lever	IDLE
Start/Stop Selector	STOP
Fire Extinguishing Handle	PULL

WARNING: AFTER SELECTING THE START/STOP SELECTOR TO STOP, DO NOT MOVE THE OPERATIVE ENGINE THRUST LEVER TO IDLE FOR AT LEAST 1 MINUTE.

Fire Extinguishing Handle..... ROTATE (L or R)
..... Wait 30 seconds.....



ENGINE FIRE, SEVERE DAMAGE OR SEPARATION (ON TAKEOFF AFTER V₁)

ENGINE FIRE, SEVERE DAMAGE OR SEPARATION (ON TAKEOFF AFTER V ₁) ACTIONS AND CALLOUTS		
	PF	PNF
On the ground	“ENGINE ____ FIRE”. (pilot first noticing the engine failure)	
		Cancel aural warnings.
At V _R	Rotate normally.	“ROTATE”
At lift-off	- Confirm positive rate of climb. “GEAR UP” - Climb at V₂ + 10 kt	- Verify positive rate of climb. “POSITIVE RATE”. - Position gear lever UP.
At 400 ft AFE	“HEADING” (NOTE 2)	“400” - Select lateral Mode. - Advise ATC - Monitor thrust, attitude and speed.
At Acceleration Altitude (from 400 ft to 1500 ft)	“FLCH, SPEED V_{FS}” At flap retraction speed “FLAPS ____”	“ACCELERATION ALTITUDE” - Select FLCH Mode. - Select / Check V_{FS} - Retract flaps on request; announce: “FLAPS ____SET”

(Continued)

**ENGINE FIRE, SEVERE DAMAGE OR SEPARATION
(ON TAKEOFF AFTER V₁) ACTIONS AND CALLOUTS (cont.)**

	PF	PNF
Fire Drill	- When flaps “0” “ENGINE FIRE DRILL” (Memory items) - Disengage Autothrottle - N1 (operative engine) at least 5% above N1 idle. “THRUST LEVER 1 (2)” - Reduce affected thrust lever to idle. - Confirm the correct START/STOP Selector “CHECKED” - Confirm that the correct engine fire extinguisher handle is being pulled “CHECKED”. “CONTINUOUS THRUST”	- Confirm the correct thrust lever is being reduced “CHECKED”. “START/STOP SELECTOR 1 (2)” - Set START/STOP selector to STOP. “ENGINE FIRE HANDLE 1 (2)” - Associated Engine Fire Extinguishing handle PULL - Select CON thrust.
	“ENGINE FIRE, SEVERE DAMAGE OR SEPARATION CHECKLIST”	Accomplish checklist. “ENGINE FIRE, SEVERE DAMAGE OR SEPARATION CHECKLIST COMPLETED”
When Engine Fire, Severe Damage or Separation Checklist completed	“AFTER TAKEOFF CHECKLIST”	Accomplish checklist. “AFTER TAKEOFF CHECKLIST COMPLETED”.

NOTE 1:

Callouts are shown in bold text.

NOTE 2:

For takeoff and go around in one engine condition, LNAV and VNAV must not be armed below the level off. Additionally, LNAV must not be armed until there is no more turn considerations.

ENGINE FAILURE AT OR ABOVE V_1

ENGINE FAILURE AT OR ABOVE V_1 - ACTIONS AND CALLOUTS		
	PF	PNF
	“ENGINE ____ FAILURE”. (pilot first noticing the engine failure)	
On the ground	Control airplane using rudder. “CHECK THRUST”.	- Cancel aural warnings. - Verify maximum thrust on operating engine. “THRUST CHECKED”.
At V_R	Rotate to Appropriate pitch.	“ROTATE”.
After lift-off	- Confirm positive rate of climb. “GEAR UP”. - Climb at $V_{2.0} \div V_2 + 10$ kt	- Verify positive rate of climb. “POSITIVE RATE”. - Position gear lever UP. - Monitor speed and attitude.
At 400 ft AFE.	Comply with airport “One Eng SID” if applicable.	
	“HDG, BANK” (NOTE 2)	“400” - Select Lateral Mode - Advise ATC - Monitor thrust attitude and speed.
At Acceleration Altitude (from 400 ft to 1500 ft)	“FLCH, SPEED V_{FS}” - Verify speed bug selector to “V_{FS}” - At flap retraction speed: “FLAPS ____”	“ACCELERATION ALTITUDE” - Select FLCH mode. - Select/Check V_{FS} - Retract flaps on request, announce flaps position: “FLAPS ____”

(Continued)

ENGINE FAILURE AT OR ABOVE V₁ - ACTIONS AND CALLOUTS (cont.)

	PF	PNF
Performing Engine Failure Checklist	• When flaps “0”. “CONTINUOUS THRUST”. “ENGINE 1(2) FAILURE CHECKLIST” • Disengage Autothrottle • N1 (operative engine) at least 5% above N1 idle. “THRUST LEVER 1 (2)” • Reduce affected thrust lever to idle. • Confirm the correct START/STOP Selector “CHECKED”	• Select/Verify CON thrust. • Accomplish checklist. • Confirm the correct thrust lever is being reduced – “CHECKED”. “START/STOP SELECTOR 1 (2)” • Set START/STOP selector knob to STOP. • Accomplish applicable Checklist. “ENGINE 1 (2) FAILURE CHECKLIST COMPLETED”
When Engine Failure Checklist is completed	“AFTER TAKE OFF CHECKLIST” .	• Accomplish the checklist. “AFTER TAKEOFF CHECKLIST COMPLETED”

NOTE 1:

Callouts are shown in bold text.

NOTE 2:

For takeoff and go around in one engine condition, LNAV and VNAV must not be armed below the level off. Additionally, LNAV must not be armed until there is no more turn considerations.

TAKEOFF WITH ENGINE FAILURE AT OR ABOVE V1

At V_R rotate the airplane following the flight director guidance.

If flight director is inoperative, rotate the airplane according to following table:

FLAP POSITION	1	2	4
PITCH ANGLE	11°	10°	12°

With positive climb:

Landing Gear UP

Airspeed MIN V_2

Maintain V_2 minimum up to the level off. At the level off, retract flaps according to the flap retraction speed reference indication.

For airplanes without this indications, at the level off, select flaps up according to the following flap retraction schedule:

T/O FLAP	SELECT FLAPS at SPEED			
	3	2	1	0
4	$V_2 + 10$	$V_2 + 20$	$V_2 + 30$	$V_2 + 50$
2			$V_2 + 10$	$V_2 + 30$
1				$V_2 + 20$

Accelerate the airplane to the final segment speed (V_{FS}) and set the engine thrust rate to continuous.

NOTE: If the airplane is at low weight and the selected altitude is low, it may be possible to lose TO/GA guidance protection.

After retracting flaps, accomplish the ENGINE 1 (2) FAILURE Procedure.

END

REJECTED TAKEOFF

REJECTED TAKEOFF - ACTIONS AND CALLOUTS

	LSP	RSP
	The pilot first noticing the malfunction identifies and announces it.	
If decision was REJECT	“REJECT, MY CONTROL” - Reduce thrust levers to idle, disconnect AT and apply reverse as required. - Apply maximum brake. - Use reverse as necessary and smoothly return reverse thrust to idle.	- Monitor airplane deceleration. - Verify the reverse status. - Cancel any aural warnings. - Call “60 kts”. - Advise ATC stating the abort.
When airplane has stopped	- Set parking brake ON. - Alert cabin crew (P.A): “POZOSTAĆ NA MIEJSCACH / REMAIN SEATED”. - Request appropriate checklist if applicable.	Perform appropriate checklist.
If emergency evacuation is required	Comply with Emergency Evacuation Procedures.	

NOTE: Callouts are shown in bold text.

- The rejected takeoff (RTO) maneuver is initiated during the takeoff roll to rapidly stop the aircraft on the runway.
- During a normal takeoff the LSP should keep his hand on the thrust levers until V_1 has been reached.
- The decision to reject the takeoff is made by the Captain, according to the circumstances. Airplane speed at the moment and adverse runway conditions should be taken into account.

- At speeds below 80 kts, the decision to reject should be considered if any undesirable event occurs, including unusual vibrations, tire failure or a Master Caution message.
- After 80 kts and before V_1 , the take-off should be rejected only in the event of engine fire/failure or any malfunctions that severely affect flight safety. After V_1 , it is recommended that take-off be continued since there is no assurance that the airplane will stop within the remaining length of runway.
- The pilot not flying should monitor all essential instruments throughout the take off and, immediately announce any malfunctions or adverse condition.
- Reverser should be set to MIN REV at 60 knots and closed at 30 knots. If necessary, the reverser can be used until the airplane comes to a complete stop.
- The airplane should be fully stopped and must not vacate the runway until it is absolutely clear that an emergency evacuation is not necessary.
- If rejecting due to fire, consider positioning the airplane so that the fire is on the downwind side.
- If a decision to proceed to a new take-off is made just after rejecting a take-off all the FMS initialization data has to be verified and confirmed.

ENGINE 1 (2) REVERSER DEPLOYED

EICAS WARNING: ENG 1 (2) REV DEPLOYED

EICAS Indication: REV icon above the associated ITT indication.

Autothrottle DISENGAGE

Associated Thrust Lever IDLE

ANY BUFFETING NOTICED

No

Yes

Start/Stop Selector STOP

APU START

Fuel BALANCE

When appropriate:

ONE ENGINE INOPERATIVE

APPROACH AND LANDING Procedure ACCOMPLISH

LAND AT THE NEAREST SUITABLE AIRPORT.

END

ENGINE 1 (2) OIL LOW PRESSURE

EICAS WARNING: ENG 1 (2) OIL LOW PRESS

EICAS Indication: Oil pressure indication in amber may be presented.

OIL PRESSURE INDICATION ABNORMAL

No

Yes

ENGINE SHUTDOWN Procedure ACCOMPLISH

END

ENGINE FAILURE – ABNORMAL PROCEDURES

ENGINE ABNORMAL VIBRATION

EICAS Indication: Engine vibration indication may be displayed in amber.

Autothrottle.....DISENGAGE

ENG VIBRATION DUE TO ICE ACCUMULATION

No

Yes

Associated Thrust Lever.....REDUCE TO IDLE,
THEN ADVANCE TO
MIN 70% N1

..... Wait 30 seconds

Associated Thrust Lever.....AS REQUIRED

END

Associated Thrust Lever.....REDUCE
Reduce thrust to keep vibration within normal range.

If other engine parameters become abnormal or exceed operating limits:

ENGINE SHUTDOWN Procedure ACCOMPLISH

END

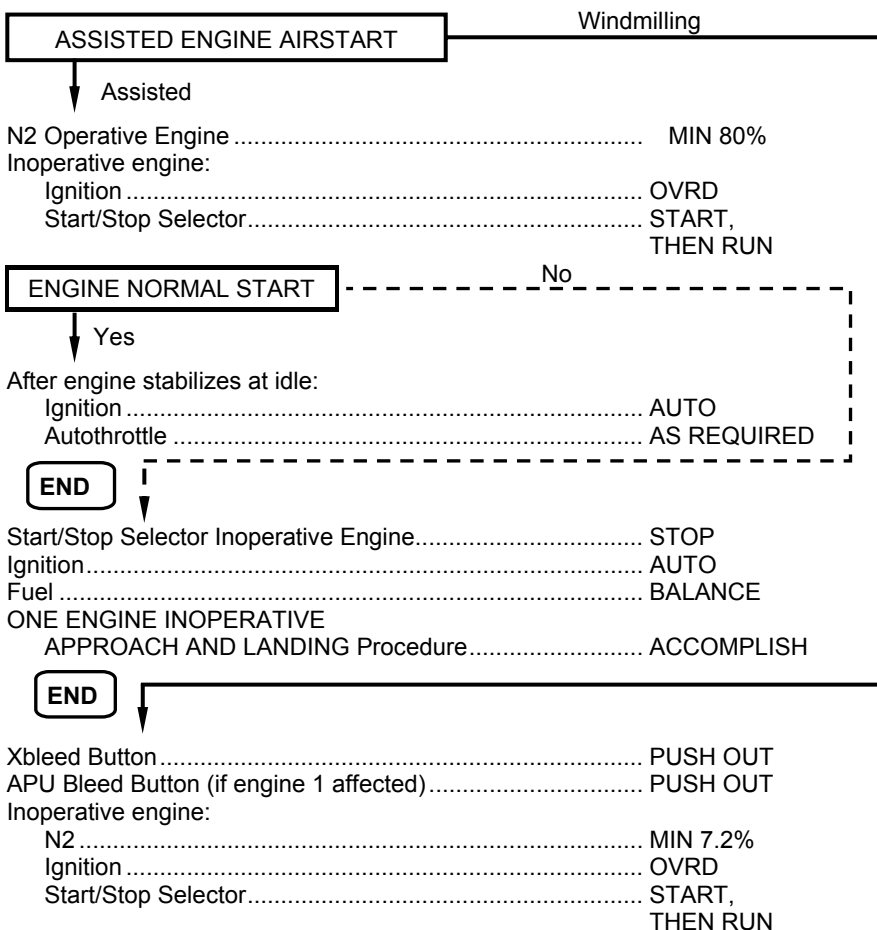
ENGINE AIRSTART

NOTE: - Windmilling starts accomplished with residual ITT below 90°C are more reliable.

- After an engine airstart, if flight conditions permit, operate the engine at idle for 2 minutes prior to applying engine thrust.

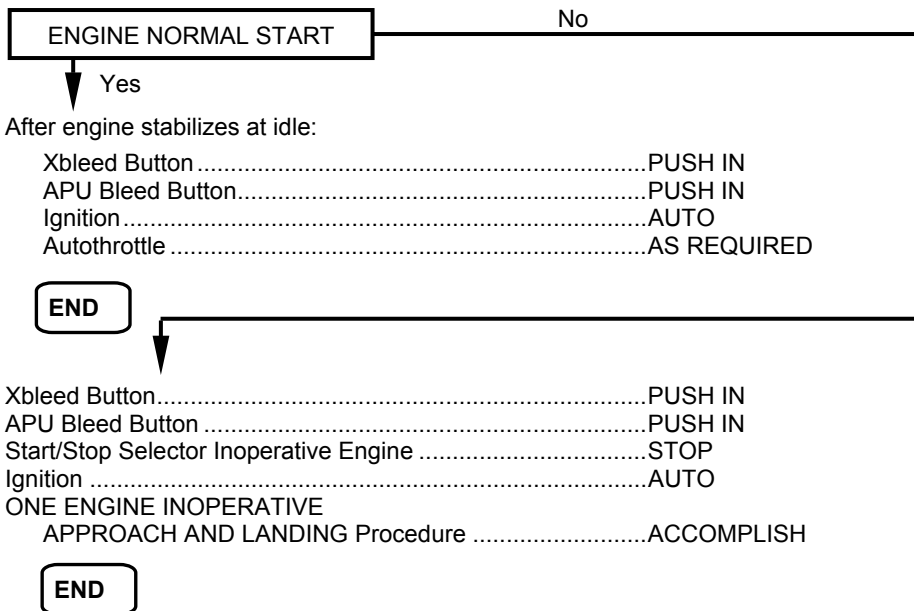
Autothrottle DISENGAGE

Airstart Envelope CHECK

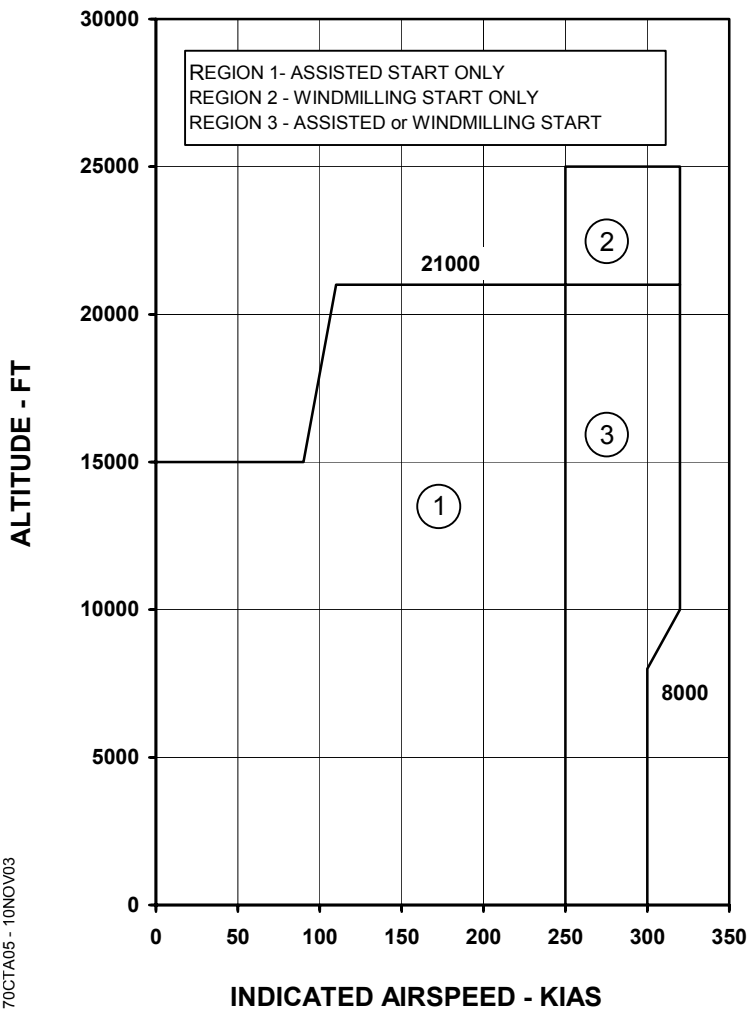


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ENGINE AIRSTART ENVELOPE



ENGINE ITT OVERTEMPERATURE

CONDITION: ITT pointer and digits flashing red.

Autothrottle.....DISENGAGE

Associated Thrust Lever.....REDUCE

Reduce thrust to keep ITT within limits.

END

ENGINE SHUTDOWN

Autothrottle.....DISENGAGE

N1 (operative engine).....AT LEAST 5% ABOVE
IDLE

Affected Engine:

Thrust Lever IDLE

Start/Stop Selector STOP

APU.....START

Associated Fuel Pump AUTO

Fuel BALANCE

**WARNING: AFTER SELECTING THE START/STOP SELECTOR TO STOP,
DO NOT MOVE THE OPERATIVE ENGINE THRUST LEVER TO
IDLE FOR AT LEAST 1 MINUTE.**

When appropriate:

ONE ENGINE INOPERATIVE

APPROACH AND LANDING Procedure.....ACCOMPLISH

LAND AT THE NEAREST SUITABLE AIRPORT.

END

ONE ENGINE INOPERATIVE APPROACH AND LANDING

Descent:

Landing Data SET
Approach Aids SET
Altimeters SET/CHECK

Landing Configuration:

Landing Gear DOWN
Slat/Flap 5
Set $V_{REF} = V_{REF FULL} + 20$ KIAS.

CAUTION: MULTIPLY THE FULL FLAPS "UNFACTORED LANDING DISTANCE" BY 1.40.

If a go around is required:

Go Around Button PRESS
Thrust Levers TO/GA

Rotate the airplane following the flight director guidance.

NOTE: - If the flight director guidance is inoperative, rotate the airplane to 8° nose up.
- If the airplane is at low weight and the selected altitude is low, it may be possible to lose TO/GA guidance protection.

Slat/Flap 3

With positive climb:

Landing Gear UP
Airspeed Approach Climb Speed

At the acceleration altitude, select slat/flap up according to the slat/flap schedule below:

LANDING SLAT / FLAP	SELECT SLAT / FLAP at SPEED		
	2	1	0
5	$V_{REF FULL} + 20$	$V_{REF FULL} + 30$	$V_{REF FULL} + 50$

END

ONE ENGINE INOPERATIVE GO-AROUND

ONE ENGINE INOPERATIVE GO – AROUND - ACTIONS and CALLOUTS		
	PF	PNF
Go-around	“GO-AROUND, FLAPS 3, CHECK THRUST”. - Press either TO/GA switches. - Verify or move thrust levers to GA power. - Verify or rotate towards GA pitch attitude.	- Selects GA flaps. - Verify thrust levers move to GA power, check thrust. - Verify GA annunciates.
Positive Rate of Climb	- Confirms positive rate of climb. “GEAR UP”. - Climbs at V_{AC}. - Execute published missed approach or proceed as instructed by ATC.	- Verifies positive rate of climb. “POSITIVE RATE”. - Positions gear lever up. - Advise ATC. - Monitor missed approach procedures.
At above 400 ft AFE	“HDG, BANK” (NOTE 2)	“400” - Select appropriate primary source. - Verify HDG SEL annunciates.
At Acceleration Altitude (between 400 ft and 1500 ft AFE)	“FLCH, SPEED V_{FS}”. - Verify speed “V_{FS}”. - At flap retraction speed: “FLAPS ____”. When flaps “0” “CONTINUOUS”	“ACCELERATION ALTITUDE” - Selects FLCH mode. - Select/Check V_{FS}. - Retracts flaps on request, announce flaps position. “FLAPS ____” - Verify / Select CON thrust.

(Continued)

ONE ENGINE INOPERATIVE GO – AROUND - ACTIONS and CALLOUTS (cont.)		
If passing transition altitude	PF	PNF
	“ALTIMETERS”	“TRANSITION ALTITUDE”
	Both pilots set altimeters and x-check.	
	“AFTER TAKEOFF CHECKLIST”	• Read in silence. “AFTER TAKEOFF CHECKLIST COMPLETED”

NOTE 1:

Callouts are shown in bold text.

NOTE 2:

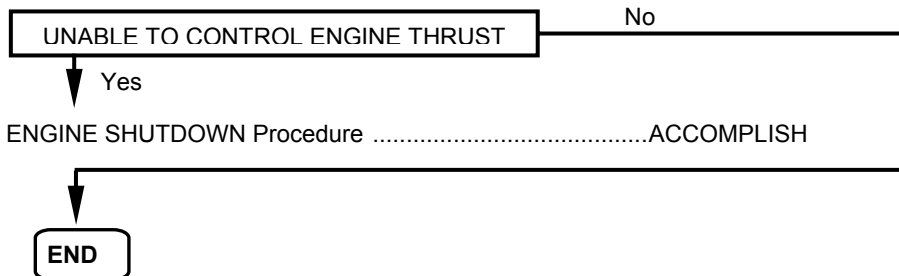
For takeoff and go around in one engine condition, LNAV and VNAV must not be armed below the level off. Additionally, LNAV must not be armed until there is no more turn considerations.

ENGINE 1 (2) CONTROL FAULT

EICAS CAUTION: ENG 1 (2) CONTROL FAULT

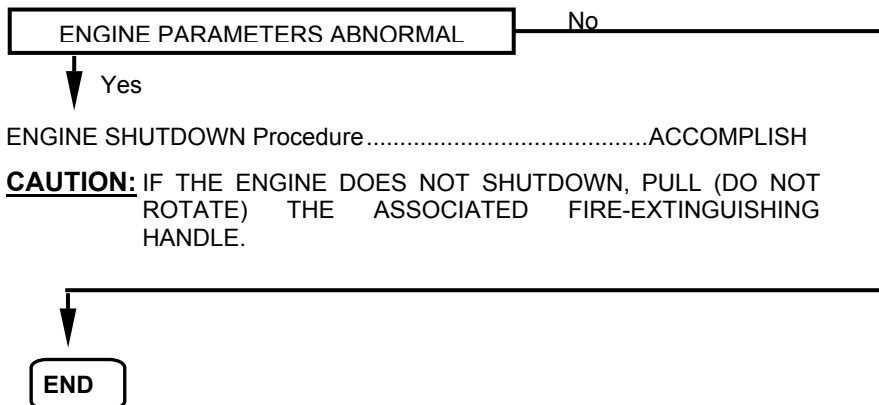
Autothrottle.....DISENGAGE

CAUTION: AVOID QUICK THRUST LEVER MOVEMENT, HIGH THRUST OPERATION AND THRUST REVERSER.



ENGINE 1 (2) FADEC OVERTEMPERATURE

EICAS CAUTION: ENG 1 (2) FADEC OVERTEMP



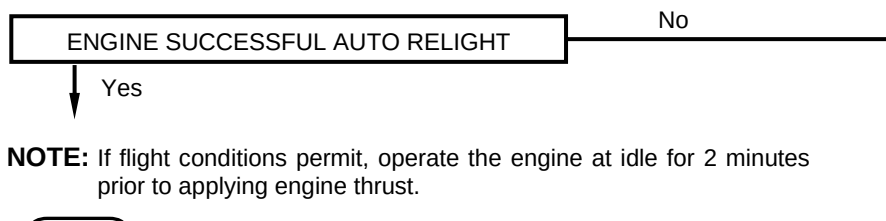
CAUTION: IF THE ENGINE DOES NOT SHUTDOWN, PULL (DO NOT ROTATE) THE ASSOCIATED FIRE-EXTINGUISHING HANDLE.

ENGINE 1 (2) FAILURE

EICAS CAUTION: ENG 1 (2) FAIL
EICAS Indication: FAIL icon on N1 indication.
Oil Press indication in red.

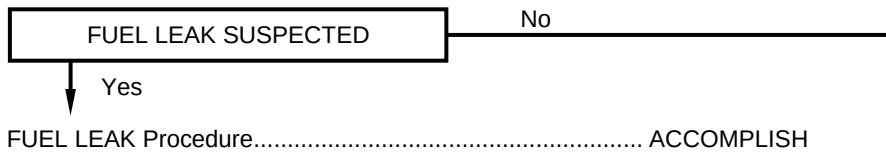
N1 (for operative engine) AT LEAST 5% ABOVE
N1 IDLE
Affected Engine Thrust Lever IDLE

WARNING: AFTER SELECTING THE START/STOP SELECTOR TO STOP, DO
NOT MOVE THE OPERATIVE ENGINE THRUST LEVER TO IDLE
FOR AT LEAST 1 MINUTE

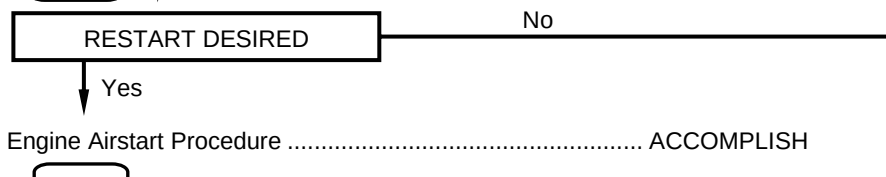


END

Start/Stop Selector STOP
APU START



END



END

ONE ENGINE INOPERATIVE APPROACH
AND LANDING Procedure ACCOMPLISH
LAND AT THE NEAREST SUITABLE AIRPORT.

END

ENGINE FAILURE (VNAV OPERATIONS ONLY)

EICAS CAUTION: ENG 1 (2) FAIL
EICAS Indication: FAIL icon on N1 indication.
Oil Press indication in red.

ENGINE Failure Procedure ACCOMPLISH
Speed Selector Knob MAN
Altitude SET
FMS Cruise Altitude AS REQUIRED

END

ENGINE 1 (2) FUEL IMPENDING BYPASS

EICAS CAUTION: ENG 1 (2) FUEL IMP BYPASS

CAUTION: IF BOTH ENGINES ARE AFFECTED, LAND AT THE NEAREST
SUITABLE AIRPORT.

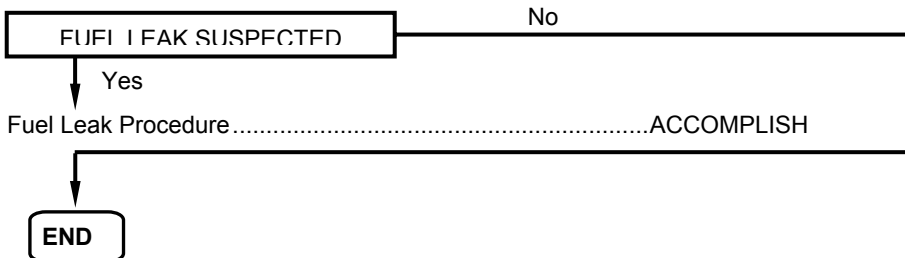
END

ENGINE 1 (2) FUEL LOW PRESSURE

EICAS CAUTION: ENG 1 (2) FUEL LO PRESS

Fuel Xfeed Selector OFF
Autothrottle DISENGAGE
Associated Thrust Lever IDLE
Altitude MAX 25000 FT

NOTE: If thrust lever is set above idle, ENG 1 (2) FUEL LO PRESS message may
return.



ENGINE 1 (2) NO DISPATCH

EICAS CAUTION: ENG 1 (2) NO DISPATCH

Do not takeoff.

END

ENGINE 1 (2) OIL LOW LEVEL

EICAS CAUTION: ENG 1 (2) OIL LO LEVEL

Do not takeoff.

END

ENGINE 1 (2) REVERSER FAILURE

EICAS CAUTION: ENG 1 (2) REV FAIL

Do not takeoff.

END

ENGINE 1 (2) REVERSER PROTECTION FAULT

EICAS CAUTION: ENG 1 (2) REV PROT FAULT

Do not takeoff.

END

ENGINE 1 (2) REVERSER THRUST LEVER ANGLE FAILURE

EICAS CAUTION: ENG 1 (2) REV TLA FAIL

ON GROUND

No

Yes

The associated thrust reverser is not available.

END

Do not move thrust levers below idle.

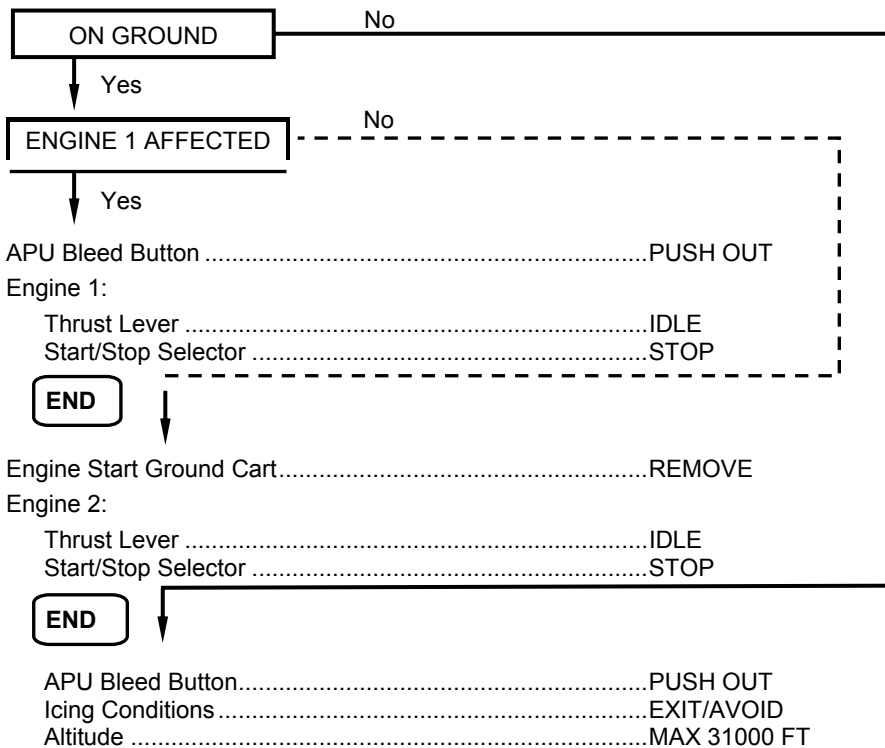
END

ENGINE 1 (2) STARTER VALVE OPENED

EICAS CAUTION: ENG 1 (2) START VLV OPEN

Crossbleed Button.....PUSH OUT

Associated Bleed Button PUSH OUT



CAUTION: IN-FLIGHT ASSISTED STARTS ARE NOT POSSIBLE FOR THE AFFECTED ENGINE.

END

ENGINE 1 (2) THRUST LEVER ANGLE FAILURE

EICAS CAUTION: ENG 1 (2) TLA FAIL

CONDITION: Associated engine thrust control is lost.

NOTE: The engine thrust will be set to idle automatically.

When appropriate:

ONE ENGINE INOPERATIVE

APPROACH AND LANDING Procedure ACCOMPLISH

END

ENGINE 1 (2) T2 HEATER FAILURE

EICAS CAUTION: ENG 1 (2) T2 HEAT FAIL

Icing Conditions EXIT/AVOID

END

ENGINE EXCEEDANCE

EICAS CAUTION: ENG EXCEEDANCE

Do not takeoff.

END

ENGINE NO TAKEOFF DATA

EICAS CAUTION: ENG NO TAKEOFF DATA

Engine Takeoff Data ENTER

END

ENGINE REFERENCE ANTI-ICE DISAGREE

EICAS CAUTION: ENG REF A-I DISAG

Configure the airplane according to takeoff data or re-enter the takeoff data according to the airplane configuration.

END

ENGINE REFERENCE ECS DISAGREE

EICAS CAUTION: ENG REF ECS DISAG

Configure the airplane according to takeoff data or re-enter the takeoff data according to the airplane configuration.

CAUTION: THE EICAS MESSAGE ENG REF ECS DISAG WILL BE ALWAYS DISPLAYED WHEN THE FOLLOWING CONDITIONS APPLY SIMULTANEOUSLY: THE REF ECS IS SET TO ON, THE APU AND ENGINES ARE RUNNING AND THE ENGINE THRUST LEVERS ARE SET TO IDLE.

END

ENGINE THRUST LEVER ANGLE NOT TOGA

EICAS CAUTION: ENG TLA NOT TOGA

Move the thrust levers to TOGA position.

END

ENGINE THRUST RATING DISAGREE

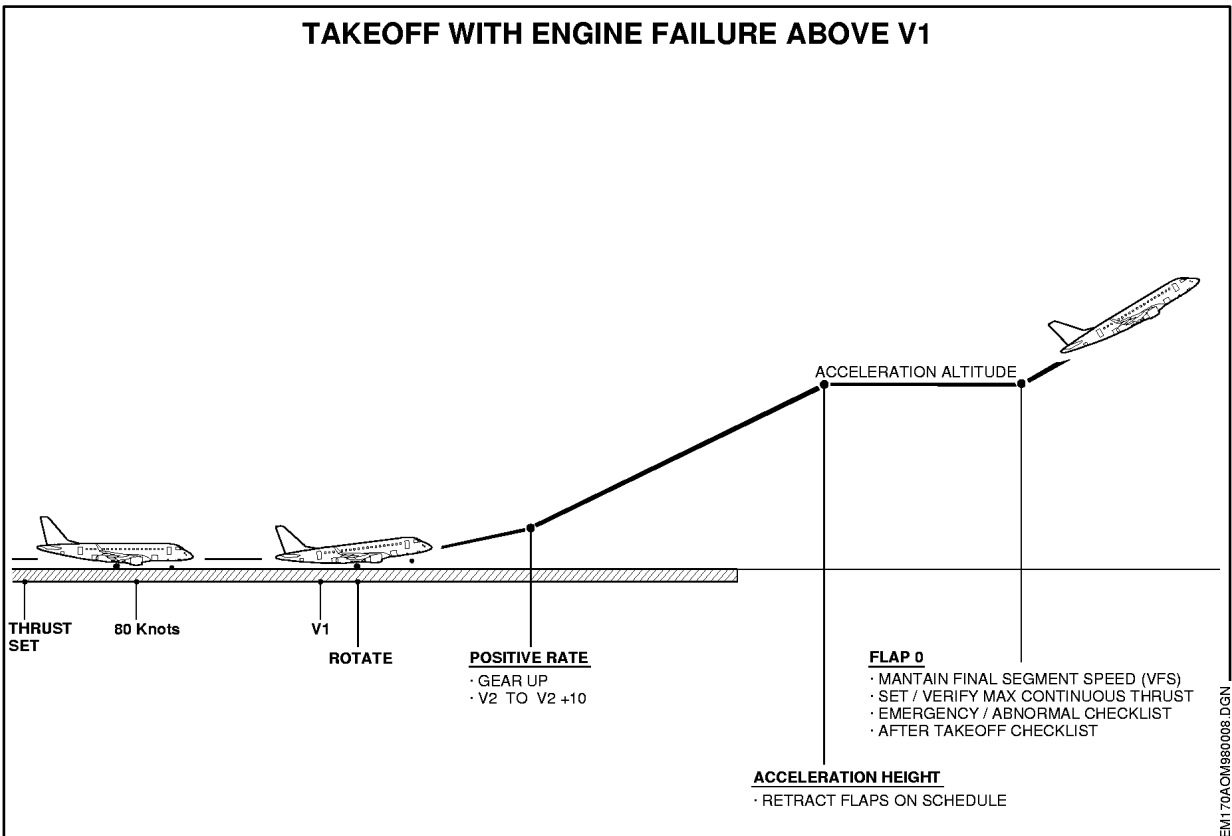
EICAS CAUTION: ENG THR RATING DISAG

Do not takeoff.

END

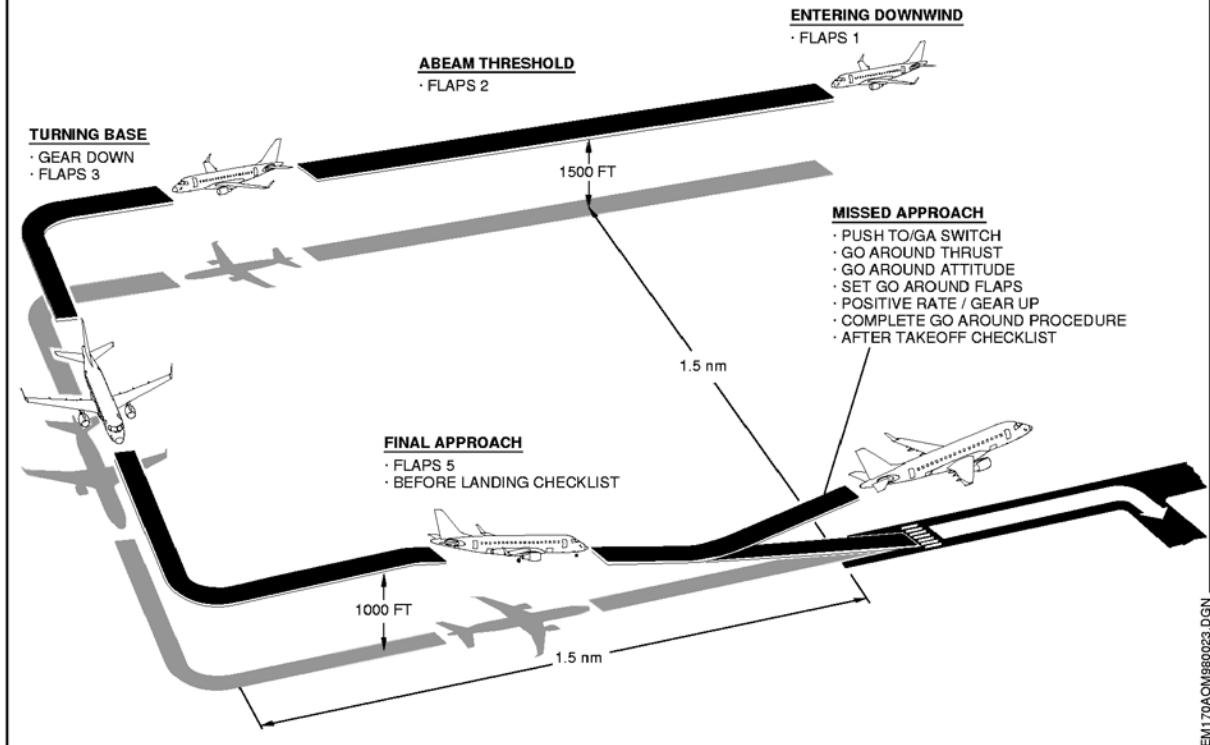
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TAKEOFF WITH ENGINE FAILURE ABOVE V1

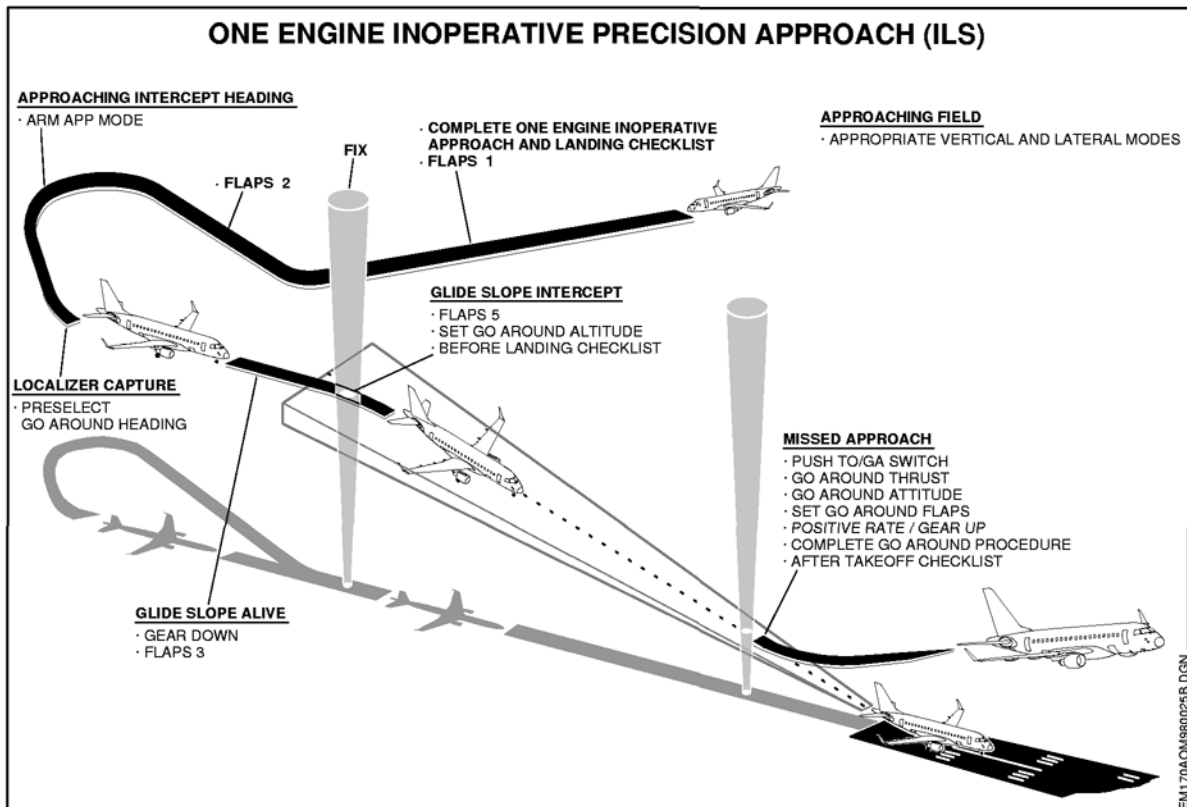


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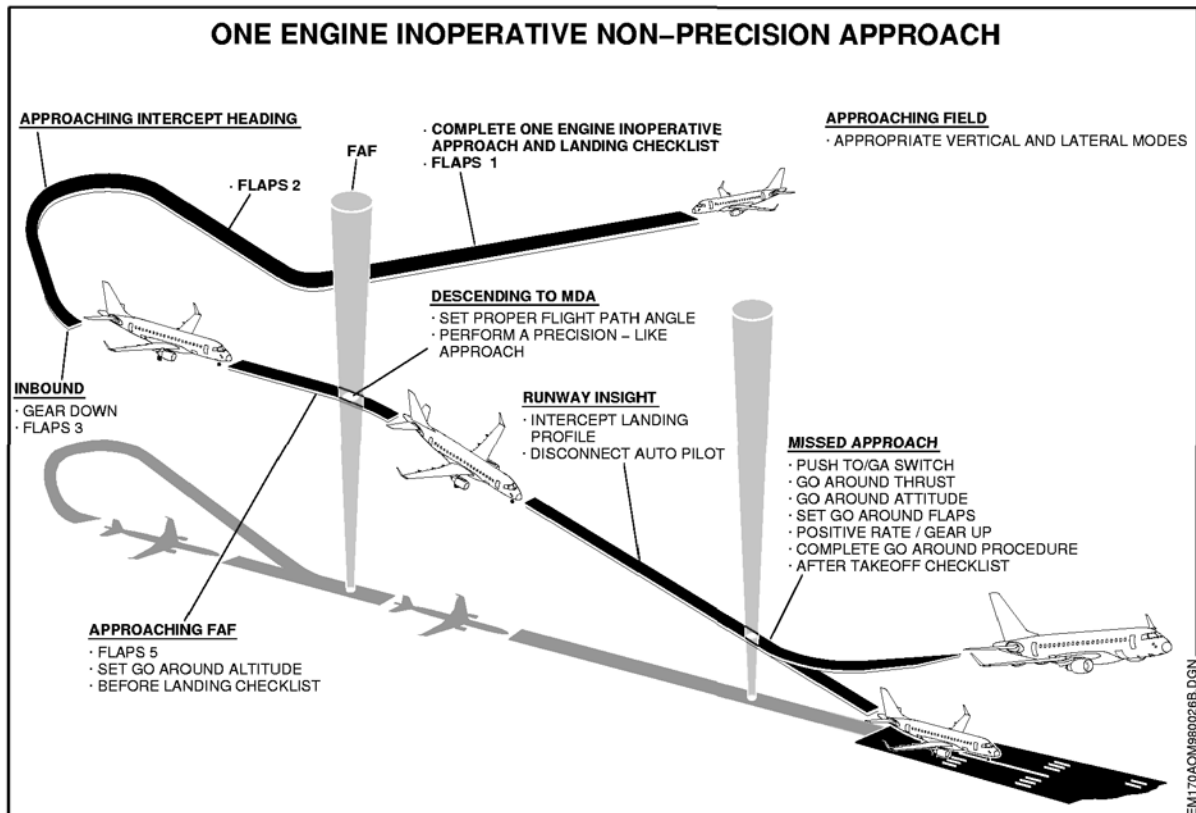
ONE ENGINE INOPERATIVE APPROACH



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APU FAILURE – ABNORMAL PROCEDURES

LOSS OF AUXILIARY POWER UNIT INDICATIONS

APU ESSENTIAL FOR THE FLIGHT

No

Yes

Monitor the APU for the remainder of the flight. If any APU fault message is displayed on EICAS:

APU Emergency Stop Button PUSH IN
APU Master Selector.....OFF
Do not restart the APU.

END

APU FAILURE

EICAS CAUTION: APU FAIL

APU FAILED DURING START

No

Yes

APU can be restarted according to the APU starter limitations.

END

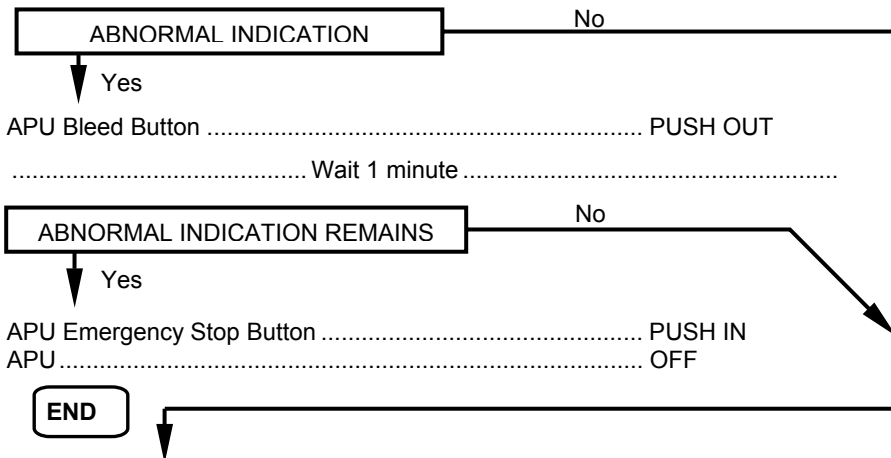
APU.....OFF
Do not restart the APU.

END

APU FAULT

EICAS CAUTION: APU FAULT

EICAS Indication: Abnormal APU EGT indication may be presented.



NOTE: If the APU is not essential for the flight, turn off the APU.

END

APU OIL HIGH TEMPERATURE

EICAS CAUTION: APU OIL HI TEMP

APU FAULT Procedure ACCOMPLISH

END

APU OIL LOW PRESSURE

EICAS CAUTION: APU OIL LO PRESS

APU FAULT Procedure ACCOMPLISH

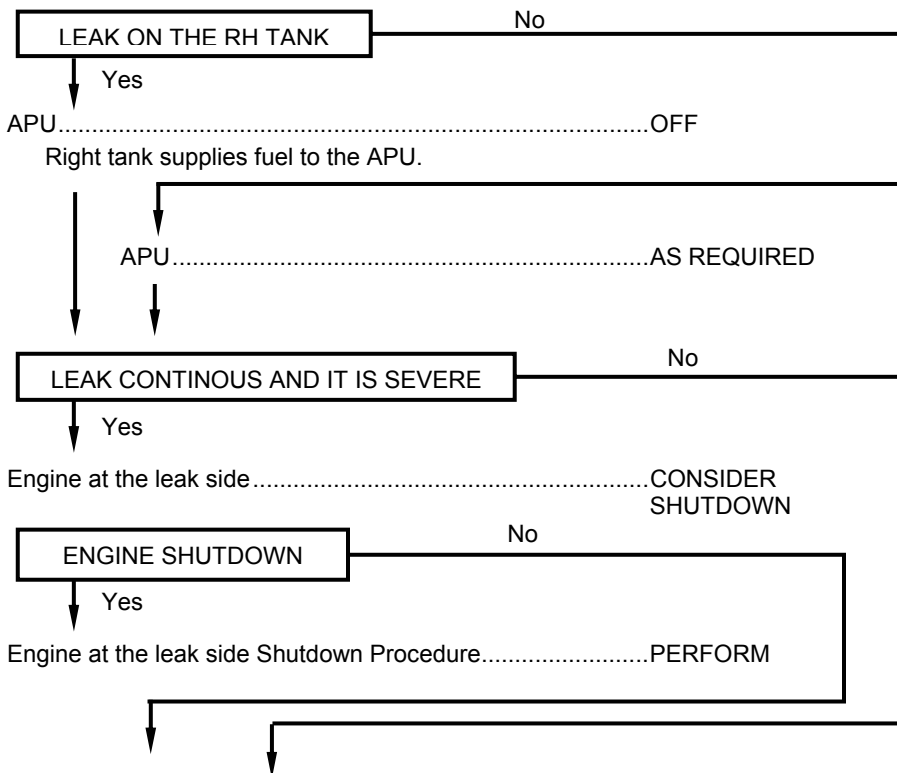
END

SYSTEM FAILURES EMERGENCY PROCEDURES

FUEL LEAK

NOTE: An unexpected difference between the total fuel quantity indicated on EICAS and the total fuel quantity indicated on the FMS Fuel Management page may indicate a fuel leak condition.

Fuel Xfeed Selector.....OFF
 Affected Fuel Tank IDENTIFY
 Asymmetric Thrust AS REQUIRED
 Use asymmetric thrust to improve or maintain wing fuel balance to counteract the effect of the suspected wing fuel leak.



CAUTION: REPLAN THE FLIGHT AND ANALYZE THE DESTINATION AND ALTERNATIVE.

LAND AT THE NEAREST SUITABLE AIRPORT.

END

JAMMED CONTROL COLUMN (PITCH)

Elev Disc Handle PULL

Unrestricted Control Column IDENTIFY

If the failure occurs above 175 KIAS, the current airspeed is the maximum speed for the remainder of the flight.

If the failure occurs below 175 KIAS, the maximum speed for the remainder of the flight is 175 KIAS.

NOTE: Expect lower pitch rates and authority.

CAUTION: DO NOT ENGAGE THE AUTOPILOT.

Relevant Inoperative Item:

AOA Limit

Avoid sideslipping the airplane.

NOTE: - The stick shaker remains operative.

Landing configuration:

Slat/Flap 5

Set $V_{REF} = V_{REF FULL} + 15 \text{ KIAS}$.

CAUTION: MULTIPLY THE FULL FLAPS UNFACTORED LANDING
DISTANCE BY 1.40.

If a go around is required:

Airspeed $V_{REF FULL} + 15 \text{ KIAS}$
(limited to 175 KIAS)

END

JAMMED CONTROL WHEEL (ROLL)

Aileron Disc Handle.....PULL

Unrestricted Control Wheel IDENTIFY

If the failure occurs above 175 KIAS, the current airspeed is the maximum speed for the remainder of the flight.

If the failure occurs below 175 KIAS, the maximum speed for the remainder of the flight is 175 KIAS.

CAUTION: DO NOT ENGAGE THE AUTOPILOT.

NOTE: - Expect lower roll rates.

- Avoid abrupt and large aileron inputs.
- Maintain bank angle below 25°.
- Rudder may be used to help controlling the airplane.
- Do not accomplish the Spoiler Fault procedure.

Relevant Inoperative Items:

Affected side aileron

Multi Function Spoiler L3 and R3

Another Multi Function Spoiler pair depending on the affected side

Landing configuration:

Slat/Flap 5

Set $V_{REF} = V_{REF FULL} + 15$ KIAS.

CAUTION: • DURING LANDING, A CROSSWIND COMPONENT GREATER THAN 10 KT MUST BE AVOIDED.

- MULTIPLY THE FULL FLAPS UNFACTORED LANDING DISTANCE BY 1.40.

If a go around is required:

Airspeed $V_{REF FULL} + 15$ KIAS
(limited to 175 KIAS)

END

JAMMED RUDDER PEDALS

If the failure occurs above 175 KIAS, the current airspeed is the maximum speed for the remainder of the flight.

If the failure occurs below 175 KIAS, the maximum speed for the remainder of the flight is 175 KIAS.

Relevant Inoperative Item:

Yaw trim

NOTE: Use assymetric thrust for directional control.

Landing configuration:

Slat/Flap..... FULL

Set $V_{REF FULL}$.

CAUTION: DURING LANDING, A CROSSWIND COMPONENT GREATER THAN 10 KT MUST BE AVOIDED.

Before Landing:

Steer Disc Switch
(Right Seat Pilot)..... PRESS and HOLD

Assymetric Thrust MAINTAIN UNTIL
NOSEWHEEL
TOUCHDOWN

After nosewheel touchdown:

Nosewheel Steering Handle PRESS and HOLD

Steer Disc Switch..... RELEASE

Thrust Levers..... IDLE

Assymmetric Braking AS REQUIRED

CAUTION: DO NOT RELEASE THE NOSEWHEEL STEERING HANDLE UNTIL THE AIRPLANE IS COMPLETELY STOPPED.

If a go around is required, proceed as a normal go around limiting the Airspeed to 175 KIAS.

NOTE: As assymetric thrust may be required to help control the airplane, maximum thrust on both engines may not be possible.

END

PITCH TRIM RUNAWAY

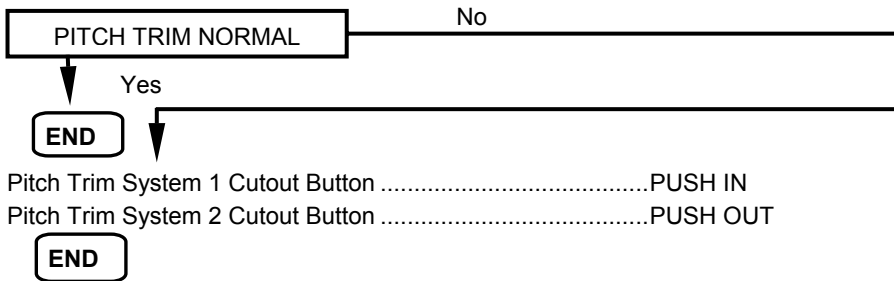
A/P Disc Button PRESS AND HOLD
Pitch Trim Systems 1 and 2
Cutout Button.....PUSH IN

A/P Disc RELEASE

WARNING: DO NOT OPEN THE SPEEDBRAKE.

Prepare to overcome unwanted pitch change:

Pitch Trim System 1 Cutout Button.....PUSH OUT
Pitch Trim Switch.....ACTUATE



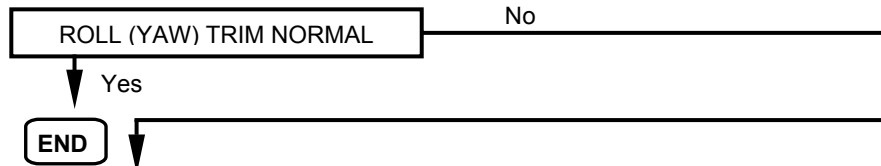
ROLL (YAW) TRIM RUNAWAY

A/P Disc Button PRESS AND HOLD

Do not engage the autopilot.

Prepare to overcome unexpected roll (yaw):

A/P Disc Button..... RELEASE



A/P Disc Button PRESS AND HOLD

Roll (Yaw) Trim Electronic CB OFF

Select on the MCDU: CB → CB MENU → CB BY SYSTEM → NEXT → FLT
CTRL → ROLL TRIM PWR or YAW TRIM PWR.

A/P Disc Button RELEASE

Continue the flight with roll (yaw) trim system inoperative.

END

STEERING RUNAWAY

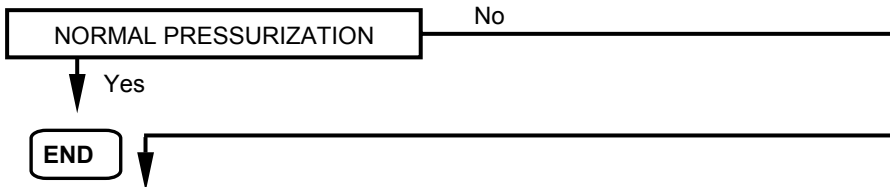
Steer Disc Switch PRESS

Steer the airplane using differential braking and rudder.

END

DOOR CARGO FORWARD (AFT) OPENED

EICAS WARNING: DOOR CRG FWD OPEN or DOOR CRG AFT OPEN



Altitude 10000 FT OR MEA,
WHICHEVER IS
HIGHER

At 10000 ft:

Pressurization Dump Button.....PUSH IN

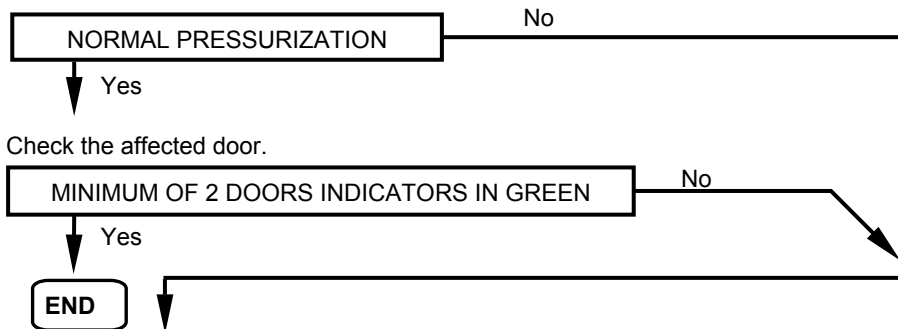
LAND AT THE NEAREST SUITABLE AIRPORT.

END

DOOR PASSENGER (SERVICE) FORWARD (AFT) OPEN

EICAS WARNING: DOOR PAX FWD OPEN or DOOR PAX AFT OPEN or
DOOR SERV FWD OPEN or DOOR SERV AFT OPEN

Fasten Seat Belts.....ON



Altitude 10000 FT OR MEA,
WHICHEVER IS
HIGHER

At 10000 ft:

Pressurization Dump Button.....PUSH IN

LAND AT THE NEAREST SUITABLE AIRPORT.

END

BATTERY DISCHARGING

EICAS WARNING: BATT DISCHARGING

LAND AT THE NEAREST SUITABLE AIRPORT.

END

BATTERY 1 (2) OVERTEMPERATURE

EICAS WARNING: BATT 1 (2) OVERTEMP

Associated Battery OFF

NOTE: Do not start the APU.

END

BATTERY 1-2 OFF

EICAS WARNING: BATT 1-2 OFF

LAND AT THE NEAREST SUITABLE AIRPORT.

NOTE: APU start is not available.

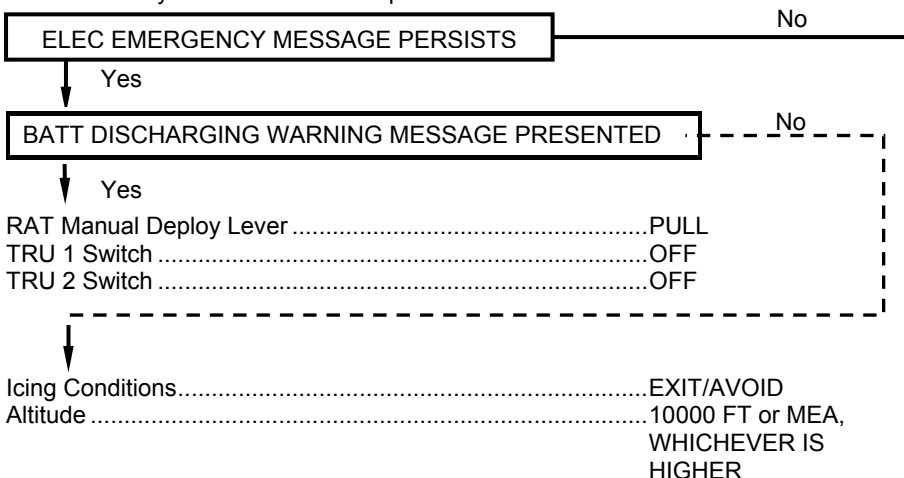
END

ELECTRICAL EMERGENCY

EICAS WARNING: ELEC EMERGENCY

Airspeed MIN 130 KIAS
 APU START
 IDG 1 Selector OFF, then AUTO
 IDG 2 Selector OFF, then AUTO
 Emergency Lights OFF

NOTE: - Only two APU start attempts are allowed.



Relevant Inoperative Items:

ADS 1 and 2	Weather Radar
IRS 2	Yaw Damper
TAT 1 and 2	Radio Altimeters 1 and 2
AOA Limit	Windshear Detection
Autothrottle	Nosewheel Steering
Autopilot	Ground Spoilers L1, R1, L2 and R2
Display Unit 1, 4 and 5	Multi Function Spoilers L3, R3, L4, R4, L5 and R5
CCD 2	Speedbrake
Flight Director 1 and 2	Engine 1 and Engine 2 Reversers
FMS 1	Fuel AC Pump 1
MCDU 1	Pack 1 e 2
GPS 1	Ice Detectors 1 and 2
NAVCOM 2	Windshield Wiper 1 and 2
TCAS	Windshield Heater 1 and 2
Anti-Ice System	

(Continue on the next page)

(Continued from the previous page)

- NOTE:** - Avoid side slipping the airplane.
- On ground, use differential braking and rudder to steer the airplane.
 - The slats and flaps will operate at low rate.

Landing configuration:

Emergency Lights ARMED

Gnd Prox Flap Ovrđ Button..... PUSH IN

Slat/Flap..... 3

Set $V_{REF} = V_{REF FULL} + 20 \text{ KIAS}$ or $V_{REF} = 130 \text{ KIAS}$ (whichever is higher).

CAUTION: MULTIPLY THE FULL FLAPS UNFACTORED LANDING
DISTANCE BY 2.10.

If a go around is required:

Slat/Flap..... 3

Airspeed..... $V_{REF FULL} + 20 \text{ KIAS}$ or
130 KIAS (whichever is
higher)

LAND AT THE NEAREST SUITABLE AIRPORT.

END

Flight Controls Mode Buttons

(Spoilers, Elevators and Rudder)..... PUSH IN, then OUT

Landing configuration:

Emergency Lights ARMED

Gnd Prox Flap Ovrđ Button..... PUSH IN

Slat/Flap..... 3

Set $V_{REF} = V_{REF FULL} + 20 \text{ KIAS}$ or $V_{REF} = 130 \text{ KIAS}$ (whichever is higher).

CAUTION: MULTIPLY THE FULL FLAPS UNFACTORED LANDING
DISTANCE BY 2.10

If a go around is required:

Slat/Flap..... 3

Airspeed..... $V_{REF FULL} + 20 \text{ KIAS}$ or
130 KIAS (whichever is
higher)

LAND AT THE NEAREST SUITABLE AIRPORT.

END

ELEVATOR NORMAL MODE FAILURE

EICAS WARNING: ELEV NML MODE FAIL

Flight Controls Mode

Elevators Button PUSH IN

NOTE: Do not accomplish the ELEVATOR FAULT Procedure.

Relevant Inoperative Items:

AOA Limit
Auto Configuration Trim
Autopilot
Elevator Thrust Compensation

AOA LIMIT FAIL Procedure ACCOMPLISH

END

GROUND SPOILERS FAILURE

EICAS WARNING: GROUND SPOILERS FAIL

CONDITION: One or more ground spoiler panels have extended inadvertently, have failed to extend when commanded or are unavailable to extend.

In flight:

Speedbrake CLOSE

Landing configuration:

Slat/Flap FULL

Set $V_{REF FULL}$.

CAUTION: MULTIPLY THE FULL FLAPS UNFACTORED LANDING DISTANCE BY 1.30.

END

RUDDER NORMAL MODE FAILURE

EICAS WARNING: RUDDER NML MODE FAIL

Flight Controls Mode Rudder Button PUSH IN

NOTE: Do not accomplish the RUDDER FAULT Procedure.

Relevant Inoperative Items:

Yaw Damper

Turn Coordination

END

SPOILER NORMAL MODE FAILURE

EICAS WARNING: SPOILER NML MODE FAIL

Speedbrake CLOSE

Flight Controls Mode

Spoilers Button PUSH IN

NOTE: Do not accomplish the SPOILER FAULT Procedure.

Relevant Inoperative Items:

Ground Spoilers

SpeedBrake

Landing configuration:

Slat/Flap FULL

Set $V_{REF FULL}$.

CAUTION: MULTIPLY THE FULL FLAPS UNFACTORED LANDING
DISTANCE BY 1.45.

END

NO TAKEOFF CONFIGURATION

EICAS WARNING: NO TAKEOFF CONFIG

Configure the airplane for takeoff.

END

FUEL 1 (2) LOW LEVEL

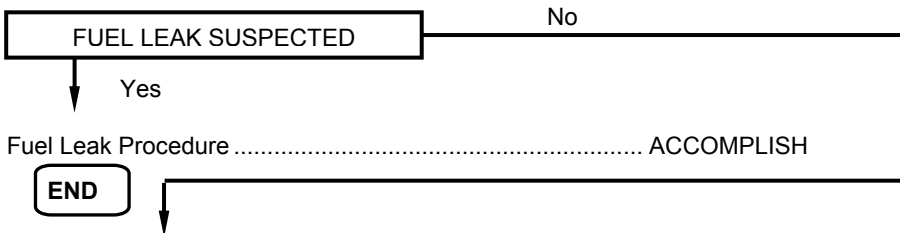
EICAS WARNING: FUEL 1 (2) LO LEVEL

EICAS Indication: Associated fuel quantity indication in red.

LAND AT THE NEAREST SUITABLE AIRPORT

CAUTION: AVOID ATTITUDES IN EXCESS OF 15° NOSE UP OR DOWN,
UNCOORDINATED MANEUVERS AND NEGATIVE G'S.

The Associated Fuel AC Pump ON



Fuel Xfeed Selector AS REQUIRED

END

HYDRAULIC SYSTEM 1 OR 2 OVERHEAT

EICAS WARNING: HYD 1 (2) OVERHEAT

Associated Electric Hydraulic Pump Selector.....OFF

Associated Engine Pump Shutoff Button PUSH IN

HYD 1 (2) SOV FAIL MESSAGE PRESENTED

No

Yes

ENGINE SHUTDOWN Procedure.....ACCOMPLISH

Appropriate LOSS OF

HYDRAULIC SYSTEM Procedure.....ACCOMPLISH

LAND AT THE NEAREST SUITABLE AIRPORT.

END

HYDRAULIC SYSTEM 3 OVERHEAT

EICAS WARNING: HYD 3 OVERHEAT

Electric Hyd Sys 3 Pump A Selector OFF

Electric Hyd Sys 3 Pump B Selector OFF

LOSS OF HYDRAULIC SYSTEM 3 Procedure.....ACCOMPLISH

END

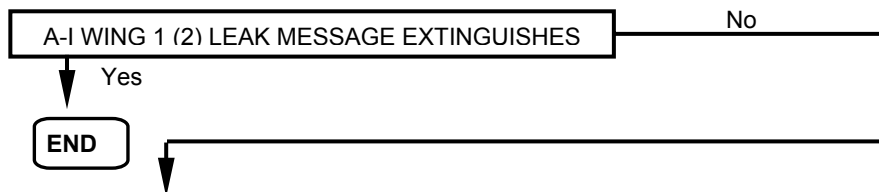
ANTI-ICE WING 1 (2) LEAKAGE

EICAS WARNING: A-I WING 1 (2) LEAK

Ice Protection Wing Button PUSH OUT

Verify the A-I SWITCH OFF message displayed on EICAS.

Icing Conditions EXIT/AVOID

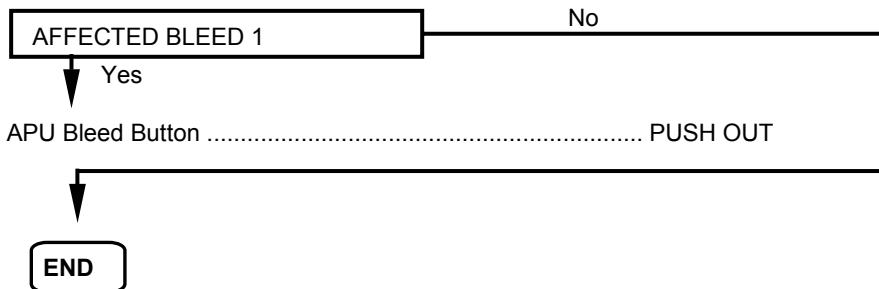


Affected Bleed Button PUSH OUT

Crossbleed Button PUSH OUT

Verify the XBLEED SW OFF message displayed on EICAS.

Altitude MAX 31000 FT

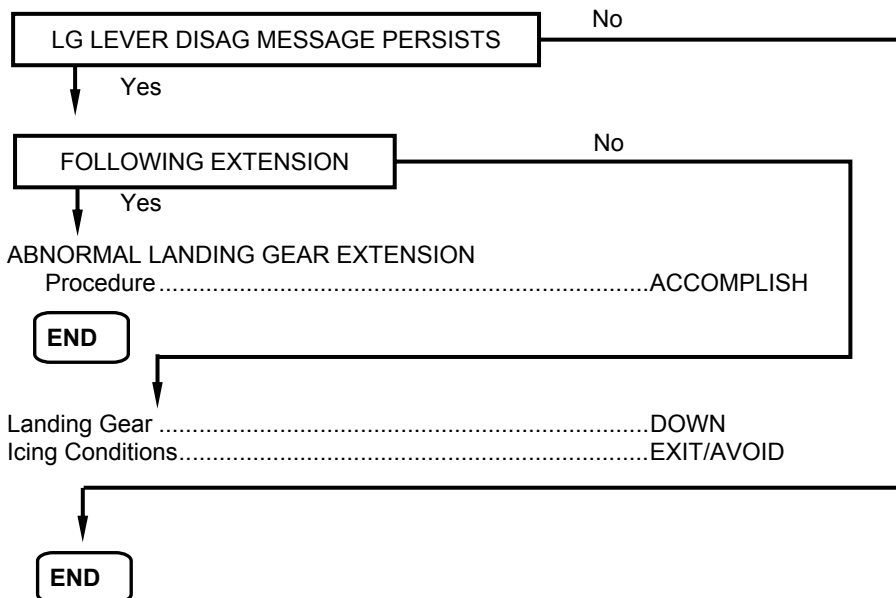


LANDING GEAR LEVER DISAGREE

EICAS WARNING: LG LEVER DISAG

EICAS Indication: One or more landing gear indications disagree with the landing gear lever.

Landing Gear Lever CYCLE



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SYSTEM FAILURES - ABNORMAL PROCEDURES

AIR CONDITIONING, PNEUMATICS AND PRESSURIZATION

LOSS OF PRESSURIZATION INDICATION

CONDITION: Cabin altitude or cabin ΔP is not being presented, or during use of the pressurization manual control.

AIRPLANE/CABIN ALTITUDE CONVERSION TABLE

AIRPLANE ALTITUDE (ft)	CABIN ALTITUDE (ft)	DIFFERENTIAL PRESSURE (PSID)
10000	600	4.3
11000	700	4.6
12000	800	4.9
13000	1000	5.2
14000	1100	5.5
15000	1300	5.7
16000	1500	6.0
17000	1600	6.2
18000	1800	6.4
19000	2000	6.6
20000	2200	6.8
21000	2500	6.9
22000	2700	7.1
23000	2900	7.3
24000	3100	7.4
25000	3400	7.5
26000	3700	7.6
27000	3900	7.7
28000	4200	7.8
29000	4400	7.9
30000	4700	8.0
31000	5000	8.1
32000	5300	8.1
33000	5600	8.2
34000	5900	8.2
35000	6200	8.2
36000	6500	8.3
37000	6800	8.3
38000	7100	8.3
39000	7400	8.3
40000	7700	8.3
41000	8000	8.3

END

AMS CONTROLLER FAILURE

EICAS CAUTION: AMS CTRL FAIL

Icing Conditions EXIT/AVOID
Altitude 10000 FT OR MEA,
WHICHEVER IS
HIGHER

At 10000 ft:

Pressurization Dump Button PUSH IN

NOTE: - Assisted crossbleed start is not available.

- Pneumatic assisted ENGINE START is not available.

END

BLEED APU LEAKAGE

EICAS CAUTION: BLEED APU LEAK

APU Bleed Button PUSH OUT

..... Wait 3 minutes

BLEED APU LEAK MESSAGE EXTINGUISHES

No

Yes

END

APU Emergency Stop Button PUSH IN

APU OFF

BLEED APU LEAK MSG EXTINGUISHES

No

Yes

END

Bleed 1 Button PUSH OUT

Xbleed Button PUSH OUT

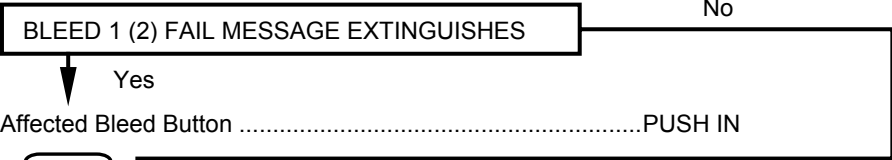
Verify the BLEED 1 OFF message and the XBLEED SW OFF message
are displayed on EICAS.

END

BLEED 1 (2) FAILURE

EICAS CAUTION: BLEED 1 (2) FAIL

Affected Bleed Button PUSH OUT
.....Wait 1 minute.....



END

Altitude MAX 31000 FT

END

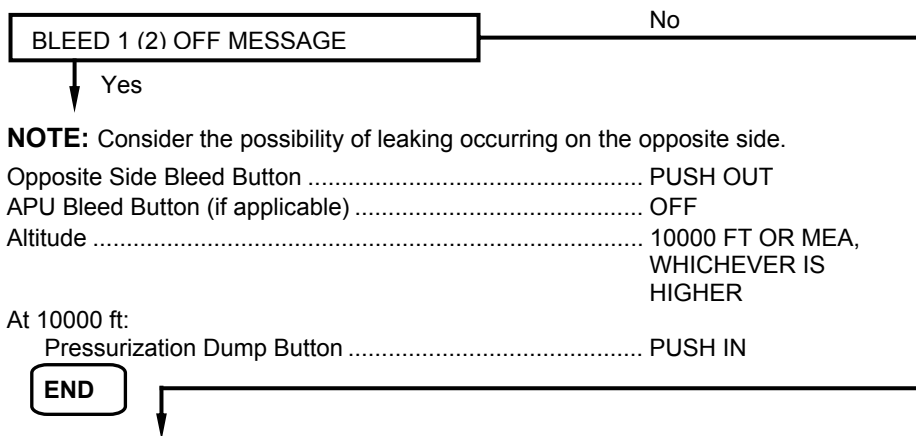
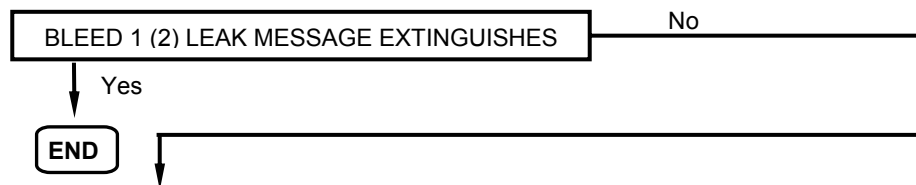
BLEED 1 (2) LEAKAGE

EICAS CAUTION: BLEED 1 (2) LEAK

LIGHT: Amber stripped bar illuminates inside the affected bleed button.

Affected Bleed Button.....	PUSH OUT
APU Bleed Button	PUSH OUT
Crossbleed Button	PUSH OUT
Icing Conditions.....	EXIT/AVOID
Altitude	MAX 31000 FT

..... Wait 3 minutes



NOTE: Consider the possibility of leaking occurring on the opposite side.

Opposite Side Bleed Button	PUSH OUT
APU Bleed Button (if applicable)	OFF
Altitude	10000 FT OR MEA, WHICHEVER IS HIGHER

At 10000 ft:

Pressurization Dump Button	PUSH IN

Associated Thrust Lever..... IDLE

When applicable:

ONE ENGINE INOPERATIVE

APPROACH AND LANDING Procedure ACCOMPLISH

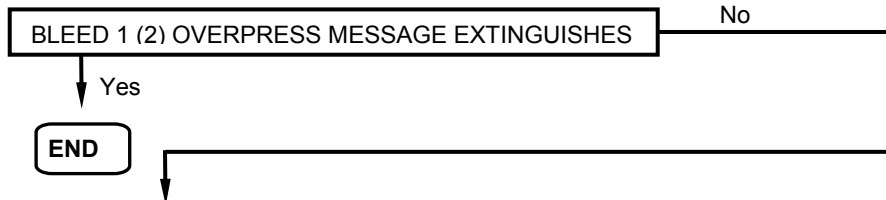
END

BLEED 1 (2) OVERPRESSURIZATION

EICAS CAUTION: BLEED 1 (2) OVERPRESS

LIGHT: Amber striped bar illuminates inside the affected bleed button.

Affected Bleed Button PUSH OUT, then IN



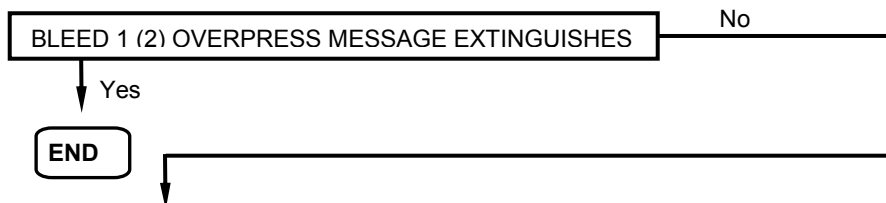
Affected Bleed Button PUSH OUT

APU Bleed Button PUSH OUT

Crossbleed Button.....PUSH OUT

Icing Conditions.....EXIT/AVOID

Altitude MAX 31000 FT



Associated Thrust Lever.....IDLE

When applicable:

ONE ENGINE INOPERATIVE

APPROACH AND LANDING Procedure.....ACCOMPLISH

END

CARGO FORWARD VENTILATION FAILURE

EICAS CAUTION: CRG FWD VENT FAIL
LAND AT THE NEAREST SUITABLE AIRPORT.

END

CENTER ELECTRONIC BAY FANS FAILURE

EICAS CAUTION: CENTER EBAY FANS FAIL
LAND AT THE NEAREST SUITABLE AIRPORT.

END

FORWARD ELECTRONIC BAY FANS FAILURE

EICAS CAUTION: FWD EBAY FANS FAIL

TRU 1 (2) FAIL MESSAGE DISPLAYED

No

Yes

LAND AT THE NEAREST SUITABLE AIRPORT.

END

PACK 1 (2) FAILURE

EICAS CAUTION: PACK 1 (2) FAIL

Associated Temperature

Controller.....12 O'CLOCK

Affected Pack Button.....PUSH OUT

.....Wait 1 minute.....

Affected Pack Button.....PUSH IN

PACK 1 (2) FAIL MESSAGE EXTINGUISHES

No

Yes

After 1 minute:

Associated Temperature

Controller.....OPERATE
NORMALLY

END

Affected Pack Button.....PUSH OUT

Altitude.....MAX 31000 FT

END

PACK 2 LEAKAGE

EICAS CAUTION: PACK 2 LEAK

Pack 2 Button.....PUSH OUT

Altitude.....MAX 31000 FT

.....Wait 3 minutes.....

PACK 2 LEAK MESSAGE EXTINGUISHES

No

Yes

END

Icing Conditions.....EXIT/AVOID

Bleed 2 Button.....PUSH OUT

Xbleed Button.....PUSH OUT

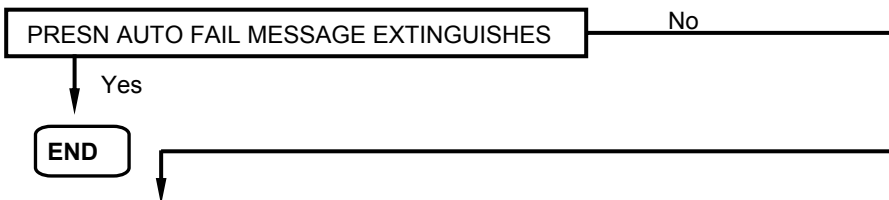
END

PRESSURIZATION AUTO FAILURE

EICAS CAUTION: PRESN AUTO FAIL

EICAS Indication: Landing Field Elevation indications showing amber dashes.

Pressurization Mode Selector..... MAN, THEN AUTO



Pressurization Mode Selector..... MAN

Cabin Alt Controller AS REQUIRED

Operate the cabin altitude control knob to set pressurization according to conversion table.

At 5000 FT AGL:

Cabin Alt Controller..... HOLD UP FOR
50 SECONDS

END

PRESSURIZATION MANUAL FAILURE

EICAS CAUTION: PRESN MAN FAIL

Altitude 10000 FT or MEA,
WHICHEVER IS
HIGER

At 25000 FT:

Pack 1 Button PUSH OUT

At 10000 FT:

Pack 2 Button PUSH OUT

END

RECIRCULATION SMOKE DETECTION FAILURE

EICAS CAUTION: RECIRC SMK DET FAIL

Recirc Fan Button PUSH OUT

END

BLEED 1 (2) OFF

EICAS ADVISORY: BLEED 1 (2) OFF

Altitude MAX 31000 FT

END**PACK 1 (2) OFF**

EICAS ADVISORY: PACK 1 (2) OFF

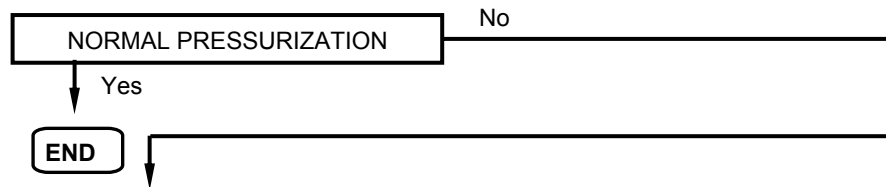
Altitude MAX 31000 FT

END

DOORS, MISCELLANEOUS

DOOR CENTER (FORWARD) ELECTRONIC BAY OPENED

EICAS CAUTION: DOOR CENTER EBAY OPEN OR DOOR FWD EBAY OPEN



Altitude 10000 FT OR MEA,
WHICHEVER IS
HIGHER

END

DOOR HYD OPENED

EICAS CAUTION: DOOR HYD OPEN

Airspeed MAX 250 KIAS

END

DOOR FUELING OPENED

EICAS ADVISORY: DOOR FUELING OPEN

Monitor the airplane systems.

END

ELECTRICAL POWER, LIGHTING

AC BUS 1 OFF

EICAS CAUTION: AC BUS 1 OFF

Relevant Inoperative Items:

Fuel AC Pump 1
Hyd Sys 2 Elec Pump
Windshield Wiper 2
Windshield Heater 2
Ice Detector 1

NOTE: - The slats will operate at low rate mode.
- Fuel Crossfeed Low 2 is not available.

When flying in icing conditions:

Ice Protection Mode Selector.....ON

Two minutes after exiting icing conditions:

Ice Protection Mode Selector.....AUTO

END

AC BUS 2 OFF

EICAS CAUTION: AC BUS 2 OFF

Relevant inoperative items:

Hyd Sys 1 Elec Pump
Hyd Sys 3 Elec Pump B
Windshield Wiper 1
Windshield Heater 1
Ice Detector 2

NOTE: - The flaps will operate at low rate mode.

When flying in icing conditions:

Ice Protection Mode Selector.....ON

Two minutes after exiting icing conditions:

Ice Protection Mode Selector.....AUTO

END

AC ESSENTIAL BUS OFF

EICAS CAUTION: AC ESS BUS OFF

TRU ESS Switch OFF

Relevant Inoperative Items:

AC Fuel Pump 2

Hyd Sys 3 Elec Pump A

NOTE: - The flaps and slats will extend at low rate mode.
- Fuel Crossfeed Low 1 is not available.

END

AC STANDBY BUS OFF

EICAS CAUTION: AC STBY BUS OFF

Monitor the electrical system.

Relevant inoperative items:

Ignition 1A

Ignition 2A

NOTE: - Engine Start, with batteries only, is not available.

END

APU GENERATOR OFF BUS

EICAS CAUTION: APU GEN OFF BUS

APU Gen Button PUSH OUT, then IN

APU GEN OFF BUS MESSAGE EXTINGUISHES

No

Yes

END

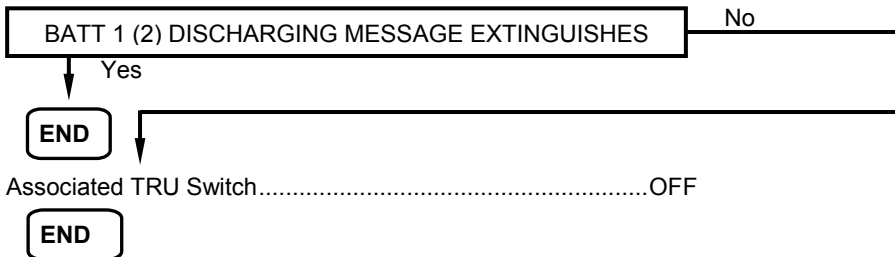
APU Gen Button PUSH OUT

END

BATTERY 1 (2) DISCHARGING

EICAS CAUTION: BATT 1 (2) DISCHARGING

Associated TRU Switch.....OFF, then AUTO



BATTERY 1 OFF

EICAS CAUTION: BATT 1 OFF

Battery 1.....VERIFY ON

NOTE: - If battery 1 selector is off, APU start is not available.

END

BATTERY 2 OFF

EICAS CAUTION: BATT 2 OFF

Battery 2.....VERIFY AUTO

END

DC BUS 1 OFF

EICAS CAUTION: DC BUS 1 OFF

Autothrottle DISENGAGE
Emergency Lights OFF
Altitude MAX 31000 FT

Relevant Inoperative Items:

Autopilot	Engine 1 Reverser
Autothrottle 1	PTU
MCDU 1	Hyd Sys 2 Elec Pump
CCD 2	Radio Altimeter 1
ADS 1	Multi Function Spoiler L5 and R5
Pack 1	Weather Radar
Display Unit 1	Windshield Wiper 2
Display Unit 4	Windshield Heater 2

NOTE: - The slats will operate at low rate.

Landing Configuration:

Emergency Lights ARMED
Slat/Flap FULL
Set $V_{REF FULL}$.

CAUTION: MULTIPLY THE FULL FLAPS UNFACTORED LANDING
DISTANCE BY 1.15.

END

DC BUS 2 OFF

EICAS CAUTION: DC BUS 2 OFF

Autothrottle DISENGAGE
Altitude MAX 31000 FT

Relevant Inoperative Items:

Display Unit 5	Transponder 2
ADS 2	NAVCOM 2
Pack 2	Radio Altimeter 2
Multi Function Spoilers L3, R3, L4 and R4	Engines' Vibration Indications
Roll Trim	TCAS
Autothrottle 2	HF Transceiver
Engine 2 Reverser	Speedbrake
Nosewheel Steering	Windshield Heater 1
Hyd Sys 1 Elec Pump	Windshield Wiper 1
Hyd Sys 3 Elec Pump B	Pedal Adjustment Switch

Landing Configuration:

Slat/Flap FULL

Set $V_{REF FULL}$.

CAUTION: MULTIPLY THE FULL FLAPS UNFACTORED LANDING DISTANCE BY 1.20.

On ground:

Use differential braking and rudder to steer the airplane.

END

DC ESSENTIAL BUS 1 OFF

EICAS CAUTION: DC ESS BUS 1 OFF

Icing Conditions..... EXIT/AVOID

Battery 1 OFF

Relevant Inoperative Items:

Display Unit 3	APU
ADS 1	RAT Automatic Deployment
Multi Function Spoilers L5 and R5	Digital Audio Panel 1
Outboard Brakes	NAVCOM 1
Engine 1 Start Valve	Transponder 1
Ignition 1A	Master Caution 1
	Oil Pressure Indicator 1
APU	Fuel Quantity 1 Indication
Hyd Sys 3 Elec Pump A	Fwd LAV Smoke Detection
Cargo Compartment Fire Bottles	
Electro-Explosive Device feed 2	

NOTE: - Compass internal light will be lost.

- FADEC will set flight idle on ground.
- The flaps will operate at low rate.
- Engine 2 windmill start is not available.
- Thrust Reversers, Wing Anti-Ice and Ground Idle may not be available.
- Expect lower roll rates and lower speedbrake efficiency.
- Do not accomplish the SPOILER FAULT procedure.

Landing Configuration:

Slat/Flap..... FULL

Set $V_{REF FULL}$.

CAUTION: MULTIPLY THE FULL FLAPS “UNFACTORED LANDING DISTANCE” BY 1.70.

On Ground:

Brakes APPLY NORMALLY

Use differential braking and rudder to steer the airplane.

If necessary:

Emergency/Parking Brake PULL

CAUTION: APPLY THE EMERGENCY/PARKING BRAKE MONITORING THE EMERGENCY/PARKING BRAKE LIGHT.
WHEN THE EMERGENCY/PARKING BRAKE LIGHT IS ON, MAINTAIN STEADY PRESSURE SINCE THE ANTI-SKID PROTECTION IS NOT AVAILABLE.

LAND AT THE NEAREST SUITABLE AIRPORT.

END

DC ESSENTIAL BUS 2 OFF

EICAS CAUTION: DC ESS BUS 2 OFF

Icing Conditions.....EXIT/AVOID

Battery 2.....OFF

Relevant Inoperative Items:

Display Unit 2	Inboard Brakes
CCD 1	DC Fuel Pump
ADS 3	Fuel Quantity 2 Indication
IESS	Fuel Crossfeed Operation
ADS Standby	APU Fire Extinguishing
MCDU 2	APU Fuel Shutoff Valve
TCAS	APU Fire Detection
Master Warning/Caution 2	Aft Lavatory Smoke Detection
Aural Warning 2	Engine 2 Oil pressure indication
Digital Audio Panel 2	Engine 1 and Engine 2 Reversers
Multi Function Spoilers L3, R3, L4 and R4	Hydraulic System 1 Depressurization Valve
Ignition 2A	

- NOTE:** - The slats will operate at low rate.
- FADEC will set flight idle on ground.
 - Engine 1 windmill start is not available.
 - Thrust Reversers, Wing Anti-Ice and Ground Idle may not be available.
 - Expect lower roll rates and lower speedbrake efficiency.
 - Do not accomplish the SPOILER FAULT procedure.

APU.....OFF

Landing Configuration:

Slat/Flap FULL

Set $V_{REF FULL}$.

CAUTION: MULTIPLY THE FULL FLAPS “UNFACTORED LANDING DISTANCE” BY 1.80.

On Ground:

Brakes APPLY NORMALLY

Use differential braking and rudder to steer the airplane.

If necessary:

Emergency/Parking Brake.....PULL

CAUTION: APPLY THE EMERGENCY/PARKING BRAKE MONITORING THE EMERGENCY PARKING BRAKE LIGHT.
WHEN THE EMERGENCY/PARKING BRAKE LIGHT IS ON, MAINTAIN STEADY PRESSURE SINCE THE ANTI-SKID PROTECTION IS NOT AVAILABLE.

LAND AT THE NEAREST SUITABLE AIRPORT.

END

DC ESSENTIAL BUS 3 OFF

EICAS CAUTION: DC ESS BUS 3 OFF

TRU ESS Switch OFF

DC ESS BUS 3 OFF MESSAGE EXTINGUISHES

No

Yes

END

Relevant Inoperative Items:

Radio Altimeter 3	Fuel Crossfeed Valve
ADS 2	Landing Gear Override Switch
Internal Light of all Switches	Cargo Compartment Fire Bottles Electro-Explosive Device feed 1
Pax Address	Rudder Trim

NOTE: - The flaps will operate at low rate.

APU OFF

END

GPU CONNECTED

EICAS CAUTION: GPU CONNECTED

Before Taxi:

GPU DISCONNECT

END

IDG 1 (2) OFF BUS

EICAS CAUTION: IDG 1 (2) OFF BUS

Affected IDG Selector OFF, then AUTO

IDG 1 (2) OFF BUS MESSAGE EXTINGUISHES

No

Yes

END

Affected IDG Selector OFF

APU.....AS REQUIRED

END

IDG 1 (2) OIL

EICAS CAUTION: IDG 1 (2) OIL

LIGHT: Affected IDG light becomes amber.

Affected IDG Selector DISC

APU.....AS REQUIRED

END

TRU 1 (2) FAILURE

EICAS CAUTION: TRU 1 (2) FAIL

Affected TRU Switch OFF, then AUTO

TRU 1 (2) FAIL MESSAGE EXTINGUISHES

No

Yes

END

Affected TRU Switch OFF

END

TRU ESSENTIAL FAILURE

EICAS CAUTION: TRU ESS FAIL

TRU ESS Switch OFF

END

EMERGENCY LIGHT NOT ARMED

EICAS CAUTION: EMER LT NOT ARMED

Emergency Lights..... ARMED

END

EMERGENCY LIGHT ON

EICAS CAUTION: EMER LT ON

Emergency Lights..... OFF, then ARMED

END

EMERGENCY LIGHT BATTERY FAULT

EICAS ADVISORY: EMER LT BATT FAULT

Do not takeoff.

END

FIRE PROTECTION

APU FIRE DETECTION FAILURE

EICAS CAUTION: APU FIRE DET FAIL

APU.....OFF

NOTE: - The message APU FIRE DET FAIL may appear just before the message APU FIRE. In this case, accomplish the APU FIRE Procedure.

END

APU FIRE-EXTINGUISHING FAILURE

EICAS CAUTION: APU FIREX FAIL

APU.....OFF

END

CARGO AFT (FORWARD) FIRE SYSTEM FAILURE

EICAS CAUTION: CRG AFT FIRE SYS FAIL OR CRG FWD FIRE SYS FAIL

AFFECTED CARGO COMPARTMENT IS EMPTY

No

Yes

END

LAND AT THE NEAREST SUITABLE AIRPORT.

END

ENGINE 1 (2) FIRE DETECTION FAILURE

EICAS CAUTION: ENG 1(2) FIRE DET FAIL

If fire is suspected in the affected engine:

ENGINE FIRE, SEVERE DAMAGE

OR SEPARATION Procedure..... ACCOMPLISH

NOTE: - The message ENG 1 (2) FIRE DET FAIL may appear just before the message ENG 1 (2) FIRE. In this case, accomplish the ENG 1 (2) FIRE Procedure.

END

FLIGHT CONTROLS

ANGLE OF ATTACK LIMIT FAILURE

EICAS CAUTION: AOA LIMIT FAIL

Avoid side slipping the airplane.

NOTE: - The stick shaker remains operative.

END

ELEVATOR THRUST COMPENSATOR FAILURE

EICAS CAUTION: ELEV THR COMP FAIL

Compensate manually any pitch tendency following thrust variations.

END

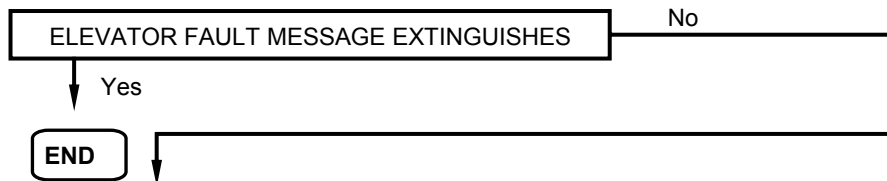
ELEVATOR FAULT

EICAS CAUTION: ELEVATOR FAULT

CONDITION: Elevator control has reverted to Direct Mode.

NOTE: - If the SPOILER FAULT message is also displayed, accomplish the Spoiler Fault procedure prior to this procedure.

Flight Controls Mode Elevators Button PUSH IN, THEN OUT



Relevant Inoperative Items:

AOA Limit
Auto Config Trim
Autopilot
Elevator Thrust Compensation

AOA LIMIT FAIL Procedure ACCOMPLISH

END

ELEVATOR LH (RH) FAILURE

EICAS CAUTION: ELEVATOR LH (RH) FAIL

CONDITION: The associated elevator panel may be jammed or its floating damped.

If the failure occurs above 175 KIAS the current airspeed is the maximum speed for the remainder of the flight.

If the failure occurs below 175 KIAS the maximum speed for the remainder of the flight is 175 KIAS.

NOTE: - Expect less elevator control authority and slower response, especially during landing flare.

Landing configuration:

Slat/Flap 5

Set $V_{REF} = V_{REF FULL} + 15$ KIAS.

CAUTION: MULTIPLY THE FULL FLAPS UNFACTORED LANDING DISTANCE BY 1.40.

If a go around is required:

Slat/Flap 5

Approach Climb Speed..... $V_{REF FULL} + 15$ KIAS

END

FLAP (SLAT) FAILURE

EICAS CAUTION: FLAP FAIL OR SLAT FAIL

INDICATION: Separate indications for flaps and slats.

Slat/Flap Lever CYCLE

Return the Slat/Flap Lever to the previously selected position and then reselect the desired flap/slat position. 3 cycles may be attempted.

FLAP (SLAT) FAIL MESSAGE PERSISTS

No

Yes

In order to choose the proper landing reference data from the following table, the pilot must use the first consequent more retracted position of the failed surface than the one indicated on the EICAS.

NOTE: - Limit bank angle to 20° maximum.

- If there is no slat or flap position indication on EICAS, slats and flaps external marks can be used to determine the slat and flap position.

(Continued on the next page)

(Continued from the previous page)

	SLAT FLAP	0	1, 2, 3	4, 5, FULL
Max Speed V _{REF} (KIAS) Ldg Coef	0	V _{MO} /M _{MO} V _{REF FULL} +60 2.41	230 KIAS V _{REF FULL} +65 2.48	180 KIAS V _{REF FULL} +65 2.49
Max Speed V _{REF} (KIAS) Ldg Coef	1	230 KIAS V _{REF FULL} +50 2.12	230 KIAS V _{REF FULL} +35 1.97	180 KIAS V _{REF FULL} +35 2.00
Max Speed V _{REF} (KIAS) Ldg Coef	2	215 KIAS V _{REF FULL} +40 1.82	215 KIAS V _{REF FULL} +25 1.55	180 KIAS V _{REF FULL} +25 1.57
Max Speed V _{REF} (KIAS) Ldg Coef	3	NOT USABLE	200 KIAS V _{REF FULL} +15 1.42	180 KIAS V _{REF FULL} +15 1.43
Max Speed V _{REF} (KIAS) Ldg Coef	4,5		200 KIAS V _{REF FULL} +15 1.31	180 KIAS V _{REF FULL} +10 1.29
Max Speed V _{REF} (KIAS) Ldg Coef	FULL		165 KIAS V _{REF FULL} +10 1.22	165 KIAS V _{REF FULL} NOT APPLICABLE

If applicable:

Gnd Prox Flap Ovrdr Button PUSH IN

If a go around is required, maintain the V_{REF} presented in the applicable slat/flap configuration presented on the table above.



END

FLT CTRL NO DISPATCH

EICAS CAUTION: FLT CTRL NO DISPATCH

Do not takeoff.

END

PITCH TRIM FAILURE

EICAS CAUTION: PITCH TRIM FAIL

If the failure occurs above 175 KIAS the current airspeed is the maximum speed for the remainder of the flight.

If the failure occurs below 175 KIAS the maximum speed for the remainder of the flight is 175 KIAS.

Pitch Trim System 1 and 2 Cutout Buttons..... PUSH IN, then OUT

Pitch Trim Switches ACTUATE

PITCH TRIM NORMAL

No

Yes

END

Pitch Trim System 1 and 2 Cutout Buttons..... PUSH IN

No more pitch trim is available.

Landing configuration:

Slat/Flap..... 5

Set $V_{REF} = V_{REF FULL} + 15 \text{ KIAS}$.

CAUTION: MULTIPLY THE FULL FLAPS UNFACTORED LANDING
DISTANCE BY 1.40.

Establish landing configuration early.

If a go around is required:

Slat/Flap..... 5

Airspeed..... $V_{REF FULL} + 15 \text{ KIAS}$

END

RUDDER FAILURE

EICAS CAUTION: RUDDER FAIL

CONDITION: The rudder panel may be jammed or floating damped.

If the failure occurs above 175 KIAS the current airspeed is the maximum speed for the remainder of the flight.

If the failure occurs below 175 KIAS the maximum speed for the remainder of the flight is 175 KIAS.

Relevant Inoperative Items:

Yaw Trim
Yaw Damper
Turn Coordination

Landing configuration:

Slat / Flap FULL

Set $V_{REF FULL}$.

CAUTION: AVOID LANDING WITH CROSSWIND COMPONENTS ABOVE 10 KTS.

If a go around is required, proceed as a normal go around limiting the approach climb speed to 175 KIAS.

NOTE: - As assymetric thrust may be required to help controlling the airplane, maximum thrust on both engines may not be possible.

LAND AT THE NEAREST SUITABLE AIRPORT.

END

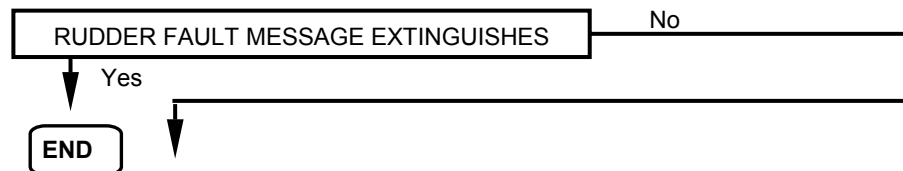
RUDDER FAULT

EICAS CAUTION: RUDDER FAULT

CONDITION: Rudder control has reverted to Direct Mode.

NOTE: - If the SPOILER FAULT message is also displayed, accomplish the Spoiler Fault procedure prior to this procedure.

Flight Controls Mode Rudder Button PUSH IN, then OUT



Relevant Inoperative Items:

Yaw Damper

Turn Coordination

END

RUDDER LIMITER FAILURE

EICAS CAUTION: RUDDER LIMITER FAIL

CONDITION: Rudder position limiter is inoperative and rudder authority in flight is 30°.

CAUTION: DO NOT APPLY ABRUPT PEDAL COMMANDS.
DO NOT APPLY FULL RUDDER DEFLECTION.

END

SLAT-FLAP LEVER DISAGAGREE

EICAS CAUTION: SLAT-FLAP LEVER DISAG

Return the slat/flap lever to previous position and then use it as required.

END

SPOILER FAULT

EICAS CAUTION: SPOILER FAULT

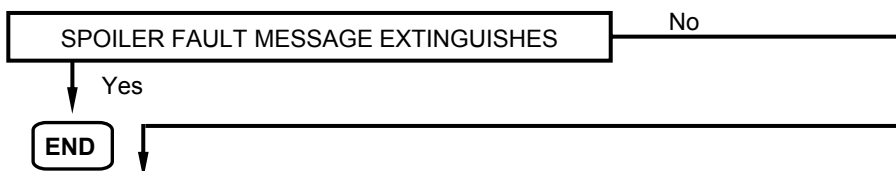
CONDITION: One or more Multifunction Spoilers Panels have reverted to Direct Mode, have extended inadvertently or have failed to extend.

Autopilot DISENGAGE

Speedbrake CLOSE

Flight Controls Mode

Spoilers Button PUSH IN, then OUT



Relevant Inoperative Items:

Ground Spoilers (partially or fully lost)

SpeedBrake (partially or fully lost)

Landing configuration:

If any spoiler panel is failed opened or if it is not possible to determine the spoiler panel position:

Slat/Flap 5

Set $V_{REF} = V_{REF FULL} + 15 \text{ KIAS}$.

CAUTION: MULTIPLY THE FULL FLAPS UNFACTORED LANDING DISTANCE BY 1.78.

If all spoiler panels are closed:

Slat/Flap FULL

Set $V_{REF FULL}$.

CAUTION: MULTIPLY THE FULL FLAPS UNFACTORED LANDING DISTANCE BY 1.45.

END

STABILIZER LOCK FAULT

EICAS CAUTION: STAB LOCK FAULT

CONDITION: The Horizontal Stabilizer may have a drift rate up to 0.5 deg/min
nose up or nose down.

Pitch Trim AS REQUIRED

CAUTION: DO NOT PRESS ANY PITCH TRIM SYSTEM CUTOFF
BUTTON.

LAND AT THE NEAREST SUITABLE AIRPORT.

END

AILERON LH (RH) FAILURE

EICAS ADVISORY: AILERON LH (RH) FAIL

On ground, do not takeoff.

In flight:

Avoid abrupt and large aileron inputs and limit bank angle to 25°.

Establish landing configuration early.

Landing configuration:

Slat/Flap 5

Set $V_{REF} = V_{REF FULL} + 10 \text{ KIAS}$.

CAUTION: MULTIPLY THE FULL FLAPS UNFACTORED LANDING
DISTANCE BY 1.30.

END

FLAP (SLAT) LO RATE

EICAS ADVISORY: FLAP LO RATE or SLAT LO RATE

During approach:

Slat/Flap Actuation ANTICIPATE

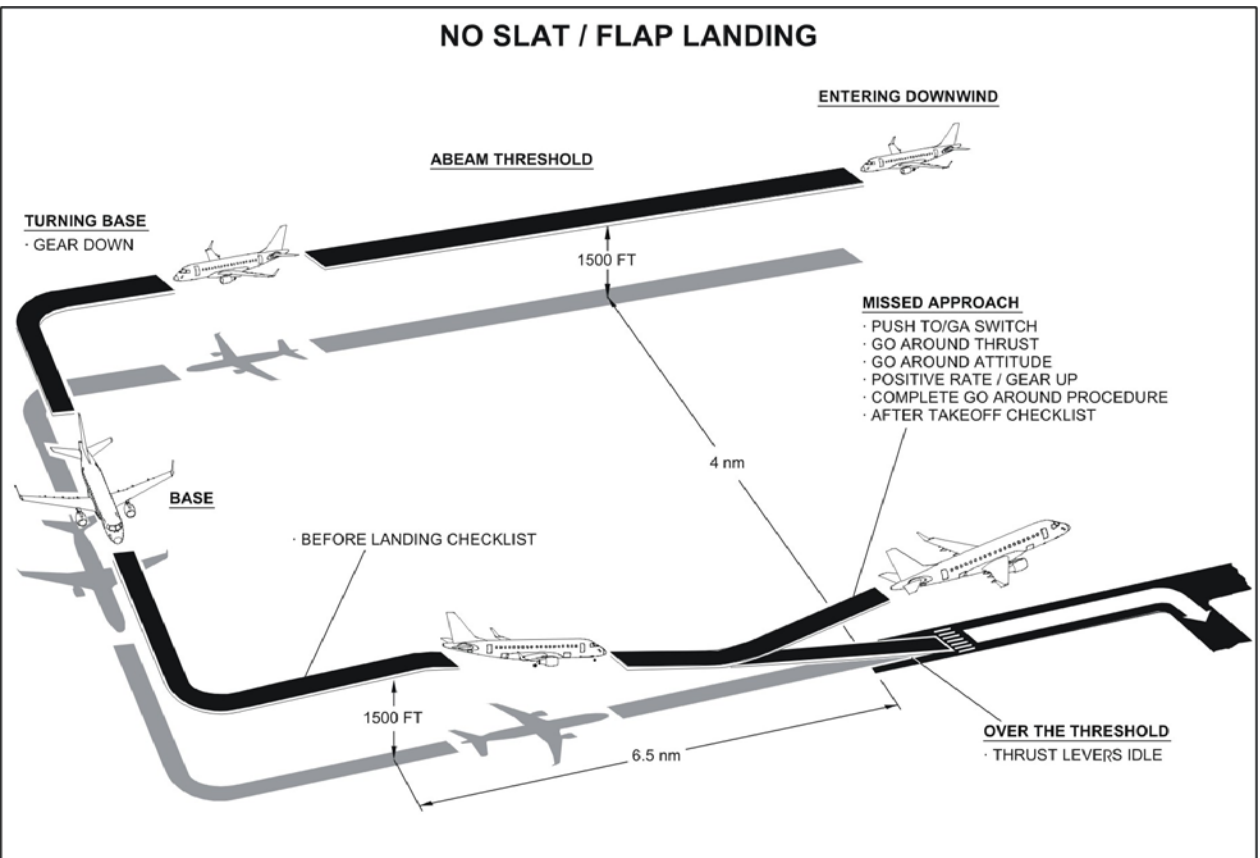
END

FLIGHT CONTROL FAULT

EICAS ADVISORY: FLT CTRL FAULT

Do not takeoff.

END



FUEL

APU FUEL SHUTOFF VALVE FAILURE

EICAS CAUTION: APU FUEL SOV FAIL

Do not restart the APU.

END

ENG 1 (2) FUEL SHUTOFF VALVE FAILURE

EICAS CAUTION: ENG 1 (2) FUEL SOV FAIL

AFTER PULLING FIRE HANDLE

No

Yes

Associated Fuel AC Pump OFF
Fuel Xfeed Selector.....OFF

END

Continue the flight monitoring the system.

END

FUEL AC PUMP 1 (2) FAILURE

EICAS CAUTION: FUEL AC PUMP 1 (2) FAIL

FUEL AC PUMP 1 AFFECTED

No

Yes

Fuel Xfeed Selector.....LOW 1

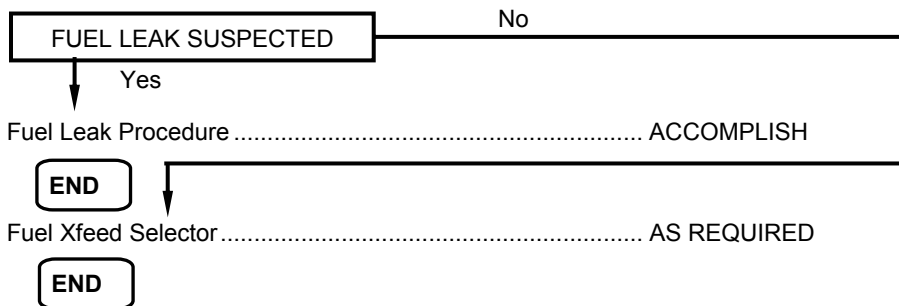
END

Fuel Xfeed Selector.....LOW 2

END

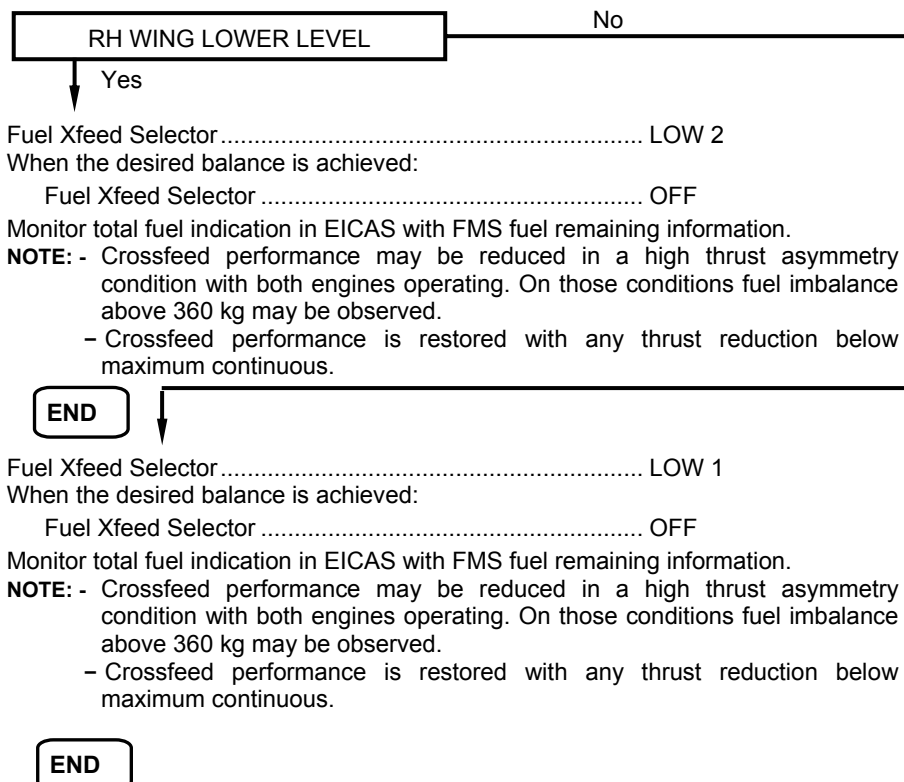
FUEL IMBALANCE

EICAS CAUTION: FUEL IMBALANCE



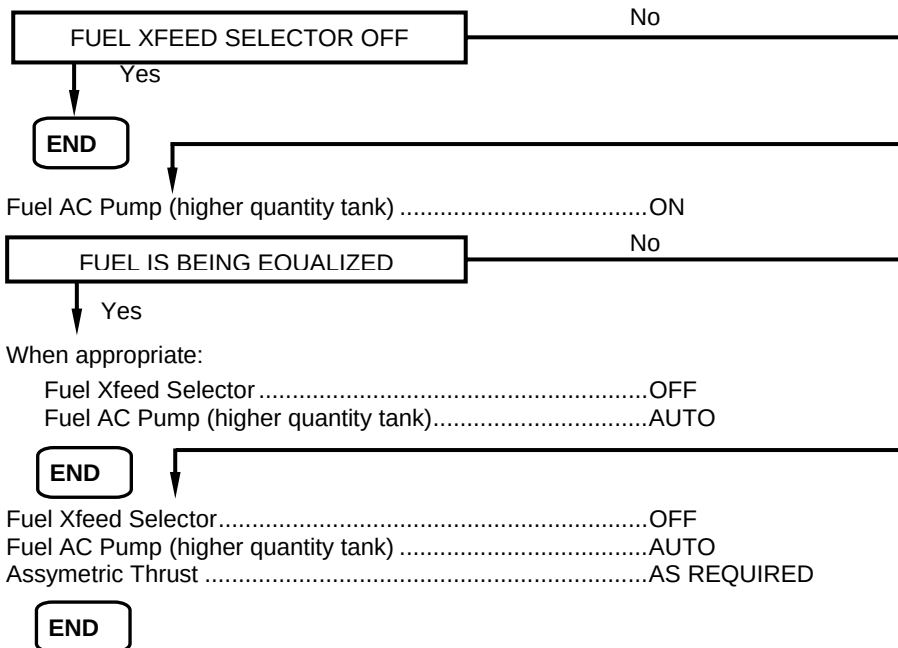
ATTITUDE WING LEVEL

Compare total fuel quantity indication on EICAS with fuel remaining information indicated on FMS Fuel Management page. If FMS fuel remaining quantity is lower than EICAS total fuel indication, disregard FMS fuel remaining information and monitor fuel quantities.



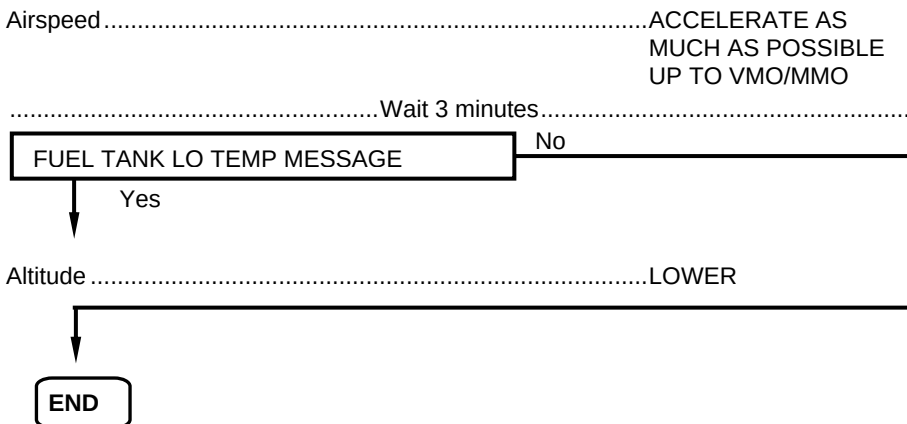
FUEL CROSSFEED FAILURE

EICAS CAUTION: FUEL XFEED FAIL



FUEL TANK LO TEMPERATURE

EICAS ADVISORY: FUEL TANK LO TEMP





FUEL DC PUMP FAILURE

EICAS ADVISORY: FUEL DC PUMP FAIL

Fuel DC Pump Selector OFF

END

HYDRAULIC POWER

LOSS OF HYDRAULIC SYSTEM 1

- NOTE:** - Expect lower roll rates and lower speedbrake efficiency.
- Do not accomplish the SPOILER FAULT procedure.

Relevant Inoperative Items:

- Multi Function Spoilers L3, R3, L4 and R4
- Ground Spoiler L2 and R2
- Autopilot
- Engine 1 Reverser
- Outboard Brakes

Plan a long final approach.

Landing configuration:

Slat/Flap FULL
Set $V_{REF FULL}$.

CAUTION: MULTIPLY THE FULL FLAPS UNFACTORED LANDING
DISTANCE BY 1.90.

END

LOSS OF HYDRAULIC SYSTEM 2

- NOTE:** - Expect lower roll rates and lower speedbrake efficiency.
- Do not accomplish the SPOILER FAULT procedure.

Relevant Inoperative Items:

- Multi Function Spoilers L5 and R5
- Ground Spoiler L1 and R1
- Engine 2 Reverser
- Landing Gear Retraction and Normal Extension
- Inboard Brakes
- Nosewheel Steering

Plan a long final approach.

Landing configuration:

Landing Gear Lever DOWN
Alternate Gear Extension Lever PULL
Slat/Flap FULL
Set $V_{REF FULL}$.

CAUTION: MULTIPLY THE FULL FLAPS UNFACTORED LANDING
DISTANCE BY 1.80.

If a go around is required:

Landing Gear DOWN

END

LOSS OF HYDRAULIC SYSTEM 3

Back up hydraulic power to R.H. elevator, to rudder and ailerons will not be available.

END

LOSS OF HYDRAULIC SYSTEM 1 AND 2

- NOTE:** - Expect lower roll and pitch rates.
- Do not accomplish the ELEVATOR FAULT and the SPOILER FAULT procedures.
 - Apply the Emergency/Parking Brake to stop the airplane monitoring the Emergency/Parking Brake light.
 - When the Emergency/Parking Brake light is on, maintain steady pressure since the Anti-Skid protection is not available.

Relevant Inoperative Items:

- L.H. Elevator
- Multi Function Spoilers L3, R3, L4, R4, L5 and R5
- Ground Spoilers L1, R1, L2 and R2
- Speedbrake
- Autopilot
- Nosewheel Steering
- Engine 1 and Engine 2 Reversers
- Outboard and Inboard Brakes
- Landing Gear Retraction and Normal Extension

Plan a long final approach.

Landing configuration:

Landing Gear Lever DOWN

Alternate Gear Extension Lever PULL

Slat/Flap 5

Set $V_{REF} = V_{REF FULL} + 10$ KIAS.

CAUTION: MULTIPLY THE FULL FLAPS UNFACTORED LANDING
DISTANCE BY 2.70.

If a go around is required:

Landing Gear Lever DOWN

Slat/Flap 5

Airspeed $V_{REF FULL} + 10$ KIAS

LAND AT THE NEAREST SUITABLE AIRPORT.

END

LOSS OF HYDRAULIC SYSTEM 1 AND 3

- NOTE:** - Expect lower roll and pitch rates.
- Expect lower roll rates and lower speedbrake efficiency.
- Do not accomplish the SPOILER FAULT procedure.

Relevant Inoperative Items:

- Rudder
- Multi Function Spoilers L3, R3, L4 and R4
- Ground Spoilers L2 and R2
- Autopilot
- Engine 1 Reverser
- Outboard Brakes

Landing configuration:

Slat/Flap..... 5

Set $V_{REF} = V_{REF FULL} + 10$ KIAS.

CAUTION: AVOID LANDING WITH CROSSWIND COMPONENTS ABOVE 10 KNOTS.
MULTIPLY THE FULL FLAPS UNFACTORED LANDING DISTANCE BY 2.30.

LAND AT THE NEAREST SUITABLE AIRPORT.

END

LOSS OF HYDRAULIC SYSTEM 2 AND 3

- NOTE:** - Expect lower roll and pitch rates and lower speedbrake efficiency.
- Do not accomplish the ELEVATOR FAULT and the SPOILER FAULT procedures.

Relevant Inoperative Items:

- L.H. Elevator
- Ailerons
- Multi Function Spoilers L5 and R5
- Ground Spoilers L1 and R1
- Engine 2 Reverser
- Inboard Brakes
- Landing Gear Retraction and Normal Extension
- NoseWheel Steering

Plan a long final approach.

Landing configuration:

Landing Gear Lever DOWN

Alternate Gear Extension Lever PULL

Slat/Flap 5

Set $V_{REF} = V_{REF FULL} + 10$ KIAS.

CAUTION: AVOID LANDING WITH CROSSWIND COMPONENTS ABOVE 10 KNOTS.
MULTIPLY THE FULL FLAPS UNFACTORED LANDING DISTANCE BY 2.20.

If a go around is required:

Landing Gear Lever DOWN

Slat/Flap 5

Airspeed $V_{REF FULL} + 10$ KIAS

LAND AT THE NEAREST SUITABLE AIRPORT.

END

HYDRAULIC PTU FAILURE

EICAS CAUTION: HYD PTU FAIL

PTU Selector ON

HYD PTU FAIL MESSAGE PERSISTS

No

Yes

PTU Selector OFF

NOTE: - During cruise flight, if PTU is commanded ON, it may be turned to AUTO.

END

END

HYDRAULIC 1 (2) EDP NOT D-PRESSED

EICAS CAUTION: HYD 1 (2) EDP NOT D-PRESS

An engine windmill restart will not be available.

END

HYDRAULIC 1 (2) HIGH TEMPERATURE

EICAS CAUTION: HYD 1 (2) HI TEMP

Associated Electric Hydraulic Pump Selector OFF

END

HYDRAULIC 3 HIGH TEMPERATURE

EICAS CAUTION: HYD 3 HI TEMP

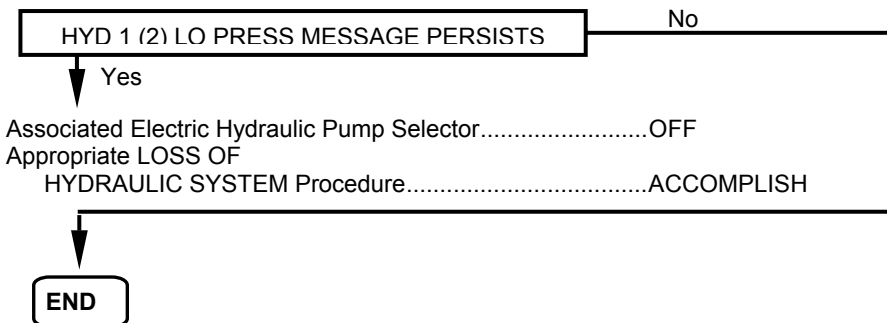
Electric Hydraulic Pump 3A Selector OFF

END

HYDRAULIC 1 (2) LOW PRESSURE

EICAS CAUTION: HYD 1 (2) LO PRESS

Associated Electric Hydraulic Pump Selector ON

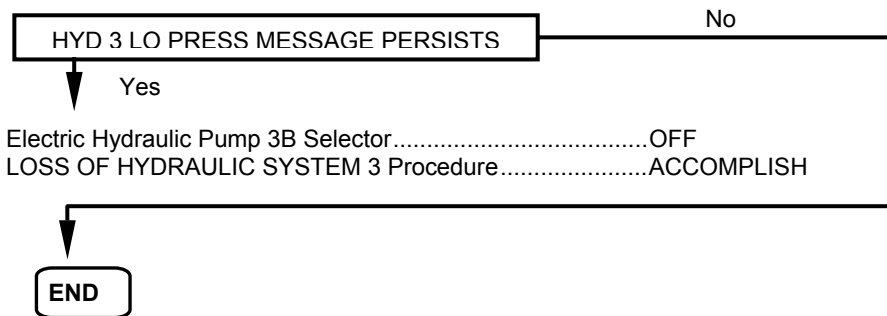


HYDRAULIC 3 LOW PRESSURE

EICAS CAUTION: HYD 3 LO PRESS

Electric Hydraulic Pump 3B Selector ON

Electric Hydraulic Pump 3A Selector.....OFF



HYDRAULIC 3 VALVE FAILED

EICAS CAUTION: HYD 3 VLV FAIL

Airspeed MIN 130 KIAS

END

HYDRAULIC 1 (2) ELECTRIC PUMP FAILURE

EICAS ADVISORY: HYD 1 (2) ELEC PUMP FAIL

Associated Electric Hydraulic Pump Selector ON

END

HYDRAULIC 3 ELECTRIC PUMP A FAILURE

EICAS ADVISORY: HYD 3 ELEC PUMP A FAIL

Electric Hydraulic Pump A Selector OFF

END

HYDRAULIC 3 ELECTRIC PUMP B FAILURE

EICAS ADVISORY: HYD 3 ELEC PUMP B FAIL

Electric Hydraulic Pump B Selector ON

END

HYDRAULIC TEMPERATURE SENSOR FAILURE

EICAS ADVISORY: HYD TEMP SENS FAIL

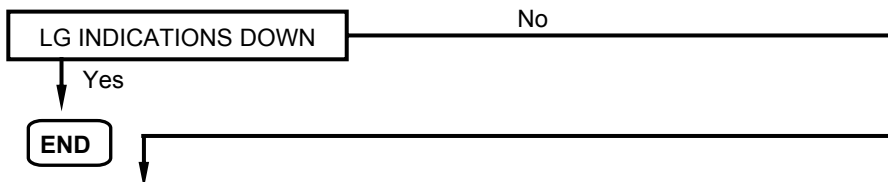
Do not takeoff.

END

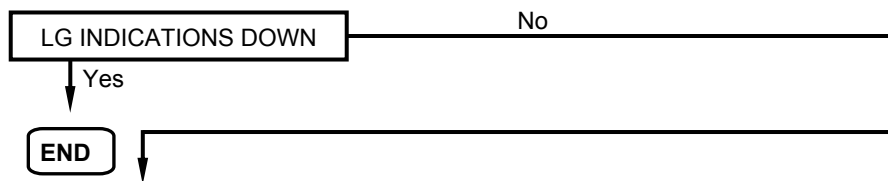
LANDING GEAR AND BRAKES

ABNORMAL LANDING GEAR EXTENSION

Landing Gear Lever DOWN
Electrical Override Switch GEAR DOWN



Alternate Gear Extension Lever PULL
Pull the alternate gear extension lever up to its latched position.
Landing Gear Indications CHECK



PARTIAL OR GEAR UP LANDING
Procedure.....ACCOMPLISH



GEAR LEVER CAN NOT BE MOVED UP

Landing Gear Lever DOWN
LG WOW SYS FAIL Procedure.....ACCOMPLISH

NOTE: - The downlock override button may be pressed to move the landing gear lever up if climb performance is required to clear obstacles.

If a go around is required:

Landing Gear.....DOWN



PARTIAL OR GEAR UP LANDING

- NOTE:** - Plan to land on available gear.
- Burn off fuel to reduce touchdown speed.

Prior to approach:

Cabin Crew	NOTIFY
Aural Warning CB's (C7; C31)	PULL
APU	OFF
Pressurization Dump Button	PUSH IN
Landing Gear Lever	DOWN
Slat/Flap	FULL

Just Before Touchdown:

Cabin	ANNOUNCE

After Landing:

Thrust Levers	IDLE
Start/Stop Selectors	STOP
Fire Extinguishing Handles	PULL and ROTATE
Emergency Evacuation	ANNOUNCE
Batteries	OFF

If a go around is required:

Landing Gear Lever	DOWN

END

BRAKE LH (RH) FAILURE

EICAS CAUTION: BRK LH (RH) FAIL

NOTE: - During landing run, Thrust Reverser and/or the Emergency/Parking Brake may be used to stop the airplane.

Landing configuration:

Slat/Flap FULL

Set $V_{REF FULL}$.

CAUTION:

APPLY THE EMERGENCY/PARKING BRAKE AND MONITOR THE EMERGENCY/PARKING BRAKE LIGHT.

WHEN THE EMERGENCY/PARKING BRAKE LIGHT IS ON, MAINTAIN STEADY PRESSURE SINCE THE ANTI-SKID PROTECTION IS NOT AVAILABLE.

MULTIPLY THE FULL FLAPS UNFACTORED LANDING DISTANCE BY 1.65.

END

BRAKE OVERHEAT

EICAS CAUTION: BRK OVERHEAT

ON GROUND

No

Yes

Airplane STOP
Chocks ON
Emergency/Parking Brake.....OFF

END

Landing Gear DOWN

BRK OVERHEAT MESSAGE PERSISTS

No

Yes

NOTE: - Wait 5 minutes after the BRK OVERHEAT message is no longer displayed to retract the landing gear.

Landing Gear UP

END

EMERGENCY BRAKE FAILURE

EICAS CAUTION: EMER BRK FAIL

CONDITION: Emergency/Parking Brake is inoperative.

When parking the airplane, use wheel chocks.

END

LANDING GEAR NO DISPATCH

EICAS CAUTION: LG NO DISPATCH

Do not takeoff.

END

LANDING GEAR NOSE DOOR OPENED

EICAS CAUTION: LG NOSE DOOR OPEN

Airspeed MAX 250 KIAS

CAUTION: DO NOT MOVE THE LANDING GEAR LEVER UP, EXCEPT
FOR CLIMB PERFORMANCE TO CLEAR OBSTACLES.

END

LANDING GEAR WEIGHT-ON-WHEEL SYSTEM FAILURE

EICAS CAUTION: LG WOW SYS FAIL

Icing Conditions EXIT/AVOID

Landing configuration:

Slat/Flap FULL

Set $V_{REF FULL}$.

CAUTION: MULTIPLY THE FULL FLAPS UNFACTORED LANDING
DISTANCE BY 1.30.

NOTE: - Thrust Reversers, Steering, Ground Spoilers, Wing Anti-Ice and Ground
Idle may not be available.

LAND AT THE NEAREST SUITABLE AIRPORT.

END

STEERING FAILURE

EICAS CAUTION: STEER FAIL

Steer the airplane using differential braking and rudder.

END

AUTOBRAKE FAILURE (if installed)

EICAS CAUTION: AUTOBRAKE FAIL

Apply brakes normally.

END

BRAKE CONTROL FAULT

EICAS ADVISORY: BRK CONTROL FAULT

Brakes APPLY NORMALLY

Landing configuration:

Slat/Flap FULL

Set $V_{REF FULL}$.

END

BRAKE LH (RH) FAULT

EICAS ADVISORY: BRK LH (RH) FAULT

NOTE: - During landing run, expect a slight directional tendency.

Brakes APPLY NORMALLY

If necessary:

Emergency/Parking Brake PULL

CAUTION: APPLY THE EMERGENCY/PARKING BRAKE MONITORING
THE EMERGENCY/PARKING BRAKE LIGHT.

WHEN THE EMERGENCY/PARKING BRAKE LIGHT IS ON,
MAINTAIN STEADY PRESSURE SINCE THE ANTI-SKID
PROTECTION IS NOT AVAILABLE.

MULTIPLY THE FULL FLAPS UNFACTORED LANDING
DISTANCE BY 1.65.

END

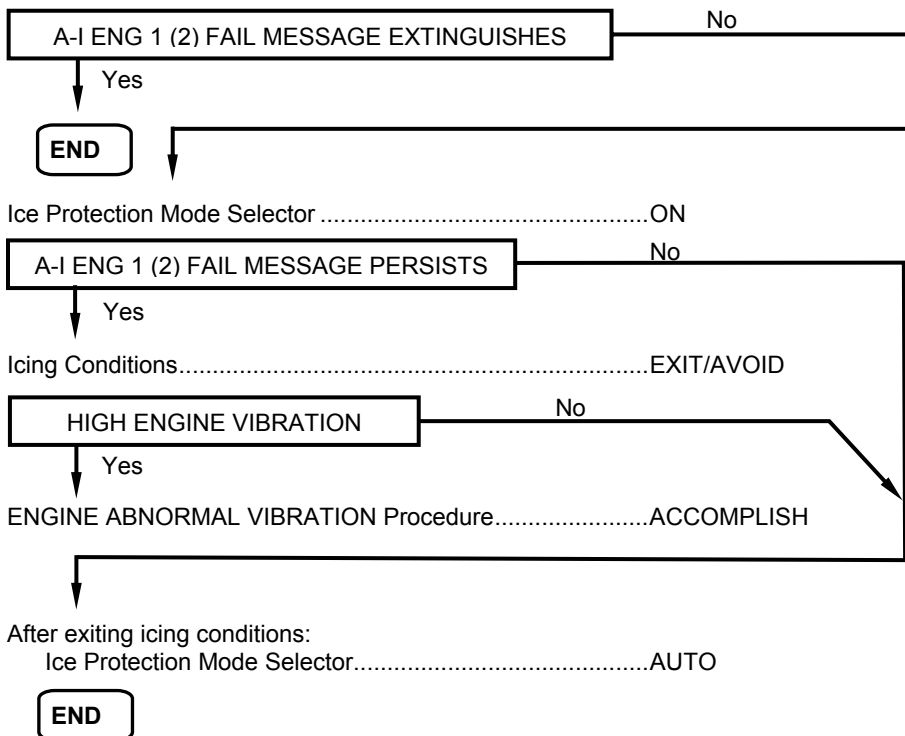
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ICE AND RAIN PROTECTION SYSTEM

ANTI-ICE ENGINE 1 (2) FAILURE

EICAS CAUTION: A-I ENG 1 (2) FAIL

Affected Ice Protection Engine Button.....PUSH OUT, then IN



ANTI-ICE LO CAPACITY

EICAS CAUTION: A-I LO CAPACITY

Thrust Levers ADVANCE

END

ANTI-ICE WING FAILURE

EICAS CAUTION: A-I WING FAIL

Ice Protection Wing Button PUSH OUT, then IN

A-I WING FAIL MESSAGE EXTINGUISHES

No

Yes

END

Ice Protection Mode Selector ON

A-I WING FAIL MESSAGE PERSISTS

No

Yes

Ice Protection Mode Selector AUTO

Ice Protection Wing Button PUSH OUT

Icing Conditions EXIT/AVOID

LANDING IN ICING CONDITIONS OR WITH ICE
ACCRETION

No

Yes

Landing Configuration:

Slat/Flap 5

Set V_{REF} FLAP 5 ICE.

CAUTION: MULTIPLY THE FULL FLAPS UNFACTORED LANDING
DISTANCE BY 1.30.

END

After exiting icing conditions:

Ice Protection Mode Selector AUTO

END

ANTI-ICE WING NO DISPATCH

EICAS CAUTION: A-I WING NO DISPATCH

Do not perform an assisted engine airstart.

END

ICE DETECTOR 1 (2) FAIL

EICAS CAUTION: ICE DETECTOR 1 (2) FAIL

When flying in icing conditions:

Ice Protection Mode Selector.....ON

Two minutes after exiting icing conditions:

Ice Protection Mode Selector.....AUTO

END

WINDSHIELD 1 (2) HTR FAIL

EICAS CAUTION: WINDSHIELD 1 (2) HTR FAIL

Affected Windshield Heating Button.....PUSH OUT, then IN

WINDSHIELD 1 (2) HTR FAIL MSG EXTINGUISHES

No

Yes

END

Affected Windshield Heating Button.....PUSH OUT

END

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OXYGEN

OXYGEN LEAKAGE

CONDITION: Evidence of oxygen leakage through the crew masks, mask hose, flow indicator (blinker), or oxygen lines.

No Smoking.....ON
Oxygen Test/Reset Button ACTUATE
Altitude AS REQUIRED

If oxygen pressure is below minimum required for dispatch, descend to 10000 ft or MEA. The pilot should use the crew portable oxygen cylinder, if necessary.

END

CREW OXYGEN LOW PRESSURE

EICAS CAUTION: CREW OXY LO PRESS

Altitude 10000 ft or MEA,
WHICHEVER IS
HIGHER

END

PASSENGER OXYGEN NOT DEPLOYED

EICAS CAUTION: PAX OXY NOT DEPLOYED

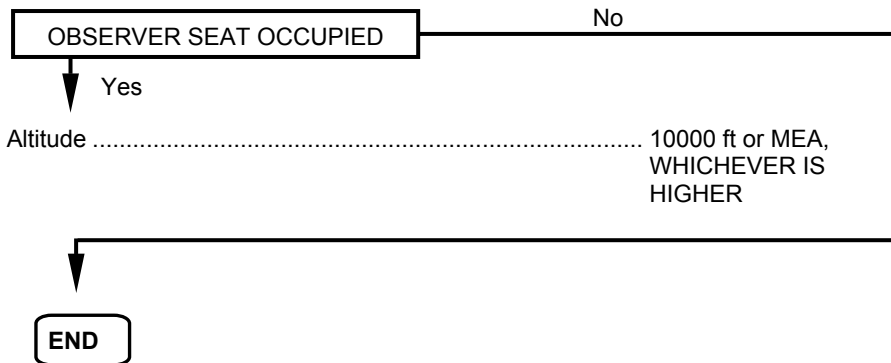
If required:

Passenger Oxygen Selector OVRD

END

OBSERVER OXYGEN LOW PRESSURE

EICAS ADVISORY: OBSERVER OXY LO PRESS



AUTOPILOT

AUTOPILOT FAILURE

EICAS CAUTION: AP FAIL

Fly the airplane manually.

END

AUTOPILOT PITCH MISTRIM

EICAS CAUTION: AP PITCH MISTRIM

Control Wheel HOLD FIRMLY
A/P Disc Button PRESS
Pitch Trim AS REQUIRED

Trim the airplane referring to the EICAS pitch indications.

Autopilot AS REQUIRED

END

AUTOPILOT PITCH TRIM FAILURE

EICAS CAUTION: AP PITCH TRIM FAIL

Control Wheel HOLD FIRMLY
A/P Disc Button PRESS
Pitch Trim AS REQUIRED

END

AUTOPILOT ROLL MISTRIM

EICAS CAUTION: AP ROLL MISTRIM

Roll Trim AS REQUIRED

Trim the airplane referring to the EICAS roll indications.

END

AUTOTHROTTLE FAIL

EICAS CAUTION: AT FAIL

Operate thrust levers manually

END

AUTOTHROTTLE NOT IN HOLD

EICAS CAUTION: AT NOT IN HOLD

Disengage the autothrottle.

END

FLIGHT DIRECTOR LATERAL MODE OFF

EICAS CAUTION: FD LATERAL MODE OFF

Select a flight director lateral mode.

END

FLIGHT DIRECTOR VERTICAL MODE OFF

EICAS CAUTION: FD VERT MODE OFF

Select a flight director vertical mode.

END

SHAKER ANTICIPATED

EICAS CAUTION: SHAKER ANTICIPATED

Avoid side slipping the airplane.

Airspeed MAX 0.5 MACH

FLAP (SLAT) FAIL MESSAGE PRESENTED

No

Yes

Slats and flaps external marks can be used to determine the slat and flap position. Use the table presented on the Flap (Slat) Fail Procedure to choose the proper landing reference data.

NOTE: - If the slats or flaps are in na intermediate position, the pilot must consider the first consequent more retracted position of the failed surface than the one indicated on the external marks.

END

Landing Configuration:

Slat/Flap FULL

Set $V_{REF FULL}$.

END

STALL PROTECTION FAILURE

EICAS CAUTION: STALL PROT FAIL

CONDITION: Stick Shaker and AOA Limiting are inoperative.

Avoid side slipping the airplane.

Landing Configuration:

For flaps 5, set $V_{REF} = V_{REF FULL} + 15 \text{ KIAS}$.

CAUTION: MULTIPLY THE FULL FLAPS UNFACTORED LANDING DISTANCE BY 1.40.

For flaps FULL, set $V_{REF} = V_{REF FULL} + 10 \text{ KIAS}$.

CAUTION: MULTIPLY THE FULL FLAPS UNFACTORED LANDING DISTANCE BY 1.22.

END

AUTOMATIC FLIGHT CONTROL SUSTEM FAULT

EICAS ADVISORY: AFCS FAULT

Do not takeoff.

END

STALL PROTECTION FAULT

EICAS ADVISORY: STALL PROT FAULT

Do not takeoff.

END

FLIGHT INSTRUMENTS AND NAVIGATION

ADS 1 (2) FAILURE

EICAS CAUTION: ADS 1 (2) FAIL

Confirm the affected ADS automatic reversion.

If necessary:

Associated Reversionary Panel ADS Button PUSH

END

ADS 3 FAILURE

EICAS CAUTION: ADS 3 FAIL

Reversion AS REQUIRED

END

ADS 1 (2) (3) HEATER FAILURE

EICAS CAUTION: ADS 1 (2) (3) HTR FAIL

Revert the affected ADS.

END

ADS 4 HEATER FAILURE

EICAS CAUTION: ADS 4 HTR FAIL

Disregard IESS altitude and airspeed indication.

END

AIRCRAFT PERSONALITY MODULE FAILURE

EICAS CAUTION: APM FAIL

Do not takeoff.

END

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AIRCRAFT PERSONALITY MODULE MISCOMPARISON

EICAS CAUTION: APM MISCOMP

Do not takeoff.

END

AURAL WARNING SYSTEM FAILURE

EICAS CAUTION: AURAL WRN SYS FAIL

Monitor visual indications.

NOTE: - Aural warnings, including EGPWS callouts, are lost. TCAS aural may be operative.

END

AVNX ASCB FAULT

EICAS CAUTION: AVNX ASCB FAULT

Do not takeoff.

END

**BLANK DISPLAY UNIT WITHOUT AUTOMATIC
REVERSION**

Select the affected side reversionary panel display selector to PFD or EICAS, as required.

END

AVIONICS MAU 1A FAILURE

EICAS CAUTION: AVNX MAU 1A FAIL

Icing Conditions EXIT/AVOID

Relevant Inoperative Items:

- Multi Function Spoilers L5 and R5
- Outboard Brakes
- Weather Radar
- Left Aileron Indication
- MCDU 1 (except circuit breakers page)
- Pitch Trim Indication
- Autopilot 1
- ACARS
- Nosewheel Steering

Landing Configuration:

Slat/Flap FULL

Set $V_{REF FULL}$.

On ground:

Brakes APPLY NORMALLY

If necessary:

Emergency/Parking Brake PULL

CAUTION: APPLY THE EMERGENCY / PARKING BRAKE MONITORING
THE EMERGENCY / PARKING BRAKE LIGHT.

WHEN THE EMERGENCY / PARKING BRAKE LIGHT IS ON,
MAINTAIN STEADY PRESSURE SINCE THE ANTI-SKID
PROTECTION IS NOT AVAILABLE.

MULTIPLY THE FULL FLAPS UNFACTORED LANDING
DISTANCE BY 1.70.

LAND AT THE NEAREST SUITABLE AIRPORT.

END

AVIONICS MAU 1B FAILURE

EICAS CAUTION: AVNX MAU 1B FAIL

Relevant Inoperative Items:

- Multi Function Spoilers L5 and R5
- Pitch Trim Indication
- GPS 1

Landing Configuration:

Slat/Flap FULL

Set $V_{REF FULL}$.

CAUTION: MULTIPLY THE FULL FLAPS UNFACTORED LANDING
DISTANCE BY 1.15.

END

AVIONICS MAU 2A FAILURE

EICAS CAUTION: AVNX MAU 2A FAIL

Relevant Inoperative Items:

- NoseWheel Steering
- FMS 1

On ground:

Steer the airplane using rudder and differential braking.

END

AVIONICS MAU 2B FAILURE

EICAS CAUTION: AVNX MAU 2B FAIL

Relevant Inoperative Items:

- Inboard Brakes
- Autopilot 1
- Right Side Weather Radar Control
- MCDU 2 (except circuit breakers page)
- EGPWS
- NAVCOM 2
- IESS - Localizer and Glide Slope Indication
- Transponder 2

Landing Configuration:

Slat/Flap..... FULL

Set $V_{REF FULL}$.

On ground:

Brakes APPLY NORMALLY

If necessary:

Emergency/Parking Brake PULL

CAUTION:

APPLY THE EMERGENCY/PARKING BRAKE AND MONITOR THE EMERGENCY/PARKING BRAKE LIGHT.

WHEN THE EMERGENCY/PARKING BRAKE LIGHT IS ON, MAINTAIN STEADY PRESSURE AS THE ANTI-SKID PROTECTION IS NOT AVAILABLE.

MULTIPLY THE FULL FLAPS UNFACTORED LANDING DISTANCE BY 1.65.

END

AVIONICS MAU 3A FAILURE

EICAS CAUTION: AVNX MAU 3A FAIL

Icing Conditions.....EXIT / AVOID

Relevant Inoperative Items:

- Multi Function Spoiler L3, R3, L4 and R4
- Speedbrake
- Ground Spoilers
- Right Aileron Indication
- APU
- ADS 3
- GPS 2
- FMS
- Autopilot 2

Landing Configuration:

Slat/Flap FULL

Set $V_{REF FULL}$.

CAUTION: MULTIPLY THE FULL FLAPS UNFACTORED LANDING DISTANCE
BY 1.20.

LAND AT THE NEAREST SUITABLE AIRPORT.

END

AVIONICS MAU 3B FAILURE

EICAS CAUTION: AVNX MAU 3B FAIL

Relevant Inoperative Items:

- Multi Function Spoilers L3, R3, L4 and R4
- Pitch Trim Indication
- Engine Vibration Indication

Landing Configuration:

Slat/Flap FULL

Set $V_{REF FULL}$.

CAUTION: MULTIPLY THE FULL FLAPS UNFACTORED LANDING DISTANCE
BY 1.20.

END

AVNX MAU 1A (1B) OVERHEAT

EICAS CAUTION: AVNX MAU 1A (1B) OVHT

Associated CB..... PULL

NOTE: - For MAU 1A OVHT, pull the B6 and B7 CB.
- For MAU 1B OVHT, pull the B15 CB.

Refer to AVNX MAU 1A (1B) FAIL Procedure to be aware of relevant inoperative items.

END

AVNX MAU 2A (2B) OVERHEAT

EICAS CAUTION: AVNX MAU 2A (2B) OVHT

Associated CB PULL

NOTE: - For MAU 2A OVHT, pull the B25 CB.
- For MAU 2B OVHT, pull the B26 and B35 CB.

Refer to AVNX MAU 2A (2B) FAIL Procedure to be aware of relevant inoperative items.

END

AVNX MAU 3A (3B) OVERHEAT

EICAS CAUTION: AVNX MAU 3A (3B) OVHT

Associated CB..... PULL

NOTE: - For MAU 3A OVHT, pull the B34 CB.
- For MAU 3B OVHT, pull the B27 CB.

Refer to AVNX MAU 3A (3B) FAIL Procedure to be aware of relevant inoperative items.

END

AVNX MAU 1 (2) (3) FAN FAILURE

EICAS CAUTION: AVNX MAU 1 (2) (3) FAN FAIL

Do not takeoff.

END

CAS MESSAGE MISCOMPARISON

INDICATION: CAS MSG flag on PFD

CAS Source Selection.....ALTERNATE
BETWEEN CAS1 AND
CAS 2 AND
COMPARE

Select on the MCDU: MENU → MISC (LSK 1L) → SETUP (LSK 2L) →
CAS SOURCE SELECTION (LSK 2R) → CAS 1 → CAS 2

Compare the messages of the two CAS sources displayed on the EICAS to check which the discrepant message is. Analyze the situation to check whether the discrepant message is spurious or not and take the appropriate corrective action.

END

CHECK EICAS

EICAS CAUTION: CHECK EICAS

Crosscheck EICAS information.

END

CHECK MFD 1 (2)

EICAS CAUTION: CHECK MFD 1 (2)

Crosscheck the associated display information with the standby instruments or with the other displays.

END

CHECK PFD 1 (2)

EICAS CAUTION: CHECK PFD 1 (2)

Crosscheck the associated display information with the standby instruments or with the other displays.

END

COMMUNICATION MANAGEMENT SYSTEM FAILURE

EICAS CAUTION: CMS FAIL

Do not takeoff.

END

CREW WARNING SYSTEM FAULT

EICAS CAUTION: CREW WRN SYS FAULT

Do not takeoff.

END

DEGRADED NAVIGATION

The DGRAD annunciator is displayed on the PFD when the accuracy and integrity of the system does not meet the requirements for the current RNP or Approach type. The UNABLE RNP or GPS APPR RAIM UNAVAIL scratchpad message will also be displayed.

If a DGRAD annunciation is displayed, the pilot should select the offside FMS, if available. If the off-side FMS is not available, procedures should be followed as described in the following table, and detailed in the paragraphs below:

DGRAD Procedures (Off-side FMS not Available)	
Operation	Required Action
Non-RNP Terminal or En-route (including B-RNAV)	Crosscheck FMS data with raw data from VOR, DME, and NDB. De-select error causing sensor, if detectable.
P-RNAV	Contact ATC, advise inability to continue P-RNAV.
RNP Terminal, En-route, Remote	Contact ATC and advise inability to continue RNP operations.
Non-RNP (excluding GPS required) Approach	Use alternate source (VOR, NDB) if available. If not, declare Missed Approach.
RNP-0.3 and GPS required Approach	Declare Missed Approach.
Non-RNP Remote	Crosscheck FMS data with raw data from GPS, IRS. De-select error causing sensor, if detectable.

During conventional (non-RNP) terminal and en-route operations and B-RNAV operations, the degraded FMS may continue to be used for navigation, provided the crew can confirm FMS guidance data through other means, such as cross checking VOR and DME raw data. Perform a cross-comparison of all sensor positions and station bearing/distance data, and de-select the error-causing sensor, if it is detected. In the case of B-RNAV, if the FMS is not able to provide continued guidance, ATC must be notified of the loss of B-RNAV capability.

During P-RNAV operations or RNP based terminal, en-route, or remote operations (including RNP-10), the degraded FMS may not be used to continue operations. If the offside FMS is not available, the pilot must contact ATC and notify of the inability to continue P-RNAV or RNP operation.

If conducting a non-RNP instrument approach, discontinue use of the degraded FMS for approach guidance and select an alternate source of navigation, if available (VOR, NDB). If an alternate source is not available or time does not permit, declare missed approach.

If conducting an RNP 0.3 approach, the degraded FMS may not be used to continue the approach. If the offside FMS is not available, declare a missed approach.

During conventional remote/oceanic operations, the FMS may continue to be used for navigation, provided the crew can confirm FMS guidance data through other means, such as cross checking GPS and IRS raw data. Perform a cross-comparison of all sensor positions and de-select the error-causing sensor, if it is detected.

END

DEAD RECKONING

The DR annunciator is displayed on the PFD when the FMS has been performing position computations without any sensors for a set time after a degraded navigation event occurs (DRGAD). The accuracy and integrity of the FMS guidance data cannot be ensured in this mode.

The pilot should discontinue use of the FMS when it is in DR mode. If there is no alternative means of navigation (off-side FMS, VOR, etc.), the pilot may elect to perform manual position updates to the FMS in the DR condition, using reference point fly-over techniques, to minimize the navigation error. In this case, ATC must be notified of the loss of navigation capability on the aircraft.

END

DISPLAY CONTROL FAILURE

EICAS CAUTION: DISPLAY CTRL FAIL

NOTE: - PFD selections of VOR, FMS, RA/BARO Minimums and Baro Setting will be locked at the last setting position prior to the failure.

- Disregard altitude call outs from aural system.
- Use IEISS for barometric setting and ILS approach.

Relevant Inoperative Items on both Pilot and Copilot Display Controllers:

- V/L Pushbutton
- Bearing "O" Pushbutton
- Bearing "<>" Pushbutton
- FMS Pushbutton
- PREV Pushbutton
- WX Pushbutton
- HSI Pushbutton
- FPR Pushbutton
- RAD/BARO Minimums Knob
- IN/Hpa baro setting Knob
- Push STD Pushbutton

END

DISPLAY CONTROL FAULT

EICAS CAUTION: DISPLAY CTRL FAULT

Do not takeoff.

END

EICAS FAULT

EICAS CAUTION: EICAS FAULT

Crosscheck EICAS information and revert if necessary.

END

EICAS OVERHEAT

EICAS CAUTION: EICAS OVHT

B11 CB PULL

Reversionary Panel Selector EICAS

END

FMS POSITION DISAGREE

EICAS Caution: FMS POS DISAG

Do not use FMS as navigation source.

END

FMS1(2)-GPS POSITION DISAGREE

EICAS Caution: FMS 1 (2) GPS POS DISAG

DUAL FMS INSTALLED

No

Yes

Select another FMS source.

END

Select another navigation source.

END

GROUND PROXIMITY FAILURE

EICAS CAUTION: GND PROX FAIL

Increase awareness in relation to ground proximity.

END

IRS EXCESSIVE MOTION

EICAS CAUTION: IRS EXCESSIVE MOTION

Airplane STOP

The IRS will restart the alignment after the motion is stopped.

END

IRS 1 (2) FAILURE

EICAS CAUTION: IRS 1 (2) FAIL

Reversionary Panel IRS Button.....PUSH

END

MCDU 1 (2) OVERHEAT

EICAS CAUTION: MCDU 1 (2) OVHT

Associated CB.....PULL

NOTE: - For MCDU 1 OVHT, pull the B16 CB.

- For MCDU 2 OVHT, pull the B31 CB.

- The associated FMS will be lost.

END

MFD 1 (2) FAULT

EICAS CAUTION: MFD 1 (2) FAULT

Crosscheck the affected MFD display information (System Synoptics, MAP, TAS, TAT, SAT, TCAS info, WX radar and Terrain Data) with the opposite side MFD display information. Disregard any non-reliable information from the affected MFD.

END

MFD 1 (2) OVERHEAT

EICAS CAUTION: MFD 1 (2) OVHT

Associated CB.....PULL

Reversion.....AS REQUIRED

NOTE: - For MFD 1 OVHT, pull the B29 CB.

- For MFD 2 OVHT, pull the B20 CB.

END

NAVCOM 1 (2) FAILURE

EICAS CAUTION: NAVCOM 1 (2) FAIL

Select and use the remaining NAVCOM (VHF, VOR, DME, Transponder).

END

NAVCOM 1 (2) OVERHEAT

EICAS CAUTION: NAVCOM 1 (2) OVHT

Associated MRC CB..... PULL

NOTE: - For NAVCOM 1 OVHT, pull the C10 CB.

- For NAVCOM 2 OVHT, pull the MRC 2 Electronic CB.

NAVCOM 1 (2) FAILURE procedure ACCOMPLISH

END

PFD 1 (2) FAULT

EICAS CAUTION: PFD 1 (2) FAULT

Crosscheck the affected PFD display information (Attitude, Airspeed, Altitude, FMA, FPA, Minimuins, Baro setting, Nav-Com radios frequencies, HDG and CRS) with the opposite side PFD display information. Disregard any non-reliable information from the affected PFD.

END

PFD 1 (2) OVERHEAT

EICAS CAUTION: PFD 1 (2) OVHT

Associated CB..... PULL

Reversionary Panel Selector AS REQUIRED

NOTE: - For PFD 1 OVHT, pull the B19 CB.

- For PFD 2 OVHT, pull the B21 CB.

END

SYSTEM CONFIGURATION FAILURE

EICAS CAUTION: SYS CONFIG FAIL

Do not takeoff.

END

TERRAIN FAILURE

EICAS CAUTION: TERRAIN FAIL

Increase awareness in relation to terrain proximity.

END

VALIDATE CONFIGURATION

EICAS CAUTION: VALIDATE CONFIG

Do not takeoff.

END

VHF 3 FAILURE

EICAS CAUTION: VHF 3 FAIL

Select another VHF source.

END

VHF 1 (2) (3) OVERHEAT

EICAS CAUTION: VHF 1 (2) (3) OVHT

Associated CB.....PULL

NOTE: - For VHF 1 OVHT, pull the C11 CB.

- For VHF 2 OVHT, pull the VHF 2 Electronic CB.
- For VHF 3 OVHT, pull the VHF 3 Electronic CB.

END

WINDSHEAR FAILURE

EICAS CAUTION: WINDSHEAR FAIL

Increase awareness in relation to weather, wind and speed variations.

END

ADS PROBE 1 (2) (3) (4)

EICAS ADVISORY: ADS PROBE 1 (2) (3) (4)

Do not takeoff.

END

FMS FAILURE

EICAS ADVISORY: FMS 1 (2) FAIL

An FMS failure is indicated by the loss of all data on the PFD and MFD maps. All data will be blanked, or dashed. A large "X" is displayed in place of the lateral deviation indicator. An "FMS1 FAIL" or "FMS2 FAIL" CAS message will also be displayed.

If an FMS failure occurs, the offside FMS should be selected. If the offside FMS is not available, the following procedures should be followed, based on the nature of the operation:

FMS Failure Procedures (Off-side FMS not Available)	
Operation	Required Action
Non-RNP Terminal or En-route	Use alternate source. (VOR, NDB, DME).
B-RNAV, P-RNAV, or RNP operations	Contact ATC and declare inability to continue B-RNAV, P-RNAV, or RNP operations.
Non-RNP (excluding GPS required) Approach	Use alternate source, if available. (VOR, NDB). If not available, declare missed approach.
RNP-0.3 or GPS required approach	Declare Missed Approach.
Remote Operations	Contact ATC and declare loss of long range navigation capability.

END

IRS PRESENT POSITION INVALID

EICAS ADVISORY: IRS PRES POS INVALID

FMS Present Position ENTER OR REENTER

END

IRS 1 (2) NAVIGATION MODE FAILURE

EICAS ADVISORY: IRS 1 (2) NAV MODE FAIL

Associated Reversionary

Panel IRS Button PUSH

END

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GUIDANCE FOR DIVERSION IN CASE OF SERIOUS TECHNICAL FAILURE

If the failure does not allow the performance of a commercial flight in compliance with MEL, but limitations defined in AFM are not exceeded, the crew may perform a ferry flight upon approval of aviation authorities.

For details see Operational Manual part A Chapter A.8.3.2.6, A.8.7.1, A.8.7.2 and A.8.7.3 Operational Procedures.

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ENHANCED GROUND PROXIMITY WARNING SYSTEM

When an EGPWS alert occurs, use the flight controls and thrust as necessary to correct the airplane attitude, flight path and configuration, according to the voice message presented, to provide terrain clearance.

WARNING: IF A TERRAIN AWARENESS WARNING OCCURS, IMMEDIATELY INITIATE AND CONTINUE A CLIMB THAT WILL PROVIDE MAXIMUM TERRAIN CLEARANCE UNTIL ALL ALERTS CEASE. ONLY VERTICAL MANOEUVRES ARE RECOMMENDED, UNLESS OPERATING IN VISUAL METEOROLOGICAL CONDITIONS (VMC), AND/OR THE PILOT DETERMINES, BASED ON AVAILABLE INFORMATION, THAT TURNING IN ADDITION TO THE VERTICAL ESCAPE MANOEUVRE IS A SAFER COURSE OF ACTION.

CAUTION: • FOR THE EGPWS, THE TERRAIN DISPLAY IS INTENDED TO BE USED AS A SITUATIONAL AWARENES TOOL ONLY AND MAY NOT PROVIDE THE ACCURACY AND/OR FIDELITY ON WHICH YOU MAY SOLELY BASE TERRAIN AVOIDANCE MANEUVERING DECISIONS.

- WHEN A TERRAIN AWARENESS CAUTION OCCURS, VERIFY THE AEROPLANE FLIGHT PATH AND CORRECT IT IF REQUIRED. IF IN DOUBT, PERFORM A CLIMB UNTIL THE CAUTION ALERT CEASES.

NOTE: The EGPWS aural alerts "TERRAIN, TERRAIN" and "OBSTACLE, OBSTACLE" would be delayed or suppressed case the "LANDING GEAR" aural alert is active and the aural alert "PULL UP, PULL UP..." would be heard after the landing gear aural alert.

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TCAS WARNING

TRAFFIC AND COLLISION AVOIDANCE SYSTEM

The pilot must not initiate evasive maneuvers using Traffic Advisory information (TA) only, without visually sighting conflicting traffic.

The traffic display and advisories are intended for assistance in visually locating the indicated conflicting traffic.

Maneuvers that are in the opposite direction of the RA are extremely hazardous, especially RAs involving altitude crossing, and thus are prohibited unless it is visually determined to be the only means to assure safe separation.

WARNING: IT IS POSSIBLE IN SOME CASES TO HAVE INSUFFICIENT AIRPLANE PERFORMANCE TO FOLLOW THE TCAS COMMAND WITHOUT FLYING INTO STALL WARNING OR BUFFET. CONDITIONS WHERE THIS MAY OCCUR INCLUDE:

- **BANK ANGLE IN EXCESS OF 15 DEGREES.**
- **OPERATIONS AT AIRPORTS ABOVE 5300 FEET MSL OR TEMPERATURES GREATER THAN ISA + 28°C (50°F).**
- **ENGINE INOPERATIVE.**
- **FAILURE TO CONFIGURE THE AIRPLANE TO GO-AROUND FOLLOWING A CLIMB RA IN LANDING CONFIGURATION.**
- **FAILURE TO ADVANCE THRUST TO MAX CONTINUOUS THRUST FOLLOWING A CLIMB RA AT REDUCED THRUST.**
- **SPEEDS LESS THAN NORMAL OPERATING SPEED.**
- **ABNORMAL CONFIGURATIONS WHICH REDUCE PERFORMANCE (E.G. GEAR DOWN).**
- **TCAS COMMAND REVERSAL TO A "CLIMB-CLIMB NOW".**
- **BUFFET MARGIN LESS THAN 0.3G.**

WARNING: IF STALL WARNING OCCURS DURING AN RA MANEUVER, IMMEDIATELY ABANDON THE RA AND EXECUTE STALL RECOVERY PROCEDURES. TCAS II WILL CONTINUE TO PROVIDE RAS DURING STALL WARNING AND RECOVERY PROCEDURE.

WARNING: IF HIGH SPEED BUFFET IS ENCOUNTERED WHEN INITIALLY RESPONDING TO AN RA, RELAX PITCH FORCE AS NECESSARY TO REDUCE BUFFET, BUT STILL CONTINUE TO MANEUVER.

WARNING: FOR CROSSING RA, A NON COMPLIANCE BY ONE AIRPLANE CAN RESULT IN REDUCED VERTICAL SEPARATION WITH THE NEED TO ACHIEVE SAFE HORIZONTAL SEPARATION BY VISUAL MEANS.

CAUTION: UNDER CERTAINS CONDITIONS, COMMANDED MANEUVERS MAY SIGNIFICANTLY REDUCE STALL MARGINS WITH THE NEED TO RESPECT THE STALL WARNING WHERE THIS MAY OCCUR.

NOTE: - For a non-crossing RA, the vertical speed must be accurately adjusted to comply with the RA in order to avoid negating the effectiveness of a coordinated maneuver by the intruding airplane.

- Evasive maneuvering should be made with autopilot and autothrottle disengaged, and limited to the minimum required to comply with the RA.
- The consequences of not following an RA may result in additional RA's in which aural alert and visual annunciations may not agree with each other.
- Using every available means, clear the airspace into which you are going to maneuver. If needed, promptly and smoothly adjust the airplane's pitch to fly into the green rectangle (if displayed), and fly out of the red trapezoidal shaped avoidance zone(s). This should require no more than 0.75g to 1.25g maneuver (+/-0.25g).
- Exaggerated responses to TCAS RAs are not desirable or appropriate because of the other potential traffic conflicts and ATC consequences. From level flight, proper response to a TCAS RA typically results in an overall altitude deviation of 300 to 500 feet to resolve a traffic conflict.

NOTE: - If a CLIMB RA is issued with the airplane in the landing configuration, a normal go-around should be initiated including the appropriate thrust increase and configuration change.

- Compliance with TCAS resolution advisories is required unless the pilot considers it unsafe to do so.
- The pilot should promptly return to the previous ATC clearance after the TCAS voice message "Clear of Conflict" is announced.
- An immediate smooth response to an RA is required to obtain maximum separations. TCAS II algorithms are based on the pilot starting the initial maneuver within 5 seconds of the RA and within 2 1/2 seconds for additional corrective RA's (increases or reversals). Any delay in responding to RA's will reduce the separations provided.

WINDSHEAR

The most important way to cope with windshear is to avoid areas of known or potential windshear areas such as thunderstorms.

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 ft/min.

To prepare for encountering possible windshear, the flight crew accomplishes the following:

- Evaluate the weather.
- Avoid known or potential windshear areas.
- Consider precautions.

WINDSHEAR PREVENTION/RECOVERY

Thrust Levers	MAX
Go Around Button	PRESS

Rotate the airplane smoothly following the Flight Director on EADI to minimize altitude loss. Pitch attitude may be well above normal angles.

Maintain airplane configuration. Do not change gear and flap position until terrain clearance is assured.

EVALUATE WEATHER

Although an advanced – technology windshear detection and annunciation system is installed, flight crewmembers should develop an awareness of windshear causes and attending danger signals to successfully avoid it.

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 cues do not replace the total set of observations. Additionally, use of the cues do not replace sound judgment when making avoidance decisions. Crewmembers are urged to exercise caution when determining a course of action.

AVOID KNOWN OR POTENTIAL WINDSHEAR AREAS

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

- Delay takeoff until conditions improve.

In flight, divert around the area of known or potential windshear.

CONSIDER PRECAUTIONS

Precautions are recommended whenever the probability of windshear exists. Be prepared for the possibility of an inadvertent encounter.

Develop a cockpit atmosphere that encourages awareness and effective crew coordination, particularly at night and during marginal weather conditions.

Approach and landing into known severe windshear conditions is prohibited.

TAKEOFF

- Use maximum takeoff thrust instead of reduced thrust.
- Use the longest runway available with the lowest possibility of a windshear encounter.
- Be alert for any airspeed fluctuations during takeoff and initial climb.
- Minimize reductions from the initial climb pitch attitude until terrain and obstructions clearance is assured.
- Develop an awareness of normal airspeed, attitude, vertical speed, and airspeed buildup values. 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

- Achieve a stabilized approach at or before attaining 1000 ft AGL or three miles to runway.
- Avoid large thrust reductions or trim changes in response to sudden airspeed increase, as these may be followed by airspeed decreases.
- Use the longest runway available with the lowest possibility of a windshear encounter.
- Whenever possible plan to use slat/flap 5.
- If a decision to continue the approach was taken after a windshear caution annunciation use a wind correction as follows:
- $V_{APP} = V_{REF} + \text{wind correction}$.

Wind correction = $\frac{1}{2}$ steady headwind component + full gust increment.

For Flaps FULL landing, the minimum wind correction is 5 KIAS and the maximum is 15 KIAS.

For Flaps 5 landing, the minimum wind correction is 5 KIAS and the maximum is 20 KIAS.

The full gust correction should be maintained until touchdown while the steady headwind correction might be bled off before touchdown.

- Use the autopilot and autothrottle for the approach to provide more monitoring and recognition time.
- Develop an awareness of normal air speed, vertical speed, thrust and pitch values.
- Cross-check flight director commands, using vertical flight path indications.
- The pilot not flying closely monitors the flight path instruments, such as vertical speed, altimeters and glideslope displacement, and calls out any deviations from normal.

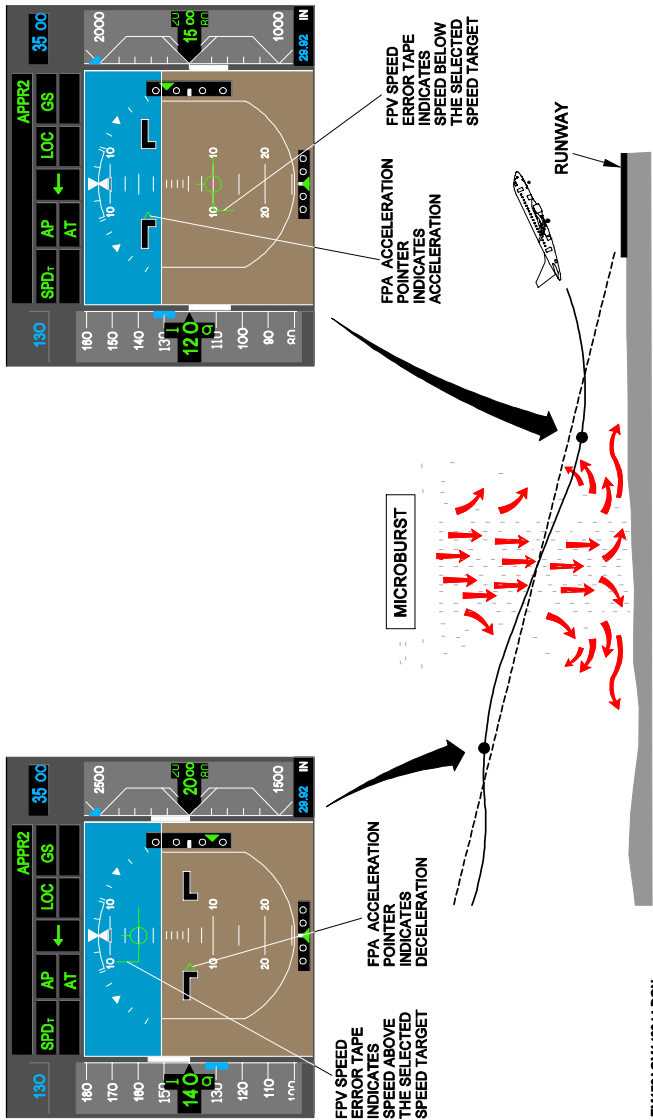
WINDSHEAR RECOGNITION TECHNIQUES

The EGPWS provides a windshear detection/annunciation system. Additionally some cues are presented to help the pilot in a windshear recognition.

Marginal flight path control may be indicated by uncontrolled changes from normal, steady-state flight conditions such as follows:

- Air speed varies 15 KIAS or more.
- Vertical speed varies 500 ft/min or more.
- Attitude pitch varies 5° or more.
- Unusual glide path, such as one or more dot displacement from the glide-slope.
- Unusual thrust lever position for a significant period of time.
- When the airplane is entering the microburst (increased head wind):
 - FPV speed error tape: indicates speed above the selected speed target.
 - FPA acceleration pointer: indicates deceleration of the airplane.
- When the airplane is exiting the microburst (increased tail wind):
 - FPV speed error tape: indicates speed below the selected speed target.
 - FPA acceleration pointer: indicates acceleration of the airplane.

ADI DISPLAY IN MICROBURST



WINDSHEAR RECOVERY TECHNIQUES

The windshear escape maneuver should be performed whenever the following happens:

- A windshear warning is annunciated during approach or after lift-off.
- PFD: WSHEAR (red).
- Voice message: "WINDSHEAR, WINDSHEAR, WINDSHEAR".
- A windshear caution is annunciated during approach and the captain decides to perform the windshear recovery technique. A windshear caution is annunciated after lift-off.
- PFD: WSHEAR (amber).
- Voice message: "CAUTION WINDSHEAR".
- Whenever the captain decides to perform the recovery techniques due to the presence of windshear clues without EGPWS announcement.

Windshear escape maneuver due to EGPWS announcement:

Thrust Levers MAX

When moving the thrust levers press either GA switch.

Flight Director Escape Guidance Cue FOLLOW

Maintain the present configuration (gear and flaps) until 1500 ft AGL and with terrain clearance assured.

Windshear escape maneuver without EGPWS announcement:

Autopilot DISENGAGE

Thrust Levers MAX

When moving the thrust levers press either GA switch.

Pitch 15° or PLI
whichever is lower

Maintain the present configuration (gear and flaps) until 1500 ft AGL and with terrain clearance assured.

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EMERGENCY LANDING/DITCHING

DITCHING

DITCHING - ACTIONS AND CALLOUTS		
	LSP	RSP
In Flight	• Notify cabin crew. • Notify ATC. • Pull aural warning CB (C7) (LSP).	• Set transponder to 7700. • Pull aural warning CB (C31) (RSP). • Select No Smoking / Fasten Seat Belts ON. • Set ELT to ON.
At 10000 ft AGL	• Monitor cabin rate.	• Press the pressurization DUMP button.
	• Adjust altimeters and set landing data.	
At 5000 ft AGL	• Check that passenger cabin procedures are completed. • Monitor cabin altitude.	• Select pressurization mode controller knob to MANUAL. • Hold down the CABIN ALT knob for 50 sec.
	• Review After Ditching Procedures.	
Before ditching	“FLAPS ____” (maximum available) • Confirm landing gear UP.	• Notify ATC about ditching position. • Set slat/flap as required. • Press the APU Emergency Stop button.
Just before water contact	• Adjust landing profile. • Maintain V_{REF} and minimum rate of descent with thrust available. If engines are not running maintain a minimum speed of 130 knots.	Alert cabin crew: “POZYCJA AWARYJNA / BRACE POSITION”

(Continued)

DITCHING - ACTIONS AND CALLOUTS (cont.)		
	LSP	RSP
After ditching	• Reduce thrust levers to idle. • Alert cabin crew: “EWAKUACJA / EVACUATE”	• Select Start/Stop Selector knobs STOP. • Engine fire extinguisher handles PULL and ROTATE 1L /2R • Set Fasten Belts OFF • Select both batteries knobs OFF

NOTE: Callouts are shown in bold text.

- Plan to land with maximum flaps available.
- Reduce fuel onboard to increase buoyancy.
- Consider landing parallel to waves taking in account wind direction.
- If engine(s) is/are running perform a landing using thrust to maintain a minimum rate of descent.
- If ditching is anticipated with enough time to prepare the passengers, Pilot In Command informs Purser of the upcoming event and passes the following information
 - Nature of the ditching.
 - Type of evacuation.
 - How the Flight Crew will signal cabin crew to start evacuation.
 - How much time is left.
 - Any further instructions that might be deemed necessary.
 - The order to assume protective position must be transmitted from the cockpit 30 seconds before ditching or at any moment an accident occurs, by using the following phraseology:

“POZYCJA AWARYJNA / BRACE POSITION”

DITCHING PROCEDURE

WARNING: AIRPLANE NOT TESTED FOR DITCHING. THE PROCEDURES HAVE BEEN DEVELOPED BASED ON PREVIOUS EXPERIENCE.

DESCENT

Cabin Crew.....NOTIFY
ATC NOTIFY
Transponder 7700
Aural Warning CBs (C7; C31).....PULL
No Smoking/Fasten Belts ON
ELT ON
Landing Data SET

AT 10000 FT AGL:

Pressurization Dump Button.....PUSH IN

APPROACH:

Altimeters SET

AT 5000 FT AGL:

Pressurization Mode Selector.....MAN
Cabin Alt Controller HOLD DOWN FOR
50 SEC

DITCHING CONFIGURATION:

TERRAIN Inhibit Button.....PUSH IN
Landing Gear.....UP
Slat/Flap MAXIMUM
AVAILABLE
APU Emergency Stop Button PUSH IN

NOTE: - If engines are not running maintain minimum speed of 130 KIAS.

- Plan ditching parallel to the line of the wave crests.
- On final approach, level the wings and avoid skidding.

JUST BEFORE WATER CONTACT:

Cabin ANNOUNCE IMPACT
Alert cabin crew to prepare passengers for ditching.

AFTER DITCHING:

Thrust Levers.....IDLE
Start/Stop Selectors.....STOP
Fire Extinguishing Handles.....PULL AND ROTATE
Emergency Evacuation.....ANNOUNCE
Batteries OFF

END

EMERGENCY DESCENT**EMERGENCY DESCENT - ACTIONS AND CALLOUTS**

In flight	LSP	RSP
	"EMERGENCY DESCENT".	–
	• Don crew oxy masks and check communications.	
	• Alert cabin crew (P.A.): "ZNIŻANIE AWARYJNE. ZAŁOŻYĆ MASKI TLENOWE / EMERGENCY DESCENT OXYGEN MASKS ON" • " Select seat belts sign ON.	• Cancel aural warnings. • Monitor cabin altitude. • Confirm Pax Oxygen (if cabin reaches 14000 ft).
	• Select altitude (MEA or 10000 ft whichever is higher). • Select FLCH. • Select Heading. • Verify thrust levers IDLE. • Set speed brake lever to FULL • Select target speed (Max appropriate).	• Select squawk 7700 • Advise ATC: "MAYDAY, MAYDAY, MAYDAY EMERGENCY DESCENT". • Check flight instruments and engine parameters. • Monitor descent path and speed.
	"EMERGENCY DESCENT CHECKLIST".	• Accomplish checklist "EMERGENCY DESCENT CHECKLIST COMPLETED".
2000 ft to MEA or 10000 ft	• Select speed 250 kts.	"2000 TO LEVEL OFF"
1000 ft to MEA or 10000 ft	• Retract speed brakes.	"1000 TO LEVEL OFF".
At Safe Altitude	Inform cabin crew: "ZAJĘLIŚMY BEZPIECZNĄ WYSOKOŚĆ. ZDJĄĆ MASKI TLENOWE / WE HAVE REACHED SAFE ALTITUDE. OXYGEN MASKS OFF"	

NOTE: Callouts are shown in bold text.

- This maneuver is designed to bring the aircraft down smoothly to a safe altitude in the shortest time when experiencing a rapid depressurization.
- Use of automated resources is recommended.
- If structural damage is suspected, use flight controls with care and limit speed as appropriate.
- Descend straight ahead or initiate turn with HDG selector, in accordance with local regulations.
- If cabin altitude reaches 14000 ft or above, verify pax oxygen supply by checking the EICAS. If a caution message “PAX OXY NOT DEPLOYED” is displayed, set immediately Pass Oxy selector mode to OVRD.
- When turbulence is encountered, reduce to turbulent air penetration speed.
- Altitude callouts are performed every 10000 ft (30000 ft/20000 ft/10000 ft) by the PNF to check crew awareness.
- Reevaluate the situation based on weather, oxygen, fuel remaining and available airports before defining the new course of action. The use of long-range cruise may be appropriate.
- RVSM – The Pilot shall follow established emergency procedure, notify ATC and follow the appropriate RVSM contingency procedure for specific RVSM airspace. Use TCAS as a reference in this situation.
- If use of oxygen is required for a long period of time set the Oxygen Masks Selector to NORMAL.

EMERGENCY DESCENT PROCEDURE

Fasten Belts Signs	ON
Altitude	10000 FT OR MEA, WHICHEVER IS HIGHER
Thrust Levers	IDLE
Speed Brake Lever	FULL OPEN
Airspeed	MAX/APPROPRIATE
Transponder	7700
ATC	NOTIFY

CAUTION: IF STRUCTURAL DAMAGE IS SUSPECTED, USE FLIGHT CONTROLS WITH CAUTION AVOIDING HIGH MANEUVERING LOADS AND REDUCING AIRSPEED AS APPROPRIATE.

END

EMERGENCY EVACUATION

EMERGENCY EVACUATION - ACTIONS AND CALLOUTS

When airplane has stopped	LSP	RSP
	"EMERGENCY EVACUATION"	—
	- Set parking brake ON. - Set Throttles to idle. - Alert cabin crew (P.A.): "POZOSTAĆ NA MIEJSCACH / REMAIN SEATED"	- Set both start/stop selectors OFF. - Pull both engines fire extinguisher handles and rotate 1L / 2R. - Press APU emergency stop button. - Press APU fire extinguisher button. - Press the Pressurization DUMP Button. - Set Fasten Belts OFF.
	Alert cabin crew (P.A.): "EWAKUACJA / EVACUATE" If required "LEWA/PRAWA STRONA // LEFT/RIGHT SIDE"	—
	Notify ATC.	—
	"EMERGENCY EVACUATION CHECKLIST".	Accomplish checklist. "EMERGENCY EVACUATION CHECKLIST COMPLETED".
	Select Batteries OFF.	

NOTE: Callouts are shown in bold text.

- The command to initiate emergency evacuation is given by the Captain through the PA system. If Captain is unable to do so, the command will be given by the next ranking and capable crewmember.
- Before initiating emergency evacuation, the captain should verify and clearly announce which side(s) is safe for evacuation.
- If it is possible, both pilots should evacuate the aircraft through the passenger cabin doors.
- FO evacuates the aircraft and assists passengers on the ground.
- Captain should be the last crewmember to leave the aircraft through the aft door, checking that all persons have already been evacuated.
- If it is not possible to reach the passenger cabin, both pilots have to evacuate the airplane through the cockpit windows.

EMERGENCY EVACUATION PROCEDURE

Emergency/Parking Brake.....	ON
Thrust Levers	IDLE
Start/Stop Selectors	STOP
Fire Extinguishing Handles.....	PULL AND ROTATE (1-L and 2-R)
APU Emergency Stop Button	PUSH IN
APU Fire Extinguishing Button	PUSH
Pressurization Dump Button.....	PUSH IN
ATC.....	NOTIFY
Emergency Evacuation	ANNOUNCE
Batteries	OFF

END

FORCED LANDING

FORCED LANDING - ACTIONS AND CALLOUTS

	LSP	RSP
In Flight	• Notify cabin crew. • Notify ATC. • Pull aural warning CB (C7) (LSP).	• Set transponder to 7700. • Pull aural warning CB (C31) (RSP). • Select No Smoking/ Fasten Seat Belts ON. • Set ELT ON.
At FL 100	• Monitor cabin rate.	• Press pressurization DUMP Button.
	• Adjust altimeters and set landing data.	
Before landing	• Review After Landing Procedures.	
	"FLAPS ____" (maximum available) "GEAR DOWN"	• Notify ATC about forced landing position. • Set slat/flap as required. • Extend landing gear using landing gear lever or alternate gear extension lever as required.
Before landing		• Press the APU Emergency Stop Button.

(Continued)

FORCED LANDING - ACTIONS AND CALLOUTS (cont.)		
	LSP	RSP
Just before touchdown	- Adjust landing profile. - Maintain VREF and minimum rate of descent with thrust available. If engines are not running maintain a minimum speed of 130 knots.	Alert cabin crew: “POZYCJA AWARYJNA / BRACE POSITION”
After landing	- Reduce thrust levers to idle. - Alert cabin crew: “EWAKUACJA / EVACUATE”	- Start/Stop selector knobs STOP. - Pull the engine fire extinguisher handles and ROTATE 1L / 2R. - Set Fasten Belts OFF. - Select both batteries knobs OFF.

NOTE: Callouts are shown in bold text.

- Plan to land with maximum flaps available.
- If engine(s) is(are) running perform a landing using thrust to maintain a minimum rate of descent.
- If forced landing is anticipated with enough time to prepare the passengers, Pilot In Command informs Purser of the upcoming event and passes the following information:
 - Nature of the failure.
 - Type of evacuation.
 - How the Flight Crew will signal cabin crew to start evacuation.
 - How much time is left.
 - Any further instructions that might be necessary.
 - The order to assume protective position must be transmitted from the cockpit 30 seconds before landing or at any moment an accident occurs, by using the following phraseology:

“POZYCJA AWARYJNA / BRACE POSITION”.

FORCED LANDING PROCEDURE

NOTE: This procedure is recommended for landings with all engines inoperative or landings on unprepared surfaces.

DESCENT:

Cabin Crew	NOTIFY
ATC	NOTIFY
Transponder	7700
Aural Warning CBs (C7; C31).....	PULL
No Smoking/Fasten Belts	ON
ELT	ON
Landing Data	SET

AT 10000 FT:

Pressurization Dump Button	PUSH IN

APPROACH:

Altimeters	SET

LANDING CONFIGURATION:

TERRAIN Inhibit Button	PUSH IN
Landing Gear	DOWN
Slat/Flap	MAXIMUM AVAILABLE
APU Emergency Stop Button.....	PUSH IN

NOTE: If engines are not running maintain minimum speed of 130 kias and alternate gear extension may be required.

JUST BEFORE TOUCHDOWN:

Cabin	ANNOUNCE IMPACT
Alert cabin crew to prepare passengers for forced landing.	

AFTER LANDING:

Thrust Levers	IDLE
Start/Stop Selectors	STOP
Fire Extinguishing Handles	PULL AND ROTATE
Emergency Evacuation	ANNOUNCE
Batteries	OFF

END

SUPPLEMENTARY ABNORMAL PROCEDURES

INTRODUCTION

This chapter covers abnormal procedures to be performed in case of such situations as Turbulent Air Penetration, Volcanic Ash and Pressurization in Manual Mode.

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TURBULENT AIR PENETRATION

Flight through severe turbulence must be avoided, if possible.

If not possible, reduce altitude to increase buffet margin.

The recommended procedures for turbulent air penetration are:

1. AIRSPEED

Below 10000 ft.....	250 KIAS
At or above 10000 ft.....	270 KIAS/ 0.7 M, WHICHEVER IS LOWER

Severe turbulence will cause large and often rapid variations in indicated airspeed. Do not chase the airspeed.

2. ATTITUDE

Maintain wings level and pitch attitude. Use attitude indicator as the primary instrument. Do not use sudden large control inputs.

3. PITCH TRIM

Maintain control of the airplane with the elevators. After establishing the trim setting for penetration speed, do not change pitch trim.

4. ALTITUDE

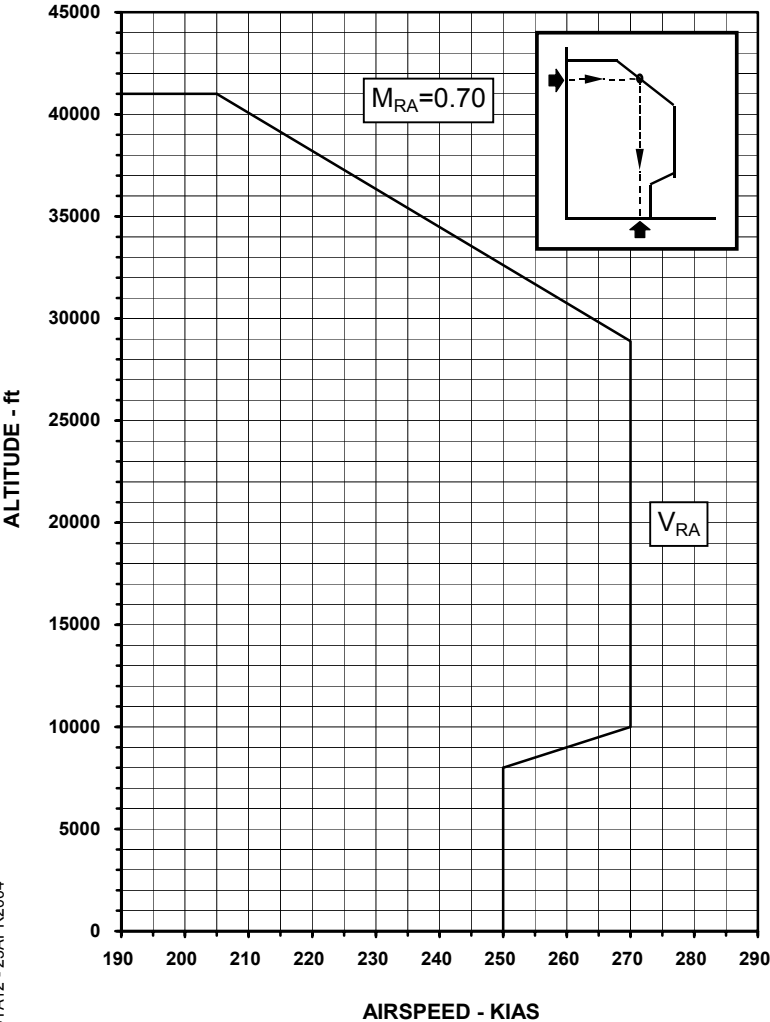
Large altitude variations are possible in severe turbulence, do not chase altitude. Allow altitude and airspeed to vary and maintain attitude.

5. THRUST SETTING

If severe turbulence cannot be avoided disconnect autothrottle and make an initial thrust setting for the target airspeed. Change thrust setting only in case of unacceptable airspeed variation.

NOTE: Do not extend flaps except for approach and landing.

**MAXIMUM RECOMMENDED TURBULENT AIR
PENETRATION SPEED**



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VOLCANIC ASH

Flight in areas of known volcanic activity must be avoided. This is particularly important during the night or daytime instrument meteorological conditions when volcanic dust may not be visible. When a flight is planned into an area with a known potential for volcanic activity, it is recommended that all NOTAMs and air traffic control directives be reviewed for current status of volcanic activity. If volcanic activity is reported, the planned flight should remain well clear of the area and, if possible, stay on the upwind side of the volcanic dust.

The airplane's weather radar is not capable of detecting volcanic ash/dust clouds and is therefore not reliable under these circumstances. The presence of volcanic ash/dust may be indicated by:

- Smoke or dust appearing inside the airplane;
- Odor similar to electrical smoke;
- Engine malfunctions such as power loss, engine stalls, increasing ITT, fluctuating engine RPM, etc;
- At night, Saint Elmo's fire/static discharges may be observed around the windshield or windows;
- Orange glow from engine inlets.

Flight into volcanic ash/dust clouds can result in the degradation of airplane and engine performance. The adverse effects caused by volcanic ash/dust encounters may be:

- Rapid erosion and damage to the internal engine components;
- Ash/dust build-up and blockage of the guide vanes and cooling holes, which may cause surge, loss of thrust and/or high ITT;
- Ash/dust blockage of the pitot system, resulting in unreliable airspeed indications;
- The abrasive properties of volcanic material may cause serious damage to the engines, wing and tail leading edge surfaces, windshields, landing lights, etc;
- Windshield and windows may become opaque, reducing visibility.

ON GROUND OPERATIONS

The following recommendations apply to starting and operating engines on airports where volcanic ash has fallen and ground contamination is present:

- When the airplane is parked install engine covers or reposition the aircraft to limit blowing ash accumulation from wind and jet blasts from other aircraft;
- During preflight, check that the engine inlet and exhaust areas have been cleared of volcanic ash;
- Check that all volcanic ash has been cleaned away from the area within 14 ft of the engine inlets;
- Use APU for engine starting only, not for air conditioning.
- Prior to starting, dry motor the engine for one minute in order to blow out any ash that may have entered the engine bypass duct area;
- Use minimum required thrust for breakaway and taxi;
- Limit exposure to contaminated surfaces by selecting alternate, cleaner taxi routes if available;
- Avoid static engine operation above idle;
- Be aware of loose ash being blown by the exhaust wake of other aircraft. Maintain adequate ground separation;
- Use a rolling takeoff technique. Avoid setting high thrust at low airspeeds;
- After landing at an airport contaminated with volcanic ash, minimize the use of reverse thrust to prevent any recirculation ingestion;

IN FLIGHT OPERATIONS

Flight operations in volcanic ash are extremely hazardous and must be avoided. However, volcanic ash/dust clouds may sometimes extend for hundreds of miles, reaching altitudes above 60000 ft and an encounter may be unavoidable.

In case of an inadvertent encounter, proceed as follows:

APU (if available) START
Ignition Selectors.....OVRD
Autothrottle.....Disconnect

The autothrottle must be kept disconnected to prevent thrust increase due to smart probes contamination.

Thrust Lever (If altitude permits) IDLE
Ice Protection Mode Selector ON

This action will increase bleed air extraction from the engines and further improve the engine stall margin.

Recirculation Button PUSH OUT
ITT MONITOR

If the ITT is still increasing even with the thrust levers in idle:

Affected Engine Shutdown

If engine shutdown or flames-out, restart the engine (refer to Quick Reference Handbook) once it has cooled down. If engine fails to start, repeated attempts should be made immediately.

NOTE: A successful start may not be possible until the airplane is clear of the volcanic ash/dust, and the airspeed and altitude is within the airstart envelope. The engines may accelerate slowly to idle at high altitudes and this could be interpreted as a failure to start or as an engine malfunction.

After exiting the area of volcanic ash/dust cloud and the engine(s) restarted, restore systems to normal operation. Inform ATC of the encounter.

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PRESSURIZATION IN MANUAL MODE

MANUAL PRESSURIZATION OPERATION

Pressurization Mode Selector MAN

Cabin Altitude Controller AS REQUIRED

The airplane/cabin altitude conversion table must be consulted to determine the cabin altitude according to airplane altitude. Refer to the Quick Reference Handbook.

Check on the EICAS the proper cabin altitude, cabin rate and differential pressure values.

Selection to UP momentarily position causes an increase of cabin rate.

Selection to DOWN momentarily position causes a decrease in cabin rate.

At the traffic pattern altitude, slowly position the knob to full UP. The maximum differential pressure at takeoff and landing is 0.2 psi.

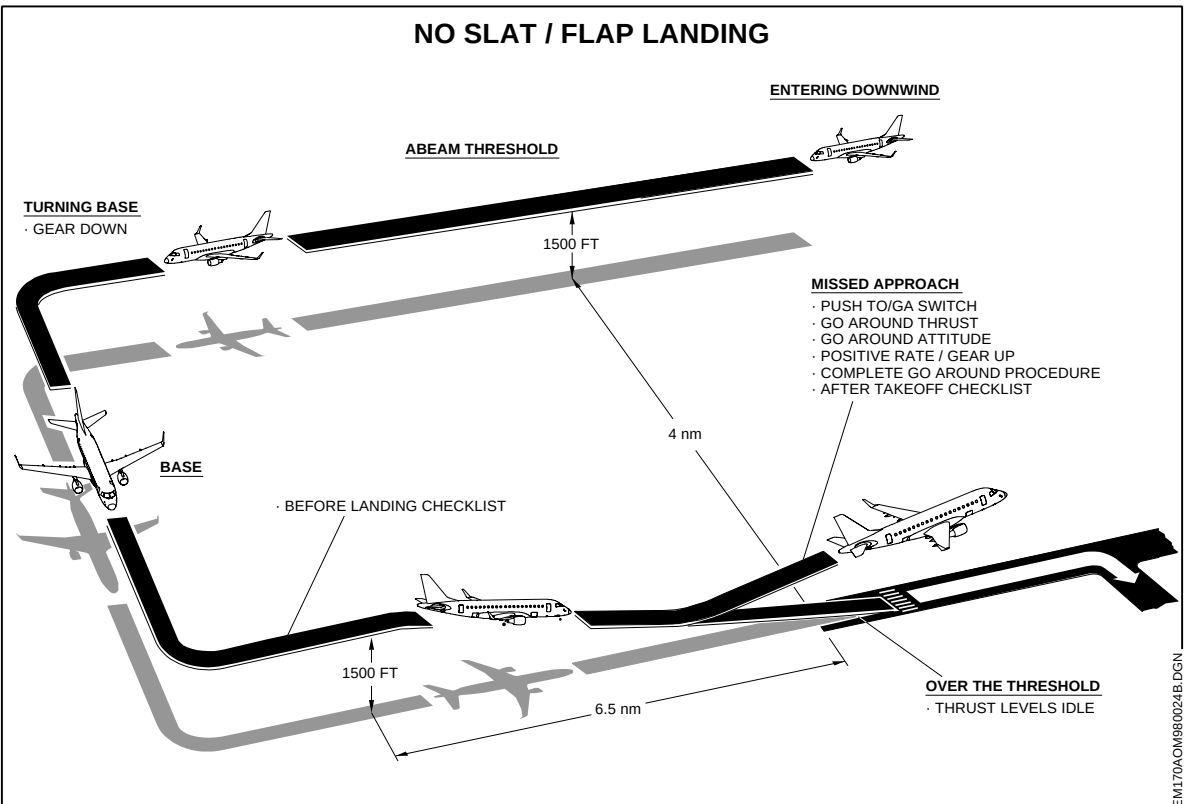
During descent the thrust levers should be moved as slowly as possible to prevent bumps.

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NO SLAT/FLAP LANDING TECHNIQUE

Recommendations:

- If possible reduce gross weight (burn off fuel) to reduce Vref.
- Use autopilot as much as possible.
- Establish a long final approach, at least 6.5 NM.
- Attitude will be higher than normal.
- Use precision glideslope such as ILS for crosscheck.
- Over threshold set thrust levers to IDLE.
- Flare enough just to reduce the rate of descent, do not float.
- Plan touchdown at touchdown zone, a go around should be made if landing occurs beyond touchdown zone.
- After landing apply a light forward pressure on yoke and use maximum reverse thrust.
- Use brakes as required.



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SECTION 4

PERFORMANCE

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INTRODUCTION

This section presents take-off, approach and landing performance information accordance with the performance requirements prescribed in JAR-OPS 1 Subpart P.

The performance information given in this Section is applicable to the CF 34-8E engine, with or without thrust reverser installed.

The performance data are based on the following conditions:

- Pertinent power less installation, air bleed, and accessory losses.
- Full temperature accountability within the operational limits for which the airplane is certified.

The performance information is not valid if:

- The airplane gross weight exceeds the appropriate maximum allowable limits.
- Any of the limitations in Section 1 is not observed.
- A reading from any graph is obtained by extrapolation (i.e. using values of parameters outside the range given on the graph).

NOTE: In the case of headwind components, the airplane may be operated in reported components greater than 30 kt, but the effect of only 30 kt may be taken.

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PERFORMANCE CONFIGURATION

The configurations referred to in the charts are shown below.

	OPERATING ENGINES	TLA	FLAPS	GEAR	AIRSPEED
TAKEOFF RUN	2 until V_{EF} , 1 after V_{EF}	TO/GA	1, 2 or 4	DOWN	0 TO V_{LOF}
1 ST SEGMENT	1	TO/GA	1, 2 or 4	DOWN TO UP	V_{LOF} TO V_2
2 ND SEGMENT	1	TO/GA	1, 2 or 4	UP	V_2
3 RD SEGMENT	1	TO/GA	TAKEOFF FLAPS TO 0	UP	V_2 TO FINAL SEGMENT SPEED
FINAL SEGMENT	1	MAX CON	0	UP	FINAL SEGMENT SPEED
ENROUTE	1	MAX CON	0	UP	ENROUTE CLIMB SPEED
APPROACH CLIMB	1	TO/GA	3 or 4 (1)	UP	APPROACH CLIMB SPEED
LANDING CLIMB	2	TO/GA	5 or FULL	DOWN	LANDING CLIMB SPEED
LANDING	2	IDLE	5 or FULL	DOWN	V_{REF}

NOTE: 1) For landing flaps 5 or FULL the approach climb flap setting is 3 or 4, respectively.

CAT II PERFORMANCE CONFIGURATION

	OPERATING ENGINES	TLA	FLAPS	GEAR	AIRSPPEED
APPROACH CLIMB	1	TO/GA	3	UP	APPROACH CLIMB SPEED (2)
LANDING CLIMB	2	TO/GA	5	DOWN	$V_{REF\ 5\ (1)}$
LANDING	2	IDLE	5	DOWN	$V_{REF\ 5\ (1)}$

NOTE: 1) The Landing Reference Speed (V_{REF5}) for Category II operations is the appropriate speed obtained from the CAFM and differs from the V_{REF5} used during the Category I operations.

2) Approach climb speed is equal to V_{REF5} .

PERFORMANCE DATA

This chapter contains performance material that provides the necessary data for compliance with the performance requirements prescribed in JAR-OPS 1 Subpart F, G.

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TAKE-OFF CLIMB LIMITS

This chapter presents take-off climb limits Mass, Altitude, Temperature and is covered by OM part B Performance Subpart 4.3 - Performance Handbook.

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TAKE-OFF FIELD LENGTH

This chapter presents take-off field length dry, wet, contaminated and is covered by OM part B Performance Subpart 4.3 IRT - Performance Handbook.

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TAKE-OFF FLIGHT PATH

This chapter presents net flight path data for obstacle clearance calculation and take-off flight path is covered by OM part B Performance Subpart 4.3 - Performance Handbook.

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GRADIENT LOSSES FOR BANKED CLIMBOUT

TAKEOFF INFORMATION

The method of performance calculation for takeoff and landing is presented in Subchapter 4.3 - Performance Handbook.

TURN ANALYSIS

The method below presents the criteria for transforming a takeoff flight path with turns into an equivalent straight flight to allow the use of the Subchapter 4.3 Performance Handbook charts or runway analysis software to determine obstacle clearance.

The method to be used herein converts an actual flight path with turns and wind effects into an equivalent straight flight path with still air.

The equivalent straight flight path with still air will be determined in terms of increments on the existing obstacles' height that should be taken into account to ensure obstacle clearance. With the equivalent straight flight path, the performance calculation must be done, as usual, as presented in the Subchapter 4.3 Performance Handbook.

OPERATIONAL LIMITATIONS

Maximum bank angle: All Engines Operative: 25° at $V_2 + 10$

One Engine Inoperative: 15° at V_2

One Engine Inoperative: 20° at $V_2 + 5$ (*)

One Engine Inoperative: 25° at $V_2 + 10$ (*)

(*) According to FAR 121.189(f), the maximum bank angle with one engine inoperative is 15°.

According to JAR OPS 1.495 (c), if the airplane is banked by more than 15° the net path must clear all obstacles after the banked turn by 50 ft instead of 35 ft.

EQUIVALENT STRAIGHT FLIGHT PATH DETERMINATION

The equivalent straight flight path (zero wind) to be used in the performance calculation should be determined as follows:

1) OBSTACLE INCREMENT IN A STEADY TURN

During a steady turn the climb gradient deteriorates. To compensate, an increment of the actual obstacle height must be obtained as a function of the gradient loss due to a steady turn and the turning distance flown to the obstacle by the following relation:

$$\Delta H = D_T \times G_L$$

Where:

ΔH = height increment

D_T = distance flown along the turning flight

G_L = gradient loss (obtained from the gradient loss due to a steady turn chart)

The equivalent obstacle height to be used in a obstacle clearance calculation is:

$$H_E = H_A + \Delta H_1 + \Delta H_2 + \dots + \Delta H_n$$

where:

H_E = equivalent obstacle height

H_A = actual obstacle height

$\Delta H_{1, 2, n}$ = height increments for each distance portion flown in turn to the obstacle.

2) WIND EFFECT ON THE FLIGHT PATH

a) STRAIGHT FLIGHT PORTIONS

Considering the drift compensation, the straight portions of the flight path may be corrected to still air equivalent distance as follows:

$$SAD = \frac{GD \times TAS}{GS}$$

Where:

SAD = still air equivalent distance

GD = actual ground distance

TAS = airplane true airspeed (obtained from the radius of turns and speed conversion chart)

GS = airplane ground speed

For straight flight:

$$GS = TAS + (V_W \times \cos \alpha)$$

Where:

V_W = wind speed

α = angle between flight direction and wind direction

Remarks:

$V_W \times \cos \alpha$ is negative for a head wind component

$V_W \times \cos \alpha$ is positive for a tailwind component

b) TURNING FLIGHT PORTIONS

Two effects must be taken into account:

b1) Trajectory Displacement:

The trajectory is displaced in the wind component direction proportionally to the time.

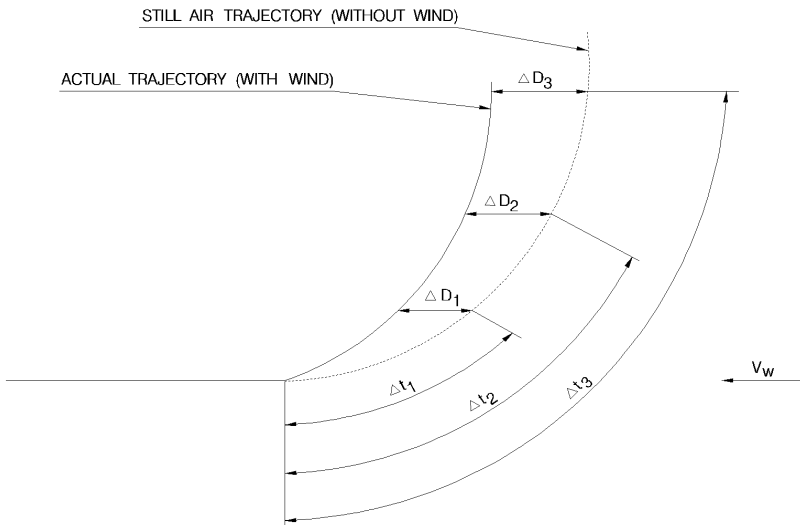
The displacement may be calculated by:

$$\Delta D = \Delta t \times V_w$$

ΔD = trajectory displacement in the wind component direction.

Δt = elapsed time in turning flight (obtained from the Horizontal Distance and Time to Complete chart)

V_w = wind speed



b2) Distance Flown Compensation

The wind takes the same effect as mentioned in item 2a.

$$SAD = \frac{GD \times TAS}{GS}$$

For turning flight:

$$GS = \frac{Dm}{\Delta t}$$

Where:

Dm = distance flown along the actual trajectory

Δt = elapsed time in turning flight

PERFORMANCE CHARTS PRESENTATION

TBD.

EN-ROUTE CLIMB LIMITS

TBD.

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APPROACH CLIMB LIMITS

This chapter presents approach climb limits and is covered by OM part B Performance Subpart 4.3 - Performance Handbook.

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LANDING CLIMB LIMITS

This chapter presents landing climb limits and is covered by OM part B Performance Subpart 4.3 - Performance Handbook.

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LANDING FIELD LENGTH

This chapter presents landing field length dry, wet and contaminated, including the effects of an in-flight failure of a system or device, if it affects the landing distance. It is covered by OM part B Performance Subpart 4.3 - Performance Handbook.

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BRAKE ENERGY LIMITS

This chapter presents brake energy limits and is covered by OM part B Performance Subpart 4.3 - Performance Handbook.

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SPEEDS APPLICABLE FOR THE VARIOUS FLIGHT STAGES

This chapter presents speeds applicable for the various flight stages also considering wet or contaminated runways, and it is covered by OM part B Performance Subpart 4.3 - Performance Handbook.

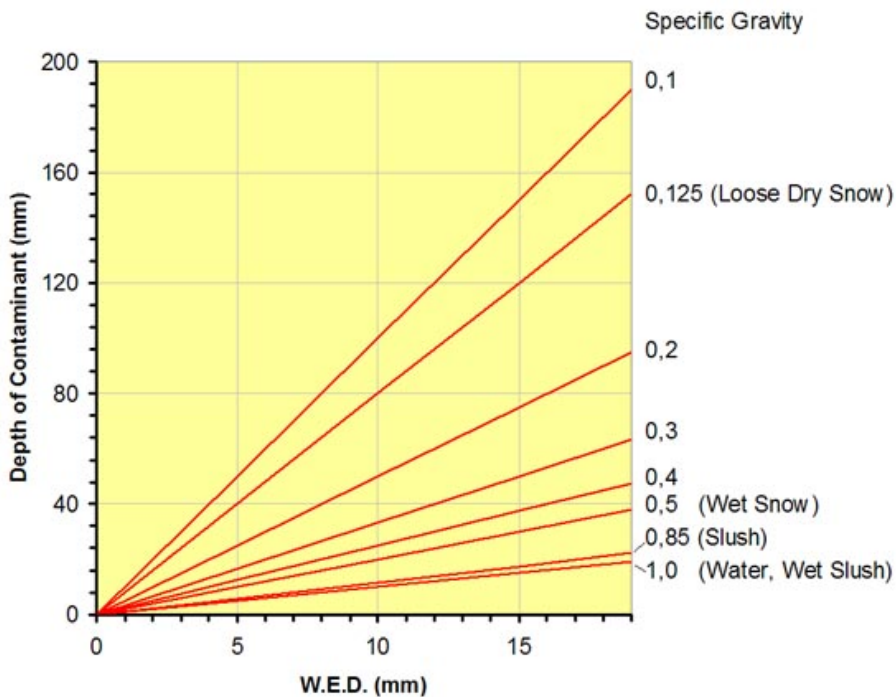
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SUPPLEMENTARY DATA COVERING FLIGHTS IN ICING CONDITIONS

This chapter presents any certificated performance related to an allowable configuration, or configuration deviation, such as anti-skid inoperative.

PERFORMANCE

WED WATER EQUIVALENT DEPTH



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SUPPLEMENTARY PERFORMANCE DATA

This chapter presents other Supplementary performance data acceptable to the Authority.

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THRUST SETTING TABLES

Thrust settings tables are presented for various pressure altitudes and static air temperatures, with engine bleed closed or open, and anti-ice on or off.

The following tables present Takeoff N1 regarding T/O-1 and T/O-2 mode and Go-around N1 for CF34-8E5 engines.

**N1 FOR T/O-1 MODE
AIR CONDITIONING ON – ANTI-ICE OFF
AIRSPEED: 0 KCAS**

CF34-8E5 ENGINE

Pressure Altitude (ft)	Static Air Temperature – °C									
	-40	-35	-30	-25	-20	-15	-10	-5	0	5
-1000	79.1	79.9	80.7	81.5	82.3	83.1	83.9	84.6	85.4	86.1
0	80.4	81.2	82.0	82.9	83.7	84.5	85.3	86.1	86.9	87.7
1000	80.7	81.5	82.4	83.2	84.0	84.8	85.6	86.4	87.1	87.9
2000	81.1	81.9	82.7	83.6	84.4	85.1	85.9	86.7	87.4	88.2
3000	81.5	82.3	83.1	83.9	84.7	85.5	86.3	87.0	87.8	88.5
4000	81.8	82.6	83.5	84.3	85.1	85.8	86.6	87.4	88.1	88.9
5000	82.2	83.0	83.9	84.7	85.5	86.3	87.0	87.8	88.6	89.4
6000	82.6	83.4	84.3	85.1	86.0	86.8	87.6	88.4	89.2	90.0
7000	83.0	83.9	84.7	85.5	86.3	87.1	87.9	88.6	89.4	90.2
8000	83.5	84.3	85.1	85.9	86.7	87.4	88.1	88.9	89.6	90.4

Pressure Altitude (ft)	Static Air Temperature – °C								
	10	15	20	25	30	35	40	45	50
-1000	86.9	87.6	88.4	89.1	89.8	89.6	88.6	87.2	85.6
0	88.5	89.2	90.0	90.8	91.6	90.3	89.3	87.7	86.1
1000	88.7	89.5	90.2	91.0	91.2	90.3	89.1	87.7	86.2
2000	89.0	89.7	90.5	91.2	91.0	90.4	89.2	87.9	86.4
3000	89.3	90.1	90.8	91.3	90.8	90.2	89.1	87.9	86.6
4000	89.7	90.4	91.2	91.2	90.7	90.0	89.1	88.0	86.9
5000	90.2	90.9	91.7	91.0	90.6	89.8	89.1	88.1	87.2
6000	90.7	91.5	91.7	90.9	90.3	89.6	88.9	88.1	87.4
7000	90.9	91.7	91.4	90.7	90.1	89.5	88.9	88.2	87.4
8000	91.1	91.7	91.3	90.7	90.1	89.5	88.9	88.2	--

**N1 FOR T/O-1 MODE
AIR CONDITIONING ON – WING & ENGINE ANTI-ICE ON
AIRSPEED: 0 KCAS**

CF34-8E5 ENGINE

Pressure Altitude (ft)	Static Air Temperature – °C									
	-35	-30	-25	-20	-15	-10	-5	0	5	10
-1000	79.8	80.6	81.4	82.2	82.9	83.8	84.6	85.4	86.2	86.9
0	81.0	81.9	82.7	83.5	84.4	85.3	86.2	87.0	87.7	88.5
1000	81.3	82.2	83.0	83.8	84.7	85.6	86.4	87.2	87.9	88.7
2000	81.7	82.5	83.3	84.1	85.0	85.9	86.7	87.5	88.2	88.9
3000	82.0	82.8	83.6	84.5	85.4	86.3	87.1	87.8	88.6	89.3
4000	82.4	83.2	84.0	84.9	85.8	86.6	87.4	88.1	88.9	89.7
5000	82.8	83.6	84.4	85.3	86.2	87.1	87.9	88.7	89.4	90.2
6000	83.2	84.1	85.0	85.8	86.7	87.6	88.4	89.2	90.0	90.8
7000	83.7	84.5	85.3	86.1	87.0	87.9	88.7	89.4	90.2	91.0
8000	84.0	84.8	85.6	86.4	87.3	88.1	88.9	89.6	90.3	90.7

**N1 FOR T/O-1 MODE
AIR CONDITIONING OFF – ANTI-ICE OFF
AIRSPEED: 0 KCAS**

CF34-8E5 ENGINE

Pressure Altitude (ft)	Static Air Temperature – °C									
	-40	-35	-30	-25	-20	-15	-10	-5	0	5
-1000	79.7	80.5	81.3	82.1	82.9	83.7	84.5	85.3	86.0	86.8
0	80.9	81.8	82.6	83.4	84.3	85.1	85.9	86.8	87.6	88.3
1000	81.3	82.2	83.0	83.8	84.7	85.5	86.3	87.0	87.8	88.6
2000	81.8	82.6	83.4	84.2	85.1	85.9	86.6	87.4	88.2	89.0
3000	82.1	83.0	83.8	84.6	85.4	86.2	87.0	87.8	88.6	89.3
4000	82.5	83.3	84.1	85.0	85.8	86.6	87.4	88.2	88.9	89.7
5000	82.9	83.7	84.5	85.4	86.2	87.1	87.8	88.6	89.4	90.2
6000	83.3	84.2	85.0	85.9	86.7	87.6	88.4	89.2	90.0	90.8
7000	83.8	84.6	85.5	86.3	87.1	87.9	88.7	89.5	90.3	91.1
8000	84.3	85.1	85.9	86.7	87.5	88.3	89.0	89.8	90.5	91.3

Pressure Altitude (ft)	Static Air Temperature – °C								
	10	15	20	25	30	35	40	45	50
-1000	87.5	88.3	89.0	89.8	90.5	90.3	89.3	88.0	86.5
0	89.1	89.9	90.7	91.5	92.3	91.0	90.0	88.5	86.9
1000	89.4	90.2	91.0	91.7	91.9	91.1	89.9	88.5	87.1
2000	89.7	90.5	91.3	92.0	91.7	91.2	90.0	88.7	87.3
3000	90.1	90.9	91.6	92.2	91.6	91.0	89.9	88.8	87.5
4000	90.5	91.3	92.0	92.0	91.5	90.8	90.0	88.9	87.9
5000	91.0	91.8	92.5	91.9	91.4	90.7	90.0	89.1	88.1
6000	91.6	92.4	92.6	91.8	91.1	90.5	89.8	89.1	88.4
7000	91.8	92.6	92.3	91.7	91.1	90.4	89.8	89.2	88.5
8000	92.0	92.6	92.2	91.6	91.0	90.4	89.9	89.3	--

N1 FOR T/O-1 MODE
AIR CONDITIONING OFF – WING & ENGINE ANTI-ICE ON
AIRSPEED: 0 KCAS

CF34-8E5 ENGINE

Pressure Altitude (ft)	Static Air Temperature – °C									
	-35	-30	-25	-20	-15	-10	-5	0	5	10
-1000	80.5	81.3	82.1	82.9	83.7	84.5	85.3	86.0	86.8	87.6
0	81.8	82.6	83.5	84.3	85.2	86.0	86.8	87.6	88.4	89.2
1000	82.2	83.0	83.9	84.7	85.5	86.3	87.1	87.9	88.6	89.4
2000	82.6	83.4	84.2	85.1	85.9	86.6	87.4	88.2	89.0	89.7
3000	83.0	83.8	84.6	85.5	86.2	87.0	87.8	88.6	89.3	90.1
4000	83.3	84.2	85.0	85.8	86.6	87.4	88.2	88.9	89.7	90.5
5000	83.7	84.6	85.4	86.2	87.1	87.9	88.6	89.4	90.2	91.0
6000	84.2	85.1	85.9	86.8	87.6	88.4	89.2	90.1	90.9	91.7
7000	84.6	85.5	86.3	87.1	87.9	88.7	89.5	90.3	91.1	91.9
8000	85.0	85.9	86.7	87.5	88.2	89.0	89.8	90.5	91.3	91.6

**N1 FOR T/O-2 MODE
AIR CONDITIONING ON – ANTI-ICE OFF
AIRSPEED: 0 KCAS**

CF34-8E5 ENGINE

Pressure Altitude (ft)	Static Air Temperature – °C									
	-40	-35	-30	-25	-20	-15	-10	-5	0	5
-1000	77.0	77.8	78.6	79.4	80.1	80.9	81.6	82.3	83.1	83.8
0	78.1	78.9	79.7	80.4	81.2	82.0	82.7	83.5	84.2	84.9
1000	78.4	79.2	79.9	80.7	81.5	82.3	83.0	83.8	84.5	85.2
2000	78.6	79.4	80.2	81.0	81.8	82.6	83.3	84.0	84.8	85.5
3000	78.9	79.7	80.5	81.3	82.1	82.8	83.6	84.3	85.0	85.8
4000	79.1	79.9	80.7	81.5	82.3	83.0	83.8	84.6	85.3	86.1
5000	79.4	80.2	81.0	81.8	82.6	83.4	84.1	84.9	85.6	86.3
6000	79.7	80.5	81.3	82.1	82.9	83.7	84.5	85.2	86.0	86.7
7000	80.1	80.9	81.7	82.5	83.3	84.1	84.8	85.6	86.4	87.1
8000	80.5	81.3	82.1	82.9	83.7	84.5	85.2	86.0	86.7	87.5

Pressure Altitude (ft)	Static Air Temperature – °C								
	10	15	20	25	30	35	40	45	50
-1000	84.5	85.2	85.9	86.6	87.3	87.1	86.2	85.3	84.4
0	85.7	86.4	87.1	87.8	88.5	87.7	86.9	86.0	85.1
1000	86.0	86.7	87.4	88.1	88.2	87.4	86.6	85.6	84.7
2000	86.3	87.0	87.7	88.4	87.9	87.1	86.2	85.3	84.3
3000	86.5	87.3	88.0	88.4	87.6	86.8	85.9	84.9	83.9
4000	86.8	87.5	88.3	88.1	87.3	86.4	85.5	84.5	83.5
5000	87.1	87.8	88.6	87.8	87.1	86.1	85.2	84.2	83.1
6000	87.5	88.2	88.4	87.6	86.8	85.9	85.0	84.0	82.9
7000	87.9	88.6	88.2	87.5	86.6	85.8	84.8	83.8	82.8
8000	88.3	88.8	88.1	87.4	86.5	85.6	84.7	83.7	--

**N1 FOR T/O-2 MODE
AIR CONDITIONING ON – WING & ENGINE ANTI-ICE ON
AIRSPEED: 0 KCAS**

CF34-8E5 ENGINE

Pressure Altitude (ft)	Static Air Temperature – °C									
	-35	-30	-25	-20	-15	-10	-5	0	5	10
-1000	77.6	78.3	79.1	79.9	80.6	81.4	82.3	83.1	83.8	84.5
0	78.7	79.5	80.3	81.0	81.8	82.6	83.5	84.2	84.9	85.7
1000	79.0	79.8	80.5	81.3	82.1	82.9	83.7	84.5	85.3	86.0
2000	79.2	80.0	80.8	81.6	82.4	83.2	84.0	84.8	85.6	86.3
3000	79.5	80.2	81.0	81.8	82.6	83.4	84.3	85.1	85.8	86.6
4000	79.7	80.5	81.3	82.1	82.8	83.7	84.5	85.3	86.1	86.8
5000	80.0	80.8	81.6	82.3	83.1	84.0	84.9	85.6	86.4	87.1
6000	80.3	81.1	81.9	82.7	83.5	84.4	85.2	86.0	86.7	87.5
7000	80.7	81.5	82.3	83.1	84.0	84.9	85.6	86.4	87.1	87.9
8000	81.0	81.8	82.6	83.5	84.4	85.2	86.0	86.8	87.5	87.7

**N1 FOR T/O-2 MODE
AIR CONDITIONING OFF – ANTI-ICE OFF
AIRSPEED: 0 KCAS**

CF34-8E5 ENGINE

Pressure Altitude (ft)	Static Air Temperature – °C									
	-40	-35	-30	-25	-20	-15	-10	-5	0	5
-1000	77.6	78.4	79.2	80.0	80.7	81.5	82.2	83.0	83.7	84.5
0	78.6	79.4	80.2	81.0	81.8	82.6	83.4	84.1	84.9	85.6
1000	78.9	79.7	80.5	81.3	82.1	82.9	83.7	84.4	85.2	85.9
2000	79.2	80.0	80.8	81.6	82.5	83.2	84.0	84.7	85.5	86.2
3000	79.5	80.3	81.1	81.9	82.7	83.5	84.2	85.0	85.8	86.5
4000	79.8	80.6	81.4	82.2	83.0	83.7	84.5	85.3	86.0	86.8
5000	80.0	80.9	81.7	82.5	83.3	84.1	84.8	85.6	86.4	87.1
6000	80.4	81.2	82.0	82.8	83.7	84.4	85.2	86.0	86.7	87.5
7000	80.8	81.6	82.4	83.3	84.1	84.9	85.6	86.4	87.2	87.9
8000	81.2	82.0	82.9	83.7	84.5	85.3	86.1	86.8	87.6	88.4

Pressure Altitude (ft)	Static Air Temperature – °C								
	10	15	20	25	30	35	40	45	50
-1000	85.2	85.9	86.6	87.3	88.0	87.8	87.0	86.1	85.2
0	86.3	87.1	87.8	88.6	89.3	88.5	87.6	86.8	85.9
1000	86.7	87.4	88.2	88.9	89.0	88.2	87.4	86.5	85.6
2000	87.0	87.7	88.5	89.2	88.7	87.9	87.1	86.2	85.3
3000	87.3	88.0	88.8	89.2	88.4	87.6	86.8	85.9	84.9
4000	87.6	88.3	89.1	88.9	88.2	87.3	86.4	85.5	84.5
5000	87.9	88.7	89.4	88.7	87.9	87.0	86.1	85.2	84.2
6000	88.3	89.0	89.2	88.5	87.7	86.8	85.9	85.0	84.1
7000	88.7	89.5	89.1	88.4	87.6	86.7	85.8	84.9	84.0
8000	89.1	89.7	89.0	88.3	87.5	86.6	85.7	84.8	--

**N1 FOR T/O-2 MODE
AIR CONDITIONING OFF - WING & ENGINE ANTI-ICE ON
AIRSPEED: 0 KCAS**

CF34-8E5 ENGINE

Pressure Altitude (ft)	Static Air Temperature – °C									
	-35	-30	-25	-20	-15	-10	-5	0	5	10
-1000	78.4	79.2	79.9	80.7	81.5	82.2	83.0	83.7	84.5	85.2
0	79.4	80.2	81.0	81.8	82.6	83.4	84.1	84.9	85.6	86.3
1000	79.7	80.5	81.3	82.1	82.9	83.7	84.4	85.2	85.9	86.7
2000	80.0	80.8	81.6	82.5	83.2	84.0	84.7	85.5	86.2	87.0
3000	80.3	81.1	81.9	82.7	83.5	84.2	85.0	85.8	86.5	87.3
4000	80.6	81.4	82.2	83.0	83.7	84.5	85.3	86.0	86.8	87.6
5000	80.9	81.7	82.5	83.3	84.1	84.9	85.6	86.4	87.1	87.9
6000	81.2	82.0	82.8	83.7	84.5	85.2	86.0	86.8	87.5	88.3
7000	81.6	82.4	83.3	84.1	84.9	85.6	86.4	87.2	88.0	88.7
8000	82.1	82.9	83.7	84.5	85.3	86.1	86.8	87.6	88.4	88.6

**N1 FOR GO-AROUND MODE
AIR CONDITIONING ON**

CF34-8E5 ENGINE

Pressure Altitude (ft)	Static Air Temperature – °C								
	-35	-30	-25	-20	-15	-10	-5	0	5
-1000	82.6	83.5	84.3	85.1	85.9	86.7	87.5	88.2	88.9
0	83.9	84.8	85.6	86.4	87.3	88.0	88.7	89.1	89.5
1000	84.8	85.6	86.4	87.1	87.7	88.1	88.7	89.4	90.2
2000	85.1	86.0	86.7	87.4	87.9	88.3	88.9	89.7	90.5
3000	85.5	86.4	87.0	87.7	88.0	88.4	89.2	89.9	90.7
4000	85.9	86.4	86.6	87.1	87.9	88.6	89.4	90.1	90.9
5000	86.4	87.1	87.9	88.1	88.4	89.1	89.8	90.5	91.2
6000	86.9	87.7	88.4	89.2	89.8	89.9	90.2	90.9	91.6
7000	87.2	88.0	88.7	89.5	89.7	89.8	90.3	91.0	91.6
8000	87.5	88.2	89.0	89.6	89.6	89.8	90.4	91.0	91.7

Pressure Altitude (ft)	Static Air Temperature – °C								
	10	15	20	25	30	35	40	45	50
-1000	89.4	89.8	90.4	91.1	91.8	92.0	91.7	91.4	90.8
0	90.2	91.0	91.7	92.5	93.2	92.3	91.2	90.7	90.6
1000	90.9	91.7	92.5	93.1	93.2	92.3	91.5	90.9	90.4
2000	91.2	92.0	92.7	93.4	93.1	92.3	91.7	91.1	90.9
3000	91.4	92.2	92.9	93.3	92.9	92.2	91.5	90.8	90.4
4000	91.6	92.4	93.0	93.1	92.8	92.1	91.3	90.4	89.5
5000	91.9	92.7	93.0	93.0	92.5	91.9	91.3	90.5	89.8
6000	92.2	92.7	92.9	92.8	92.3	91.9	91.4	90.8	90.2
7000	92.3	92.7	92.9	92.7	92.2	91.7	91.1	90.5	89.9
8000	92.3	92.7	92.9	92.7	92.1	91.5	91.0	90.4	--

N1 FOR GO-AROUND MODE AIR CONDITIONING OFF

CF34-8E5 ENGINE

Pressure Altitude (ft)	Static Air Temperature – °C								
	-35	-30	-25	-20	-15	-10	-5	0	5
-1000	82.6	83.5	84.3	85.1	85.9	86.7	87.5	88.2	88.9
0	83.9	84.8	85.6	86.4	87.3	88.0	88.7	89.1	89.5
1000	84.8	85.6	86.4	87.1	87.7	88.1	88.7	89.4	90.2
2000	85.1	86.0	86.7	87.4	87.9	88.3	88.9	89.7	90.5
3000	85.5	86.3	87.0	87.7	88.0	88.4	89.2	89.9	90.7
4000	85.9	86.4	86.6	87.1	87.9	88.6	89.4	90.1	90.9
5000	86.4	87.1	87.9	88.1	88.4	89.1	89.8	90.5	91.2
6000	86.9	87.7	88.4	89.2	89.8	89.9	90.2	90.9	91.6
7000	87.2	88.0	88.7	89.5	89.7	89.8	90.3	91.0	91.6
8000	87.5	88.2	89.0	89.6	89.6	89.8	90.4	91.0	91.7

Pressure Altitude (ft)	Static Air Temperature – °C								
	10	15	20	25	30	35	40	45	50
-1000	89.4	89.8	90.4	91.1	91.8	92.0	91.7	91.3	90.8
0	90.2	91.0	91.7	92.5	93.2	92.3	91.2	90.6	90.4
1000	90.9	91.7	92.5	93.1	93.1	92.3	91.5	90.9	90.5
2000	91.2	92.0	92.7	93.4	93.1	92.3	91.7	91.1	90.9
3000	91.4	92.2	92.9	93.3	92.9	92.2	91.5	90.8	90.4
4000	91.6	92.4	93.0	93.1	92.8	92.1	91.3	90.4	89.5
5000	91.9	92.7	93.0	93.0	92.5	91.9	91.3	90.5	89.8
6000	92.2	92.7	92.9	92.8	92.3	91.9	91.4	90.8	90.2
7000	92.3	92.7	92.9	92.7	92.2	91.7	91.1	90.5	89.9
8000	92.3	92.7	92.9	92.7	92.1	91.5	91.0	90.4	--

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TAKEOFF

ASSUMED TEMPERATURE REDUCED THRUST

In many situations, the airplane takes off at weights lower than the maximum permissible takeoff weight. In consequence, it is possible to continue complying with performance limitations using a decreased engine thrust adapted to the actual weight. This is called assumed temperature reduced thrust method.

Certification authorities permit the use of up to 25% of takeoff thrust reduction for operation with assumed temperature reduced thrust.

UTILIZATION OF ASSUMED TEMPERATURE REDUCED THRUST

Assumed temperature reduced thrust method can be used when the actual weight is lower than the maximum permissible takeoff weight for the actual temperature.

AIRWORTHINES REQUIREMENTS

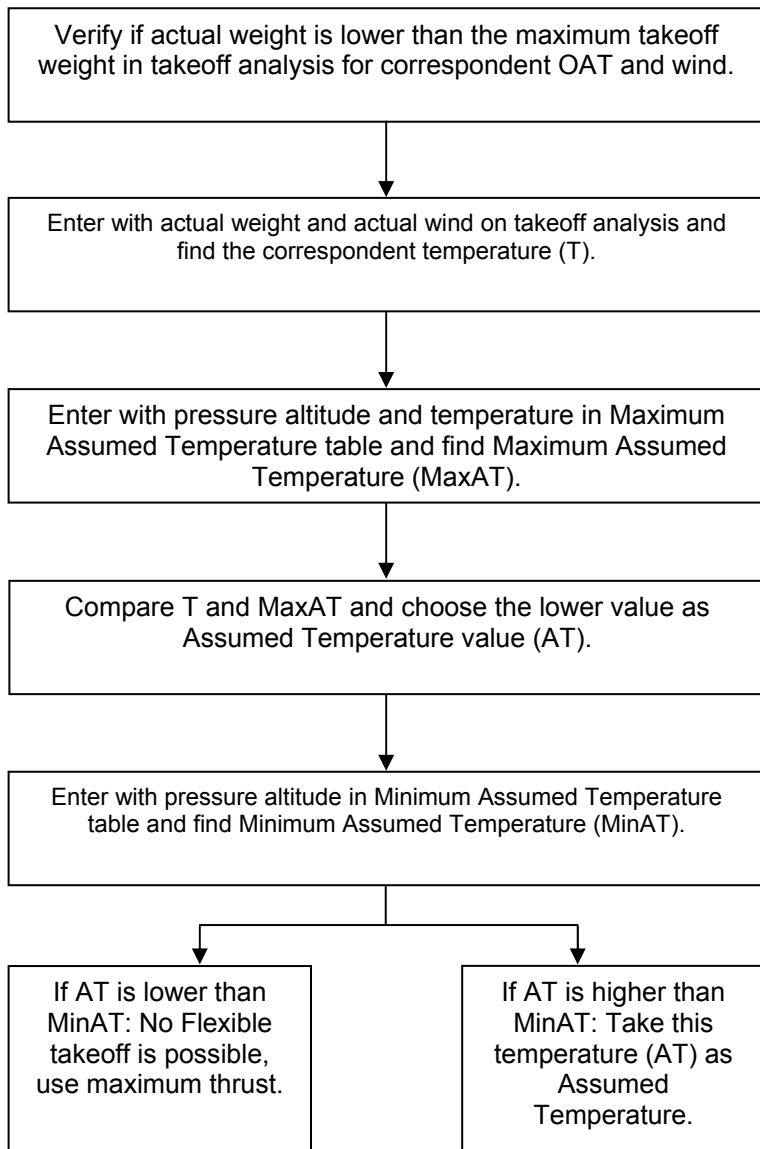
- Maximum Assumed Temperature (25% reduction). See Maximum Assumed Temperature Table.
- Assumed temperature reduced thrust is not allowed when runway is contaminated with water, ice, slush or snow.
- The operator shall at regular intervals check the maximum thrust in order to detect any possible engine deterioration, unless the operators has an adequate engine performance monitoring program.

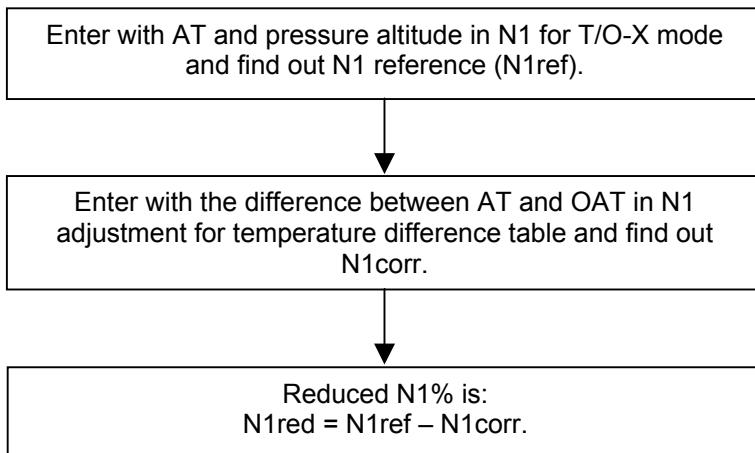
RECOMMENDATION

Assumed temperature reduced thrust should be always used whenever possible in order to save engine life.

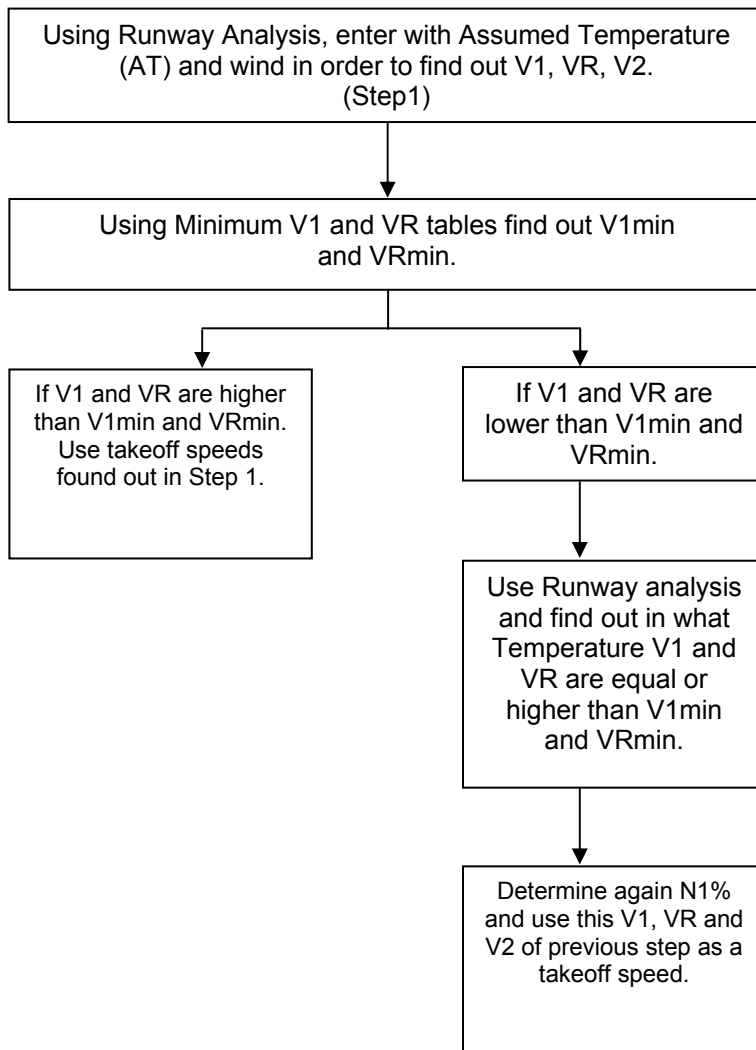
Use always the flaps configuration, which provides the greatest maximum takeoff weight in order to maximize thrust reduction.

FLEXIBLE TEMPERATURE DETERMINATION FOR AIRPLANES EQUIPPED WITH FADEC VERSION 4.12



N1 % FOR FLEXIBLE TAKEOFF

TAKEOFF SPEEDS



MAXIMUM ASSUMED TEMPERATURE TABLE

ENGINE: CF34-8E5 – T/O-1

AIR CONDITIONING ON

(Applicable for airplanes equipped with FADEC version 4.12)

OAT (°C)	PRESSURE ALTITUDE 1000 ft									
	-1	0	1	2	3	4	5	6	7	8
52	55	–	–	–	–	–	–	–	–	–
50	54	53	–	–	–	–	–	–	–	–
45	50	49	50	51	–	–	–	–	–	–
40	46	45	46	47	47	48	48	–	–	–
35	42	42	43	42	43	44	44	45	45	–
30	38	38	38	39	38	39	39	39	39	40
25	35	34	35	35	35	35	34	34	34	34
20	35	34	33	30	29	29	29	28	29	28
15	35	35	32	30	28	26	24	23	23	24
10 and below	35	33	32	30	28	25	23	21	20	19

RMK: FOR ECS OFF ADD 2°C ON MAXIMUM ASSUMED TEMPERATURE

MINIMUM ASSUMED TEMPERATURE

Engine: CF34-8E5 – T/O-1

(Applicable for airplanes equipped with FADEC version 4.12)

	PRESSURE ALTITUDE 1000 ft									
	-1	0	1	2	3	4	5	6	7	8
MinAt	32	30	28	26	24	22	20	18	16	14



N1% ADJUSTMENT FOR TEMPERATURE DIFFERENCE

ENGINE: CF34-8E5 – T/O-1

(Applicable for airplanes equipped with FADEC version 4.12)

AT MINUS OAT (°C)	OUTSIDE AIR TEMPERATURE (OAT) - (°C)												
	-40	-20	0	5	10	15	20	25	30	35	40	45	50
5	–	–	–	–	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6
10	–	–	–	–	1.6	1.5	1.5	1.5	1.5	1.4	1.4	1.4	1.3
20	–	–	–	–	3.0	3.0	3.0	2.9	2.9	2.8	2.7	2.7	–
30	4.8	4.6	4.4	4.4	4.4	4.4	4.4	4.3	4.3	4.1	–	–	–
40	6.2	6.0	5.8	5.7	5.8	5.7	5.7	5.6	–	–	–	–	–
50	7.5	7.3	7.1	7.0	7.0	7.0	–	–	–	–	–	–	–
60	8.8	8.5	8.3	8.2	–	–	–	–	–	–	–	–	–
70	10.0	9.7	–	–	–	–	–	–	–	–	–	–	–

MAXIMUM ASSUMED TEMPERATURE TABLE

ENGINE: CF34-8E5 – T/O-2

AIR CONDITIONING ON

(Applicable for airplanes equipped with FADEC version 4.12)

OAT (°C)	PRESSURE ALTITUDE 1000 ft									
	-1	0	1	2	3	4	5	6	7	8
52	65	–	–	–	–	–	–	–	–	–
50	63	63	–	–	–	–	–	–	–	–
45	57	58	57	56	–	–	–	–	–	–
40	52	52	52	51	50	49	48	–	–	–
35	47	47	46	46	45	45	44	43	44	–
30	42	42	41	41	40	39	39	39	39	39
25	39	37	36	36	35	35	33	34	34	33
20	38	37	34	32	30	29	29	29	29	28
15	39	36	34	32	29	26	24	23	23	23
10 and below	38	37	34	32	29	26	23	21	20	19

RMK: FOR ECS OFF ADD 2°C ON MAXIMUM ASSUMED TEMPERATURE

MINIMUM ASSUMED TEMPERATURE

ENGINE: CF34-8E5 – T/O-2

(Applicable for airplanes equipped with FADEC version 4.12)

	PRESSURE ALTITUDE 1000 ft									
	-1	0	1	2	3	4	5	6	7	8
MinAt	32	30	28	26	24	22	20	18	16	14

N1% ADJUSTMENT FOR TEMPERATURE DIFFERENCE

ENGINE: CF34-8E5 – T/O-2

(Applicable for airplanes equipped with FADEC version 4.12)

AT MINUS OAT (°C)	OUTSIDE AIR TEMPERATURE (OAT)- (°C)												
	-40	-20	0	5	10	15	20	25	30	35	40	45	50
5	–	–	–	–	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.6
10	–	–	–	–	1.5	1.5	1.5	1.5	1.4	1.4	1.4	1.3	1.3
20	–	–	–	–	2.9	2.9	2.9	2.8	2.8	2.7	2.7	2.6	–
30	4.6	4.5	4.3	4.3	4.3	4.3	4.2	4.2	4.1	4.0	–	–	–
40	6.0	5.8	5.6	5.6	5.6	5.5	5.5	5.4	–	–	–	–	–
50	7.3	7.0	6.8	6.8	6.8	6.8	–	–	–	–	–	–	–
60	8.5	8.3	8.0	8.0	–	–	–	–	–	–	–	–	–
70	9.7	9.4	–	–	–	–	–	–	–	–	–	–	–

MINIMUM V1 FOR AIRPLANES EQUIPPED WITH FADEC VERSION 4.12

ENGINE: CF34-8E5 – T/O-1

ALTITUDE: SEA LEVEL AND BELOW

OAT (°C)	WEIGHT (KG)							
	22000	24000	26000	28000	30000	32000	34000	36000
10	94	93	93	93	93	94	94	94
15	94	93	93	93	93	93	94	94
20	94	93	93	93	93	93	94	94
25	94	93	93	93	93	93	94	94
30	93	93	92	93	93	93	93	94
35	91	90	90	90	90	90	91	91
40	88	88	87	87	88	88	88	89
45	85	85	85	85	85	85	86	86
50	83	82	82	82	82	83	83	83

Altitude: 2000 ft

OAT (°C)	WEIGHT (kg)							
	22000	24000	26000	28000	30000	32000	34000	36000
10	91	91	90	90	91	91	91	91
15	91	90	90	90	90	91	91	91
20	91	90	90	90	90	91	91	91
25	91	90	90	90	90	90	91	91
30	89	89	89	89	89	89	90	90
35	87	87	86	87	87	87	87	88
40	85	84	84	84	84	85	85	85
45	82	82	81	82	82	82	82	83

MINIMUM V1 FOR AIRPLANES EQUIPPED WITH FADEC VERSION 4.12

ENGINE: CF34-8E5 – T/O-1

ALTITUDE: 4000 FT

OAT (°C)	WEIGHT (KG)							
	22000	24000	26000	28000	30000	32000	34000	36000
10	88	88	87	87	88	88	88	89
15	88	88	87	87	88	88	88	88
20	88	87	87	87	87	88	88	88
25	87	86	86	86	86	87	87	87
30	85	85	85	85	85	85	86	86
35	84	83	83	83	83	84	84	84
40	82	81	81	81	81	82	82	82

ALTITUDE: 6000 FT

OAT (°C)	WEIGHT (KG)							
	22000	24000	26000	28000	30000	32000	34000	36000
10	85	85	84	84	85	85	85	86
15	85	84	84	84	85	85	85	85
20	84	84	83	84	84	84	84	85
25	83	83	83	83	83	83	84	84
30	82	81	81	81	81	82	82	82
35	80	80	79	80	80	80	80	81

ALTITUDE: 8000 FT

OAT (°C)	WEIGHT (KG)							
	22000	24000	26000	28000	30000	32000	34000	36000
10	82	81	81	81	81	82	82	82
15	81	81	81	81	81	81	82	82
20	81	80	80	80	81	81	81	82
25	80	79	79	79	80	80	80	80
30	78	78	78	78	78	78	79	79

MINIMUM V1 FOR AIRPLANES EQUIPPED WITH FADEC VERSION 4.12

ENGINE: CF34-8E5 – T/O-2

ALTITUDE: SEA LEVEL AND BELOW

OAT (°C)	WEIGHT (KG)							
	22000	24000	26000	28000	30000	32000	34000	36000
10	93	93	93	93	93	93	94	94
15	93	93	92	93	93	93	93	94
20	93	93	92	92	93	93	93	94
25	93	93	92	92	93	93	93	94
30	93	92	92	92	92	93	93	93
35	90	90	89	90	90	90	91	91
40	88	87	87	87	87	88	88	88
45	85	85	84	85	85	85	85	86
50	82	82	82	82	82	82	83	83

ALTITUDE: 2000 FT

OAT (°C)	WEIGHT (KG)							
	22000	24000	26000	28000	30000	32000	34000	36000
10	91	90	90	90	90	90	91	91
15	90	90	90	90	90	90	91	91
20	90	90	90	90	90	90	91	91
25	90	90	89	90	90	90	90	91
30	89	88	88	88	89	89	89	90
35	87	86	86	86	87	87	87	87
40	84	84	84	84	84	84	85	85
45	82	81	81	81	82	82	82	82

MINIMUM V1 FOR AIRPLANES EQUIPPED WITH FADEC VERSION 4.12

ENGINE: CF34-8E5 – T/O-2

ALTITUDE: 4000 FT

OAT (°C)	WEIGHT (KG)							
	22000	24000	26000	28000	30000	32000	34000	36000
10	88	87	87	87	87	88	88	88
15	87	87	87	87	87	87	88	88
20	87	87	86	87	87	87	88	88
25	86	86	86	86	86	86	87	87
30	85	85	84	84	85	85	85	86
35	83	83	82	83	83	83	84	84
40	81	81	80	81	81	81	82	82

ALTITUDE: 6000 FT

OAT (°C)	WEIGHT (KG)							
	22000	24000	26000	28000	30000	32000	34000	36000
10	85	84	84	84	84	85	85	85
15	84	84	84	84	84	84	85	85
20	84	83	83	83	84	84	84	85
25	83	82	82	82	83	83	83	84
30	81	81	81	81	81	81	82	82
35	80	79	79	79	79	80	80	80

ALTITUDE: 8000 FT

OAT (°C)	WEIGHT (KG)							
	22000	24000	26000	28000	30000	32000	34000	36000
10	81	81	81	81	81	81	82	82
15	81	81	80	81	81	81	82	82
20	80	80	80	80	80	81	81	81
25	79	79	79	79	79	80	80	80
30	78	77	77	77	78	78	78	79

MINIMUM VR FOR AIRPLANES EQUIPPED WITH FADEC VERSION 4.12

ENGINE: CF34-8E5 – T/O-1

ALTITUDE: SEA LEVEL AND BELOW

OAT (°C)	WEIGHT (KG)							
	22000	24000	26000	28000	30000	32000	34000	36000
10	104	101	98	95	93	94	94	94
15	104	101	98	95	93	93	94	94
20	103	101	98	95	93	93	94	94
25	103	101	98	95	93	93	94	94
30	103	100	97	94	93	93	93	94
35	99	96	93	90	90	90	91	91
40	94	91	88	87	88	88	88	89
45	90	87	85	85	85	85	86	86
50	85	82	82	82	82	83	83	83

ALTITUDE: 2000 FT

OAT (°C)	WEIGHT (KG)							
	22000	24000	26000	28000	30000	32000	34000	36000
10	99	96	93	90	91	91	91	91
15	99	96	93	90	90	91	91	91
20	99	96	93	90	90	91	91	91
25	99	96	93	90	90	90	91	91
30	97	94	91	89	89	89	90	90
35	93	90	87	87	87	87	87	88
40	89	86	84	84	84	85	85	85
45	84	82	81	82	82	82	82	83

MINIMUM VR FOR AIRPLANES EQUIPPED WITH FADEC VERSION 4.12

ENGINE: CF34-8E5 – T/O-1

ALTITUDE: 4000 FT

OAT (°C)	WEIGHT (KG)							
	22000	24000	26000	28000	30000	32000	34000	36000
10	94	91	88	87	88	88	88	89
15	94	91	88	87	88	88	88	88
20	94	91	88	87	87	88	88	88
25	92	89	86	86	86	87	87	87
30	90	87	85	85	85	85	86	86
35	87	84	83	83	83	84	84	84
40	83	81	81	81	81	82	82	82

ALTITUDE: 6000 FT

OAT (°C)	WEIGHT (KG)							
	22000	24000	26000	28000	30000	32000	34000	36000
10	89	86	84	84	85	85	85	86
15	89	86	84	84	85	85	85	85
20	88	85	83	84	84	84	84	85
25	86	83	83	83	83	83	84	84
30	84	81	81	81	81	82	82	82
35	81	80	79	80	80	80	80	81

ALTITUDE: 8000 FT

OAT (°C)	WEIGHT (KG)							
	22000	24000	26000	28000	30000	32000	34000	36000
10	84	81	81	81	81	82	82	82
15	83	81	81	81	81	81	82	82
20	82	80	80	80	81	81	81	82
25	80	79	79	79	80	80	80	80
30	78	78	78	78	78	78	79	79

MINIMUM VR FOR AIRPLANES EQUIPPED WITH FADEC VERSION 4.12

ENGINE: CF34-8E5 – T/O-2

ALTITUDE: SEA LEVEL AND BELOW

OAT (°C)	WEIGHT (KG)							
	22000	24000	26000	28000	30000	32000	34000	36000
10	104	101	98	95	93	93	94	94
15	104	101	98	95	93	93	93	94
20	103	101	98	95	93	93	93	94
25	103	101	98	95	93	93	93	94
30	103	100	97	94	92	93	93	93
35	99	96	93	90	90	90	91	91
40	94	91	88	87	87	88	88	88
45	90	87	84	85	85	85	85	86
50	85	82	82	82	82	82	83	83

ALTITUDE: 2000 FT

OAT (°C)	WEIGHT (KG)							
	22000	24000	26000	28000	30000	32000	34000	36000
10	99	96	93	90	90	90	91	91
15	99	96	93	90	90	90	91	91
20	99	96	93	90	90	90	91	91
25	99	96	93	90	90	90	90	91
30	97	94	91	88	89	89	89	90
35	93	90	87	86	87	87	87	87
40	89	86	84	84	84	84	85	85
45	84	81	81	81	82	82	82	82

MINIMUM VR FOR AIRPLANES EQUIPPED WITH FADEC VERSION 4.12

ENGINE: CF34-8E5 – T/O-2

ALTITUDE: 4000 FT

OAT (°C)	WEIGHT (KG)							
	22000	24000	26000	28000	30000	32000	34000	36000
10	94	91	88	87	87	88	88	88
15	94	91	88	87	87	87	88	88
20	94	91	88	87	87	87	88	88
25	92	89	86	86	86	86	87	87
30	90	87	84	84	85	85	85	86
35	87	84	82	83	83	83	84	84
40	83	81	80	81	81	81	82	82

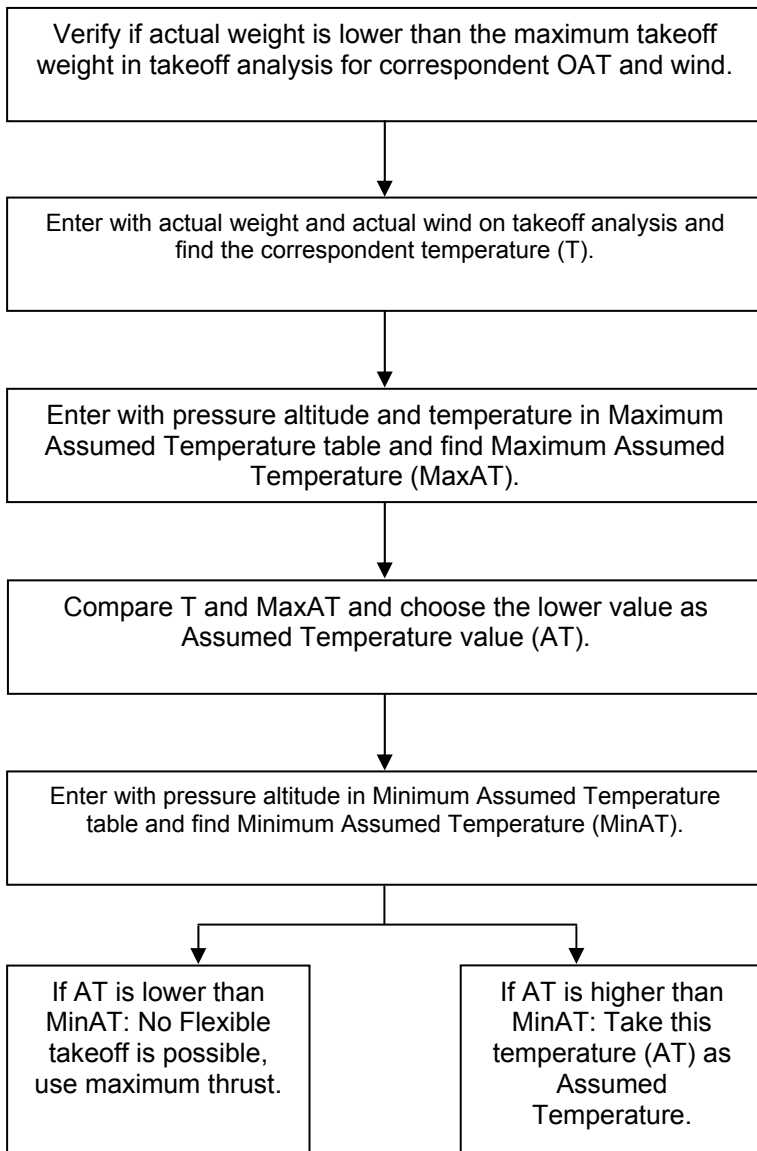
ALTITUDE: 6000 FT

OAT (°C)	WEIGHT (KG)							
	22000	24000	26000	28000	30000	32000	34000	36000
10	89	86	84	84	84	85	85	85
15	89	86	84	84	84	84	85	85
20	88	85	83	83	84	84	84	85
25	86	83	82	82	83	83	83	84
30	84	81	81	81	81	81	82	82
35	81	79	79	79	79	80	80	80

ALTITUDE: 8000 FT

OAT (°C)	WEIGHT (KG)							
	22000	24000	26000	28000	30000	32000	34000	36000
10	84	81	81	81	81	81	82	82
15	83	81	80	81	81	81	82	82
20	82	80	80	80	80	81	81	81
25	80	79	79	79	79	80	80	80
30	78	77	77	77	78	78	78	79

FLEXIBLE TEMPERATURE DETERMINATION FOR AIRPLANES EQUIPPED WITH FADEC VERSION 5.20



N1 % FOR FLEXIBLE TAKEOFF

Enter with AT and pressure altitude in N1 for T/O-X mode and find out N1 reference (N1ref).

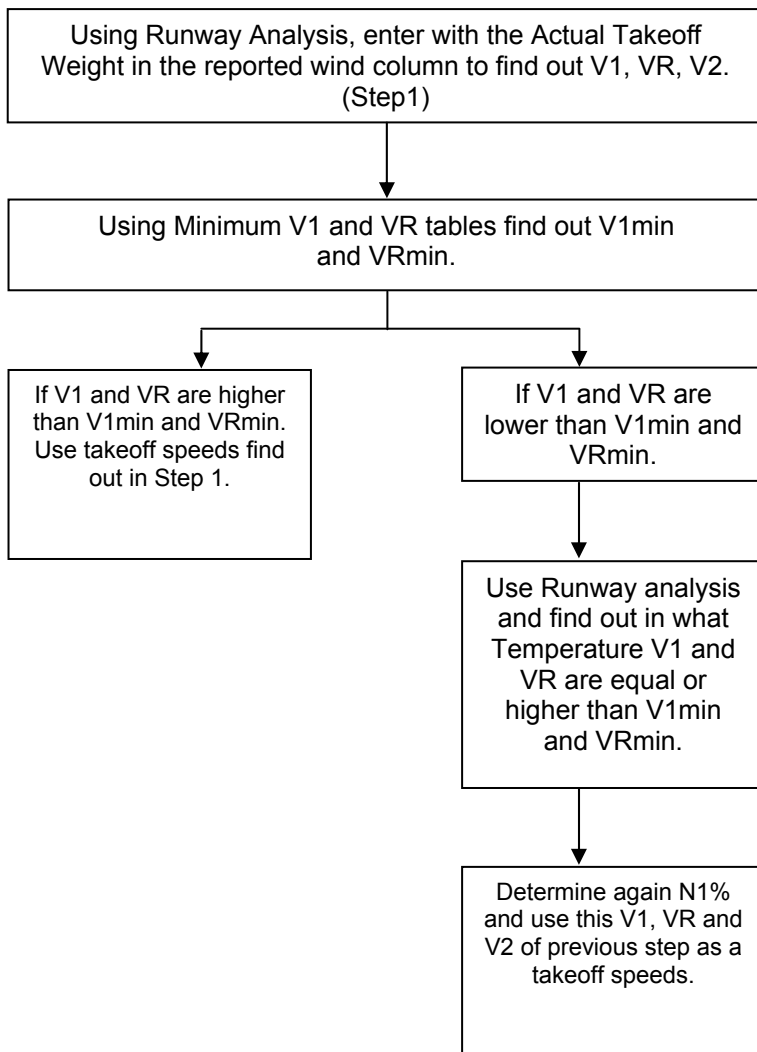


Enter with the difference between AT and OAT in N1 adjustment for temperature difference table and find out N1corr.



Reduced N1% is:
 $N1_{red} = N1_{ref} - N1_{corr}$.

TAKEOFF SPEEDS



MAXIMUM ASSUMED TEMPERATURE TABLE

Engine: CF34-8E5 – T/O-1

AIR CONDITIONING ON

(Applicable for airplanes equipped with FADEC version 5.20)

OAT (°C)	PRESSURE ALTITUDE 1000 ft									
	-1	0	1	2	3	4	5	6	7	8
52	60	–	–	–	–	–	–	–	–	–
50	58	57	–	–	–	–	–	–	–	–
45	54	53	54	55	–	–	–	–	–	–
40	50	50	50	51	52	53	54	–	–	–
35	47	46	47	48	48	49	50	51	51	–
30	45	44	43	43	43	44	45	46	46	47
25	44	42	41	41	40	40	39	40	40	41
20	43	42	40	40	39	38	36	35	35	34
15	43	42	40	40	37	36	34	33	31	30
10 and below	43	41	40	40	38	36	33	31	29	28

RMK: FOR ECS OFF ADD 2°C ON MAXIMUM ASSUMED TEMPERATURE

MINIMUM ASSUMED TEMPERATURE

Engine: CF34-8E5 – T/O-1

	PRESSURE ALTITUDE 1000 ft									
	-1	0	1	2	3	4	5	6	7	8
MinAt	32	30	28	26	24	22	20	18	16	14

N1% ADJUSTMENT FOR TEMPERATURE DIFFERENCE

Engine: CF34-8E5 – T/O-1

(Applicable for airplanes equipped with FADEC version 5.20)

AT MINUS OAT (°C)	OUTSIDE AIR TEMPERATURE (OAT) - (°C)												
	-40	-20	0	5	10	15	20	25	30	35	40	45	50
5	–	–	–	–	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.6
10	–	–	–	1.6	1.6	1.5	1.5	1.6	1.4	1.4	1.3	1.3	1.3
20	–	–	3.1	3.1	3.0	3.0	2.9	3.1	2.8	2.7	2.6	2.6	2.5
30	–	–	4.6	4.5	4.4	4.4	4.3	4.6	4.1	4.0	–	–	–
40	–	6.4	6.0	5.9	5.8	5.7	5.6	5.9	–	–	–	–	–
50	–	7.8	7.3	7.2	7.1	6.9	–	–	–	–	–	–	–
60	9.8	9.1	8.5	8.4	–	–	–	–	–	–	–	–	–
70	11.1	10.4	–	–	–	–	–	–	–	–	–	–	–



MAXIMUM ASSUMED TEMPERATURE TABLE

Engine: CF34-8E5 – T/O-2 **AIR CONDITIONING ON**
(Applicable for airplanes equipped with FADEC version 5.20)

OAT (°C)	PRESSURE ALTITUDE 1000 ft									
	-1	0	1	2	3	4	5	6	7	8
52	59	–	–	–	–	–	–	–	–	–
50	56	57	–	–	–	–	–	–	–	–
45	51	51	50	50	–	–	–	–	–	–
40	46	47	46	45	44	44	43	–	–	–
35	41	42	40	40	39	39	38	38	38	–
30	39	38	36	35	35	34	33	32	33	34
25	37	35	33	32	31	29	28	27	28	28
20	37	35	32	30	28	26	24	23	23	22
15	37	35	31	29	27	24	22	21	20	19
10 and below	37	34	32	29	27	24	21	19	17	16

RMK: FOR ECS OFF ADD 2°C ON MAXIMUM ASSUMED TEMPERATURE

MINIMUM ASSUMED TEMPERATURE

Engine: CF34-8E5 – T/O-2

	PRESSURE ALTITUDE 1000 ft									
	-1	0	1	2	3	4	5	6	7	8
MinAt	32	30	28	26	24	22	20	18	16	14

N1% ADJUSTMENT FOR TEMPERATURE DIFFERENCE

Engine: CF34-8E5 – T/O-2

(Applicable for airplanes equipped with FADEC version 5.20)

AT MINUS OAT (°C)	OUTSIDE AIR TEMPERATURE (OAT)- (°C)												
	-40	-20	0	5	10	15	20	25	30	35	40	45	50
5	–	–	–	–	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.6
10	–	–	–	1.6	1.5	1.5	1.5	1.4	1.4	1.4	1.3	1.3	1.3
20	–	–	3.1	3.0	3.0	2.9	2.9	2.8	2.7	2.7	2.6	2.5	2.5
30	–	–	4.5	4.4	4.4	4.3	4.2	4.1	4.0	3.9	–	–	–
40	–	6.3	5.9	5.8	5.7	5.6	5.5	5.4	–	–	–	–	–
50	–	7.6	7.2	7.0	6.9	6.8	–	–	–	–	–	–	–
60	9.6	8.9	8.4	8.3	–	–	–	–	–	–	–	–	–
70	10.9	10.2	–	–	–	–	–	–	–	–	–	–	–

**MINIMUM V1 FOR AIRPLANES EQUIPPED WITH FADEC
VERSION 5.20****Engine: CF34-8E5 – T/O-1****Altitude: Sea Level and below**

OAT (°C)	WEIGHT (KG)							
	24000	26000	28000	30000	32000	34000	36000	38000
10	95	95	95	95	95	96	96	96
15	95	95	95	95	95	96	96	96
20	95	95	95	95	95	95	96	96
25	95	94	95	95	95	95	96	96
30	95	94	94	95	95	95	96	96
35	92	92	92	92	92	93	93	93
40	90	89	89	90	90	90	90	91
45	87	86	87	87	87	87	88	88
50	84	84	84	84	84	85	85	85

Altitude: 2000 ft

OAT (°C)	WEIGHT (KG)							
	24000	26000	28000	30000	32000	34000	36000	38000
10	93	92	92	92	93	93	93	94
15	92	92	92	92	93	93	93	94
20	92	92	92	92	93	93	93	94
25	92	92	92	92	92	93	93	93
30	91	90	91	91	91	91	92	92
35	89	88	88	89	89	89	90	90
40	86	86	86	86	86	87	87	87
45	83	83	83	83	84	84	84	85
50	81	80	81	81	81	82	82	82

MINIMUM V1 FOR AIRPLANES EQUIPPED WITH FADEC VERSION 5.20

Engine: CF34-8E5 – T/O-1

Altitude: 4000 ft

OAT (°C)	WEIGHT (KG)							
	24000	26000	28000	30000	32000	34000	36000	38000
10	89	89	89	90	90	90	90	91
15	89	89	89	89	90	90	90	91
20	89	89	89	89	89	90	90	91
25	88	88	88	88	89	89	89	90
30	87	86	87	87	87	87	88	88
35	85	85	85	85	85	86	86	86
40	83	83	83	83	83	84	84	84
45	81	80	81	81	81	82	82	82
50	79	78	79	79	79	80	80	80

Altitude: 6000 ft

OAT (°C)	WEIGHT (KG)							
	24000	26000	28000	30000	32000	34000	36000	38000
10	87	86	86	87	87	87	88	88
15	86	86	86	86	87	87	87	88
20	86	85	85	86	86	86	87	87
25	84	84	84	85	85	85	86	86
30	83	83	83	83	83	84	84	84
35	81	81	81	81	82	82	82	83
40	79	79	79	80	80	80	81	81
45	78	77	78	78	78	78	79	79
50	76	76	76	76	76	77	77	77

MINIMUM V1 FOR AIRPLANES EQUIPPED WITH FADEC VERSION 5.20

Engine: CF34-8E5 – T/O-1

Altitude: 8000 ft

OAT (°C)	WEIGHT (KG)							
	24000	26000	28000	30000	32000	34000	36000	38000
10	83	83	83	83	83	84	84	85
15	83	83	83	83	83	84	84	84
20	82	82	82	82	83	83	83	84
25	81	81	81	81	81	82	82	82
30	79	79	79	79	80	80	80	81
35	78	77	78	78	78	78	79	79
40	76	76	76	76	76	77	77	77
45	74	74	74	74	75	75	75	76
50	73	72	73	73	73	74	74	74

MINIMUM V1 FOR AIRPLANES EQUIPPED WITH FADEC VERSION 5.20

Engine: CF34-8E5 – T/O-2

Altitude: Sea Level and below

OAT (°C)	WEIGHT (KG)							
	24000	26000	28000	30000	32000	34000	36000	38000
10	91	91	91	91	91	91	92	92
15	91	90	91	91	91	91	92	92
20	91	90	90	91	91	91	92	92
25	91	90	90	91	91	91	91	92
30	90	90	90	90	91	91	91	92
35	88	88	88	88	89	89	89	90
40	86	86	86	86	87	87	87	88
45	84	84	84	84	85	85	85	86
50	82	82	82	82	83	83	83	84

Altitude: 2000 ft

OAT (°C)	WEIGHT (KG)							
	24000	26000	28000	30000	32000	34000	36000	38000
10	88	88	88	88	89	89	89	90
15	88	88	88	88	88	89	89	89
20	88	88	88	88	88	89	89	89
25	88	88	88	88	88	89	89	89
30	86	86	86	86	87	87	87	88
35	84	84	84	84	85	85	85	86
40	82	82	82	82	83	83	83	84
45	80	80	80	81	81	81	81	82
50	78	78	78	79	79	79	79	80

MINIMUM V1 FOR AIRPLANES EQUIPPED WITH FADEC VERSION 5.20

Engine: CF34-8E5 – T/O-2

Altitude: 4000 ft

OAT (°C)	WEIGHT (KG)							
	24000	26000	28000	30000	32000	34000	36000	38000
10	85	85	85	86	86	86	87	87
15	85	85	85	85	86	86	86	87
20	85	85	85	85	86	86	86	87
25	84	84	84	84	85	85	85	86
30	82	82	82	82	83	83	83	84
35	80	80	80	81	81	81	82	82
40	79	78	78	79	79	79	80	80
45	77	76	76	77	77	77	78	78
50	75	74	74	75	75	75	76	76

Altitude: 6000 ft

OAT (°C)	WEIGHT (KG)							
	24000	26000	28000	30000	32000	34000	36000	38000
10	83	83	83	83	83	84	84	84
15	83	83	83	83	83	84	84	84
20	82	82	82	82	83	83	83	84
25	80	80	80	80	81	81	81	82
30	79	78	78	79	79	79	80	80
35	77	76	77	77	77	78	78	78
40	75	75	75	75	75	76	76	76
45	73	73	73	73	74	74	74	75
50	71	71	71	71	72	72	72	73

MINIMUM V1 FOR AIRPLANES EQUIPPED WITH FADEC VERSION 5.20

Engine: CF34-8E5 – T/O-2

Altitude: 8000 ft

OAT (°C)	WEIGHT (KG)							
	24000	26000	28000	30000	32000	34000	36000	38000
10	80	80	80	80	80	81	81	81
15	80	79	79	80	80	80	81	81
20	79	78	78	79	79	79	80	80
25	77	77	77	77	77	78	78	78
30	75	75	75	75	76	76	76	77
35	73	73	73	74	74	74	75	75
40	72	71	72	72	72	72	73	73
45	70	70	70	70	70	71	71	71
50	68	68	68	69	69	69	69	70

MINIMUM VR FOR AIRPLANES EQUIPPED WITH FADEC VERSION 5.20

Engine: CF34-8E5 – T/O-1

Altitude: Sea Level and below

OAT (°C)	WEIGHT (KG)							
	24000	26000	28000	30000	32000	34000	36000	38000
10	98	96	95	95	95	96	96	96
15	98	95	95	95	95	96	96	96
20	98	95	95	95	95	95	96	96
25	98	95	95	95	95	95	96	96
30	98	95	94	95	95	95	96	96
35	94	92	92	92	92	93	93	93
40	90	89	89	90	90	90	90	91
45	87	86	87	87	87	87	88	88
50	84	84	84	84	84	85	85	85

Altitude: 2000 ft

OAT (°C)	WEIGHT (KG)							
	24000	26000	28000	30000	32000	34000	36000	38000
10	94	92	92	92	93	93	93	94
15	94	92	92	92	93	93	93	94
20	94	92	92	92	93	93	93	94
25	94	92	92	92	92	93	93	93
30	92	90	91	91	91	91	92	92
35	89	88	88	89	89	89	90	90
40	86	86	86	86	86	87	87	87
45	83	83	83	83	84	84	84	85
50	81	80	81	81	81	82	82	82

MINIMUM VR FOR AIRPLANES EQUIPPED WITH FADEC VERSION 5.20

Engine: CF34-8E5 – T/O-1

Altitude: 4000 ft

OAT (°C)	WEIGHT (KG)							
	24000	26000	28000	30000	32000	34000	36000	38000
10	89	89	89	90	90	90	90	91
15	89	89	89	89	90	90	90	91
20	89	89	89	89	89	90	90	91
25	88	88	88	88	89	89	89	90
30	87	86	87	87	87	87	88	88
35	85	85	85	85	85	86	86	86
40	83	83	83	83	83	84	84	84
45	81	80	81	81	81	82	82	82
50	79	78	79	79	79	80	80	80

Altitude: 6000 ft

OAT (°C)	WEIGHT (KG)							
	24000	26000	28000	30000	32000	34000	36000	38000
10	87	86	86	87	87	87	88	88
15	86	86	86	86	87	87	87	88
20	86	85	85	86	86	86	87	87
25	84	84	84	85	85	85	86	86
30	83	83	83	83	83	84	84	84
35	81	81	81	81	82	82	82	83
40	79	79	79	80	80	80	81	81
45	78	77	78	78	78	78	79	79
50	76	76	76	76	76	77	77	77

MINIMUM VR FOR AIRPLANES EQUIPPED WITH FADEC VERSION 5.20

Engine: CF34-8E5 – T/O-1

Altitude: 8000 ft

OAT (°C)	WEIGHT (KG)							
	24000	26000	28000	30000	32000	34000	36000	38000
10	83	83	83	83	83	84	84	85
15	83	83	83	83	83	84	84	84
20	82	82	82	82	83	83	83	84
25	81	81	81	81	81	82	82	82
30	79	79	79	79	80	80	80	81
35	78	77	78	78	78	78	79	79
40	76	76	76	76	76	77	77	77
45	74	74	74	74	75	75	75	76
50	73	72	73	73	73	74	74	74

MINIMUM VR FOR AIRPLANES EQUIPPED WITH FADEC VERSION 5.20

Engine: CF34-8E5 – T/O-2

Altitude: Sea Level and below

OAT (°C)	WEIGHT (KG)							
	24000	26000	28000	30000	32000	34000	36000	38000
10	91	91	91	91	91	91	92	92
15	91	90	91	91	91	91	92	92
20	91	90	90	91	91	91	92	92
25	91	90	90	91	91	91	91	92
30	91	90	90	90	91	91	91	92
35	88	88	88	88	89	89	89	90
40	86	86	86	86	87	87	87	88
45	84	84	84	84	85	85	85	86
50	82	82	82	82	83	83	83	84

Altitude: 2000 ft

OAT (°C)	WEIGHT (KG)							
	24000	26000	28000	30000	32000	34000	36000	38000
10	88	88	88	88	89	89	89	90
15	88	88	88	88	88	89	89	89
20	88	88	88	88	88	89	89	89
25	88	88	88	88	88	89	89	89
30	86	86	86	86	87	87	87	88
35	84	84	84	84	85	85	85	86
40	82	82	82	82	83	83	83	84
45	80	80	80	81	81	81	81	82
50	78	78	78	79	79	79	79	80

MINIMUM VR FOR AIRPLANES EQUIPPED WITH FADEC VERSION 5.20

Engine: CF34-8E5 – T/O-2

Altitude: 4000 ft

OAT (°C)	WEIGHT (KG)							
	24000	26000	28000	30000	32000	34000	36000	38000
10	85	85	85	86	86	86	87	87
15	85	85	85	85	86	86	86	87
20	85	85	85	85	86	86	86	87
25	84	84	84	84	85	85	85	86
30	82	82	82	82	83	83	83	84
35	80	80	80	81	81	81	82	82
40	79	78	78	79	79	79	80	80
45	77	76	76	77	77	77	78	78
50	75	74	74	75	75	75	76	76

Altitude: 6000 ft

OAT (°C)	WEIGHT (KG)							
	24000	26000	28000	30000	32000	34000	36000	38000
10	83	83	83	83	83	84	84	84
15	83	83	83	83	83	84	84	84
20	82	82	82	82	83	83	83	84
25	80	80	80	80	81	81	81	82
30	79	78	78	79	79	79	80	80
35	77	76	77	77	77	78	78	78
40	75	75	75	75	75	76	76	76
45	73	73	73	73	74	74	74	75
50	71	71	71	71	72	72	72	73

MINIMUM VR FOR AIRPLANES EQUIPPED WITH FADEC VERSION 5.20

Engine: CF34-8E5 – T/O-2

Altitude: 8000 ft

OAT (°C)	WEIGHT (KG)							
	24000	26000	28000	30000	32000	34000	36000	38000
10	80	80	80	80	80	81	81	81
15	80	79	79	80	80	80	81	81
20	79	78	78	79	79	79	80	80
25	77	77	77	77	77	78	78	78
30	75	75	75	75	76	76	76	77
35	73	73	73	74	74	74	75	75
40	72	71	72	72	72	72	73	73
45	70	70	70	70	70	71	71	71
50	68	68	68	69	69	69	69	70

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SIMPLIFIED TAKEOFF ANALYSIS TABLES

Simplified Takeoff Analysis tables are presented for a set of pressure altitudes, temperatures and runway lengths for the conditions below:

- Dry runway;
- Zero wind;
- Zero slope;
- No clearway;
- No stopway;
- Obstacles are not considered;
- Anti ice-off;
- Balanced V_1 .

Following limitation factors were considered in the calculation of these tables:

- Field length;
- Climb;
- Brake energy;
- Tire speed.

Limitation codes:

- R – Runway Length;
- W – WAT (Climb);
- B – Brake;
- S – Structural;
- A – Approach Climb.

SIMPLIFIED TAKEOFF ANALYSIS TABLES
EMBRAER 170 – CF34-8E5 – T/O-1 MODE – JAA CERTIFICATION
FLAPS 2 – V2/Vs =1.20 – DRY RUNWAY – ANTI ICE OFF – A/C ON

AIRPORT PRESSURE ALTITUDE: SEA LEVEL.

Temp (°C)	RUNWAY LENGTH (m)						
	TAKEOFF WEIGHT(kg) – LIMITATION CODE						
	V1/VR/V2 (KIAS)						
	1600	1800	2000	2200	2400	2600	2800
-20	35650 R 132/141/147	37200 S 136/145/150	37200 S 136/145/150	37200 S 136/145/150	37200 S 136/145/150	37200 S 136/145/150	37200 S 136/145/150
-15	35321 R 131/140/146	37200 S 136/145/150	37200 S 136/145/150	37200 S 136/145/150	37200 S 136/145/150	37200 S 136/145/150	37200 S 136/145/150
-10	35002 R 130/140/146	37045 R 136/145/150	37200 S 136/145/150	37200 S 136/145/150	37200 S 136/145/150	37200 S 136/145/150	37200 S 136/145/150
-5	34690 R 129/139/145	36716 R 135/144/149	37200 S 136/145/150	37200 S 136/145/150	37200 S 136/145/150	37200 S 136/145/150	37200 S 136/145/150
0	34370 R 128/138/144	36377 R 134/143/148	37200 S 136/145/150	37200 S 136/145/150	37200 S 136/145/150	37200 S 136/145/150	37200 S 136/145/150
5	34063 R 128/137/144	36046 R 133/142/148	37200 S 136/145/150	37200 S 136/145/150	37200 S 136/145/150	37200 S 136/145/150	37200 S 136/145/150
10	33754 R 127/137/143	35714 R 132/142/147	37200 S 137/145/150	37200 S 136/145/150	37200 S 137/145/150	37200 S 137/145/150	37200 S 137/145/150
15	33453 R 126/136/142	35389 R 132/141/146	37200 S 137/145/150	37200 S 137/145/150	37200 S 137/145/150	37200 S 137/145/150	37200 S 137/145/150
20	33159 R 125/135/142	35073 R 131/140/146	36872 R 136/145/149	37200 S 137/145/150	37200 S 137/145/150	37200 S 137/145/150	37200 S 137/145/150
25	32871 R 124/135/141	34764 R 130/140/145	36546 R 135/144/149	37200 S 137/146/150	37200 S 137/145/150	37200 S 137/145/150	37200 S 137/145/150
30	32590 R 123/134/140	34461 R 129/139/144	36229 R 134/143/148	37200 S 137/146/150	37200 S 137/145/150	37200 S 137/145/150	37200 S 137/145/150
35	31336 R 122/132/138	33137 R 127/136/142	34820 R 132/141/145	36444 R 137/145/148	37200 S 139/146/150	37200 S 139/146/150	37200 S 139/146/150
40	30120 R 120/129/135	31857 R 126/134/139	33481 R 131/138/142	35016 R 135/142/146	36328 R 139/145/148	36564 A 140/146/149	36564 A 140/146/149
45	28836 R 119/127/132	30509 R 124/132/136	32085 R 129/136/139	33446 R 133/139/142	34548 A 137/142/145	34548 A 137/142/145	34548 A 137/142/145
50	27530 R 117/124/129	29143 R 122/129/133	30642 R 127/133/136	31880 R 131/136/139	32809 A 134/138/141	32809 A 134/138/141	32809 A 134/138/141
55	26422 R 115/122/126	27988 R 120/127/130	29363 R 125/130/133	30569 R 129/133/136	31031 W 130/135/137	31031 W 130/134/137	31031 W 130/134/137
60	25296 R 113/120/124	26812 R 118/124/127	28060 R 123/128/130	29149 W 127/130/133	29149 W 127/130/133	29149 W 127/130/133	29149 W 127/130/133

For A/Ice ON, decrease weight by 200 kg.

SIMPLIFIED TAKEOFF ANALYSIS TABLES
EMBRAER 170 – CF34-8E5 – T/O-1 MODE – JAA CERTIFICATION
FLAPS 2 – V2/Vs =1.20 – DRY RUNWAY – ANTI ICE OFF – A/C ON

AIRPORT PRESSURE ALTITUDE: 500 FT.

Temp (°C)	RUNWAY LENGTH (m)						
	TAKEOFF WEIGHT(kg) – LIMITATION CODE						
	V1/VR/V2 (KIAS)						
	1600	1800	2000	2200	2400	2600	2800
-20	35133 R 131/140/146	37188 R 137/145/150	37200 S 137/145/150	37200 S 137/145/150	37200 S 137/145/150	37200 S 137/145/150	37200 S 137/145/150
-15	34811 R 130/139/145	36847 R 136/144/149	37200 S 137/145/150	37200 S 137/145/150	37200 S 137/145/150	37200 S 137/145/150	37200 S 137/145/150
-10	34497 R 129/139/144	36516 R 135/144/149	37200 S 137/145/150	37200 S 137/145/150	37200 S 137/145/150	37200 S 137/145/150	37200 S 137/145/150
-5	34193 R 128/138/144	36191 R 134/143/148	37200 S 137/145/150	37200 S 137/145/150	37200 S 137/145/150	37200 S 137/145/150	37200 S 137/145/150
0	33886 R 127/137/143	35860 R 133/142/147	37200 S 137/145/150	37200 S 137/145/150	37200 S 137/145/150	37200 S 137/145/150	37200 S 137/145/150
5	33586 R 127/136/143	35536 R 132/141/147	37200 S 137/146/150	37200 S 137/145/150	37200 S 137/145/150	37200 S 137/145/150	37200 S 137/145/150
10	33286 R 126/136/142	35213 R 131/141/146	37021 R 136/145/150	37200 S 137/146/150	37200 S 137/145/150	37200 S 137/145/150	37200 S 137/145/150
15	32992 R 125/135/141	34897 R 131/140/145	36689 R 136/144/149	37200 S 137/146/150	37200 S 137/145/150	37200 S 137/145/150	37200 S 137/145/150
20	32705 R 124/134/141	34587 R 130/139/145	36364 R 135/144/148	37200 S 137/146/150	37200 S 137/145/150	37200 S 137/145/150	37200 S 137/145/150
25	32425 R 123/134/140	34287 R 129/138/144	36048 R 134/143/148	37200 S 137/146/150	37200 S 137/146/150	37200 S 137/146/150	37200 S 137/146/150
30	31979 R 122/133/139	33816 R 128/138/143	35545 R 133/142/147	37183 R 137/146/150	37200 S 137/146/150	37200 S 137/146/150	37200 S 137/146/150
35	30776 R 121/130/136	32548 R 126/135/140	34193 R 131/140/144	35789 R 136/143/147	37200 S 140/147/150	37200 S 140/147/150	37200 S 140/147/150
40	29573 R 119/128/134	31283 R 125/133/138	32879 R 129/137/141	34371 R 134/141/144	35660 R 138/144/147	35678 A 138/144/147	35678 A 138/144/147
45	28318 R 118/126/131	29965 R 123/130/135	31514 R 127/135/138	32852 R 132/138/141	33775 A 135/140/143	33775 A 135/140/143	33775 A 135/140/143
50.	27064 R 116/123/128	28650 R 121/128/132	30126 R 125/132/135	31345 R 130/135/138	32052 A 132/137/139	32052 A 132/137/139	32052 A 132/137/139
55.	25929 R 114/121/125	27467 R 119/125/129	28811 R 124/129/132	29997 R 128/132/135	30411 W 129/133/136	30411 W 129/133/136	30411 W 129/133/136
60.	24843 R 112/119/123	26332 R 117/123/126	27550 R 122/126/129	28533 W 125/129/131	28533 W 125/129/131	28533 W 125/129/131	28533 W 125/129/131

For A/Ice ON, decrease weight by 200 kg.

SIMPLIFIED TAKEOFF ANALYSIS TABLES

EMBRAER 170 – CF34-8E5 – T/O-1 MODE – JAA CERTIFICATION
FLAPS 2 – V2/VS =1.20 – DRY RUNWAY – ANTI ICE OFF – A/C ON

AIRPORT PRESSURE ALTITUDE: 1000 FT.

Temp (°C)	RUNWAY LENGTH (m)						
	TAKEOFF WEIGHT(kg) – LIMITATION CODE						
	V1/VR/V2 (KIAS)						
	1600	1800	2000	2200	2400	2600	2800
-20	34618 R 130/139/145	36647 R 136/144/149	37200 S 137/145/150	37200 S 137/145/150	37200 S 137/145/150	37200 S 137/145/150	37200 S 137/145/150
-15	34304 R 129/138/144	36313 R 135/143/148	37200 S 137/146/150	37200 S 137/145/150	37200 S 137/145/150	37200 S 137/145/150	37200 S 137/145/150
-10	34002 R 128/138/143	35989 R 134/143/148	37200 S 137/146/150	37200 S 137/145/150	37200 S 137/145/150	37200 S 137/145/150	37200 S 137/145/150
-5	33703 R 127/137/143	35667 R 133/142/147	37200 S 137/146/150	37200 S 137/145/150	37200 S 137/145/150	37200 S 137/145/150	37200 S 137/145/150
0	33406 R 126/136/142	35346 R 132/141/146	37165 R 137/146/150	37200 S 137/146/150	37200 S 137/145/150	37200 S 137/145/150	37200 S 137/145/150
5	33112 R 125/135/142	35029 R 131/140/146	36831 R 136/145/149	37200 S 137/146/150	37200 S 137/145/150	37200 S 137/145/150	37200 S 137/145/150
10	32819 R 125/135/141	34714 R 130/140/145	36499 R 135/144/149	37200 S 137/146/150	37200 S 137/146/150	37200 S 137/146/150	37200 S 137/146/150
15	32533 R 124/134/140	34405 R 129/139/144	36176 R 134/143/148	37200 S 137/146/150	37200 S 137/146/150	37200 S 137/146/150	37200 S 137/146/150
20	32254 R 123/133/140	34109 R 129/138/144	35860 R 134/143/147	37200 S 137/146/150	37200 S 137/146/150	37200 S 137/146/150	37200 S 137/146/150
25	31982 R 122/133/139	33820 R 128/137/143	35552 R 133/142/147	37188 R 137/146/150	37200 S 137/146/150	37200 S 137/146/150	37200 S 137/146/150
30	31370 R 121/131/138	33175 R 127/136/142	34863 R 132/141/145	36474 R 136/145/149	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150
35	30217 R 120/129/135	31960 R 125/134/139	33578 R 130/138/143	35138 R 134/142/146	36531 R 138/145/149	37139 A 140/147/150	37139 A 140/147/150
40	29029 R 118/127/133	30711 R 124/132/136	33279 R 128/136/140	33747 R 133/140/143	34827 A 136/142/145	34827 A 136/142/145	34827 A 136/142/145
45	27802 R 116/125/130	29422 R 122/129/133	30945 R 126/133/137	32260 R 131/137/140	32994 A 133/139/141	32994 A 133/138/141	32994 A 133/138/141
50.A	26601 R 115/122/127	28160 R 120/127/131	29613 R 124/131/134	30812 R 129/134/137	31298 A 130/135/138	31298 A 130/135/138	31298 A 130/135/138
55.A	25442 R 113/120/124	26950 R 118/124/128	28261 R 123/128/131	29427 R 127/131/133	29811 A 128/132/134	29811 A 128/132/134	29811 A 128/132/134
60.A	24392 R 111/118/122	25854 R 116/122/125	27043 R 121/125/128	28045 W 124/128/130	28045 W 124/128/130	28045 W 124/128/130	28045 W 124/128/130

For A/Ice ON, decrease weight by 200 kg.

SIMPLIFIED TAKEOFF ANALYSIS TABLES
EMBRAER 170 – CF34-8E5 – T/O-1 MODE – JAA CERTIFICATION
FLAPS 2 – V2/Vs = 1.20 – DRY RUNWAY – ANTI ICE OFF – A/C On

AIRPORT PRESSURE ALTITUDE: 1500 FT.

Temp (°C)	RUNWAY LENGTH (m)						
	TAKEOFF WEIGHT(kg) – LIMITATION CODE						
	V1/VR/V2 (KIAS)						
	1600	1800	2000	2200	2400	2600	2800
-20	34087 R 129/138/144	36083 R 134/143/148	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150
-15	33783 R 128/137/143	35755 R 134/142/147	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150
-10	33487 R 127/137/142	35436 R 133/142/146	37200 S 137/146/150	37200 S 137/146/150	37200 S 137/146/150	37200 S 137/146/150	37200 S 137/146/150
-5	33197 R 126/136/142	35125 R 132/141/146	36937 R 137/145/150	37200 S 137/146/150	37200 S 137/146/150	37200 S 137/146/150	37200 S 137/146/150
0	32911 R 125/135/141	34817 R 131/140/145	36612 R 136/144/149	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150
5	32623 R 124/134/141	34507 R 130/139/145	36286 R 135/144/148	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150
10	32338 R 124/134/140	34202 R 129/139/144	35963 R 134/143/148	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150
15	32059 R 123/133/139	33907 R 128/138/143	35649 R 133/142/147	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150
20	31788 R 122/132/139	33620 R 128/137/143	35342 R 133/142/146	36975 R 137/145/150	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150
25	31523 R 121/132/138	33340 R 127/136/142	35041 R 132/141/146	36656 R 136/145/149	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150
30	30807 R 120/130/137	32581 R 126/135/140	34231 R 131/139/144	35813 R 135/143/147	37200 S 139/146/150	37200 S 139/146/150	37200 S 139/146/150
35	29705 R 119/128/134	31421 R 124/133/138	33011 R 129/137/141	34537 R 133/141/145	35896 R 137/144/147	36487 A 139/146/149	36487 A 139/145/149
40	28530 R 117/126/131	30185 R 123/131/135	31726 R 127/135/139	33169 R 131/138/142	34256 A 135/141/144	34256 A 135/141/144	34256 A 135/141/144
45	27317 R 115/124/129	28910 R 121/128/132	30406 R 125/132/136	31697 R 130/136/139	32321 A 132/137/140	32321 A 132/137/140	32321 A 132/137/140
50.A	26149 R 114/121/126	27681 R 119/126/129	29112 R 123/130/133	30290 R 128/133/135	30675 A 129/134/136	30675 A 129/133/136	30675 A 129/133/136
55.A	25004 R 112/119/123	26485 R 117/123/127	27775 R 122/127/130	28920 R 126/130/132	29189 A 127/130/133	29189 A 127/130/133	29189 A 127/130/133
60.A	23990 R 110/117/121	25426 R 115/121/124	26598 R 120/124/127	27618 W 123/127/129	27618 W 123/127/129	27618 W 123/127/129	27618 W 123/127/129

For A/Ice ON, decrease weight by 200 kg.

SIMPLIFIED TAKEOFF ANALYSIS TABLES
EMBRAER 170 – CF34-8E5 – T/O-1 MODE – JAA CERTIFICATION
FLAPS 2 – V2/Vs = 1.20 – DRY RUNWAY – ANTI ICE OFF – A/C ON

AIRPORT PRESSURE ALTITUDE: 2000 FT.

Temp (°C)	RUNWAY LENGTH (m)						
	TAKEOFF WEIGHT(kg) – LIMITATION CODE						
	V1/VR/V2 (KIAS)						
	1600	1800	2000	2200	2400	2600	2800
-20	33564 R 128/137/143	35522 R 133/142/147	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150
-15	33265 R 127/136/142	35200 R 132/141/146	37031 R 137/146/150	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150
-10	32975 R 126/135/141	34889 R 132/140/145	36697 R 137/145/149	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150
-5	32692 R 125/135/141	34585 R 131/140/145	36371 R 136/144/148	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150
0	32417 R 124/134/140	34290 R 130/139/144	36060 R 135/143/148	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150
5	32136 R 123/133/139	33993 R 129/138/143	35743 R 134/143/147	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150
10	31858 R 123/133/139	33698 R 128/137/143	35429 R 133/142/146	37080 R 138/146/150	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150
15	31587 R 122/132/138	33413 R 127/137/142	35124 R 132/141/146	36753 R 137/145/149	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150
20	31324 R 121/131/138	33133 R 127/136/142	34825 R 132/140/145	36436 R 136/144/149	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150
25	31065 R 120/131/137	32860 R 126/135/141	34533 R 131/140/145	36125 R 135/144/148	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150
30	30247 R 119/129/135	31991 R 125/134/139	33611 R 129/138/143	35157 R 134/142/146	36637 R 138/145/149	37200 S 140/147/150	37200 S 140/147/150
35	29197 R 118/127/133	30884 R 123/132/137	32448 R 128/136/140	33946 R 132/140/143	35266 R 136/143/146	35841 A 138/144/147	35841 A 138/144/147
40	28033 R 116/125/130	29662 R 121/129/134	31177 R 126/134/137	32594 R 130/137/140	33691 A 134/140/143	33691 A 134/140/143	33691 A 134/140/143
45	26834 R 114/122/127	28399 R 120/127/131	29872 R 124/131/134	31139 R 128/134/137	31644 A 130/136/138	31644 A 130/135/138	31644 A 130/135/138
50.A	25700 R 113/120/125	27205 R 118/125/128	28616 R 122/129/132	29772 R 127/132/134	30041 A 128/132/135	30041 A 128/132/135	30041 A 128/132/135
55.A	24569 R 111/118/122	26025 R 116/122/126	27292 R 120/126/129	28419 R 125/129/131	28563 A 125/129/132	28563 A 125/129/132	28563 A 125/129/132
60.A	23590 R 109/116/120	25002 R 114/120/123	26157 R 119/123/126	27237 W 123/126/128	27237 W 123/126/128	27237 W 123/126/128	27237 W 123/126/128

For A/Ice ON, decrease weight by 200 kg.

SIMPLIFIED TAKEOFF ANALYSIS TABLES
EMBRAER 170 – CF34-8E5 – T/O-1 MODE – JAA CERTIFICATION
FLAPS 2 – V2/VS =1.20 – DRY RUNWAY – ANTI ICE OFF – A/C ON

AIRPORT PRESSURE ALTITUDE: 2500 FT.

Temp (°C)	RUNWAY LENGTH (m)						
	TAKEOFF WEIGHT(kg) – LIMITATION CODE						
	V1/VR/V2 (KIAS)						
	1600	1800	2000	2200	2400	2600	2800
-20	33058 R 127/136/141	34979 R 132/141/146	36805 R 137/145/149	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150
-15	32765 R 126/135/141	34663 R 131/140/145	36466 R 136/145/149	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150
-10	32478 R 125/134/140	34355 R 131/139/144	36137 R 136/144/148	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150
-5	32196 R 124/134/140	34057 R 130/139/144	35812 R 135/143/147	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150
0	31920 R 123/133/139	33765 R 129/138/143	35500 R 134/142/147	37165 R 138/146/150	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150
5	31641 R 122/132/138	33469 R 128/137/142	35183 R 133/142/146	36829 R 137/145/149	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150
10	31366 R 122/132/138	33180 R 127/136/142	34874 R 132/141/145	36500 R 137/145/149	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150
15	31099 R 121/131/137	32896 R 126/136/141	34573 R 131/140/145	36179 R 136/144/148	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150
20	30837 R 120/130/137	32620 R 126/135/141	34279 R 130/139/144	35864 R 135/143/147	37200 S 138/146/150	37200 S 138/146/150	37200 S 138/146/150
25	30520 R 119/129/136	32284 R 125/134/140	33927 R 130/139/143	35486 R 134/142/147	36991 R 138/146/150	37200 S 139/146/150	37200 S 139/146/150
30	29653 R 118/128/134	31368 R 123/132/138	32959 R 128/137/141	34469 R 133/141/144	35907 R 137/144/147	37139 R 140/147/150	37200 S 140/147/150
35	28637 R 117/126/132	30296 R 122/131/135	31831 R 127/135/139	33303 R 131/138/142	34577 R 135/142/145	34983 A 136/143/146	34983 A 136/142/146
40	27511 R 115/124/129	29113 R 120/128/133	30601 R 125/132/136	31991 R 129/136/139	32986 A 133/138/141	32986 A 133/138/141	32986 A 133/138/141
45	26371 R 113/121/126	27907 R 119/126/130	29357 R 123/130/133	30602 R 127/133/136	31036 A 129/134/137	31036 A 129/134/137	31036 A 129/134/137
50.A	25281 R 112/119/124	26760 R 117/124/127	28153 R 121/127/131	29290 R 126/131/133	29405 A 126/131/133	29405 A 126/131/133	29405 A 126/131/133
55.A	24201 R 110/117/121	25633 R 115/121/125	26886 R 120/125/128	27864 A 123/127/130	27864 A 123/127/130	27864 A 123/127/130	27864 A 123/127/130
60.A	23252 R 109/115/119	24641 R 113/119/122	25783 R 118/122/125	26604 A 121/125/127	26604 A 121/124/127	26604 A 121/124/127	26604 A 121/124/127

For A/Ice ON, decrease weight by 200 kg.

SIMPLIFIED TAKEOFF ANALYSIS TABLES

EMBRAER 170 – CF34-8E5 – T/O-1 MODE – JAA CERTIFICATION
FLAPS 2 – V2/VS = 1.20 – DRY RUNWAY – ANTI ICE OFF – A/C ON

AIRPORT PRESSURE ALTITUDE: 3000 FT.

Temp (°C)	RUNWAY LENGTH (m)						
	TAKEOFF WEIGHT(kg) – LIMITATION CODE						
	V1/VR/V2 (KIAS)						
	1600	1800	2000	2200	2400	2600	2800
-20	32555 R 126/135/140	34438 R 131/140/144	36237 R 136/144/148	37200 S 139/146/150	37200 S 139/146/150	37200 S 139/146/150	37200 S 139/146/150
-15	32267 R 125/134/140	34133 R 130/139/144	35906 R 135/143/147	37200 S 139/146/150	37200 S 139/146/150	37200 S 139/146/150	37200 S 139/146/150
-10	31985 R 124/133/139	33835 R 129/138/143	35580 R 134/143/147	37200 S 139/146/150	37200 S 139/146/150	37200 S 139/146/150	37200 S 139/146/150
-5	31703 R 123/133/139	33536 R 129/138/143	35256 R 134/142/146	36916 R 138/146/150	37200 S 139/146/150	37200 S 139/146/150	37200 S 139/146/150
0	31427 R 122/132/138	33243 R 128/137/142	34943 R 133/141/145	36582 R 137/145/149	37200 S 139/146/150	37200 S 139/146/150	37200 S 139/146/150
5	31149 R 121/131/137	32950 R 127/136/141	34629 R 132/140/145	36249 R 136/144/148	37200 S 139/147/150	37200 S 139/146/150	37200 S 139/146/150
10	30877 R 121/130/137	32663 R 126/135/141	34323 R 131/140/144	35924 R 135/144/148	37200 S 139/147/150	37200 S 139/146/150	37200 S 139/146/150
15	30613 R 120/130/136	32383 R 125/135/140	34031 R 130/139/144	35608 R 135/143/147	37116 R 139/146/150	37200 S 139/147/150	37200 S 139/146/150
20	30354 R 119/129/136	32110 R 125/134/139	33744 R 129/138/143	35298 R 134/142/146	36794 R 138/146/149	37200 S 139/147/150	37200 S 139/146/150
25	29975 R 118/128/135	31711 R 124/133/139	33326 R 129/137/142	34850 R 133/141/145	36330 R 137/145/148	37200 S 139/147/150	37200 S 139/147/150
30	29062 R 117/126/133	30746 R 122/131/136	32309 R 127/135/140	33791 R 131/139/143	35180 R 135/143/146	36224 A 139/145/148	36224 A 139/145/148
35	28079 R 116/125/130	29710 R 121/129/134	31217 R 126/133/138	32662 R 130/137/141	33904 R 134/140/143	34215 A 135/141/144	34215 A 135/141/144
40	26992 R 114/123/128	28565 R 119/127/132	30027 R 124/131/135	31389 R 128/135/138	32292 A 131/137/140	32292 A 131/137/140	32292 A 131/137/140
45.A	25910 R 112/120/125	27419 R 118/125/129	28845 R 122/129/132	30068 R 126/132/135	30442 A 128/133/136	30442 A 128/133/136	30442 A 128/133/136
50.A	24866 R 111/118/123	26319 R 116/123/126	27693 R 120/126/130	28778 A 124/129/132	28778 A 124/129/132	28778 A 124/129/132	28778 A 124/129/132
55.A	23838 R 109/116/120	25245 R 114/120/124	26485 R 119/124/127	27166 A 121/126/128	27166 A 121/125/128	27166 A 121/125/128	27166 A 121/125/128
60.A	***** ***/**/***	***** ***/**/***	***** ***/**/***	***** ***/**/***	***** ***/**/***	***** ***/**/***	***** ***/**/***

For A/Ice ON, decrease weight by 200 kg.

SIMPLIFIED TAKEOFF ANALYSIS TABLES
EMBRAER 170 – CF34-8E5 – T/O-1 MODE – JAA CERTIFICATION
FLAPS 2 – V2/VS =1.20 – DRY RUNWAY – ANTI ICE OFF – A/C ON

AIRPORT PRESSURE ALTITUDE: 3500 FT.

Temp (°C)	RUNWAY LENGTH (m)						
	TAKEOFF WEIGHT(kg) – LIMITATION CODE						
	V1/VR/V2 (KIAS)						
	1600	1800	2000	2200	2400	2600	2800
-20	32051 R 125/134/139	33904 R 130/139/143	35669 R 135/143/147	37200 S 139/147/150	37200 S 139/146/150	37200 S 139/146/150	37200 S 139/146/150
-15	31766 R 124/133/139	33604 R 129/138/143	35340 R 134/142/146	37003 R 139/146/150	37200 S 139/147/150	37200 S 139/146/150	37200 S 139/146/150
-10	31488 R 123/132/138	33309 R 128/137/142	35020 R 133/142/146	36669 R 138/145/149	37200 S 139/147/150	37200 S 139/146/150	37200 S 139/146/150
-5	31213 R 122/132/138	33019 R 128/136/141	34704 R 133/141/145	36339 R 137/145/148	37200 S 139/147/150	37200 S 139/146/150	37200 S 139/146/150
0	30940 R 121/131/137	32730 R 127/136/141	34396 R 132/140/144	36011 R 136/144/148	37200 S 139/147/150	37200 S 139/147/150	37200 S 139/146/150
5	30666 R 120/130/136	32442 R 126/135/140	34092 R 131/139/144	35683 R 135/143/147	37163 R 139/147/150	37200 S 139/147/150	37200 S 139/147/150
10	30399 R 120/129/136	32159 R 125/134/140	33796 R 130/139/143	35364 R 134/142/146	36859 R 138/146/149	37200 S 139/147/150	37200 S 139/147/150
15	30137 R 119/129/135	31883 R 124/134/139	33506 R 129/138/142	35050 R 134/142/146	36538 R 137/145/149	37200 S 139/147/150	37200 S 139/147/150
20	29868 R 118/128/135	31602 R 124/133/138	33214 R 128/137/142	34738 R 133/141/145	36216 R 137/145/148	37200 S 139/147/150	37200 S 139/147/150
25	29390 R 117/127/133	31097 R 123/132/137	32683 R 127/136/141	34176 R 132/140/144	35625 R 136/143/147	36889 R 139/146/150	37200 S 140/147/150
30	28509 R 116/125/131	30166 R 121/130/135	31700 R 126/134/139	33157 R 130/138/142	34500 R 134/141/145	35353 A 137/143/146	35353 A 137/143/146
35	27550 R 114/123/129	29154 R 120/128/133	30635 R 124/132/136	32054 R 129/136/139	33273 R 133/139/142	33550 A 134/140/143	33550 A 134/139/143
40	26514 R 113/121/127	28058 R 118/126/130	29498 R 123/130/134	30836 R 127/134/137	31742 A 130/136/139	31742 A 130/136/139	31742 A 130/136/139
45.A	25486 R 111/119/124	26970 R 117/124/128	28374 R 121/128/131	29582 R 125/131/134	30002 A 127/132/135	30002 A 127/132/135	30002 A 127/132/135
50.A	24479 R 110/117/122	25907 R 115/122/125	27267 R 119/125/129	28343 A 123/128/131	28343 A 123/128/131	28343 A 123/128/131	28343 A 123/128/131
55.A	23512 R 108/115/119	24898 R 113/119/123	26133 R 118/123/126	26800 A 120/125/127	26800 A 120/125/127	26800 A 120/125/127	26800 A 120/125/127
60.A	***** *** / *** / ***	***** *** / *** / ***	***** *** / *** / ***	***** *** / *** / ***	***** *** / *** / ***	***** *** / *** / ***	***** *** / *** / ***

For A/c On, decrease weight by 200 kg.

SIMPLIFIED TAKEOFF ANALYSIS TABLES
EMBRAER170 – CF34-8E5 – T/O-1 MODE – JAA CERTIFICATION FLAPS 2 –
V2/Vs =1.20 – DRY RUNWAY – ANTI ICE OFF – A/C ON

AIRPORT PRESSURE ALTITUDE: 4000 FT.

Temp (°C)	RUNWAY LENGTH (m)						
	TAKEOFF WEIGHT(kg) – LIMITATION CODE						
	V1/VR/V2 (KIAS)						
	1600	1800	2000	2200	2400	2600	2800
-20	31550 R 124/133/138	33376 R 129/138/142	35104 R 134/142/146	36733 R 138/146/149	37200 S 140/147/150	37200 S 140/147/150	37200 S 140/147/150
-15	31267 R 123/132/138	33078 R 128/137/142	34778 R 133/141/145	36417 R 138/145/149	37200 S 140/147/150	37200 S 140/147/150	37200 S 140/147/150
-10	30992 R 122/131/137	32788 R 127/136/141	34463 R 132/140/145	36087 R 137/144/148	37200 S 140/147/150	37200 S 140/147/150	37200 S 140/147/150
-5	30725 R 121/130/136	32505 R 127/135/140	34159 R 131/140/144	35766 R 136/144/147	37193 R 140/147/150	37200 S 140/147/150	37200 S 140/147/150
0	30454 R 120/130/136	32220 R 126/135/140	33861 R 131/139/143	35443 R 135/143/147	36886 R 139/146/150	37200 S 140/147/150	37200 S 140/147/150
5	30185 R 119/129/135	31935 R 125/134/139	33562 R 130/138/143	35121 R 134/142/146	36579 R 138/146/149	37200 S 140/147/150	37200 S 140/147/150
10	29917 R 119/128/135	31653 R 124/133/139	33267 R 129/137/142	34803 R 133/141/145	36277 R 137/145/148	37200 S 140/147/150	37200 S 140/147/150
15	29652 R 118/128/134	31375 R 123/132/138	32976 R 128/137/141	34490 R 132/141/145	35956 R 136/144/148	37200 S 140/147/150	37200 S 140/147/150
20	29372 R 117/127/133	31083 R 123/132/137	32671 R 127/136/141	34168 R 132/140/144	35622 R 136/143/147	36888 R 139/146/150	37200 S 140/147/150
25	28808 R 116/126/132	30486 R 121/131/136	32042 R 126/135/139	33509 R 131/139/143	34924 R 134/142/145	36150 R 138/145/148	36286 A 138/145/148
30	27959 R 115/124/130	29588 R 120/129/134	31095 R 125/133/137	32525 R 129/137/140	33839 R 133/140/143	34520 A 135/142/145	34520 A 135/141/145
35	27026 R 113/122/128	28601 R 119/127/132	30055 R 123/131/135	31449 R 127/135/138	32644 R 131/138/141	32888 A 132/138/141	32888 A 132/138/141
40	26039 R 112/120/126	27557 R 117/125/129	28972 R 122/129/132	30286 R 126/132/135	31205 A 129/135/138	31205 A 129/135/138	31205 A 129/135/138
45.A	25064 R 111/118/123	26525 R 116/123/127	27906 R 120/127/130	29100 R 124/130/133	29577 A 126/131/134	29577 A 126/131/134	29577 A 126/131/134
50.A	24094 R 109/116/121	25498 R 114/121/124	26841 R 118/124/128	27911 A 122/127/130	27911 A 122/127/130	27911 A 122/127/130	27911 A 122/127/130
55.A	23188 R 108/114/119	24554 R 112/119/122	25784 R 117/122/125	26441 A 119/124/127	26441 A 119/124/127	26441 A 119/124/127	26441 A 119/124/127
60.A	***** *** / *** / ***	***** *** / *** / ***	***** *** / *** / ***	***** *** / *** / ***	***** *** / *** / ***	***** *** / *** / ***	***** *** / *** / ***

For A/Ice ON, decrease weight by 200 kg.

SIMPLIFIED TAKEOFF ANALYSIS TABLES
EMBRAER 170 – CF34-8E5 – T/O-1 MODE – JAA CERTIFICATION
FLAPS 4 – V2/Vs =1.19 – DRY RUNWAY – ANTI ICE OFF – A/C ON

AIRPORT PRESSURE ALTITUDE: SEA LEVEL.

Temp (°C)	RUNWAY LENGTH (m)						
	TAKEOFF WEIGHT(kg) – LIMITATION CODE						
	V1/VR/V2 (KIAS)						
	1600	1800	2000	2200	2400	2600	2800
-20	37200 S 122/124/129	37200 S 122/124/129	37200 S 122/124/129	37200 S 122/124/129	37200 S 122/124/129	37200 S 122/124/129	37200 S 122/124/129
-15	37200 S 122/124/129	37200 S 122/124/129	37200 S 122/124/129	37200 S 122/124/129	37200 S 122/124/129	37200 S 122/124/129	37200 S 122/124/129
-10	37200 S 122/124/129	37200 S 122/124/129	37200 S 122/124/129	37200 S 122/124/129	37200 S 122/124/129	37200 S 122/124/129	37200 S 122/124/129
-5	37200 S 122/124/129	37200 S 122/124/129	37200 S 122/124/129	37200 S 122/124/129	37200 S 122/124/129	37200 S 122/124/129	37200 S 122/124/129
0	37200 S 122/125/129	37200 S 122/124/129	37200 S 122/124/129	37200 S 122/124/129	37200 S 122/124/129	37200 S 122/124/129	37200 S 122/124/129
5	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129
10	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129
15	36928 R 121/124/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129
20	36593 R 120/124/128	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129
25	36265 R 120/123/128	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129
30	35946 R 119/122/127	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129
35	34502 R 117/120/125	36166 W 121/124/128	36166 W 121/124/128	36166 W 121/124/128	36166 W 121/124/128	36166 W 121/124/128	36166 W 121/124/128
40	33164 R 116/118/122	33763 W 117/120/123	33763 W 117/120/123	33763 W 117/120/123	33763 W 117/120/123	33763 W 117/120/123	33763 W 117/120/123
45	31669 W 114/116/119	31669 W 114/116/119	31669 W 114/116/119	31669 W 114/116/119	31669 W 114/116/119	31669 W 114/116/119	31669 W 114/116/119
50	29568 W 110/112/115	29568 W 110/112/115	29568 W 110/112/115	29568 W 110/112/115	29568 W 110/112/115	29568 W 110/112/115	29568 W 110/112/115
55.A	27711 W 107/108/112	27711 W 107/108/112	27711 W 107/108/112	27711 W 107/108/112	27711 W 107/108/112	27711 W 107/108/112	27711 W 107/108/112
60.A	25953 W 104/105/108	25953 W 104/105/108	25953 W 104/105/108	25953 W 104/105/108	25953 W 104/105/108	25953 W 104/105/108	25953 W 104/105/108

For A/Ice ON, there is no weight penalty.

SIMPLIFIED TAKEOFF ANALYSIS TABLES
EMBRAER 170 – CF34-8E5 – T/O-1 MODE – JAA CERTIFICATION
FLAPS 4 – V2/Vs =1.19 – DRY RUNWAY – ANTI ICE OFF – A/C On

AIRPORT PRESSURE ALTITUDE: 500 FT.

Temp (°C)	RUNWAY LENGTH (m)						
	TAKEOFF WEIGHT(kg) – LIMITATION CODE						
	V1/VR/V2 (KIAS)						
	1600	1800	2000	2200	2400	2600	2800
-20	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129
-15	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129
-10	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129
-5	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129
0	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129
5	37070 R 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129
10	36727 R 121/124/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129
15	36392 R 120/123/128	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129
20	36066 R 119/123/127	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129
25	35749 R 119/122/127	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129
30	35238 R 118/121/126	37200 S 123/126/129	37200 S 123/125/129	37200 S 123/125/129	37200 S 123/125/129	37200 S 123/125/129	37200 S 123/125/129
35	33879 R 116/119/123	35339 W 120/122/126	35339 W 120/122/126	35339 W 120/122/126	35339 W 120/122/126	35339 W 120/122/126	35339 W 120/122/126
40	32556 R 115/117/121	33129 W 116/119/122	33129 W 116/119/122	33129 W 116/119/122	33129 W 116/119/122	33129 W 116/119/122	33129 W 116/119/122
45	31090 W 113/115/118	31090 W 113/115/118	31090 W 113/115/118	31090 W 113/115/118	31090 W 113/115/118	31090 W 113/115/118	31090 W 113/115/118
50.A	29076 W 109/111/114	29076 W 109/111/114	29076 W 109/111/114	29076 W 109/111/114	29076 W 109/111/114	29076 W 109/111/114	29076 W 109/111/114
55.A	27202 W 106/107/111	27202 W 106/107/111	27202 W 106/107/111	27202 W 106/107/111	27202 W 106/107/111	27202 W 106/107/111	27202 W 106/107/111
60.A	25481 W 103/104/107	25481 W 103/104/107	25481 W 103/104/107	25481 W 103/104/107	25481 W 103/104/107	25481 W 103/104/107	25481 W 103/104/107

For A/Ice ON, decrease weight by 100 kg.

SIMPLIFIED TAKEOFF ANALYSIS TABLES
EMBRAER 170 – CF34-8E5 – T/O-1 MODE – JAA CERTIFICATION
FLAPS 4 – V2/VS =1.19 – DRY RUNWAY – ANTI ICE OFF – A/C ON

AIRPORT PRESSURE ALTITUDE: 1000 FT.

Temp (°C)	RUNWAY LENGTH (m)						
	TAKEOFF WEIGHT(kg) – LIMITATION CODE V1/VR/V2 (KIAS)						
	1600	1800	2000	2200	2400	2600	2800
-20	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129
-15	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129
-10	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129
-5	37192 R 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129
0	36856 R 122/124/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129
5	36522 R 121/124/128	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129
10	36189 R 120/123/128	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129
15	35863 R 119/122/127	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129
20	35547 R 118/122/126	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129
25	35237 R 118/121/126	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129	37200 S 122/125/129
30	34539 R 117/120/125	36679 R 122/125/128	36943 W 123/125/129	36943 W 123/125/129	36943 W 123/125/129	36943 W 123/125/129	36943 W 123/125/129
35	33261 R 115/118/122	34612 W 119/121/125	34612 W 119/121/125	34612 W 119/121/125	34612 W 119/121/125	34612 W 119/121/125	34612 W 119/121/125
40	31952 R 114/116/120	32565 W 115/118/121	32565 W 115/118/121	32565 W 115/118/121	32565 W 115/118/121	32565 W 115/118/121	32565 W 115/118/121
45	30552 W 112/114/117	30552 W 112/114/117	30552 W 112/114/117	30552 W 112/114/117	30552 W 112/114/117	30552 W 112/114/117	30552 W 112/114/117
50.A	28603 W 109/110/113	28603 W 109/110/113	28603 W 109/110/113	28603 W 109/110/113	28603 W 109/110/113	28603 W 109/110/113	28603 W 109/110/113
55.A	26748 W 105/106/110	26748 W 105/106/110	26748 W 105/106/110	26748 W 105/106/110	26748 W 105/106/110	26748 W 105/106/110	26748 W 105/106/110
60.A	25092 W 102/103/106	25092 W 102/103/106	25092 W 102/103/106	25092 W 102/103/106	25092 W 102/103/106	25092 W 102/103/106	25092 W 102/103/106

For A/Ice ON, decrease weight by 100 kg.

SIMPLIFIED TAKEOFF ANALYSIS TABLES
EMBRAER 170 – CF34-8E5 – T/O-1 MODE – JAA CERTIFICATION
FLAPS 4 – V2/Vs = 1.19 – DRY RUNWAY – ANTI ICE OFF – A/C ON

AIRPORT PRESSURE ALTITUDE: 1500 FT.

Temp (°C)	RUNWAY LENGTH (m)						
	TAKEOFF WEIGHT(kg) – LIMITATION CODE						
	V1/VR/V2 (KIAS)						
	1600	1800	2000	2200	2400	2600	2800
-20	37200 S 123/125/129	37200 S 123/125/129	37200 S 123/125/129	37200 S 123/125/129	37200 S 123/125/129	37200 S 123/125/129	37200 S 123/125/129
-15	37200 S 123/125/129	37200 S 123/125/129	37200 S 123/125/129	37200 S 123/125/129	37200 S 123/125/129	37200 S 123/125/129	37200 S 123/125/129
-10	36937 R 122/125/129	37200 S 123/125/129	37200 S 123/125/129	37200 S 123/125/129	37200 S 123/125/129	37200 S 123/125/129	37200 S 123/125/129
-5	36607 R 121/124/128	37200 S 123/125/129	37200 S 123/125/129	37200 S 123/125/129	37200 S 123/125/129	37200 S 123/125/129	37200 S 123/125/129
0	36282 R 121/124/128	37200 S 123/125/129	37200 S 123/125/129	37200 S 123/125/129	37200 S 123/125/129	37200 S 123/125/129	37200 S 123/125/129
5	35956 R 120/123/127	37200 S 123/125/129	37200 S 123/125/129	37200 S 123/125/129	37200 S 123/125/129	37200 S 123/125/129	37200 S 123/125/129
10	35630 R 119/122/127	37200 S 123/126/129	37200 S 123/125/129	37200 S 123/125/129	37200 S 123/125/129	37200 S 123/125/129	37200 S 123/125/129
15	35314 R 118/121/126	37200 S 123/126/129	37200 S 123/125/129	37200 S 123/125/129	37200 S 123/125/129	37200 S 123/125/129	37200 S 123/125/129
20	35008 R 117/121/125	37180 R 123/126/129	37200 S 123/126/129	37200 S 123/126/129	37200 S 123/126/129	37200 S 123/126/129	37200 S 123/126/129
25	34708 R 117/120/125	36858 R 122/125/129	37200 S 123/126/129	37200 S 123/126/129	37200 S 123/126/129	37200 S 123/126/129	37200 S 123/126/129
30	33912 R 116/119/124	36000 R 121/124/127	36112 W 121/124/127	36112 W 121/124/127	36112 W 121/124/127	36112 W 121/124/127	36112 W 121/124/127
35	32700 R 114/117/121	34002 W 118/120/124	34002 W 118/120/124	34002 W 118/120/124	34002 W 118/120/124	34002 W 118/120/124	34002 W 118/120/124
40	31408 R 113/115/119	32034 W 115/117/120	32034 W 115/117/120	32034 W 115/117/120	32034 W 115/117/120	32034 W 115/117/120	32034 W 115/117/120
45	30029 W 111/113/116	30029 W 111/113/116	30029 W 111/113/116	30029 W 111/113/116	30029 W 111/113/116	30029 W 111/113/116	30029 W 111/113/116
50.A	28137 W 108/109/113	28137 W 108/109/113	28137 W 108/109/113	28137 W 108/109/113	28137 W 108/109/113	28137 W 108/109/113	28137 W 108/109/113
55.A	26316 W 104/106/109	26316 W 104/106/109	26316 W 104/106/109	26316 W 104/106/109	26316 W 104/106/109	26316 W 104/106/109	26316 W 104/106/109
60.A	24736 W 101/102/105	24736 W 101/102/105	24736 W 101/102/105	24736 W 101/102/105	24736 W 101/102/105	24736 W 101/102/105	24736 W 101/102/105

For A/Ice ON, decrease weight by 100 kg.

SIMPLIFIED TAKEOFF ANALYSIS TABLES
EMBRAER 170 – CF34-8E5 – T/O-1 MODE – JAA CERTIFICATION
FLAPS 4 – V2/Vs =1.19 – DRY RUNWAY – ANTI ICE OFF – A/C On

AIRPORT PRESSURE ALTITUDE: 2000 FT.

Temp (°C)	RUNWAY LENGTH (m)						
	TAKEOFF WEIGHT(kg) – LIMITATION CODE V1/VR/V2 (KIAS)						
	1600	1800	2000	2200	2400	2600	2800
-20	37026 R 123/125/129	37174 W 123/125/129	37174 W 123/125/129	37174 W 123/125/129	37174 W 123/125/129	37174 W 123/125/129	37174 W 123/125/129
-15	36682 R 122/125/128	37155 W 123/125/129	37155 W 123/125/129	37155 W 123/125/129	37155 W 123/125/129	37155 W 123/125/129	37155 W 123/125/129
-10	36350 R 121/124/128	37135 W 123/125/129	37135 W 123/125/129	37135 W 123/125/129	37135 W 123/125/129	37135 W 123/125/129	37135 W 123/125/129
-5	36026 R 120/123/127	37093 W 123/125/129	37093 W 123/125/129	37093 W 123/125/129	37093 W 123/125/129	37093 W 123/125/129	37093 W 123/125/129
0	35712 R 120/123/127	37051 W 123/125/129	37051 W 123/125/129	37051 W 123/125/129	37051 W 123/125/129	37051 W 123/125/129	37051 W 123/125/129
5	35392 R 119/122/126	36993 W 123/125/129	36993 W 123/125/129	36993 W 123/125/129	36993 W 123/125/129	36993 W 123/125/129	36993 W 123/125/129
10	35075 R 118/121/126	36925 W 123/125/129	36925 W 123/125/129	36925 W 123/125/129	36925 W 123/125/129	36925 W 123/125/129	36925 W 123/125/129
15	34768 R 117/121/125	36858 W 122/125/129	36858 W 122/125/129	36858 W 122/125/129	36858 W 122/125/129	36858 W 122/125/129	36858 W 122/125/129
20	34468 R 117/120/125	36612 R 122/125/128	36790 W 122/125/129	36790 W 122/125/129	36790 W 122/125/129	36790 W 122/125/129	36790 W 122/125/129
25	34184 R 116/119/124	36299 R 121/124/128	36697 W 122/125/128	36697 W 122/125/128	36697 W 122/125/128	36697 W 122/125/128	36697 W 122/125/128
30	33297 R 115/118/122	35230 W 120/122/126	35230 W 120/122/126	35230 W 120/122/126	35230 W 120/122/126	35230 W 120/122/126	35230 W 120/122/126
35	32146 R 113/116/120	33357 W 117/119/123	33357 W 117/119/123	33357 W 117/119/123	33357 W 117/119/123	33357 W 117/119/123	33357 W 117/119/123
40	30868 R 112/114/118	31449 W 113/115/119	31449 W 113/115/119	31449 W 113/115/119	31449 W 113/115/119	31449 W 113/115/119	31449 W 113/115/119
45	29513 W 110/112/115	29513 W 110/112/115	29513 W 110/112/115	29513 W 110/112/115	29513 W 110/112/115	29513 W 110/112/115	29513 W 110/112/115
50.	27707 W 107/108/112	27707 W 107/108/112	27707 W 107/108/112	27707 W 107/108/112	27707 W 107/108/112	27707 W 107/108/112	27707 W 107/108/112
55.	25942 W 104/105/108	25942 W 104/105/108	25942 W 104/105/108	25942 W 104/105/108	25942 W 104/105/108	25942 W 104/105/108	25942 W 104/105/108
60.	24429 W 101/102/105	24429 W 101/102/105	24429 W 101/102/105	24429 W 101/102/105	24429 W 101/102/105	24429 W 101/102/105	24429 W 101/102/105

For A/Ice ON, decrease weight by 500 kg.

SIMPLIFIED TAKEOFF ANALYSIS TABLES

EMBRAER 170 – CF34-8E5 – T/O-1 MODE – JAA CERTIFICATION
FLAPS 4 – V2/VS =1.19 – DRY RUNWAY – ANTI ICE OFF – A/C ON

AIRPORT PRESSURE ALTITUDE: 2500 FT.

Temp (°C)	RUNWAY LENGTH (m)						
	TAKEOFF WEIGHT(kg) – LIMITATION CODE						
	V1/VR/V2 (KIAS)						
	1600	1800	2000	2200	2400	2600	2800
-20	36444 R 122/124/128	36590 W 122/124/128	36590 W 122/124/128	36590 W 122/124/128	36590 W 122/124/128	36590 W 122/124/128	36590 W 122/124/128
-15	36108 R 121/124/127	36575 W 122/124/128	36575 W 122/124/128	36575 W 122/124/128	36575 W 122/124/128	36575 W 122/124/128	36575 W 122/124/128
-10	35780 R 120/123/127	36559 W 122/124/128	36559 W 122/124/128	36559 W 122/124/128	36559 W 122/124/128	36559 W 122/124/128	36559 W 122/124/128
-5	35458 R 119/122/126	36501 W 122/124/128	36501 W 122/124/128	36501 W 122/124/128	36501 W 122/124/128	36501 W 122/124/128	36501 W 122/124/128
0	35148 R 119/122/126	36443 W 122/124/128	36443 W 122/124/128	36443 W 122/124/128	36443 W 122/124/128	36443 W 122/124/128	36443 W 122/124/128
5	34830 R 118/121/125	36374 W 122/124/128	36374 W 122/124/128	36374 W 122/124/128	36374 W 122/124/128	36374 W 122/124/128	36374 W 122/124/128
10	34518 R 117/120/125	36304 W 121/124/128	36304 W 121/124/128	36304 W 121/124/128	36304 W 121/124/128	36304 W 121/124/128	36304 W 121/124/128
15	34218 R 116/120/124	36234 W 121/124/128	36234 W 121/124/128	36234 W 121/124/128	36234 W 121/124/128	36234 W 121/124/128	36234 W 121/124/128
20	33932 R 116/119/124	36024 R 121/124/127	36163 W 121/124/128	36163 W 121/124/128	36163 W 121/124/128	36163 W 121/124/128	36163 W 121/124/128
25	33584 R 115/118/123	35641 R 120/123/127	35983 W 121/124/127	35983 W 121/124/127	35983 W 121/124/127	35983 W 121/124/127	35983 W 121/124/127
30	32640 R 114/117/121	34340 W 118/121/124	34340 W 118/121/124	34340 W 118/121/124	34340 W 118/121/124	34340 W 118/121/124	34340 W 118/121/124
35	31529 R 112/115/119	32682 W 115/118/121	32682 W 115/118/121	32682 W 115/118/121	32682 W 115/118/121	32682 W 115/118/121	32682 W 115/118/121
40	30293 R 111/113/117	30840 W 112/114/118	30840 W 112/114/118	30840 W 112/114/118	30840 W 112/114/118	30840 W 112/114/118	30840 W 112/114/118
45	28999 W 109/111/114	28999 W 109/111/114	28999 W 109/111/114	28999 W 109/111/114	28999 W 109/111/114	28999 W 109/111/114	28999 W 109/111/114
50.	27290 W 106/108/111	27290 W 106/108/111	27290 W 106/108/111	27290 W 106/108/111	27290 W 106/108/111	27290 W 106/108/111	27290 W 106/108/111
55.	25594 W 103/104/107	25594 W 103/104/107	25594 W 103/104/107	25594 W 103/104/107	25594 W 103/104/107	25594 W 103/104/107	25594 W 103/104/107
60.	24148 W 100/101/104	24148 W 100/101/104	24148 W 100/101/104	24148 W 100/101/104	24148 W 100/101/104	24148 W 100/101/104	24148 W 100/101/104

For A/Ice ON, decrease weight by 500 kg.

SIMPLIFIED TAKEOFF ANALYSIS TABLES
EMBRAER 170 – CF34-8E5 – T/O-1 MODE – JAA CERTIFICATION
FLAPS 4 – V2/VS =1.19 – DRY RUNWAY – ANTI ICE OFF – A/C ON

AIRPORT PRESSURE ALTITUDE: 3000 FT.

Temp (°C)	RUNWAY LENGTH (m)						
	TAKEOFF WEIGHT(kg) – LIMITATION CODE V1/VR/V2 (KIAS)						
	1600	1800	2000	2200	2400	2600	2800
-20	35866 R 121/123/127	35990 W 121/123/127	35990 W 121/123/127	35990 W 121/123/127	35990 W 121/123/127	35990 W 121/123/127	35990 W 121/123/127
-15	35536 R 120/123/126	35970 W 121/123/127	35970 W 121/123/127	35970 W 121/123/127	35970 W 121/123/127	35970 W 121/123/127	35970 W 121/123/127
-10	35213 R 119/122/126	35949 W 121/123/127	35949 W 121/123/127	35949 W 121/123/127	35949 W 121/123/127	35949 W 121/123/127	35949 W 121/123/127
-5	34897 R 119/121/125	35905 W 121/123/127	35905 W 121/123/127	35905 W 121/123/127	35905 W 121/123/127	35905 W 121/123/127	35905 W 121/123/127
0	34587 R 118/121/125	35853 W 121/123/127	35853 W 121/123/127	35853 W 121/123/127	35853 W 121/123/127	35853 W 121/123/127	35853 W 121/123/127
5	34273 R 117/120/124	35781 W 121/123/127	35781 W 121/123/127	35781 W 121/123/127	35781 W 121/123/127	35781 W 121/123/127	35781 W 121/123/127
10	33976 R 116/119/124	35709 W 120/123/127	35709 W 120/123/127	35709 W 120/123/127	35709 W 120/123/127	35709 W 120/123/127	35709 W 120/123/127
15	33686 R 115/119/123	35636 W 120/123/127	35636 W 120/123/127	35636 W 120/123/127	35636 W 120/123/127	35636 W 120/123/127	35636 W 120/123/127
20	33402 R 115/118/123	35443 R 120/123/126	35539 W 120/123/126	35539 W 120/123/126	35539 W 120/123/126	35539 W 120/123/126	35539 W 120/123/126
25	32987 R 114/117/122	34984 R 119/122/125	35099 W 119/122/126	35099 W 119/122/126	35099 W 119/122/126	35099 W 119/122/126	35099 W 119/122/126
30	31988 R 113/116/120	33632 W 117/120/123	33632 W 117/119/123	33632 W 117/119/123	33632 W 117/119/123	33632 W 117/119/123	33632 W 117/119/123
35	30914 R 111/114/118	32042 W 114/117/120	32042 W 114/117/120	32042 W 114/117/120	32042 W 114/117/120	32042 W 114/117/120	32042 W 114/117/120
40	29723 R 110/112/116	30283 W 111/113/117	30283 W 111/113/117	30283 W 111/113/117	30283 W 111/113/117	30283 W 111/113/117	30283 W 111/113/117
45.A	28539 R 108/110/113	28543 W 108/110/113	28543 W 108/110/113	28543 W 108/110/113	28543 W 108/110/113	28543 W 108/110/113	28543 W 108/110/113
50.A	26905 W 105/107/110	26905 W 105/107/110	26905 W 105/107/110	26905 W 105/107/110	26905 W 105/107/110	26905 W 105/107/110	26905 W 105/107/110
55.A	25306 W 102/104/107	25306 W 102/104/107	25306 W 102/104/107	25306 W 102/104/107	25306 W 102/104/107	25306 W 102/104/107	25306 W 102/104/107
60.A	***** ***j***j***	***** ***j***j***	***** ***j***j***	***** ***j***j***	***** ***j***j***	***** ***j***j***	***** ***j***j***

For A/Ice ON, decrease weight by 400 kg.

SIMPLIFIED TAKEOFF ANALYSIS TABLES

**EMBRAER 170 – CF34-8E5 – T/O-1 MODE – JAA CERTIFICATION
FLAPS 4 – V2/VS =1.19 – DRY RUNWAY – ANTI ICE OFF – A/C ON**

AIRPORT PRESSURE ALTITUDE: 3500 FT.

Temp (°C)	RUNWAY LENGTH (m)						
	TAKEOFF WEIGHT(kg) – LIMITATION CODE V1/VR/V2 (KIAS)						
	1600	1800	2000	2200	2400	2600	2800
-20	35295 R 120/122/126	35396 W 120/122/126	35396 W 120/122/126	35396 W 120/122/126	35396 W 120/122/126	35396 W 120/122/126	35396 W 120/122/126
-15	34968 R 119/122/125	35370 W 120/122/126	35370 W 120/122/126	35370 W 120/122/126	35370 W 120/122/126	35370 W 120/122/126	35370 W 120/122/126
-10	34650 R 118/121/125	35344 W 120/122/126	35344 W 120/122/126	35344 W 120/122/126	35344 W 120/122/126	35344 W 120/122/126	35344 W 120/122/126
-5	34340 R 118/120/124	35315 W 120/122/126	35315 W 120/122/126	35315 W 120/122/126	35315 W 120/122/126	35315 W 120/122/126	35315 W 120/122/126
0	34043 R 117/120/124	35268 W 120/122/126	35268 W 120/122/126	35268 W 120/122/126	35268 W 120/122/126	35268 W 120/122/126	35268 W 120/122/126
5	33745 R 116/119/123	35196 W 120/122/126	35196 W 120/122/126	35196 W 120/122/126	35196 W 120/122/126	35196 W 120/122/126	35196 W 120/122/126
10	33453 R 115/118/123	35116 W 119/122/126	35116 W 119/122/126	35116 W 119/122/126	35116 W 119/122/126	35116 W 119/122/126	35116 W 119/122/126
15	33167 R 114/118/122	35007 W 119/122/126	35007 W 119/122/126	35007 W 119/122/126	35007 W 119/122/126	35007 W 119/122/126	35007 W 119/122/126
20	32867 R 114/117/122	34833 W 119/122/125	34833 W 119/122/125	34833 W 119/122/125	34833 W 119/122/125	34833 W 119/122/125	34833 W 119/122/125
25	32342 R 113/116/121	34214 W 118/121/124	34214 W 118/120/124	34214 W 118/120/124	34214 W 118/120/124	34214 W 118/120/124	34214 W 118/120/124
30	31381 R 112/115/119	32933 W 116/118/122	32933 W 116/118/122	32933 W 116/118/122	32933 W 116/118/122	32933 W 116/118/122	32933 W 116/118/122
35	30334 R 110/113/117	31416 W 113/115/119	31416 W 113/115/119	31416 W 113/115/119	31416 W 113/115/119	31416 W 113/115/119	31416 W 113/115/119
40	29197 R 109/111/115	29744 W 110/112/116	29744 W 110/112/116	29744 W 110/112/116	29744 W 110/112/116	29744 W 110/112/116	29744 W 110/112/116
45.A	28070 R 107/109/112	28110 W 107/109/112	28110 W 107/109/112	28110 W 107/109/112	28110 W 107/109/112	28110 W 107/109/112	28110 W 107/109/112
50.A	26536 W 105/106/109	26536 W 105/106/109	26536 W 105/106/109	26536 W 105/106/109	26536 W 105/106/109	26536 W 105/106/109	26536 W 105/106/109
55.A	25045 W 102/103/106	25045 W 102/103/106	25045 W 102/103/106	25045 W 102/103/106	25045 W 102/103/106	25045 W 102/103/106	25045 W 102/103/106
60.A	***** ***/**/***	***** ***/**/***	***** ***/**/***	***** ***/**/***	***** ***/**/***	***** ***/**/***	***** ***/**/***

For A/Ice ON, decrease weight by 400 kg.

SIMPLIFIED TAKEOFF ANALYSIS TABLES
EMBRAER170 – CF34-8E5 – T/O-1 MODE – JAA CERTIFICATION
FLAPS 4 – V2/VS =1.19 – DRY RUNWAY – ANTI ICE OFF – A/C ON

AIRPORT PRESSURE ALTITUDE: 4000 FT.

Temp (°C)	RUNWAY LENGTH (m)						
	TAKEOFF WEIGHT(kg) – LIMITATION CODE						
	V1/VR/V2 (KIAS)						
	1600	1800	2000	2200	2400	2600	2800
-20	34726 R 119/121/125	34837 W 119/122/125	34837 W 119/122/125	34837 W 119/122/125	34837 W 119/122/125	34837 W 119/122/125	34837 W 119/122/125
-15	34403 R 118/121/124	34811 W 119/121/125	34811 W 119/121/125	34811 W 119/121/125	34811 W 119/121/125	34811 W 119/121/125	34811 W 119/121/125
-10	34101 R 117/120/124	34784 W 119/121/125	34784 W 119/121/125	34784 W 119/121/125	34784 W 119/121/125	34784 W 119/121/125	34784 W 119/121/125
-5	33807 R 117/119/123	34758 W 119/121/125	34758 W 119/121/125	34758 W 119/121/125	34758 W 119/121/125	34758 W 119/121/125	34758 W 119/121/125
0	33512 R 116/119/123	34711 W 119/121/125	34711 W 119/121/125	34711 W 119/121/125	34711 W 119/121/125	34711 W 119/121/125	34711 W 119/121/125
5	33218 R 115/118/122	34604 W 119/121/125	34604 W 119/121/125	34604 W 119/121/125	34604 W 119/121/125	34604 W 119/121/125	34604 W 119/121/125
10	32924 R 114/117/122	34493 W 118/121/125	34493 W 118/121/125	34493 W 118/121/125	34493 W 118/121/125	34493 W 118/121/125	34493 W 118/121/125
15	32632 R 113/117/121	34381 W 118/121/124	34381 W 118/121/124	34381 W 118/121/124	34381 W 118/121/124	34381 W 118/121/124	34381 W 118/121/124
20	32322 R 113/116/121	34143 W 118/120/124	34143 W 118/120/124	34143 W 118/120/124	34143 W 118/120/124	34143 W 118/120/124	34143 W 118/120/124
25	31702 R 112/115/119	33540 W 117/119/123	33540 W 117/119/123	33540 W 117/119/123	33540 W 117/119/123	33540 W 117/119/123	33540 W 117/119/123
30	30774 R 111/113/118	32279 W 115/117/121	32279 W 115/117/121	32279 W 115/117/121	32279 W 115/117/121	32279 W 115/117/121	32279 W 115/117/121
35	29756 R 109/112/116	30815 W 112/114/118	30815 W 112/114/118	30815 W 112/114/118	30815 W 112/114/118	30815 W 112/114/118	30815 W 112/114/118
40	28674 R 108/110/114	29241 W 109/111/115	29241 W 109/111/115	29241 W 109/111/115	29241 W 109/111/115	29241 W 109/111/115	29241 W 109/111/115
45.	27605 R 106/108/111	27694 W 107/108/112	27694 W 107/108/112	27694 W 107/108/112	27694 W 107/108/112	27694 W 107/108/112	27694 W 107/108/112
50.	26178 W 104/105/109	26178 W 104/105/109	26178 W 104/105/109	26178 W 104/105/109	26178 W 104/105/109	26178 W 104/105/109	26178 W 104/105/109
55.	24789 W 101/103/106	24789 W 101/103/106	24789 W 101/103/106	24789 W 101/103/106	24789 W 101/103/106	24789 W 101/103/106	24789 W 101/103/106
60.	***** ***j***j***	***** ***j***j***	***** ***j***j***	***** ***j***j***	***** ***j***j***	***** ***j***j***	***** ***j***j***

For A/Ice ON, decrease weight by 400 kg.

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ACCELERATE STOP DISTANCE TABLE

These tables are used to determine the minimum distance required to be covered by RVR measurement during low visibility take-off procedures.

ACCELERATE STOP DISTANCE (METERS)**FLAPS 1 – DRY RUNWAY – ZERO WIND – AIR CONDITION ON ENG
A/I ON – CF34-8E5 T/O-1 – ATTCS ON – SLOPE 0%****Altitude: Sea Level**

OAT (°C)	TOGW (KG)							
	30000	31000	32000	33000	34000	35000	36000	37000
-5	1346	1436	1529	1626	1727	1831	1938	2049
0	1371	1463	1558	1657	1760	1866	1976	2089
5	1396	1490	1587	1689	1794	1902	2014	2130
10	1422	1518	1617	1721	1828	1939	2053	2172

Altitude: 1000 ft

OAT (°C)	TOGW (KG)							
	30000	31000	32000	33000	34000	35000	36000	37000
-5	1425	1520	1620	1723	1830	1940	2054	2173
0	1451	1548	1650	1755	1865	1977	2094	2215
5	1477	1577	1680	1788	1900	2015	2134	2257
10	1504	1606	1712	1821	1936	2053	2175	2301

Altitude: 2000 ft

OAT (°C)	TOGW (KG)							
	30000	31000	32000	33000	34000	35000	36000	37000
-5	1514	1616	1722	1832	1946	2064	2186	2315
0	1540	1644	1752	1865	1981	2102	2226	2358
5	1568	1674	1784	1899	2018	2141	2268	2403
10	1596	1705	1817	1934	2056	2181	2311	2449

Altitude: 3000 ft

OAT (°C)	TOGW (KG)							
	30000	31000	32000	33000	34000	35000	36000	37000
-5	1610	1719	1832	1950	2073	2200	2333	2474
0	1639	1750	1866	1987	2112	2242	2378	2522
5	1669	1783	1901	2024	2152	2284	2425	2571
10	1699	1815	1936	2062	2193	2328	2472	2621

ACCELERATE STOP DISTANCE (METERS)
FLAPS 1 – WET RUNWAY – ZERO WIND – AIR CONDITION ON ENG
A/I ON – CF34-8E5 T/O-1 – ATTCs ON – SLOPE 0%

Altitude: Sea Level

OAT (°C)	TOGW (KG)							
	30000	31000	32000	33000	34000	35000	36000	37000
-5	1431	1531	1636	1745	1859	1976	2097	2222
0	1459	1562	1670	1781	1898	2018	2141	2269
5	1489	1594	1703	1818	1937	2059	2185	2317
10	1519	1626	1738	1855	1977	2102	2231	2366

Altitude: 1000 ft

OAT (°C)	TOGW (KG)							
	30000	31000	32000	33000	34000	35000	36000	37000
-5	1520	1628	1739	1856	1978	2102	2231	2365
0	1550	1660	1774	1893	2018	2146	2277	2414
5	1580	1692	1809	1931	2059	2189	2324	2464
10	1611	1726	1846	1970	2101	2234	2372	2515

Altitude: 2000 ft

OAT (°C)	TOGW (KG)							
	30000	31000	32000	33000	34000	35000	36000	37000
-5	1621	1736	1856	1981	2112	2246	2384	2527
0	1652	1769	1891	2019	2153	2289	2430	2577
5	1684	1804	1929	2059	2196	2335	2479	2629
10	1717	1839	1967	2100	2239	2382	2529	2682

Altitude: 3000 ft

OAT (°C)	TOGW (KG)							
	30000	31000	32000	33000	34000	35000	36000	37000
-5	1731	1854	1983	2118	2259	2404	2553	2708
0	1765	1891	2023	2161	2305	2453	2605	2763
5	1799	1929	2064	2204	2352	2503	2659	2821
10	1835	1967	2104	2249	2399	2554	2713	2878

ACCELERATE STOP DISTANCE (METERS)**FLAPS 2 – DRY RUNWAY – ZERO WIND – AIR CONDITION ON ENG
A/I ON – CF34-8E5 T/O-1 – ATTCS ON – SLOPE 0%****Altitude: Sea Level**

OAT (°C)	TOGW (KG)							
	30000	31000	32000	33000	34000	35000	36000	37000
-5	1193	1272	1356	1444	1536	1631	1729	1830
0	1215	1295	1381	1471	1565	1662	1763	1867
5	1237	1319	1407	1499	1595	1694	1797	1903
10	1260	1344	1434	1528	1626	1728	1832	1941

Altitude: 1000 ft

OAT (°C)	TOGW (KG)							
	30000	31000	32000	33000	34000	35000	36000	37000
-5	1263	1348	1438	1532	1630	1732	1836	1945
0	1286	1372	1465	1561	1661	1765	1872	1983
5	1309	1397	1492	1590	1693	1798	1907	2021
10	1332	1423	1519	1620	1725	1833	1944	2060

Altitude: 2000 ft

OAT (°C)	TOGW (KG)							
	30000	31000	32000	33000	34000	35000	36000	37000
-5	1342	1435	1531	1632	1738	1846	1958	2073
0	1365	1460	1558	1661	1769	1879	1994	2111
5	1390	1486	1587	1692	1802	1915	2032	2151
10	1415	1513	1616	1724	1836	1951	2070	2192

Altitude: 3000 ft

OAT (°C)	TOGW (KG)							
	30000	31000	32000	33000	34000	35000	36000	37000
-5	1429	1529	1632	1741	1854	1971	2089	2212
0	1455	1556	1662	1773	1889	2008	2129	2254
5	1482	1585	1694	1807	1925	2047	2170	2298
10	1509	1614	1725	1841	1961	2086	2211	2342

ACCELERATE STOP DISTANCE (METERS)
FLAPS 2 – WET RUNWAY – ZERO WIND – AIR CONDITION ON ENG
A/I ON – CF34-8E5 T/O-1 – ATTCs ON – SLOPE 0%

Altitude: Sea Level

OAT (°C)	TOGW (KG)							
	30000	31000	32000	33000	34000	35000	36000	37000
-5	1273	1365	1460	1559	1663	1770	1879	1993
0	1299	1392	1490	1592	1698	1807	1919	2035
5	1324	1420	1519	1624	1732	1844	1959	2078
10	1351	1448	1550	1657	1768	1882	2000	2122

Altitude: 1000 ft

OAT (°C)	TOGW (KG)							
	30000	31000	32000	33000	34000	35000	36000	37000
-5	1355	1452	1554	1660	1772	1885	2003	2125
0	1381	1480	1585	1694	1807	1924	2044	2168
5	1407	1509	1616	1727	1843	1963	2085	2213
10	1435	1539	1648	1762	1881	2003	2128	2259

Altitude: 2000 ft

OAT (°C)	TOGW (KG)							
	30000	31000	32000	33000	34000	35000	36000	37000
-5	1446	1551	1661	1775	1895	2017	2143	2274
0	1473	1580	1692	1809	1931	2056	2184	2318
5	1502	1611	1725	1844	1969	2097	2228	2364
10	1531	1642	1759	1881	2008	2139	2273	2412

Altitude: 3000 ft

OAT (°C)	TOGW (KG)							
	30000	31000	32000	33000	34000	35000	36000	37000
-5	1546	1658	1776	1900	2029	2161	2296	2437
0	1576	1691	1811	1937	2069	2205	2343	2487
5	1606	1724	1848	1977	2111	2250	2391	2538
10	1638	1758	1884	2016	2153	2295	2440	2590

ACCELERATE STOP DISTANCE (METERS)**FLAPS 4 – DRY RUNWAY – ZERO WIND – AIR CONDITION ON ENG
A/I ON – CF34-8E5 T/O-1 – ATTCS ON – SLOPE 0%****Altitude: Sea Level**

OAT (°C)	TOGW (KG)							
	30000	31000	32000	33000	34000	35000	36000	37000
-5	996	1058	1128	1199	1272	1345	1419	1495
0	1012	1076	1147	1220	1294	1369	1444	1522
5	1028	1094	1167	1241	1317	1393	1470	1550
10	1046	1114	1188	1263	1341	1418	1497	1579

Altitude: 1000 ft

OAT (°C)	TOGW (KG)							
	30000	31000	32000	33000	34000	35000	36000	37000
-5	1052	1122	1195	1270	1348	1425	1503	1585
0	1069	1140	1215	1292	1370	1449	1530	1613
5	1086	1159	1235	1313	1394	1475	1557	1642
10	1104	1179	1257	1336	1418	1501	1585	1672

Altitude: 2000 ft

OAT (°C)	TOGW (KG)							
	30000	31000	32000	33000	34000	35000	36000	37000
-5	1116	1192	1270	1350	1432	1514	1598	1686
0	1135	1212	1291	1372	1455	1539	1626	1715
5	1154	1232	1313	1396	1481	1567	1654	1745
10	1173	1253	1335	1420	1506	1594	1684	1777

Altitude: 3000 ft

OAT (°C)	TOGW (KG)							
	30000	31000	32000	33000	34000	35000	36000	37000
-5	1187	1268	1350	1434	1522	1610	1700	1793
0	1207	1289	1373	1459	1548	1638	1730	1825
5	1228	1311	1397	1484	1575	1668	1762	1859
10	1249	1334	1421	1510	1603	1697	1793	1893

ACCELERATE STOP DISTANCE (METERS)

FLAPS 4 – WET RUNWAY – ZERO WIND – AIR CONDITION ON ENG
A/I ON – CF34-8E5 T/O-1 – ATTCs ON – SLOPE 0%

Altitude: Sea Level

OAT (°C)	TOGW (KG)							
	30000	31000	32000	33000	34000	35000	36000	37000
-5	1068	1083	1157	1234	1314	1395	1478	1564
0	1086	1102	1178	1257	1340	1423	1507	1595
5	1104	1122	1200	1281	1365	1450	1537	1627
10	1121	1144	1223	1306	1392	1479	1568	1660

Altitude: 1000 ft

OAT (°C)	TOGW (KG)							
	30000	31000	32000	33000	34000	35000	36000	37000
-5	1084	1151	1230	1313	1399	1486	1575	1666
0	1102	1171	1253	1337	1425	1514	1605	1699
5	1119	1193	1275	1362	1452	1543	1636	1732
10	1137	1215	1300	1388	1480	1573	1668	1766

Altitude: 2000 ft

OAT (°C)	TOGW (KG)							
	30000	31000	32000	33000	34000	35000	36000	37000
-5	1146	1228	1313	1402	1495	1588	1684	1783
0	1166	1250	1337	1428	1522	1618	1715	1816
5	1188	1273	1361	1454	1551	1649	1749	1852
10	1209	1296	1387	1482	1580	1681	1782	1888

Altitude: 3000 ft

OAT (°C)	TOGW (KG)							
	30000	31000	32000	33000	34000	35000	36000	37000
-5	1223	1311	1403	1499	1598	1699	1802	1910
0	1246	1335	1429	1527	1629	1732	1837	1947
5	1269	1361	1456	1556	1660	1766	1873	1986
10	1292	1386	1484	1586	1692	1800	1910	2025

V₁/V_R/V₂ SPEEDS

**EMBRAER 170 – JAA – CF34-8E5 – T/O-1 MODE – ATTCS ON FLAPS 1 –
BALANCED V₁ – DRY RUNWAY - ANTI-ICE ON/OFF – AIR CONDITION ON/OFF**

PRESSURE ALTITUDE (ft)	STATIC AIR TEMPERATURE (°C)														
SL →	-40 to 33	34 to 42	43 to 50												
1000 →	-40 to 35	36 to 41	42 to 48												
2000 →		-40 to 39	40 to 46												
3000 →		-40 to 35	36 to 44												
4000 →		-40 to 31	32 to 42												
5000 →		-40 to 26	27 to 38	39 to 40											
6000 →			-40 to 25	26 to 38											
7000 →			-40 to 13	14 to 32	33 to 36										
8000 →			-40 to 4	5 to 19	20 to 34										
	↓	↓	↓	↓	↓										
WEIGHT (kg)	V₁	V_R	V₂	V₁	V_R	V₂	V₁	V_R	V₂	V₁	V_R	V₂	V₁	V_R	V₂
23500	102	116	123	106	118	123	110	119	123	113	120	123	113	121	124
24000	104	118	125	108	119	125	112	121	125	114	122	125	115	122	125
24500	106	119	126	110	121	126	113	122	126	116	123	126	117	124	126
25000	108	121	127	111	122	127	115	124	127	118	125	127	119	125	127
25500	110	122	128	113	124	128	117	125	128	120	126	129	120	127	129
26000	112	124	130	115	125	130	119	127	130	121	128	130	122	128	130
26500	114	125	131	117	127	131	120	128	131	123	129	131	124	130	131
27000	115	127	132	118	128	132	122	129	132	125	131	132	125	131	132
27500	117	128	133	120	130	133	124	131	133	126	132	134	127	132	134
28000	119	130	135	122	131	135	125	132	135	128	133	135	128	134	135
28500	120	131	136	123	132	136	127	134	136	129	135	136	130	135	136
29000	122	132	137	125	134	137	128	135	137	131	136	137	132	136	137
29500	124	134	138	127	135	138	130	136	138	132	137	138	133	137	138
30000	125	135	139	128	136	139	132	138	139	134	139	140	134	139	140
30500	127	137	141	130	138	141	133	139	141	135	140	141	136	140	141
31000	129	138	142	131	139	142	135	140	142	137	141	142	137	141	142
31500	130	139	143	133	140	143	136	141	143	138	142	143	139	142	143
32000	132	140	144	134	142	144	137	143	144	139	143	144	140	144	144
32500	133	142	145	136	143	145	139	144	145	141	145	145	141	145	145
33000	135	143	146	137	144	146	140	145	146	142	146	146	143	146	146
33500	136	144	147	139	145	147	142	146	147	143	147	147	144	147	148
34000	137	146	148	140	147	148	143	147	148	145	148	149	145	148	149
34500	139	147	149	141	148	149	144	149	149	146	149	150	146	149	150
35000	140	148	151	143	149	151	146	150	151	147	150	151	148	151	151
35500	142	149	152	144	150	152	147	151	152	148	152	152	148	152	152
36000	143	150	153	146	151	153	148	152	153	150	153	153	149	153	153
36500	144	152	154	147	153	154	149	153	154	151	154	154	148	154	154
37000	146	153	155	148	154	155	151	154	155	151	155	155	147	155	155
37500	147	154	156	149	155	156	152	155	156	150	156	156	146	156	156

V₁/V_R/V₂ SPEEDS
**EMBRAER 170 – JAA – CF34-8E5 – T/O-1 MODE – ATTCS ON FLAPS 2 –
BALANCED V₁ – DRY RUNWAY - ANTI-ICE ON/OFF – AIR CONDITION ON/OFF**

PRESSURE ALTITUDE (ft)	STATIC AIR TEMPERATURE (°C)														
SL →	-40 to 36			37 to 41			42 to 46			47 to 50					
1000 →	-40 to 35			36 to 41			42 to 46			47 to 48					
2000 →	-40 to 31			32 to 38			39 to 43			44 to 46					
3000 →	-40 to 24			25 to 34			35 to 40			41 to 44					
4000 →				-40 to 31			32 to 37			38 to 42					
5000 →				-40 to 26			27 to 34			35 to 40					
6000 →				-40 to 18			19 to 29			30 to 37			38 to 38		
7000 →							-40 to 24			25 to 32			33 to 36		
8000 →							-40 to 14			15 to 19			20 to 25		
	↓			↓			↓			↓			↓		
WEIGHT (kg)	V ₁	V _R	V ₂	V ₁	V _R	V ₂	V ₁	V _R	V ₂	V ₁	V _R	V ₂	V ₁	V _R	V ₂
23500	97	108	119	99	111	119	102	112	119	104	113	119	107	115	119
24000	98	110	121	101	112	121	103	113	121	106	115	121	109	116	121
24500	99	112	122	103	114	122	105	115	122	107	116	122	110	118	122
25000	101	113	123	105	115	123	107	116	123	109	118	123	112	119	123
25500	103	115	124	106	117	124	109	118	124	111	119	124	114	121	124
26000	105	116	125	108	118	125	110	119	125	113	121	125	115	122	126
26500	106	118	127	110	120	127	112	121	127	114	122	127	117	124	127
27000	108	119	128	111	121	128	114	122	128	116	124	128	119	125	128
27500	110	121	129	113	123	129	115	124	129	118	125	129	120	126	129
28000	111	122	130	115	124	130	117	125	130	119	126	130	122	128	130
28500	113	124	131	116	126	131	119	127	131	121	128	131	123	129	132
29000	115	125	132	118	127	132	120	128	132	122	129	132	125	130	133
29500	116	127	134	120	128	134	122	129	134	124	130	134	127	132	134
30000	118	128	135	121	130	135	123	131	135	125	132	135	128	133	135
30500	119	129	136	123	131	136	125	132	136	127	133	136	130	134	136
31000	121	131	137	124	132	137	126	134	137	129	134	137	132	136	137
31500	122	132	138	126	134	138	128	135	138	130	136	138	133	137	138
32000	124	133	139	127	135	139	129	136	139	132	137	139	135	138	139
32500	125	135	140	129	136	140	131	137	140	133	138	140	136	139	140
33000	127	136	141	130	138	141	132	139	141	135	139	141	138	140	142
33500	128	137	142	132	139	142	134	140	142	137	141	142	139	142	143
34000	130	139	143	133	140	143	135	141	143	138	142	143	140	143	144
34500	131	140	144	134	141	144	137	142	144	140	143	144	142	144	145
35000	133	141	146	136	143	146	138	143	146	141	144	146	143	145	146
35500	134	142	147	137	144	147	140	145	147	142	145	147	144	146	147
36000	135	144	148	139	145	148	141	146	148	144	146	148	146	148	148
36500	137	145	149	140	146	149	143	147	149	145	148	149	147	149	149
37000	138	146	150	142	147	150	144	148	150	146	149	150	147	150	150
37500	139	147	151	143	148	151	145	149	151	148	150	151	146	151	151

V₁/V_R/V₂ SPEEDS

**EMBRAER 170 – JAA – CF34-8E5 – T/O-1 MODE – ATTCS ON FLAPS 4 –
BALANCED V₁ – DRY RUNWAY - ANTI-ICE ON/OFF – AIR CONDITION ON/OFF**

PRESSURE ALTITUDE (ft)	STATIC AIR TEMPERATURE (°C)											
SL →	-40 to 34	35 to 38	39 to 42	43 to 46	47 to 50							
1000 →	-40 to 31	32 to 36	37 to 40	41 to 44	45 to 48							
2000 →	-40 to 26	27 to 32	33 to 37	38 to 41	42 to 46							
3000 →		-40 to 27	28 to 33	34 to 38	39 to 44							
4000 →			-40 to 27	28 to 34	35 to 42							
5000 →			-40 to 17	18 to 29	30 to 40							
6000 →				-40 to 21	22 to 38							
7000 →					-40 to 36							
8000 →					-40 to 34							
	↓	↓	↓	↓	↓							
WEIGHT (kg)	V ₁	V _R	V ₂	V ₁	V _R	V ₂	V ₁	V _R	V ₂	V ₁	V _R	V ₂
23500	90	98	112	87	92	104	86	92	103	87	93	103
24000	90	97	111	87	92	104	87	94	104	89	95	104
24500	90	96	110	88	94	105	89	95	105	91	96	105
25000	90	96	109	89	95	106	91	97	106	93	98	106
25500	90	96	109	90	97	107	92	98	107	94	99	107
26000	91	96	108	92	98	108	94	99	108	96	101	108
26500	92	98	109	94	100	109	96	101	109	98	102	109
27000	92	99	110	95	101	110	97	102	110	99	103	110
27500	94	101	111	97	103	111	99	104	111	101	105	111
28000	96	102	112	99	104	112	101	105	112	103	106	112
28500	97	103	113	100	105	113	102	106	113	104	107	113
29000	99	105	114	102	107	114	104	108	114	106	109	114
29500	100	106	115	103	108	115	105	109	115	107	110	115
30000	102	107	116	105	109	116	107	110	116	109	111	116
30500	103	109	117	107	111	117	108	112	117	110	113	117
31000	105	110	118	108	112	118	110	113	118	112	114	118
31500	106	111	119	110	113	119	111	114	119	113	115	119
32000	108	113	120	111	114	120	113	115	120	114	116	120
32500	109	114	121	112	116	121	114	117	121	116	118	121
33000	111	115	122	114	117	122	115	118	122	117	119	122
33500	112	116	123	115	118	123	117	119	123	118	120	123
34000	114	118	124	117	119	124	118	120	124	120	121	124
34500	115	119	125	118	121	125	119	121	125	121	122	125
35000	117	120	125	119	122	125	121	123	125	122	124	125
35500	118	121	126	120	123	126	122	124	126	123	125	126
36000	119	122	127	122	124	127	123	125	127	124	126	127
36500	120	123	128	123	125	128	124	126	128	125	127	128
37000	122	124	129	124	126	129	125	127	129	127	128	129
37500	123	126	130	125	127	130	126	128	130	128	129	130

V₁/V_R/V₂ SPEEDS
**EMBRAER 170 – JAA – CF34-8E5 – T/O-2 MODE – ATTCS ON FLAPS 1 –
BALANCED V₁ – DRY RUNWAY - ANTI-ICE ON/OFF – AIR CONDITION ON/OFF**

PRESSURE ALTITUDE (ft)		STATIC AIR TEMPERATURE (°C)											
SL	→	-40 to 38	39 to 44	45 to 50									
1000	→	-40 to 37	38 to 43	44 to 48									
2000	→	-40 to 32	33 to 38	39 to 45	46 to 46								
3000	→	-40 to 27	28 to 34	35 to 41	42 to 44								
4000	→		-40 to 29	30 to 36	37 to 42								
5000	→		-40 to 24	25 to 31	32 to 40								
6000	→			-40 to 26	27 to 37	38 to 38							
7000	→			-40 to 22	23 to 32	33 to 36							
8000	→			-40 to 14	15 to 28	29 to 34							
	↓		↓	↓	↓	↓							
WEIGHT (kg)		V ₁	V _R	V ₂	V ₁	V _R	V ₂	V ₁	V _R	V ₂	V ₁	V _R	V ₂
23500		108	116	123	111	117	123	113	118	123	115	119	123
24000		110	117	125	113	119	125	115	120	125	117	121	125
24500		112	119	126	115	120	126	117	121	126	119	122	126
25000		114	120	127	117	122	127	119	123	127	121	124	127
25500		116	122	128	118	123	128	120	124	128	122	125	129
26000		118	124	130	120	125	130	122	126	130	124	127	130
26500		119	125	131	122	126	131	124	127	131	125	128	131
27000		121	126	132	124	128	132	125	129	132	127	130	132
27500		123	128	133	125	129	133	127	130	133	129	131	133
28000		124	129	135	127	131	135	128	131	135	130	132	135
28500		126	131	136	128	132	136	130	133	136	132	134	136
29000		128	132	137	130	133	137	131	134	137	133	135	137
29500		129	134	138	131	135	138	133	136	138	135	136	138
30000		131	135	139	133	136	139	134	137	139	136	138	140
30500		132	136	141	134	138	141	136	138	141	137	139	141
31000		134	138	142	136	139	142	137	140	142	139	140	142
31500		135	139	143	137	140	143	139	141	143	140	141	143
32000		137	140	144	139	142	144	140	142	144	141	143	144
32500		138	142	145	140	143	145	142	143	145	143	144	145
33000		140	143	146	142	144	146	143	144	146	144	145	146
33500		141	144	147	143	145	147	144	146	147	145	146	147
34000		142	146	148	144	146	148	145	147	148	147	147	148
34500		144	147	149	146	148	149	147	148	149	148	149	150
35000		145	148	151	147	149	151	148	149	151	149	150	151
35500		147	149	152	148	150	152	149	150	152	150	151	152
36000		148	150	153	149	151	153	150	151	153	151	152	153
36500		149	152	154	151	152	154	152	153	154	153	153	154
37000		150	153	155	152	153	155	153	154	155	154	154	155
37500		152	154	156	153	154	156	154	155	156	155	155	156

V₁/V_R/V₂ SPEEDS

**EMBRAER 170 – JAA – CF34-8E5 – T/O-2 MODE – ATTCS ON FLAPS 2 –
BALANCED V₁ – DRY RUNWAY - ANTI-ICE ON/OFF – AIR CONDITION ON/OFF**

PRESSURE ALTITUDE (ft)	STATIC AIR TEMPERATURE (°C)														
SL →	-40 to 38	39 to 45	46 to 50												
1000 →	-40 to 38	39 to 44	45 to 48												
2000 →	-40 to 33	34 to 40	41 to 46												
3000 →	-40 to 28	29 to 35	36 to 42	43 to 44											
4000 →		-40 to 30	31 to 37	38 to 42											
5000 →		-40 to 25	26 to 33	34 to 40											
6000 →		-40 to 21	22 to 28	29 to 38											
7000 →			-40 to 24	25 to 31	32 to 36										
8000 →			-40 to 19	20 to 22	23 to 34										
	↓	↓	↓	↓	↓										
WEIGHT (kg)	V₁	V_R	V₂	V₁	V_R	V₂	V₁	V_R	V₂	V₁	V_R	V₂	V₁	V_R	V₂
23500	96	108	119	100	110	119	102	112	119	106	114	119	109	115	119
24000	98	110	121	102	112	121	104	113	121	108	115	121	110	117	121
24500	100	111	122	104	114	122	106	115	122	109	117	122	112	118	122
25000	102	113	123	105	115	123	108	116	123	111	118	123	114	120	123
25500	104	115	124	107	117	124	110	118	124	113	120	124	116	121	124
26000	105	116	125	109	118	125	111	120	125	115	121	125	117	122	126
26500	107	118	127	111	120	127	113	121	127	116	123	127	119	124	127
27000	109	119	128	112	121	128	115	123	128	118	124	128	121	125	128
27500	111	121	129	114	123	129	117	124	129	120	126	129	123	127	129
28000	112	122	130	116	124	130	118	125	130	121	127	130	125	128	130
28500	114	124	131	118	126	131	120	127	131	123	128	131	126	129	131
29000	116	125	132	119	127	132	121	128	132	125	130	133	128	131	133
29500	117	127	134	121	129	134	123	130	134	127	131	134	130	132	134
30000	119	128	135	122	130	135	124	131	135	128	132	135	131	133	135
30500	121	129	136	124	131	136	126	132	136	130	134	136	133	135	136
31000	122	131	137	125	133	137	128	134	137	132	135	137	134	136	137
31500	124	132	138	127	134	138	129	135	138	133	136	138	136	137	138
32000	125	134	139	128	135	139	131	136	139	135	137	139	137	138	139
32500	127	135	140	130	136	140	133	137	140	136	139	140	138	140	140
33000	128	136	141	132	138	141	134	139	141	138	140	141	140	141	142
33500	130	138	142	133	139	142	136	140	142	139	141	142	141	142	143
34000	131	139	143	135	140	143	138	141	143	140	142	144	142	143	144
34500	133	140	144	136	141	144	139	142	144	142	143	145	144	145	145
35000	134	141	146	138	143	146	140	143	146	143	145	146	145	146	146
35500	136	143	147	139	144	147	142	145	147	144	146	147	146	147	147
36000	137	144	148	141	145	148	143	146	148	146	147	148	147	148	148
36500	138	145	149	142	146	149	144	147	149	147	148	149	148	149	149
37000	140	146	150	144	147	150	146	148	150	148	149	150	148	150	150
37500	141	147	151	145	148	151	147	149	151	149	150	151	147	151	151

V₁/V_R/V₂ SPEEDS
**EMBRAER 170 – JAA – CF34-8E5 – T/O-2 MODE – ATTCS ON FLAPS 4 –
BALANCED V₁ – DRY RUNWAY - ANTI-ICE ON/OFF – AIR CONDITION ON/OFF**

PRESSURE ALTITUDE (ft)		STATIC AIR TEMPERATURE (°C)														
SL	→	-40 to 39	40 to 43	44 to 47	48 to 50											
1000	→	-40 to 37	38 to 41	42 to 45	46 to 48											
2000	→	-40 to 33	34 to 37	38 to 41	42 to 46											
3000	→	-40 to 27	28 to 33	34 to 40	41 to 44											
4000	→		-40 to 28	29 to 35	36 to 39	40 to 42										
5000	→		-40 to 20	21 to 30	31 to 35	36 to 40										
6000	→			-40 to 26	27 to 30	31 to 38										
7000	→				-40 to 26	27 to 36										
8000	→				-40 to 21	22 to 34										
	↓		↓	↓	↓	↓										
WEIGHT (kg)		V ₁ V _R V ₂	V ₁ V _R V ₂	V ₁ V _R V ₂	V ₁ V _R V ₂	V ₁ V _R V ₂	V ₁ V _R V ₂	V ₁ V _R V ₂	V ₁ V _R V ₂	V ₁ V _R V ₂	V ₁ V _R V ₂	V ₁ V _R V ₂	V ₁ V _R V ₂	V ₁ V _R V ₂	V ₁ V _R V ₂	V ₁ V _R V ₂
23500		90 97 109	88 93 103	90 94 103	91 95 103	97 99 103										
24000		90 97 108	90 95 104	91 96 104	93 97 104	98 100 104										
24500		90 97 108	92 96 105	93 97 105	95 98 105	100 101 105										
25000		91 97 107	93 98 106	95 99 106	97 100 106	101 103 106										
25500		92 98 108	95 99 107	97 100 107	98 101 107	103 104 107										
26000		93 99 108	97 101 108	98 102 108	100 103 108	104 106 108										
26500		95 100 109	98 102 109	100 103 109	102 104 109	106 107 109										
27000		97 101 110	100 104 110	102 105 110	103 105 110	107 108 110										
27500		98 103 111	102 105 111	103 106 111	105 107 111	109 110 111										
28000		100 104 112	103 106 112	105 107 112	106 108 112	110 111 112										
28500		101 106 113	105 108 113	106 109 113	108 109 113	111 112 113										
29000		103 107 114	106 109 114	108 110 114	109 111 114	113 113 114										
29500		105 108 115	108 110 115	109 111 115	111 112 115	114 115 115										
30000		106 110 116	109 112 116	111 112 116	112 113 116	115 116 116										
30500		108 111 117	111 113 117	112 114 117	113 114 117	117 117 117										
31000		109 112 118	112 114 118	113 115 118	115 116 118	118 118 118										
31500		111 113 119	114 115 119	115 116 119	116 117 119	119 120 120										
32000		112 115 120	115 117 120	116 117 120	117 118 120	120 121 121										
32500		113 116 121	116 118 121	117 119 121	118 119 121	122 122 122										
33000		115 117 122	117 119 122	119 120 122	120 121 122	123 123 123										
33500		116 118 123	119 120 123	120 121 123	121 122 123	124 124 124										
34000		118 120 124	120 121 124	121 122 124	122 123 124	125 125 125										
34500		119 121 125	121 123 125	122 123 125	123 124 125	126 127 127										
35000		120 122 125	122 124 125	123 124 125	124 125 125	127 128 128										
35500		121 123 126	124 125 126	125 125 126	125 126 126	129 129 129										
36000		122 124 127	125 126 127	126 127 127	127 127 127	130 130 130										
36500		124 125 128	126 127 128	127 128 128	128 128 128	131 131 131										
37000		125 126 129	127 128 129	128 129 129	129 129 129	132 132 132										
37500		126 127 130	128 129 130	129 130 130	130 130 130	133 133 133										



FLAP RETRACTION SPEED SCHEDULE

PRIMUS EPIC SYSTEM SOFTWARE LOAD 15

T/O FLAP	SELECT FLAPS at SPEED			
	3	2	1	0
4	$V_2 + 10$	$V_2 + 20$	$V_2 + 30$	$V_2 + 50$
2			$V_2 + 10$	$V_2 + 30$
1				$V_2 + 20$

PRIMUS EPIC SYSTEM SOFTWARE LOAD 17

During flap retraction, the next flap setting should be selected when the F-Bug is reached.

The F-Bug calculation algorithm is designed so as to meet minimum safe margins to V_{FE} and Shaker speed. A minimum margin of 20% above the stall speed is set for the next flap.

FINAL SEGMENT SPEED

WEIGHT (kg)	V_{FS} (KIAS)
21000	151
22000	155
23000	158
24000	162
25000	165
26000	168
27000	172
28000	175
29000	178
30000	181
31000	184
32000	187
33000	190
34000	193
35000	196
36000	198
37000	201
38000	204

STAB TRIM SETTING FOR TAKEOFF

All Weights	CG POSITION (% MAC)										
	7	9	11	13	15	17	19	21	23	25	27
Flap 1	-6.0	-6.0	-5.5	-5.0	-5.0	-4.5	-4.0	-3.5	-3.0	-3.0	-2.5
Flap 2	-6.0	-6.0	-5.5	-5.0	-4.5	-4.0	-3.5	-3.5	-3.0	-2.5	-2.0
Flap 4	-6.0	-5.5	-5.0	-4.5	-4.0	-3.5	-3.0	-2.5	-2.0	-1.5	-1.0

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SUPPLEMENTARY TAKEOFF INFORMATION

AIRCRAFT CLASSIFICATION NUMBER - ACN

The Pavement Classification Number (PCN) reported shall indicate that an airplane with ACN equal to or less than the reported PCN can operate on that pavement.

PCN - PAVEMENT CLASSIFICATION NUMBER

Example: PCN 50 / F / A / X / T

1	2	3	4

1 - Type of pavement:

R = Rigid (concrete); F = Flexible (asphalt);

2 - Pavement sub-grade strength category:

A = High, B = Medium, C = Low, D = Ultra-low.

3 - Maximum tire pressure authorized for the pavement:

W = High, no limit; X = Medium (up to 217 psi);

Y = Low (up to 145 psi); Z = Very low (up to 73 psi).

4 - Pavement evaluation method:

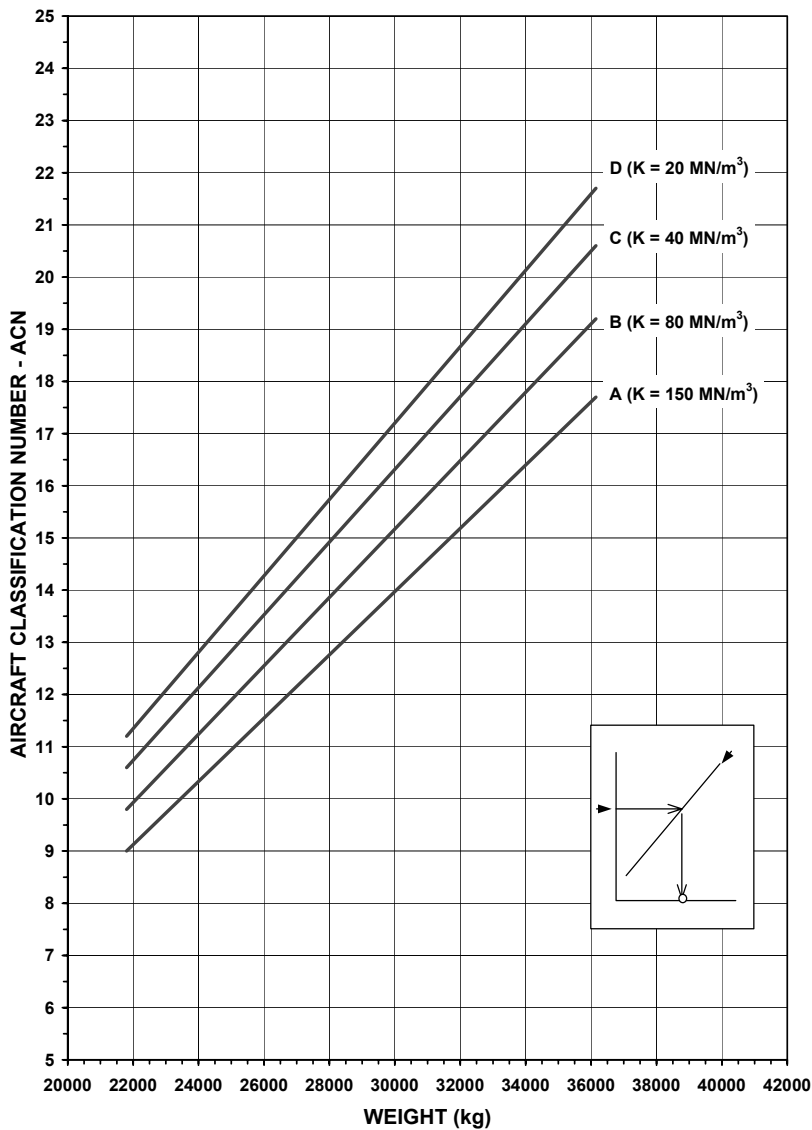
T = Technical evaluation;

U = By experience of airplane actually using the pavement.

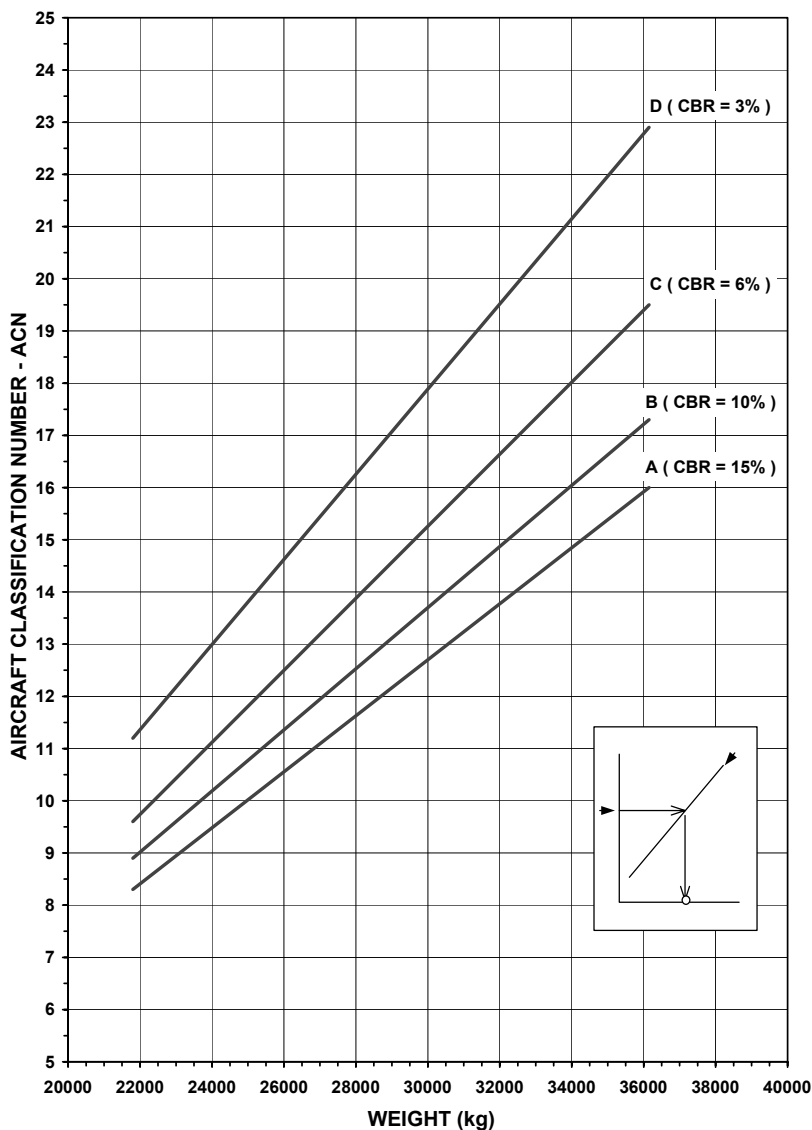
OVERLOAD OPERATIONS

Individual airport authorities are free to decide on their own criteria for permitting overload operations as long as pavements remain safe for use by airplane. However, a 10% difference in ACN over PCN for flexible pavement and 5% for rigid pavements is generally accepted, provided that overload operations do not exceed 5% of the annual departures and are spread throughout the year.

EMBRAER 170 ST - ACN RIGID PAVEMENT



EMBRAER 170 ST - ACN FLEXIBLE PAVEMENT



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APPROACH

APPROACH CLIMB SPEEDS

NO ICE ACCRETION

WEIGHT (kg)	FLAP 3 (KIAS)	FLAP 4 (KIAS)
22000	105	102
23000	107	104
24000	110	107
25000	112	109
26000	114	111
27000	116	113
28000	118	115
29000	121	117
30000	123	119
31000	125	121
32000	127	123
33000	129	125
34000	131	126
35000	132	127
36000	134	128
37000	136	129

LANDING CLIMB AND REFERENCE SPEEDS

NO ICE ACCRETION

WEIGHT (kg)	FLAP 5 (KIAS)	FLAP FULL (KIAS)
22000	105	102
23000	107	104
24000	110	107
25000	112	109
26000	114	111
27000	116	113
28000	118	115
29000	121	117
30000	123	119
31000	125	121
32000	127	123
33000	129	125
34000	131	126
35000	132	127
36000	134	128
37000	136	129

APPROACH CLIMB SPEEDS

WITH ICE ACCRETION

WEIGHT (kg)	FLAP 3 (KIAS)	FLAP 4 (KIAS)
22000	112	102
23000	115	104
24000	117	107
25000	120	109
26000	122	111
27000	125	113
28000	127	115
29000	129	117
30000	131	119
31000	133	121
32000	136	123
33000	138	125
34000	140	126
35000	142	127
36000	144	128
37000	145	129

WITH ICE ACCRETION

WEIGHT (kg)	FLAP 5 (KIAS)	FLAP FULL (KIAS)
22000	112	102
23000	115	104
24000	117	107
25000	120	109
26000	122	111
27000	125	113
28000	127	115
29000	129	117
30000	131	119
31000	133	121
32000	136	123
33000	138	125
34000	140	126
35000	142	127
36000	144	128
37000	145	129

CATEGORY II APPROACH CLIMB AND LANDING REFERENCE SPEEDS

WEIGHT (kg)	FLAP 5 (KIAS)
22000	117
23000	119
24000	122
25000	124
26000	127
27000	129
28000	132
29000	134
30000	136
31000	139
32000	141
33000	143
34000	145
35000	147
36000	149
37000	152

FLAPS MANEUVERING SPEEDS

FLAP	SPEED (KIAS)
UP	210
1	180
2	160
3	150
4	140
5	140
FULL	130

These speeds allow an inadvertent 15 degrees overshoot beyond the normal 25 degrees bank and provide 1.3G margin over stick shaker speed. They are valid for all weights up to the Maximum Structural Landing Weight.

The speeds above may be used as reference for flaps extension and maneuvering. For flaps retraction refer to the schedule related in section 4.1.2.b (Takeoff).

For weights above the Maximum Structural Landing Weight, the speeds above are maintained.

APPROACH CLIMB GRADIENT TABLES

The Approach Climb Gradient tables show the gradients as function of temperature (°C) and weight (kg).

The associated conditions are:

- Approach Flaps: 3 or 4;
- Gear UP;
- One Engine Inoperative;
- Anti-Ice OFF and Engine and Wing anti-ice ON;
- No Ice Accretion.

APPROACH CLIMB GRADIENT (%)
LANDING FLAPS 5/APPROACH FLAPS 3
ALTITUDE: SL

CF34-8E5 ENGINES

ANTI-ICE OFF

SAT (°C)	WEIGHT (Kg)											
	23000	24000	25000	26000	27000	28000	29000	30000	31000	32000	33000	
0	14.19	13.06	11.96	10.95	10.03	9.18	8.41	7.74	7.11	6.52	5.98	
2	14.18	13.05	11.95	10.94	10.01	9.16	8.39	7.72	7.09	6.50	5.96	
4	14.18	13.04	11.94	10.93	10.00	9.14	8.37	7.70	7.07	6.49	5.94	
6	14.16	13.03	11.92	10.91	9.98	9.12	8.35	7.68	7.05	6.47	5.92	
8	14.14	13.01	11.90	10.89	9.96	9.10	8.33	7.66	7.03	6.45	5.91	
10	14.11	12.98	11.88	10.87	9.94	9.08	8.31	7.64	7.01	6.43	5.89	
12	14.09	12.96	11.86	10.84	9.91	9.06	8.29	7.62	6.99	6.41	5.87	
14	14.07	12.94	11.84	10.82	9.89	9.04	8.27	7.60	6.98	6.40	5.86	
16	14.05	12.92	11.82	10.80	9.87	9.02	8.25	7.58	6.96	6.38	5.84	
18	14.03	12.90	11.80	10.78	9.85	9.00	8.23	7.56	6.94	6.36	5.82	
20	14.00	12.88	11.78	10.76	9.83	8.97	8.20	7.54	6.92	6.34	5.80	
22	13.98	12.86	11.76	10.74	9.81	8.95	8.18	7.52	6.90	6.32	5.79	
24	13.96	12.84	11.73	10.72	9.79	8.93	8.16	7.50	6.88	6.31	5.77	
26	13.77	12.65	11.59	10.61	9.72	8.89	8.14	7.48	6.86	6.29	5.75	
28	13.74	12.63	11.57	10.59	9.70	8.87	8.12	7.46	6.84	6.27	5.73	
30	13.45	12.35	11.34	10.43	9.59	8.82	8.10	7.44	6.82	6.25	5.72	
32	12.89	11.80	10.84	9.96	9.15	8.40	7.71	7.06	6.44	5.88	5.35	
34	12.31	11.26	10.32	9.46	8.67	7.94	7.26	6.63	6.04	5.49	4.97	
36	11.73	10.71	9.79	8.96	8.19	7.48	6.82	6.21	5.63	5.10	4.60	
38	11.14	10.15	9.26	8.45	7.71	7.02	6.38	5.78	5.23	4.71	4.23	
40	10.56	9.59	8.73	7.95	7.22	6.56	5.94	5.36	4.82	4.32	3.86	
42	10.11	9.17	8.33	7.56	6.86	6.21	5.60	5.04	4.51	4.02	3.57	
44	9.67	8.75	7.93	7.18	6.50	5.86	5.27	4.72	4.20	3.73	3.28	
46	9.23	8.33	7.53	6.80	6.13	5.51	4.94	4.40	3.90	3.43	2.99	
48	8.79	7.91	7.13	6.42	5.77	5.16	4.60	4.08	3.59	3.13	2.71	
50	8.35	7.50	6.73	6.04	5.41	4.82	4.27	3.76	3.28	2.84	2.42	

ENGINE & WING A/I ON

SAT (°C)	WEIGHT (Kg)											
	23000	24000	25000	26000	27000	28000	29000	30000	31000	32000	33000	
-8	14.13	13.00	11.91	10.90	9.98	9.13	8.36	7.69	7.06	6.48	5.93	
-6	14.14	13.01	11.93	10.92	10.00	9.15	8.38	7.71	7.08	6.50	5.95	
-4	14.13	13.00	11.93	10.92	10.00	9.15	8.38	7.71	7.08	6.50	5.95	
-2	14.11	12.98	11.91	10.90	9.98	9.13	8.36	7.69	7.06	6.48	5.93	
0	14.09	12.97	11.89	10.88	9.96	9.11	8.34	7.67	7.04	6.46	5.91	
2	14.07	12.95	11.87	10.86	9.94	9.09	8.32	7.65	7.02	6.44	5.90	
4	14.05	12.93	11.85	10.84	9.91	9.06	8.30	7.63	7.00	6.42	5.88	
6	14.04	12.92	11.83	10.82	9.89	9.04	8.27	7.61	6.98	6.40	5.86	
8	14.02	12.90	11.81	10.80	9.87	9.02	8.25	7.59	6.96	6.38	5.84	
10	14.00	12.88	11.79	10.78	9.85	9.00	8.23	7.56	6.94	6.36	5.82	

APPROACH CLIMB GRADIENT (%)
LANDING FLAPS 5/APPROACH FLAPS 3
ALTITUDE: 1000 FT

CF34-8E5 ENGINES

ANTI-ICE OFF

SAT (°C)	WEIGHT (Kg)										
	23000	24000	25000	26000	27000	28000	29000	30000	31000	32000	33000
0	13.59	12.49	11.45	10.49	9.62	8.81	8.07	7.41	6.79	6.21	5.68
2	13.57	12.47	11.43	10.48	9.60	8.79	8.06	7.39	6.78	6.20	5.67
4	13.55	12.45	11.41	10.46	9.58	8.78	8.04	7.38	6.76	6.19	5.66
6	13.53	12.43	11.39	10.44	9.57	8.76	8.03	7.37	6.75	6.18	5.64
8	13.51	12.41	11.37	10.42	9.55	8.75	8.01	7.35	6.74	6.16	5.63
10	13.49	12.39	11.36	10.41	9.54	8.73	8.00	7.34	6.72	6.15	5.62
12	13.47	12.37	11.34	10.39	9.52	8.72	7.98	7.33	6.71	6.14	5.61
14	13.45	12.35	11.32	10.37	9.50	8.70	7.97	7.31	6.70	6.13	5.59
16	13.43	12.33	11.30	10.36	9.49	8.69	7.96	7.30	6.68	6.11	5.58
18	13.41	12.31	11.28	10.34	9.47	8.67	7.94	7.29	6.67	6.10	5.57
20	13.39	12.29	11.26	10.32	9.46	8.66	7.93	7.27	6.66	6.09	5.56
22	13.36	12.27	11.25	10.30	9.44	8.64	7.91	7.26	6.65	6.08	5.54
24	13.09	12.01	11.01	10.09	9.25	8.47	7.76	7.11	6.51	5.94	5.42
26	13.06	11.99	10.98	10.07	9.23	8.45	7.74	7.09	6.49	5.93	5.40
28	12.87	11.78	10.82	9.95	9.15	8.41	7.72	7.07	6.47	5.91	5.39
30	12.39	11.33	10.38	9.52	8.73	7.99	7.32	6.69	6.10	5.55	5.04
32	11.85	10.81	9.89	9.05	8.28	7.57	6.91	6.30	5.72	5.19	4.69
34	11.31	10.30	9.40	8.59	7.84	7.15	6.51	5.91	5.35	4.83	4.34
36	10.77	9.78	8.91	8.12	7.40	6.72	6.10	5.52	4.97	4.47	4.00
38	10.23	9.27	8.42	7.66	6.96	6.30	5.70	5.13	4.60	4.11	3.65
40	9.75	8.82	8.00	7.25	6.57	5.93	5.34	4.79	4.27	3.79	3.34
42	9.27	8.37	7.57	6.85	6.18	5.56	4.99	4.45	3.95	3.48	3.04
44	8.80	7.92	7.14	6.44	5.80	5.20	4.64	4.11	3.62	3.16	2.73
46	8.33	7.47	6.72	6.04	5.41	4.83	4.29	3.77	3.29	2.85	2.43
48	7.85	7.03	6.30	5.64	5.03	4.46	3.94	3.44	2.97	2.53	2.13
50	7.85	7.02	6.29	5.63	5.03	4.46	3.93	3.43	2.96	2.53	2.12

ENGINE & WING A/I ON

SAT (°C)	WEIGHT (Kg)										
	23000	24000	25000	26000	27000	28000	29000	30000	31000	32000	33000
-8	13.47	12.37	11.37	10.46	9.60	8.79	8.05	7.39	6.77	6.20	5.66
-6	13.47	12.37	11.37	10.45	9.60	8.79	8.05	7.39	6.77	6.20	5.67
-4	13.46	12.36	11.36	10.44	9.58	8.77	8.04	7.38	6.76	6.19	5.65
-2	13.45	12.35	11.35	10.43	9.56	8.76	8.02	7.36	6.75	6.17	5.64
0	13.44	12.35	11.34	10.42	9.55	8.74	8.01	7.35	6.73	6.16	5.63
2	13.43	12.34	11.33	10.40	9.53	8.73	7.99	7.33	6.72	6.15	5.61
4	13.41	12.33	11.32	10.38	9.51	8.71	7.98	7.32	6.71	6.13	5.60
6	13.39	12.30	11.30	10.36	9.49	8.69	7.96	7.31	6.69	6.12	5.59
8	13.36	12.28	11.27	10.34	9.47	8.68	7.95	7.29	6.68	6.11	5.58
10	13.34	12.26	11.25	10.32	9.46	8.66	7.93	7.28	6.66	6.09	5.56

APPROACH CLIMB GRADIENT (%)
LANDING FLAPS 5/APPROACH FLAPS 3
ALTITUDE: 2000 FT

CF34-8E5 ENGINES

ANTI-ICE OFF

SAT (°C)	WEIGHT (Kg)											
	23000	24000	25000	26000	27000	28000	29000	30000	31000	32000	33000	
0	12.74	11.66	10.69	9.80	8.99	8.24	7.55	6.91	6.31	5.76	5.24	
2	12.72	11.64	10.67	9.79	8.98	8.22	7.53	6.90	6.30	5.75	5.23	
4	12.70	11.63	10.66	9.77	8.96	8.21	7.52	6.88	6.29	5.74	5.22	
6	12.68	11.61	10.64	9.76	8.95	8.20	7.51	6.87	6.28	5.72	5.21	
8	12.66	11.59	10.62	9.74	8.93	8.18	7.49	6.86	6.26	5.71	5.20	
10	12.65	11.58	10.61	9.73	8.92	8.17	7.48	6.84	6.25	5.70	5.18	
12	12.63	11.56	10.59	9.71	8.90	8.15	7.47	6.83	6.24	5.68	5.17	
14	12.61	11.54	10.58	9.70	8.89	8.14	7.45	6.82	6.22	5.67	5.16	
16	12.59	11.53	10.56	9.68	8.87	8.13	7.44	6.80	6.21	5.66	5.15	
18	12.57	11.51	10.54	9.67	8.86	8.11	7.43	6.79	6.20	5.65	5.13	
20	12.55	11.49	10.53	9.65	8.85	8.10	7.41	6.78	6.18	5.63	5.12	
22	12.42	11.37	10.42	9.56	8.77	8.04	7.36	6.73	6.14	5.59	5.08	
24	12.39	11.35	10.39	9.52	8.72	7.98	7.30	6.68	6.09	5.54	5.03	
26	12.37	11.33	10.37	9.51	8.71	7.97	7.29	6.66	6.08	5.54	5.03	
28	11.94	10.92	9.99	9.14	8.36	7.64	6.97	6.35	5.78	5.24	4.75	
30	11.51	10.51	9.60	8.77	8.00	7.30	6.64	6.04	5.47	4.95	4.45	
32	11.03	10.06	9.17	8.36	7.61	6.92	6.28	5.69	5.14	4.62	4.14	
34	10.51	9.57	8.70	7.91	7.18	6.51	5.89	5.31	4.77	4.27	3.81	
36	10.00	9.08	8.23	7.46	6.76	6.10	5.49	4.93	4.41	3.92	3.47	
38	9.48	8.59	7.77	7.02	6.33	5.69	5.10	4.56	4.05	3.57	3.13	
40	8.97	8.10	7.30	6.57	5.90	5.28	4.71	4.18	3.69	3.23	2.80	
42	8.45	7.61	6.84	6.13	5.48	4.87	4.32	3.81	3.33	2.88	2.46	
44	7.94	7.13	6.37	5.69	5.05	4.47	3.93	3.43	2.97	2.53	2.13	
46	7.44	6.64	5.91	5.25	4.63	4.06	3.54	3.06	2.61	2.19	1.80	
48	7.43	6.64	5.90	5.24	4.62	4.05	3.53	3.05	2.60	2.18	1.79	
50	7.43	6.64	5.90	5.24	4.62	4.05	3.53	3.05	2.60	2.18	1.79	

ENGINE & WING A/I ON

SAT (°C)	WEIGHT (Kg)											
	23000	24000	25000	26000	27000	28000	29000	30000	31000	32000	33000	
-8	12.68	11.62	10.66	9.79	8.99	8.23	7.54	6.90	6.30	5.75	5.23	
-6	12.66	11.60	10.64	9.77	8.97	8.22	7.53	6.89	6.29	5.73	5.22	
-4	12.64	11.58	10.63	9.76	8.96	8.20	7.51	6.87	6.28	5.72	5.20	
-2	12.62	11.56	10.61	9.74	8.94	8.19	7.50	6.86	6.26	5.71	5.19	
0	12.60	11.54	10.59	9.72	8.92	8.18	7.48	6.85	6.25	5.70	5.18	
2	12.58	11.52	10.57	9.71	8.91	8.16	7.47	6.83	6.24	5.68	5.17	
4	12.56	11.50	10.55	9.69	8.89	8.15	7.46	6.82	6.23	5.67	5.16	
6	12.54	11.48	10.53	9.67	8.88	8.13	7.44	6.81	6.21	5.66	5.14	
8	12.52	11.46	10.52	9.66	8.86	8.12	7.43	6.79	6.20	5.65	5.13	
10	12.50	11.45	10.50	9.64	8.85	8.10	7.42	6.78	6.19	5.64	5.12	

APPROACH CLIMB GRADIENT (%)
LANDING FLAPS 5/APPROACH FLAPS 3
ALTITUDE: 3000 FT

CF34-8E5 ENGINES

ANTI-ICE OFF

SAT (°C)	WEIGHT (Kg)										
	23000	24000	25000	26000	27000	28000	29000	30000	31000	32000	33000
0	11.99	10.97	10.03	9.18	8.40	7.68	7.01	6.39	5.82	5.28	4.78
2	11.98	10.95	10.02	9.17	8.39	7.66	7.00	6.38	5.81	5.27	4.77
4	11.96	10.93	10.00	9.15	8.37	7.65	6.98	6.37	5.79	5.26	4.76
6	11.95	10.92	9.99	9.14	8.36	7.63	6.97	6.35	5.78	5.25	4.75
8	11.93	10.90	9.97	9.12	8.34	7.62	6.95	6.34	5.77	5.24	4.74
10	11.91	10.89	9.96	9.11	8.33	7.61	6.94	6.33	5.76	5.22	4.73
12	11.90	10.87	9.94	9.09	8.31	7.59	6.93	6.32	5.74	5.21	4.72
14	11.88	10.86	9.92	9.08	8.30	7.58	6.91	6.30	5.73	5.20	4.71
16	11.86	10.84	9.91	9.06	8.28	7.56	6.90	6.29	5.72	5.19	4.69
18	11.85	10.83	9.89	9.05	8.27	7.55	6.89	6.28	5.71	5.18	4.68
20	11.79	10.77	9.85	9.01	8.23	7.52	6.86	6.25	5.68	5.16	4.66
22	11.73	10.71	9.79	8.96	8.19	7.48	6.82	6.22	5.65	5.12	4.63
24	11.71	10.68	9.76	8.93	8.16	7.45	6.79	6.19	5.62	5.09	4.60
26	11.32	10.33	9.42	8.60	7.84	7.14	6.49	5.90	5.34	4.83	4.35
28	10.91	9.95	9.06	8.26	7.51	6.82	6.19	5.61	5.06	4.55	4.08
30	10.50	9.56	8.69	7.90	7.17	6.49	5.87	5.30	4.76	4.27	3.80
32	10.06	9.14	8.29	7.52	6.80	6.14	5.54	4.97	4.45	3.96	3.51
34	9.63	8.73	7.90	7.14	6.44	5.80	5.20	4.65	4.14	3.66	3.22
36	9.16	8.27	7.46	6.73	6.05	5.42	4.83	4.30	3.80	3.33	2.90
38	8.68	7.82	7.03	6.31	5.65	5.04	4.47	3.95	3.46	3.00	2.58
40	8.20	7.37	6.60	5.90	5.25	4.66	4.10	3.59	3.11	2.67	2.26
42	7.73	6.91	6.17	5.49	4.86	4.28	3.74	3.24	2.77	2.34	1.94
44	7.26	6.46	5.74	5.08	4.47	3.90	3.38	2.89	2.43	2.01	1.62
46	7.24	6.45	5.72	5.06	4.45	3.89	3.37	2.88	2.43	2.00	1.61
48	7.24	6.45	5.72	5.06	4.45	3.89	3.37	2.88	2.43	2.00	1.61
50	7.24	6.45	5.72	5.06	4.45	3.89	3.37	2.88	2.43	2.00	1.61

ENGINE & WING A/I ON

SAT (°C)	WEIGHT (Kg)										
	23000	24000	25000	26000	27000	28000	29000	30000	31000	32000	33000
-8	11.92	10.91	9.98	9.14	8.36	7.64	6.98	6.37	5.80	5.27	4.78
-6	11.90	10.89	9.96	9.12	8.35	7.63	6.97	6.36	5.79	5.26	4.76
-4	11.88	10.87	9.95	9.10	8.33	7.61	6.95	6.35	5.78	5.25	4.75
-2	11.86	10.85	9.93	9.09	8.32	7.60	6.94	6.33	5.76	5.23	4.74
0	11.84	10.83	9.91	9.07	8.30	7.59	6.93	6.32	5.75	5.22	4.73
2	11.82	10.81	9.89	9.06	8.29	7.57	6.92	6.31	5.74	5.21	4.71
4	11.80	10.79	9.87	9.04	8.27	7.56	6.90	6.30	5.73	5.20	4.70
6	11.78	10.77	9.85	9.02	8.26	7.55	6.89	6.28	5.71	5.18	4.69
8	11.76	10.75	9.84	9.01	8.24	7.53	6.88	6.27	5.70	5.17	4.67
10	11.74	10.73	9.82	8.99	8.23	7.52	6.87	6.26	5.69	5.15	4.66

APPROACH CLIMB GRADIENT (%)
LANDING FLAPS 5/APPROACH FLAPS 3
ALTITUDE: 4000 FT

CF34-8E5 ENGINES**ANTI-ICE OFF**

SAT (°C)	WEIGHT (Kg)											
	23000	24000	25000	26000	27000	28000	29000	30000	31000	32000	33000	
0	11.29	10.31	9.41	8.59	7.83	7.13	6.49	5.88	5.32	4.80	4.31	
2	11.27	10.29	9.39	8.57	7.82	7.12	6.47	5.87	5.31	4.79	4.31	
4	11.25	10.27	9.37	8.55	7.80	7.10	6.46	5.86	5.30	4.78	4.30	
6	11.23	10.25	9.35	8.54	7.78	7.09	6.45	5.85	5.29	4.78	4.29	
8	11.21	10.23	9.33	8.52	7.77	7.07	6.43	5.84	5.28	4.77	4.28	
10	11.19	10.21	9.32	8.50	7.75	7.06	6.42	5.82	5.27	4.75	4.27	
12	11.17	10.19	9.30	8.49	7.74	7.04	6.40	5.81	5.26	4.74	4.26	
14	11.15	10.17	9.28	8.47	7.72	7.03	6.39	5.80	5.24	4.73	4.25	
16	11.13	10.15	9.26	8.45	7.70	7.01	6.37	5.78	5.23	4.71	4.23	
18	11.11	10.12	9.23	8.42	7.68	6.98	6.35	5.76	5.21	4.69	4.21	
20	11.01	10.03	9.15	8.34	7.60	6.91	6.28	5.69	5.14	4.63	4.16	
22	10.92	9.94	9.06	8.26	7.52	6.83	6.20	5.62	5.08	4.57	4.10	
24	10.71	9.73	8.85	8.06	7.33	6.65	6.03	5.45	4.92	4.41	3.95	
26	10.34	9.39	8.54	7.76	7.04	6.38	5.77	5.20	4.66	4.17	3.70	
28	9.97	9.04	8.20	7.44	6.73	6.08	5.48	4.92	4.39	3.91	3.45	
30	9.60	8.68	7.86	7.11	6.42	5.78	5.19	4.64	4.13	3.65	3.20	
32	9.22	8.33	7.52	6.79	6.11	5.49	4.91	4.37	3.86	3.39	2.95	
34	8.80	7.92	7.13	6.42	5.76	5.15	4.59	4.05	3.56	3.10	2.67	
36	8.37	7.51	6.75	6.05	5.41	4.82	4.26	3.74	3.25	2.80	2.38	
38	7.95	7.11	6.36	5.68	5.06	4.48	3.94	3.43	2.95	2.50	2.09	
40	7.52	6.70	5.98	5.32	4.71	4.15	3.62	3.12	2.65	2.21	1.80	
42	7.10	6.30	5.59	4.95	4.36	3.81	3.30	2.81	2.34	1.91	1.51	
44	7.09	6.29	5.58	4.94	4.35	3.80	3.29	2.79	2.33	1.90	1.50	
46	7.09	6.29	5.58	4.94	4.35	3.80	3.29	2.79	2.33	1.90	1.50	
48	7.09	6.29	5.58	4.94	4.35	3.80	3.29	2.79	2.33	1.90	1.50	
50	7.09	6.29	5.58	4.94	4.35	3.80	3.29	2.79	2.33	1.90	1.50	

ENGINE & WING A/I ON

SAT (°C)	WEIGHT (Kg)											
	23000	24000	25000	26000	27000	28000	29000	30000	31000	32000	33000	
-8	11.19	10.23	9.33	8.52	7.78	7.09	6.44	5.85	5.29	4.77	4.29	
-6	11.18	10.22	9.32	8.51	7.76	7.07	6.43	5.84	5.28	4.76	4.28	
-4	11.17	10.21	9.31	8.50	7.75	7.05	6.41	5.83	5.27	4.75	4.27	
-2	11.15	10.19	9.30	8.48	7.73	7.03	6.40	5.81	5.26	4.74	4.26	
0	11.13	10.16	9.27	8.46	7.71	7.02	6.38	5.79	5.25	4.73	4.25	
2	11.10	10.14	9.25	8.44	7.69	7.00	6.36	5.78	5.23	4.72	4.24	
4	11.08	10.11	9.22	8.41	7.67	6.98	6.34	5.76	5.21	4.70	4.23	
6	11.05	10.08	9.20	8.39	7.65	6.96	6.33	5.74	5.19	4.69	4.21	
8	11.02	10.05	9.17	8.37	7.63	6.94	6.31	5.72	5.18	4.67	4.20	
10	10.96	10.00	9.12	8.32	7.58	6.90	6.27	5.69	5.14	4.63	4.16	

APPROACH CLIMB GRADIENT (%)
LANDING FLAPS 5/APPROACH FLAPS 3
ALTITUDE: 5000 FT

CF34-8E5 ENGINES

ANTI-ICE OFF

SAT (°C)	WEIGHT (Kg)										
	23000	24000	25000	26000	27000	28000	29000	30000	31000	32000	33000
0	10.66	9.70	8.83	8.04	7.31	6.63	6.00	5.43	4.90	4.40	3.94
2	10.64	9.68	8.81	8.02	7.30	6.62	5.99	5.42	4.89	4.39	3.92
4	10.61	9.66	8.79	8.00	7.28	6.61	5.99	5.41	4.87	4.37	3.91
6	10.59	9.63	8.77	7.98	7.26	6.59	5.97	5.39	4.86	4.36	3.89
8	10.56	9.61	8.74	7.96	7.24	6.57	5.95	5.38	4.84	4.34	3.88
10	10.53	9.57	8.71	7.93	7.21	6.54	5.93	5.36	4.82	4.32	3.86
12	10.50	9.54	8.68	7.90	7.19	6.52	5.91	5.34	4.80	4.31	3.84
14	10.46	9.51	8.65	7.88	7.16	6.50	5.89	5.32	4.79	4.29	3.83
16	10.43	9.47	8.61	7.83	7.11	6.45	5.83	5.27	4.73	4.24	3.78
18	10.31	9.35	8.50	7.72	7.01	6.35	5.74	5.17	4.64	4.15	3.70
20	10.18	9.23	8.38	7.61	6.90	6.25	5.64	5.08	4.55	4.07	3.61
22	10.02	9.08	8.23	7.47	6.77	6.12	5.52	4.96	4.44	3.96	3.51
24	9.83	8.89	8.06	7.30	6.61	5.96	5.36	4.81	4.29	3.81	3.36
26	9.47	8.56	7.74	7.00	6.31	5.68	5.09	4.55	4.04	3.57	3.13
28	9.11	8.22	7.42	6.69	6.02	5.40	4.83	4.29	3.79	3.33	2.89
30	8.76	7.88	7.10	6.39	5.73	5.12	4.56	4.03	3.54	3.08	2.66
32	8.38	7.53	6.75	6.05	5.41	4.81	4.26	3.75	3.27	2.82	2.40
34	8.00	7.17	6.41	5.72	5.09	4.50	3.96	3.46	2.99	2.55	2.15
36	7.63	6.81	6.07	5.39	4.77	4.19	3.66	3.17	2.71	2.29	1.89
38	7.25	6.45	5.72	5.06	4.45	3.88	3.36	2.88	2.44	2.02	1.63
40	6.88	6.10	5.38	4.73	4.13	3.58	3.06	2.60	2.16	1.76	1.38
42	6.86	6.08	5.36	4.72	4.12	3.56	3.05	2.59	2.15	1.74	1.37
44	6.86	6.08	5.36	4.72	4.12	3.56	3.05	2.59	2.15	1.74	1.37
46	6.86	6.08	5.36	4.72	4.12	3.56	3.05	2.59	2.15	1.74	1.37
48	6.86	6.08	5.36	4.72	4.12	3.56	3.05	2.59	2.15	1.74	1.37
50	6.86	6.08	5.36	4.72	4.12	3.56	3.05	2.59	2.15	1.74	1.37

ENGINE & WING A/I ON

SAT (°C)	WEIGHT (Kg)										
	23000	24000	25000	26000	27000	28000	29000	30000	31000	32000	33000
-8	10.51	9.57	8.72	7.95	7.23	6.57	5.95	5.38	4.84	4.35	3.88
-6	10.49	9.55	8.70	7.92	7.21	6.55	5.94	5.36	4.83	4.33	3.87
-4	10.46	9.52	8.67	7.90	7.19	6.53	5.92	5.35	4.81	4.32	3.85
-2	10.43	9.50	8.65	7.88	7.17	6.51	5.90	5.33	4.80	4.30	3.84
0	10.41	9.47	8.63	7.86	7.15	6.49	5.89	5.32	4.78	4.29	3.83
2	10.38	9.45	8.60	7.84	7.13	6.48	5.87	5.30	4.77	4.27	3.81
4	10.36	9.42	8.58	7.82	7.11	6.46	5.85	5.28	4.75	4.26	3.80
6	10.33	9.40	8.56	7.79	7.09	6.44	5.83	5.27	4.74	4.25	3.79
8	10.27	9.33	8.49	7.72	7.01	6.35	5.74	5.18	4.65	4.16	3.71
10	10.15	9.22	8.38	7.61	6.91	6.25	5.65	5.09	4.57	4.08	3.63

APPROACH CLIMB GRADIENT (%)
LANDING FLAPS FULL/APPROACH FLAPS 4
ALTITUDE: SL

CF34-8E5 ENGINES

ANTI-ICE OFF

SAT (°C)	WEIGHT (Kg)											
	23000	24000	25000	26000	27000	28000	29000	30000	31000	32000	33000	
0	13.43	12.28	11.25	10.27	9.34	8.48	7.69	6.95	6.29	5.70	5.15	
2	13.42	12.28	11.24	10.26	9.32	8.46	7.67	6.93	6.27	5.69	5.13	
4	13.41	12.27	11.23	10.25	9.31	8.45	7.65	6.91	6.26	5.67	5.11	
6	13.39	12.25	11.22	10.24	9.30	8.43	7.63	6.89	6.24	5.65	5.09	
8	13.37	12.23	11.20	10.22	9.28	8.41	7.61	6.87	6.22	5.63	5.08	
10	13.35	12.21	11.18	10.20	9.26	8.39	7.60	6.86	6.20	5.61	5.06	
12	13.32	12.19	11.16	10.18	9.24	8.37	7.58	6.84	6.18	5.59	5.04	
14	13.30	12.17	11.14	10.16	9.22	8.35	7.56	6.82	6.16	5.58	5.02	
16	13.28	12.15	11.12	10.14	9.20	8.33	7.54	6.80	6.14	5.56	5.01	
18	13.26	12.12	11.10	10.12	9.18	8.31	7.52	6.78	6.12	5.54	4.99	
20	13.23	12.10	11.07	10.10	9.16	8.29	7.50	6.76	6.10	5.52	4.97	
22	13.21	12.08	11.05	10.08	9.14	8.27	7.48	6.74	6.08	5.50	4.95	
24	13.19	12.06	11.03	10.06	9.12	8.25	7.46	6.72	6.07	5.48	4.94	
26	13.00	11.88	10.86	9.91	9.00	8.17	7.40	6.69	6.05	5.47	4.92	
28	12.97	11.85	10.84	9.88	8.98	8.15	7.38	6.67	6.03	5.45	4.90	
30	12.70	11.58	10.57	9.65	8.80	8.02	7.30	6.62	6.01	5.43	4.88	
32	12.14	11.05	10.06	9.15	8.34	7.59	6.89	6.24	5.64	5.07	4.53	
34	11.56	10.50	9.54	8.66	7.87	7.13	6.45	5.82	5.23	4.67	4.15	
36	10.97	9.94	9.01	8.16	7.38	6.67	6.00	5.39	4.82	4.28	3.77	
38	10.38	9.38	8.47	7.64	6.89	6.20	5.56	4.96	4.41	3.88	3.39	
40	9.80	8.82	7.94	7.13	6.41	5.73	5.11	4.53	4.00	3.49	3.01	
42	9.35	8.40	7.53	6.75	6.04	5.38	4.77	4.21	3.69	3.19	2.72	
44	8.91	7.98	7.13	6.36	5.67	5.03	4.44	3.88	3.37	2.89	2.43	
46	8.46	7.56	6.73	5.98	5.31	4.68	4.10	3.56	3.06	2.59	2.14	
48	8.02	7.14	6.33	5.60	4.94	4.33	3.77	3.24	2.75	2.29	1.86	
50	7.58	6.72	5.93	5.22	4.58	3.98	3.43	2.92	2.44	1.99	1.57	

ENGINE & WING A/I ON

SAT (°C)	WEIGHT (Kg)											
	23000	24000	25000	26000	27000	28000	29000	30000	31000	32000	33000	
-8	13.36	12.23	11.19	10.22	9.29	8.43	7.64	6.91	6.25	5.66	5.11	
-6	13.36	12.23	11.20	10.23	9.31	8.45	7.66	6.92	6.27	5.68	5.12	
-4	13.35	12.22	11.19	10.23	9.31	8.45	7.66	6.92	6.27	5.68	5.12	
-2	13.33	12.20	11.17	10.21	9.29	8.43	7.64	6.90	6.25	5.66	5.10	
0	13.31	12.18	11.16	10.19	9.27	8.41	7.62	6.88	6.23	5.64	5.09	
2	13.29	12.17	11.14	10.18	9.25	8.39	7.60	6.86	6.21	5.62	5.07	
4	13.28	12.15	11.12	10.16	9.23	8.37	7.58	6.84	6.19	5.60	5.05	
6	13.26	12.13	11.11	10.14	9.21	8.35	7.56	6.82	6.17	5.58	5.03	
8	13.24	12.11	11.09	10.12	9.19	8.33	7.54	6.80	6.15	5.56	5.01	
10	13.22	12.10	11.08	10.11	9.17	8.31	7.52	6.78	6.13	5.54	4.99	

APPROACH CLIMB GRADIENT (%)
LANDING FLAPS FULL/APPROACH FLAPS 4
ALTITUDE: 1000 FT

CF34-8E5 ENGINES

ANTI-ICE OFF

SAT (°C)	WEIGHT (Kg)											
	23000	24000	25000	26000	27000	28000	29000	30000	31000	32000	33000	
0	12.82	11.71	10.70	9.76	8.88	8.06	7.31	6.61	5.98	5.40	4.85	
2	12.80	11.69	10.68	9.74	8.86	8.05	7.30	6.60	5.96	5.39	4.84	
4	12.78	11.67	10.67	9.73	8.84	8.03	7.28	6.58	5.95	5.37	4.83	
6	12.76	11.65	10.65	9.71	8.83	8.02	7.27	6.57	5.94	5.36	4.81	
8	12.74	11.63	10.63	9.69	8.81	8.00	7.25	6.55	5.93	5.35	4.80	
10	12.72	11.61	10.61	9.67	8.80	7.98	7.24	6.54	5.91	5.33	4.79	
12	12.70	11.59	10.59	9.66	8.78	7.97	7.22	6.53	5.90	5.32	4.78	
14	12.68	11.57	10.57	9.64	8.76	7.95	7.21	6.51	5.89	5.31	4.77	
16	12.66	11.55	10.55	9.62	8.75	7.94	7.19	6.50	5.87	5.30	4.75	
18	12.63	11.53	10.53	9.60	8.73	7.92	7.18	6.49	5.86	5.28	4.74	
20	12.61	11.51	10.52	9.58	8.71	7.91	7.16	6.47	5.85	5.27	4.73	
22	12.59	11.49	10.50	9.57	8.70	7.89	7.15	6.46	5.83	5.26	4.72	
24	12.31	11.23	10.24	9.33	8.48	7.70	6.98	6.30	5.69	5.12	4.59	
26	12.29	11.21	10.22	9.31	8.46	7.68	6.96	6.28	5.67	5.10	4.57	
28	12.13	11.03	10.04	9.14	8.33	7.58	6.89	6.25	5.65	5.09	4.55	
30	11.64	10.57	9.60	8.72	7.92	7.18	6.50	5.86	5.28	4.73	4.21	
32	11.11	10.06	9.11	8.25	7.47	6.75	6.09	5.47	4.90	4.36	3.85	
34	10.58	9.55	8.62	7.78	7.02	6.33	5.68	5.08	4.52	4.00	3.50	
36	10.03	9.03	8.13	7.31	6.58	5.90	5.27	4.69	4.15	3.64	3.15	
38	9.48	8.51	7.64	6.84	6.13	5.47	4.87	4.30	3.77	3.28	2.81	
40	9.00	8.06	7.20	6.43	5.74	5.10	4.51	3.95	3.44	2.96	2.50	
42	8.51	7.60	6.77	6.02	5.35	4.73	4.15	3.61	3.11	2.64	2.19	
44	8.03	7.15	6.34	5.61	4.96	4.35	3.79	3.27	2.79	2.32	1.89	
46	7.55	6.69	5.91	5.20	4.57	3.98	3.44	2.93	2.46	2.01	1.58	
48	7.07	6.24	5.48	4.80	4.18	3.61	3.08	2.59	2.13	1.69	1.28	
50	7.07	6.24	5.48	4.79	4.18	3.61	3.08	2.59	2.13	1.69	1.27	

ENGINE & WING A/I ON

SAT (°C)	WEIGHT (Kg)										
	23000	24000	25000	26000	27000	28000	29000	30000	31000	32000	33000
-8	12.71	11.60	10.59	9.67	8.83	8.04	7.29	6.59	5.96	5.38	4.84
-6	12.70	11.59	10.59	9.67	8.82	8.04	7.29	6.59	5.96	5.38	4.84
-4	12.68	11.58	10.58	9.66	8.81	8.03	7.28	6.58	5.95	5.37	4.82
-2	12.67	11.57	10.57	9.65	8.80	8.01	7.26	6.56	5.93	5.36	4.81
0	12.65	11.56	10.57	9.65	8.80	7.99	7.25	6.55	5.92	5.34	4.80
2	12.64	11.55	10.56	9.64	8.78	7.98	7.23	6.54	5.91	5.33	4.79
4	12.62	11.53	10.54	9.62	8.77	7.96	7.21	6.52	5.89	5.32	4.77
6	12.60	11.51	10.52	9.60	8.75	7.94	7.20	6.51	5.88	5.30	4.76
8	12.58	11.49	10.50	9.58	8.73	7.92	7.18	6.49	5.87	5.29	4.75
10	12.56	11.47	10.48	9.56	8.71	7.90	7.17	6.48	5.85	5.28	4.73

APPROACH CLIMB GRADIENT (%)
LANDING FLAPS FULL/APPROACH FLAPS 4
ALTITUDE: 2000 FT

CF34-8E5 ENGINES

ANTI-ICE OFF

SAT (°C)	WEIGHT (Kg)											
	23000	24000	25000	26000	27000	28000	29000	30000	31000	32000	33000	
0	11.99	10.90	9.92	9.02	8.20	7.44	6.74	6.09	5.49	4.93	4.41	
2	11.97	10.89	9.90	9.00	8.18	7.43	6.73	6.08	5.48	4.92	4.39	
4	11.95	10.87	9.89	8.99	8.17	7.41	6.71	6.06	5.47	4.91	4.38	
6	11.93	10.85	9.87	8.97	8.16	7.40	6.70	6.05	5.45	4.90	4.37	
8	11.91	10.83	9.85	8.96	8.14	7.38	6.69	6.04	5.44	4.88	4.36	
10	11.89	10.81	9.84	8.94	8.13	7.37	6.67	6.02	5.43	4.87	4.35	
12	11.87	10.80	9.82	8.93	8.11	7.36	6.66	6.01	5.42	4.86	4.33	
14	11.85	10.78	9.80	8.91	8.10	7.34	6.65	6.00	5.40	4.85	4.32	
16	11.83	10.76	9.79	8.90	8.08	7.33	6.63	5.99	5.39	4.84	4.31	
18	11.81	10.74	9.77	8.88	8.07	7.32	6.62	5.97	5.38	4.82	4.30	
20	11.80	10.73	9.76	8.87	8.05	7.30	6.61	5.96	5.37	4.81	4.29	
22	11.66	10.60	9.64	8.76	7.96	7.22	6.54	5.90	5.32	4.76	4.24	
24	11.62	10.57	9.61	8.73	7.93	7.18	6.50	5.85	5.27	4.72	4.20	
26	11.59	10.55	9.59	8.72	7.91	7.17	6.48	5.84	5.25	4.71	4.19	
28	11.17	10.14	9.21	8.35	7.56	6.83	6.16	5.53	4.96	4.42	3.91	
30	10.73	9.73	8.81	7.97	7.20	6.49	5.83	5.22	4.65	4.12	3.62	
32	10.25	9.27	8.38	7.56	6.81	6.11	5.47	4.87	4.32	3.80	3.31	
34	9.73	8.78	7.91	7.11	6.38	5.70	5.07	4.49	3.95	3.45	2.97	
36	9.21	8.28	7.44	6.66	5.95	5.29	4.68	4.11	3.58	3.09	2.63	
38	8.69	7.79	6.97	6.22	5.52	4.88	4.28	3.73	3.22	2.74	2.29	
40	8.17	7.30	6.50	5.77	5.09	4.47	3.89	3.35	2.85	2.39	1.95	
42	7.66	6.81	6.04	5.32	4.67	4.06	3.50	2.97	2.49	2.04	1.61	
44	7.14	6.32	5.57	4.88	4.24	3.65	3.10	2.59	2.13	1.69	1.27	
46	6.63	5.84	5.11	4.44	3.82	3.24	2.71	2.21	1.76	1.34	0.94	
48	6.62	5.83	5.10	4.43	3.81	3.24	2.70	2.21	1.76	1.33	0.93	
50	6.62	5.83	5.10	4.43	3.81	3.24	2.70	2.21	1.76	1.33	0.93	

ENGINE & WING A/I ON

SAT (°C)	WEIGHT (Kg)											
	23000	24000	25000	26000	27000	28000	29000	30000	31000	32000	33000	
-8	11.91	10.84	9.88	8.99	8.18	7.43	6.74	6.08	5.49	4.93	4.40	
-6	11.89	10.82	9.86	8.97	8.17	7.42	6.72	6.07	5.47	4.91	4.38	
-4	11.87	10.80	9.84	8.95	8.15	7.40	6.71	6.06	5.46	4.90	4.37	
-2	11.85	10.79	9.82	8.94	8.13	7.39	6.70	6.04	5.45	4.89	4.36	
0	11.83	10.77	9.80	8.92	8.12	7.37	6.68	6.03	5.43	4.88	4.35	
2	11.81	10.75	9.78	8.90	8.10	7.36	6.67	6.02	5.42	4.86	4.34	
4	11.79	10.73	9.76	8.88	8.08	7.34	6.65	6.00	5.41	4.85	4.32	
6	11.77	10.71	9.74	8.87	8.07	7.33	6.64	5.99	5.40	4.84	4.31	
8	11.75	10.69	9.73	8.85	8.05	7.31	6.63	5.98	5.38	4.83	4.30	
10	11.73	10.67	9.71	8.83	8.03	7.30	6.61	5.96	5.37	4.81	4.29	

APPROACH CLIMB GRADIENT (%)
LANDING FLAPS FULL/APPROACH FLAPS 4
ALTITUDE: 3000 FT

CF34-8E5 ENGINES

ANTI-ICE OFF

SAT (°C)	WEIGHT (Kg)										
	23000	24000	25000	26000	27000	28000	29000	30000	31000	32000	33000
0	11.23	10.19	9.25	8.39	7.60	6.87	6.20	5.57	4.99	4.45	3.94
2	11.21	10.18	9.24	8.37	7.59	6.86	6.19	5.56	4.98	4.44	3.93
4	11.20	10.16	9.22	8.36	7.57	6.84	6.17	5.54	4.97	4.43	3.92
6	11.18	10.15	9.21	8.34	7.56	6.83	6.16	5.53	4.96	4.42	3.91
8	11.16	10.13	9.19	8.33	7.54	6.82	6.14	5.52	4.94	4.41	3.90
10	11.15	10.11	9.18	8.32	7.53	6.80	6.13	5.50	4.93	4.39	3.89
12	11.13	10.10	9.16	8.30	7.52	6.79	6.12	5.49	4.92	4.38	3.87
14	11.11	10.08	9.15	8.29	7.50	6.77	6.10	5.48	4.90	4.37	3.86
16	11.10	10.07	9.13	8.27	7.49	6.76	6.09	5.46	4.89	4.36	3.85
18	11.08	10.05	9.12	8.26	7.47	6.75	6.08	5.45	4.88	4.34	3.84
20	11.02	10.00	9.07	8.21	7.43	6.71	6.05	5.42	4.85	4.32	3.82
22	10.96	9.94	9.01	8.16	7.39	6.67	6.00	5.38	4.82	4.29	3.79
24	10.94	9.92	8.99	8.13	7.36	6.64	5.98	5.36	4.79	4.26	3.76
26	10.54	9.54	8.64	7.81	7.04	6.34	5.68	5.07	4.52	3.99	3.50
28	10.12	9.16	8.28	7.46	6.71	6.02	5.38	4.78	4.23	3.72	3.24
30	9.71	8.76	7.90	7.10	6.37	5.69	5.06	4.47	3.94	3.43	2.96
32	9.28	8.35	7.50	6.72	6.00	5.34	4.72	4.15	3.62	3.13	2.67
34	8.85	7.94	7.11	6.34	5.64	4.99	4.39	3.82	3.31	2.83	2.37
36	8.37	7.48	6.67	5.93	5.24	4.61	4.02	3.47	2.97	2.50	2.05
38	7.89	7.03	6.24	5.51	4.84	4.22	3.65	3.12	2.63	2.17	1.73
40	7.41	6.57	5.81	5.10	4.45	3.84	3.29	2.77	2.29	1.84	1.41
42	6.94	6.12	5.37	4.68	4.05	3.46	2.92	2.41	1.95	1.51	1.10
44	6.46	5.67	4.94	4.27	3.66	3.08	2.56	2.06	1.61	1.18	0.78
46	6.45	5.65	4.93	4.26	3.65	3.07	2.55	2.05	1.60	1.17	0.77
48	6.45	5.65	4.93	4.26	3.65	3.07	2.55	2.05	1.60	1.17	0.77
50	6.45	5.65	4.93	4.26	3.65	3.07	2.55	2.05	1.60	1.17	0.77

ENGINE & WING A/I ON

SAT (°C)	WEIGHT (Kg)										
	23000	24000	25000	26000	27000	28000	29000	30000	31000	32000	33000
-8	11.13	10.11	9.19	8.34	7.56	6.83	6.16	5.54	4.97	4.43	3.93
-6	11.11	10.10	9.17	8.32	7.54	6.82	6.15	5.52	4.95	4.42	3.92
-4	11.09	10.08	9.15	8.30	7.52	6.80	6.13	5.51	4.94	4.41	3.91
-2	11.07	10.06	9.13	8.29	7.51	6.79	6.12	5.50	4.93	4.40	3.89
0	11.05	10.04	9.12	8.27	7.49	6.77	6.11	5.49	4.92	4.39	3.88
2	11.03	10.02	9.10	8.25	7.48	6.76	6.09	5.47	4.91	4.37	3.87
4	11.02	10.00	9.08	8.23	7.46	6.74	6.08	5.46	4.90	4.36	3.86
6	11.00	9.98	9.06	8.21	7.44	6.73	6.07	5.45	4.88	4.35	3.85
8	10.98	9.96	9.04	8.20	7.43	6.71	6.05	5.44	4.87	4.34	3.83
10	10.96	9.94	9.02	8.18	7.41	6.70	6.04	5.43	4.86	4.33	3.82

APPROACH CLIMB GRADIENT (%)
LANDING FLAPS FULL/APPROACH FLAPS 4
ALTITUDE: 4000 FT

CF34-8E5 ENGINES

ANTI-ICE OFF

SAT (°C)	WEIGHT (Kg)											
	23000	24000	25000	26000	27000	28000	29000	30000	31000	32000	33000	
0	10.51	9.52	8.62	7.79	7.03	6.32	5.67	5.06	4.51	3.98	3.48	
2	10.49	9.50	8.60	7.77	7.01	6.31	5.66	5.05	4.49	3.97	3.47	
4	10.47	9.48	8.58	7.76	7.00	6.29	5.64	5.04	4.48	3.96	3.46	
6	10.45	9.46	8.56	7.74	6.98	6.28	5.63	5.02	4.47	3.95	3.45	
8	10.43	9.44	8.54	7.72	6.96	6.26	5.62	5.01	4.46	3.94	3.44	
10	10.41	9.42	8.53	7.70	6.95	6.25	5.60	5.00	4.44	3.92	3.43	
12	10.38	9.40	8.51	7.68	6.93	6.23	5.59	4.98	4.43	3.91	3.42	
14	10.36	9.38	8.49	7.67	6.91	6.22	5.57	4.97	4.42	3.90	3.41	
16	10.34	9.36	8.47	7.65	6.89	6.19	5.55	4.95	4.40	3.88	3.39	
18	10.32	9.34	8.45	7.62	6.87	6.17	5.53	4.93	4.38	3.86	3.37	
20	10.25	9.26	8.36	7.54	6.79	6.10	5.46	4.86	4.31	3.80	3.31	
22	10.15	9.16	8.27	7.45	6.71	6.02	5.39	4.79	4.25	3.73	3.25	
24	9.96	8.97	8.07	7.26	6.52	5.84	5.21	4.62	4.09	3.58	3.10	
26	9.58	8.62	7.75	6.95	6.23	5.56	4.95	4.37	3.84	3.34	2.86	
28	9.20	8.26	7.41	6.63	5.92	5.26	4.66	4.09	3.57	3.08	2.61	
30	8.83	7.91	7.07	6.30	5.61	4.97	4.37	3.82	3.30	2.82	2.36	
32	8.45	7.55	6.73	5.98	5.30	4.67	4.08	3.54	3.04	2.56	2.11	
34	8.03	7.14	6.34	5.61	4.94	4.33	3.76	3.23	2.74	2.27	1.83	
36	7.60	6.74	5.95	5.24	4.59	3.99	3.44	2.92	2.44	1.98	1.55	
38	7.18	6.33	5.56	4.87	4.24	3.65	3.11	2.61	2.14	1.69	1.26	
40	6.76	5.93	5.18	4.50	3.88	3.31	2.79	2.30	1.84	1.40	0.98	
42	6.33	5.53	4.79	4.13	3.53	2.98	2.47	1.99	1.54	1.11	0.69	
44	6.32	5.51	4.78	4.11	3.52	2.96	2.45	1.98	1.53	1.09	0.68	
46	6.32	5.51	4.78	4.11	3.52	2.96	2.45	1.98	1.53	1.09	0.68	
48	6.32	5.51	4.78	4.11	3.52	2.96	2.45	1.98	1.53	1.09	0.68	
50	6.32	5.51	4.78	4.11	3.52	2.96	2.45	1.98	1.53	1.09	0.68	

ENGINE & WING A/I ON

SAT (°C)	WEIGHT (Kg)											
	23000	24000	25000	26000	27000	28000	29000	30000	31000	32000	33000	
-8	10.39	9.42	8.53	7.72	6.97	6.27	5.62	5.02	4.47	3.94	3.45	
-6	10.38	9.41	8.53	7.71	6.95	6.26	5.61	5.01	4.46	3.93	3.44	
-4	10.37	9.40	8.52	7.70	6.94	6.24	5.60	4.99	4.44	3.92	3.43	
-2	10.35	9.38	8.50	7.68	6.93	6.23	5.58	4.97	4.42	3.91	3.42	
0	10.33	9.36	8.48	7.66	6.91	6.21	5.56	4.96	4.41	3.89	3.41	
2	10.31	9.33	8.45	7.64	6.88	6.18	5.54	4.94	4.39	3.88	3.39	
4	10.28	9.31	8.43	7.61	6.86	6.16	5.52	4.92	4.38	3.86	3.38	
6	10.26	9.29	8.40	7.59	6.84	6.14	5.50	4.91	4.36	3.85	3.36	
8	10.23	9.26	8.37	7.56	6.82	6.12	5.48	4.89	4.34	3.83	3.35	
10	10.17	9.20	8.32	7.51	6.77	6.08	5.44	4.85	4.31	3.79	3.31	

APPROACH CLIMB GRADIENT (%)
LANDING FLAPS FULL/APPROACH FLAPS 4
ALTITUDE: 5000 FT

CF34-8E5 ENGINES

ANTI-ICE OFF

SAT (°C)	WEIGHT (Kg)											
	23000	24000	25000	26000	27000	28000	29000	30000	31000	32000	33000	
0	9.86	8.91	8.04	7.24	6.51	5.82	5.19	4.60	4.06	3.56	3.08	
2	9.84	8.89	8.02	7.22	6.49	5.81	5.18	4.59	4.05	3.55	3.07	
4	9.82	8.87	8.00	7.20	6.47	5.79	5.16	4.58	4.04	3.54	3.06	
6	9.80	8.85	7.98	7.18	6.45	5.77	5.15	4.56	4.03	3.52	3.05	
8	9.79	8.82	7.95	7.15	6.42	5.75	5.12	4.54	4.01	3.51	3.03	
10	9.76	8.80	7.92	7.12	6.40	5.72	5.10	4.52	3.99	3.49	3.01	
12	9.73	8.77	7.89	7.09	6.37	5.70	5.08	4.50	3.97	3.47	3.00	
14	9.70	8.74	7.86	7.06	6.34	5.67	5.06	4.48	3.95	3.45	2.98	
16	9.67	8.71	7.83	7.03	6.30	5.63	5.01	4.43	3.90	3.40	2.93	
18	9.55	8.59	7.71	6.92	6.20	5.53	4.91	4.34	3.81	3.32	2.85	
20	9.42	8.46	7.59	6.80	6.09	5.43	4.82	4.24	3.72	3.23	2.76	
22	9.27	8.32	7.45	6.66	5.96	5.30	4.69	4.13	3.61	3.12	2.66	
24	9.07	8.13	7.27	6.50	5.79	5.14	4.54	3.98	3.46	2.98	2.52	
26	8.71	7.79	6.95	6.19	5.50	4.86	4.27	3.72	3.21	2.73	2.28	
28	8.35	7.45	6.63	5.88	5.21	4.58	4.00	3.46	2.96	2.49	2.05	
30	7.99	7.11	6.31	5.57	4.91	4.30	3.73	3.20	2.71	2.25	1.82	
32	7.61	6.75	5.96	5.25	4.60	3.99	3.43	2.91	2.44	1.98	1.56	
34	7.23	6.39	5.62	4.92	4.28	3.68	3.14	2.62	2.16	1.72	1.30	
36	6.85	6.03	5.28	4.59	3.96	3.38	2.84	2.34	1.88	1.45	1.04	
38	6.47	5.67	4.93	4.26	3.64	3.07	2.54	2.05	1.60	1.18	0.78	
40	6.10	5.31	4.59	3.93	3.33	2.77	2.25	1.76	1.32	0.91	0.52	
42	6.08	5.29	4.58	3.92	3.31	2.75	2.23	1.75	1.31	0.90	0.51	
44	6.08	5.29	4.58	3.92	3.31	2.75	2.23	1.75	1.31	0.90	0.51	
46	6.08	5.29	4.58	3.92	3.31	2.75	2.23	1.75	1.31	0.90	0.51	
48	6.08	5.29	4.58	3.92	3.31	2.75	2.23	1.75	1.31	0.90	0.51	
50	6.08	5.29	4.58	3.92	3.31	2.75	2.23	1.75	1.31	0.90	0.51	

ENGINE & WING A/I ON

SAT (°C)	WEIGHT (Kg)										
	23000	24000	25000	26000	27000	28000	29000	30000	31000	32000	33000
-8	9.72	8.77	7.91	7.13	6.41	5.74	5.12	4.54	4.01	3.51	3.03
-6	9.69	8.75	7.89	7.10	6.39	5.72	5.10	4.53	4.00	3.49	3.02
-4	9.67	8.72	7.87	7.08	6.36	5.70	5.08	4.51	3.98	3.48	3.01
-2	9.64	8.70	7.84	7.06	6.34	5.68	5.07	4.49	3.97	3.46	2.99
0	9.62	8.67	7.82	7.04	6.32	5.66	5.05	4.48	3.95	3.45	2.98
2	9.59	8.65	7.80	7.01	6.30	5.64	5.03	4.46	3.93	3.44	2.96
4	9.56	8.63	7.77	6.99	6.28	5.62	5.01	4.44	3.92	3.42	2.95
6	9.54	8.60	7.75	6.97	6.26	5.60	4.99	4.43	3.90	3.41	2.94
8	9.50	8.55	7.69	6.90	6.19	5.53	4.91	4.34	3.82	3.32	2.86
10	9.37	8.43	7.58	6.80	6.09	5.43	4.82	4.25	3.73	3.24	2.77

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LANDING

UNFACTORED LANDING DISTANCES

Unfactored landing distance is the actual distance to land the airplane on a zero slope, ISA temperature, dry runway, from a point 50 ft above runway threshold at V_{ref} , using only the brakes and spoilers as deceleration devices (i.e., no engine reverse thrust is used).

The required landing distance for dispatch is the unfactored landing distance increased by 66.7% for dry runway, or 91.7% for wet runway.

For obtaining the DRY runway factored distance, multiply unfactored landing distance by 1.667.

For obtaining the WET runway factored distance, multiply unfactored landing distance by 1.917.

UNFACTORED LANDING DISTANCE TABLE
CF34-8E5 ENGINES – JAA – FLAPS 5 – ISA CONDITIONS – ANTI-ICE
OFF – NO ICE ACCRETION – AUTO BRAKES OFF

Weight (kg)	ALTITUDE							
	0 ft				1000 ft			
	WIND							
	-10 Kt	0 Kt	10 Kt	20 Kt	-10 Kt	0 Kt	10 Kt	20 Kt
23000	760	640	604	569	771	649	612	576
25000	797	674	636	600	809	684	645	608
27000	834	709	670	633	849	720	680	642
29000	872	740	700	665	889	756	715	676
31000	912	776	734	693	930	792	750	709
33000	956	812	768	727	976	829	786	744
35000	1001	849	803	760	1023	869	822	778
37000	1043	886	838	792	1065	905	856	809

Weight (kg)	ALTITUDE							
	2000 ft				3000 ft			
	WIND							
	-10 Kt	0 Kt	10 Kt	20 Kt	-10 Kt	0 Kt	10 Kt	20 Kt
23000	784	662	624	589	798	675	638	602
25000	823	698	659	622	837	709	670	632
27000	865	735	695	657	880	748	707	668
29000	906	772	731	691	922	786	744	704
31000	948	809	767	726	968	825	781	740
33000	996	846	801	758	1017	866	820	777
35000	1044	888	840	797	1069	910	861	815
37000	1092	929	879	832	1119	953	902	854

Weight (kg)	ALTITUDE							
	4000 ft				5000 ft			
	WIND							
	-10 Kt	0 Kt	10 Kt	20 Kt	-10 Kt	0 Kt	10 Kt	20 Kt
23000	811	686	647	611	825	700	661	625
25000	853	724	684	646	867	739	700	661
27000	897	764	723	684	913	778	736	696
29000	940	803	761	720	958	818	775	734
31000	988	843	800	758	1009	860	816	773
33000	1039	884	837	793	1063	906	859	813
35000	1096	933	884	836	1125	960	909	861
37000	1150	980	929	880	1180	1006	954	903

Landing distance in meters.

UNFACTORED LANDING DISTANCE TABLE
CF34-8E5 ENGINES – JAA – FLAPS FULL – ISA CONDITIONS – ANTI-ICE OFF – NO ICE ACCRETION – AUTO BRAKES OFF

Weight (kg)	ALTITUDE							
	0 ft				1000 ft			
	WIND							
	-10 Kt	0 Kt	10 Kt	20 Kt	-10 Kt	0 Kt	10 Kt	20 Kt
23000	734	616	580	546	744	624	592	558
25000	769	648	611	575	780	657	619	583
27000	804	679	641	604	816	689	650	613
29000	839	710	671	633	852	722	682	643
31000	874	742	701	662	889	755	716	677
33000	910	773	731	691	928	789	747	707
35000	943	799	755	714	962	816	772	730
37000	966	818	773	731	985	834	788	745

Weight (kg)	ALTITUDE							
	2000 ft				3000 ft			
	WIND							
	-10 Kt	0 Kt	10 Kt	20 Kt	-10 Kt	0 Kt	10 Kt	20 Kt
23000	757	636	599	564	770	649	612	577
25000	794	670	632	596	808	684	646	609
27000	831	703	664	627	846	718	679	641
29000	868	737	696	657	884	752	712	673
31000	906	770	729	689	923	787	745	705
33000	946	804	761	719	965	821	778	736
35000	980	831	787	744	1001	850	805	762
37000	1006	853	806	762	1026	873	826	781

Weight (kg)	ALTITUDE							
	4000 ft				5000 ft			
	WIND							
	-10 Kt	0 Kt	10 Kt	20 Kt	-10 Kt	0 Kt	10 Kt	20 Kt
23000	782	659	621	585	796	672	634	598
25000	821	695	656	618	836	709	670	632
27000	861	730	690	651	877	746	705	666
29000	900	766	724	684	917	782	740	700
31000	941	802	759	718	960	819	776	735
33000	984	837	793	750	1005	856	811	768
35000	1022	868	821	780	1044	888	841	796
37000	1049	891	843	797	1072	913	864	817

Landing distance in meters.

LANDING DISTANCE CORRECTION FACTOR – JAA

Emerg/Abnormal Procedure	Flaps – Speed	Factor
Dual Engine Failure	Slat/Flap 3 – $V_{REF FULL} + 20$ or 130 KIAS	2.10
Jammed Control Column (pitch)	Slat/Flap 5 – $V_{REF FULL} + 15$	1.40
Jammed Control Wheel	Slat/Flap 5 – $V_{REF FULL} + 15$	1.40
Loss of hydraulic System 1	Slat/Flap Full – $V_{REF FULL}$	1.90
Loss of hydraulic System 2	Slat/Flap Full – $V_{REF FULL}$	1.80
Loss of Hydraulic System 1 and 2	Slat/Flap 5 – $V_{REF FULL} + 10$	2.70
Loss of Hydraulic System 1 and 3	Slat/Flap 5 – $V_{REF FULL} + 10$	2.30
Loss of Hydraulic System 2 and 3	Slat/Flap 5 – $V_{REF FULL} + 10$	2.20
One Engine Inoperative Approach and Landing	Slat/Flap 5 – $V_{REF FULL} + 20$	1.50
Stall Protection Failure	Slat/Flap 5 – $V_{REF FULL} + 15$	1.40
	Slat/Flap full – $V_{REF FULL} + 10$	1.22
Electrical Emergency	Slat/Flap 3 – $V_{REF FULL} + 20$ or 130 KIAS	2.10
DC BUS 1 OFF	Slat/Flap full – $V_{REF FULL}$	1.15
DC BUS 2 OFF	Slat/Flap full – $V_{REF FULL}$	1.20
DC Essential BUS 1 OFF	Slat/Flap full – $V_{REF FULL}$	1.70
DC Essential BUS 2 OFF	Slat/Flap full – $V_{REF FULL}$	1.80
Ground Spoilers Failure	Slat/Flap full – $V_{REF FULL}$	1.30
Spoilers Normal Mode Failure	Slat/Flap full – $V_{REF FULL}$	1.45
Elevator LH (RH) Failure	Slat/Flap 5 – $V_{REF FULL} + 15$	1.40
Pitch Trim Failure	Slat/Flap 5 – $V_{REF FULL} + 15$	1.40
Spoiler fault	Slat/Flap 5 – $V_{REF FULL} + 15$	1.78
	Slat/Flap full – $V_{REF FULL}$	1.45
Aileron LH (RH) Failure	Slat/Flap 5 – $V_{REF FULL} + 10$	1.30
Avionics MAU 1A Failure	Slat/Flap full – $V_{REF FULL}$	1.70
Avionics MAU 1B Failure	Slat/Flap full – $V_{REF FULL}$	1.15
Avionics MAU 2B Failure	Slat/Flap full – $V_{REF FULL}$	1.65
Avionics MAU 3A Failure	Slat/Flap full – $V_{REF FULL}$	1.20

Avionics MAU 3B Failure		Slat/Flap full – $V_{REF FULL}$	1.20
Anti-Ice Wing Failure		Slat/Flap 5 – $V_{REF FLAP 5}$ after ice encounter	1.30
Brake LH (RH) Failure		Slat/Flap full – $V_{REF FULL}$	1.65
Landing Gear WOW System Failure		Slat/Flap full – $V_{REF FULL}$	1.30
Brake LH (RH) Fault		–	1.65
Electrical System Fire or Smoke	DC BUS 1 OFF AND DC Essential BUS OFF	Slat/Flap 3 – $V_{REF FULL} + 20$ or 130 KIAS	2.30
	DC Essential BUS 2 and DC BUS 2 OFF	Slat/Flap 3 – $V_{REF FULL} + 20$ or 130 KIAS	2.50
	DC Essential BUS 3 OFF	Slat/Flap 3 – $V_{REF FULL} + 20$ or 130 KIAS	2.10
	TRU ESS and TRU BUS auto	Slat/Flap 3 – $V_{REF FULL} + 20$ or 130 KIAS	2.10

FLAP (SLAT) FAIL

Refer to the table below for maximum speed, approach speed and coefficient to be applied to the unfactored landing distance:

	SLAT FLAP	0	1, 2, 3	4, 5, FULL
Max Speed V _{REF} (KIAS) Ldg Coef	0	V _{MO} /M _{MO} V _{REF FULL} + 60 2.41	230 KIAS V _{REF FULL} + 65 2.48	180 KIAS V _{REF FULL} + 65 2.49
Max Speed V _{REF} (KIAS) Ldg Coef	1	230 KIAS V _{REF FULL} + 50 2.12	230 KIAS V _{REF FULL} + 35 1.97	180 KIAS V _{REF FULL} + 35 2.00
Max Speed V _{REF} (KIAS) Ldg Coef	2	215 KIAS V _{REF FULL} + 40 1.82	215 KIAS V _{REF FULL} + 25 1.55	180 KIAS V _{REF FULL} + 25 1.57
Max Speed V _{REF} (KIAS) Ldg Coef	3	NOT USABLE	200 KIAS V _{REF FULL} + 15 1.42	180 KIAS V _{REF FULL} + 15 1.43
Max Speed V _{REF} (KIAS) Ldg Coef	4,5		200 KIAS V _{REF FULL} + 15 1.31	180 KIAS V _{REF FULL} + 10 1.29
Max Speed V _{REF} (KIAS) Ldg Coef	FULL		165 KIAS V _{REF FULL} + 10 1.22	165 KIAS V _{REF FULL} Not Applicable

QUICK TURN AROUND WEIGHT

For normal operation, the brake temperature can be monitored through the brake temperature indication in the MFD.

The Quick Turn Around Weight Table must be used only when the brake temperature indication is not working properly (according to the MMEL). In this case, if the landing weight exceeds the Quick Turn Around Weight, a subsequent takeoff must not be performed before 25 minutes after chocks on. At the end of this time interval, check that the wheel thermal plugs have not melted.

NOTE: If the tires are not flat after 25 minutes, this is a positive indication that the wheel thermal plugs have not melted.

QUICK TURN AROUND WEIGHT CORRECTIONS:

Slope correction:

- Decrease 700 kg from the Quick Turn Around Weight per each 1% slope down.
- Increase 500 kg to the Quick Turn Around Weight per each 1% slope up.

QUICK TURN AROUND WEIGHT TABLE

ALL ENGINE TYPES – JAA – FLAPS 5 – SLOPE ZERO

Temp (°C)	ALTITUDE							
	0 ft				1000 ft			
	WIND							
	-10 Kt	0 Kt	10 Kt	20 Kt	-10 Kt	0 Kt	10 Kt	20 Kt
-20	38383	39000	39000	39000	37657	39000	39000	39000
-15	37972	39000	39000	39000	37247	39000	39000	39000
-10	37572	39000	39000	39000	36867	39000	39000	39000
-5	37179	39000	39000	39000	36507	39000	39000	39000
0	36816	39000	39000	39000	36133	39000	39000	39000
5	36468	39000	39000	39000	35780	39000	39000	39000
10	36107	39000	39000	39000	35442	39000	39000	39000
15	35768	39000	39000	39000	35113	38894	39000	39000
20	35441	39000	39000	39000	34801	38529	39000	39000
25	35122	38910	39000	39000	34507	38153	39000	39000
30	34820	38557	39000	39000	34227	37785	39000	39000
35	34536	38195	39000	39000	33952	37424	38713	39000
40	34263	37838	39000	39000	33672	37075	38358	39000
45	33999	37490	38777	39000	33402	36757	38000	39000
50	33727	37146	38437	39000	—	—	—	—

Temp (°C)	ALTITUDE							
	2000 ft				3000 ft			
	WIND							
	-10 Kt	0 Kt	10 Kt	20 Kt	-10 Kt	0 Kt	10 Kt	20 Kt
-20	36943	39000	39000	39000	36244	39000	39000	39000
-15	36567	39000	39000	39000	35859	39000	39000	39000
-10	36182	39000	39000	39000	35495	39000	39000	39000
-5	35813	39000	39000	39000	35141	38918	39000	39000
0	35463	39000	39000	39000	34805	38526	39000	39000
5	35121	38899	39000	39000	34491	38124	39000	39000
10	34798	38520	39000	39000	34192	37730	39000	39000
15	34494	38131	39000	39000	33896	37344	38632	39000
20	34205	37751	39000	39000	33597	36987	38249	39000
25	33919	37378	38666	39000	33315	36639	37868	39000
30	33630	37030	38297	39000	33043	36289	37496	38758
35	33355	36692	37928	39000	32782	35944	37142	38396
40	33091	36356	37567	38829	32522	35621	36803	38026
45	32832	36018	37209	38481	—	—	—	—

NOTE: Quick Turn Around Weight in kg.

QUICK TURN AROUND WEIGHT TABLE **ALL ENGINES TYPES – JAA – FLAPS 5 – SLOPE ZERO**

Temp (°C)	ALTITUDE							
	4000 ft				5000 ft			
	WIND							
	-10 Kt	0 Kt	10 Kt	20 Kt	-10 Kt	0 Kt	10 Kt	20 Kt
-20	35548	39000	39000	39000	34888	38616	39000	39000
-15	35180	38960	39000	39000	34547	38188	39000	39000
-10	34830	38553	39000	39000	34223	37763	39000	39000
-5	34503	38138	39000	39000	33905	37348	38634	39000
0	34193	37730	39000	39000	33586	36965	38223	39000
5	33886	37329	38617	39000	33283	36592	37815	39000
10	33578	36962	38221	39000	32993	36215	37415	38678
15	33288	36602	37827	39000	32713	35852	37042	38285
20	33007	36239	37442	38705	32436	35508	36682	37891
25	32737	35886	37080	38327	32165	35172	36322	37507
30	32469	35554	36732	37946	31900	34861	35964	37141
35	32208	35230	36386	37574	31641	34557	35631	36792
40	31952	34925	36038	37217	31388	34271	35306	36449

Quick Turn Around Weight in kg.

QUICK TURN AROUND WEIGHT TABLE

ALL ENGINE TYPES – JAA – FLAPS FULL – SLOPE ZERO

Temp (°C)	ALTITUDE							
	0 ft				1000 ft			
	WIND							
	-10 Kt	0 Kt	10 Kt	20 Kt	-10 Kt	0 Kt	10 Kt	20 Kt
-20	39000	39000	39000	39000	39000	39000	39000	39000
-15	39000	39000	39000	39000	39000	39000	39000	39000
-10	39000	39000	39000	39000	39000	39000	39000	39000
-5	39000	39000	39000	39000	39000	39000	39000	39000
0	39000	39000	39000	39000	39000	39000	39000	39000
5	39000	39000	39000	39000	39000	39000	39000	39000
10	39000	39000	39000	39000	38669	39000	39000	39000
15	39000	39000	39000	39000	38244	39000	39000	39000
20	38668	39000	39000	39000	37831	39000	39000	39000
25	38258	39000	39000	39000	37425	39000	39000	39000
30	37859	39000	39000	39000	37031	39000	39000	39000
35	37467	39000	39000	39000	36655	39000	39000	39000
40	37077	39000	39000	39000	36283	39000	39000	39000
45	36717	39000	39000	39000	35919	39000	39000	39000
50	36359	39000	39000	39000	—	—	—	—

Temp (°C)	ALTITUDE							
	2000 ft				3000 ft			
	WIND							
	-10 Kt	0 Kt	10 Kt	20 Kt	-10 Kt	0 Kt	10 Kt	20 Kt
-20	39000	39000	39000	39000	39000	39000	39000	39000
-15	39000	39000	39000	39000	39000	39000	39000	39000
-10	39000	39000	39000	39000	38733	39000	39000	39000
-5	39000	39000	39000	39000	38278	39000	39000	39000
0	38694	39000	39000	39000	37835	39000	39000	39000
5	38254	39000	39000	39000	37400	39000	39000	39000
10	37826	39000	39000	39000	36981	39000	39000	39000
15	37406	39000	39000	39000	36580	39000	39000	39000
20	37000	39000	39000	39000	36183	39000	39000	39000
25	36611	39000	39000	39000	35795	39000	39000	39000
30	36227	39000	39000	39000	35421	39000	39000	39000
35	35851	39000	39000	39000	35077	39000	39000	39000
40	35485	39000	39000	39000	34722	39000	39000	39000
45	35146	39000	39000	39000	—	—	—	—

Quick Turn Around Weight in kg.

QUICK TURN AROUND WEIGHT TABLE **ALL ENGINES TYPES – JAA – FLAPS FULL – SLOPE ZERO**

Temp (°C)	ALTITUDE							
	4000 ft				5000 ft			
	WIND							
	-10 Kt	0 Kt	10 Kt	20 Kt	-10 Kt	0 Kt	10 Kt	20 Kt
-20	38801	39000	39000	39000	37945	39000	39000	39000
-15	38327	39000	39000	39000	37479	39000	39000	39000
-10	37868	39000	39000	39000	37023	39000	39000	39000
-5	37418	39000	39000	39000	36591	39000	39000	39000
0	36983	39000	39000	39000	36166	39000	39000	39000
5	36567	39000	39000	39000	35750	39000	39000	39000
10	36157	39000	39000	39000	35355	39000	39000	39000
15	35756	39000	39000	39000	34986	39000	39000	39000
20	35374	39000	39000	39000	34602	39000	39000	39000
25	35019	39000	39000	39000	34269	38673	39000	39000
30	34649	39000	39000	39000	33963	38245	39000	39000
35	34319	38749	39000	39000	33687	37826	39000	39000
40	34019	38334	39000	39000	33418	37421	38970	39000

Quick Turn Around Weight in kg.

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POSITION ERROR CORRECTIONS

The corrections to be applied to indicated airspeed or altitude in order to eliminate the effect of location of the static port on instrument readings are shown in the Airspeed Position Error Correction charts and in the Altitude Position Error Correction charts. No position error correction is required for ADSP 1 and ADSP 2 and they are only applicable to ADSP 3 according to the following conditions:

- Airspeed Position Error Correction for flaps 0, 1, 2, 3, 4, 5 and full.
- Altitude Position Error Correction for flaps 0, 1, 2, 3, 4, 5 and full.

AIRSPEED POSITION ERROR CORRECTION CHART

USE

Enter the chart with indicated airspeed, considering the appropriate configuration, to read airspeed correction. The calibrated airspeed will be the sum of the indicated airspeed and airspeed correction.

EXAMPLE

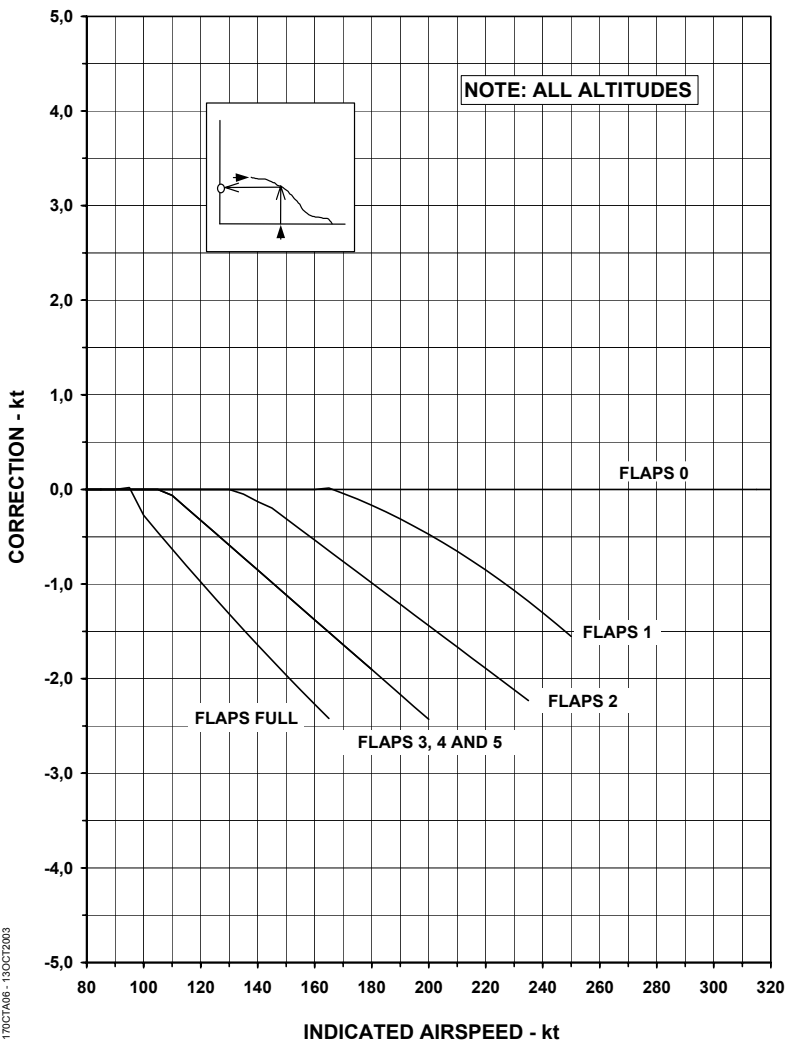
Given:

ADSP 3
Indicated Airspeed 150 KIAS
Flaps Full

Determine:

Airspeed correction -2.0
Calibrated Airspeed 148 KCAS

**AIRSPEED POSITION ERROR CORRECTION
AIR DATA SYSTEM 3
FLAPS 0, 1, 2, 3, 4, 5 AND FULL**



ALTITUDE POSITION ERROR CORRECTIONS CHARTS

USE

Enter the appropriate chart with indicated airspeed, the indicated pressure altitude considering the appropriate airplane configuration to read the altimetric correction. The true pressure altitude will be the indicated pressure altitude minus the altimetric correction.

EXAMPLE

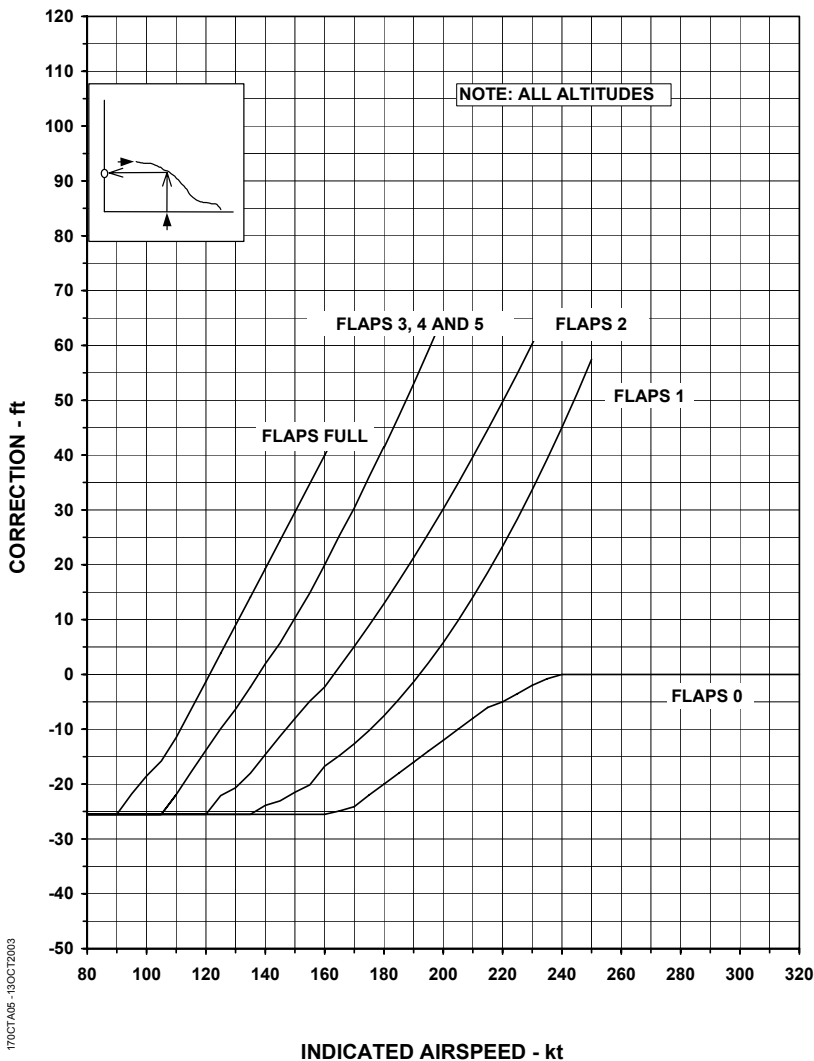
Given:

ADSP 3
Indicated Airspeed 200 KIAS
Flaps.....2
Altitude 3000 ft

Determine:

Altimetric correction 30 ft
True Pressure Altitude 2970 ft

**ALTITUDE POSITION ERROR CORRECTION
AIR DATA SYSTEM 3
FLAPS 0,1, 2, 3, 4, 5 AND FULL**



ADDITIONAL PERFORMANCE DATA

This chapter presents additional performance data.

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ALL ENGINE CLIMB GRADIENTS

ALL ENGINES TAKEOFF CLIMB GRADIENT [%]

Takeoff thrust (T/O-1)

ERJ170 / CF34-8E5

A/C: ON

Anti-ice: ON or OFF

Flaps: 1 & 2

No wind, no Bank Angle

Pressure altitude 0 ft

temp [C]	Gross Weight (1000 KG)							
	36	34	32	30	28	26	24	22
45	12.2	13.5	15.2	17.0	19.2	21.7	24.7	28.4
40	13.8	15.2	17.0	19.0	21.3	24.1	27.4	31.5
35	15.3	16.9	18.8	21.0	23.5	26.5	30.1	34.5
30 and below	16.9	18.6	20.7	23.0	25.7	29.0	32.9	37.8

Pressure altitude 1,000 ft

temp [C]	Gross Weight (1000 KG)							
	36	34	32	30	28	26	24	22
45	11.4	12.6	14.2	15.9	18.0	20.4	23.3	26.8
40	12.9	14.2	15.9	17.8	20.1	22.7	25.8	29.6
35	14.4	15.9	17.7	19.7	22.1	25.0	28.3	32.5
30	15.9	17.5	19.4	21.6	24.2	27.3	30.9	35.5
25 and below	16.5	18.1	20.1	22.4	25.1	28.2	32.1	36.8

Pressure altitude 2,000 ft

temp [C]	Gross Weight (1000 KG)							
	36	34	32	30	28	26	24	22
45	10.5	11.7	13.2	14.9	16.9	19.2	22.0	25.3
40	12.0	13.3	14.9	16.8	18.9	21.4	24.4	28.1
35	13.5	14.9	16.6	18.6	20.9	23.7	26.9	30.9
30	14.8	16.4	18.2	20.3	22.8	25.7	29.2	33.5
25 and below	15.9	17.5	19.4	21.6	24.2	27.2	30.9	35.4

NOTE: FOR FLAPS 4 SUBTRACT GRADIENT BY 1.4%

ALL ENGINES TAKEOFF CLIMB GRADIENT [%]

Takeoff thrust (T/O-2)

ERJ170 / CF34-8E5

A/C: ON

Anti-ice: ON or OFF

Flaps: 1 & 2

No wind, no Bank Angle

Pressure altitude **0 ft**

temp [C]	Gross Weight (1000 KG)							
	36	34	32	30	28	26	24	22
45	11.6	12.8	14.4	16.1	18.2	20.6	23.4	26.9
40	12.7	14.0	15.7	17.6	19.7	22.3	25.4	29.0
35	13.8	15.3	17.0	19.0	21.3	24.0	27.3	31.3
30 and below	15.0	16.5	18.3	20.4	22.9	25.8	29.3	33.5

Pressure altitude **1,000 ft**

temp [C]	Gross Weight (1000 KG)							
	36	34	32	30	28	26	24	22
45	10.5	11.7	13.2	14.8	16.8	19.0	21.7	24.9
40	11.6	12.9	14.4	16.2	18.3	20.7	23.5	27.0
35	12.7	14.1	15.7	17.6	19.8	22.3	25.4	29.1
30	13.8	15.3	17.0	19.0	21.3	24.0	27.3	31.3
25 and below	14.3	15.8	17.5	19.6	22.0	24.8	28.1	32.3

Pressure altitude **2,000 ft**

temp [C]	Gross Weight (1000 KG)							
	36	34	32	30	28	26	24	22
45	9.6	10.7	12.1	13.7	15.5	17.6	20.2	23.2
40	10.6	11.8	13.2	14.9	16.9	19.1	21.8	25.1
35	11.6	12.9	14.4	16.2	18.3	20.7	23.6	27.1
30	12.7	14.1	15.7	17.6	19.8	22.3	25.4	29.2
25 and below	13.6	15.0	16.7	18.7	21.0	23.7	26.9	30.9

NOTE: FOR FLAPS 4 SUBTRACT GRADIENT BY 1.5%

DRIFT-DOWN DATA

If an engine fails or there is a radical loss of thrust while in cruise, descent to a lower altitude and adjustment in speed usually is necessary. Drift-down procedure, designed to minimize loss of range, is given. The thrust levers on the operating engines are advanced to maximum continuous thrust and the airplane is slowed to optimum drift-down (maximum L/D) speed while maintaining cruise altitude. In most cases it will not be possible to maintain cruise altitude at a steady state value of maximum L/D speed; therefore, the airplane will descend at this speed. This results in the minimum drift down angle. A higher speed will increase the descent angle. During descent, there is enough time to consult the engine inoperative cruise data and establish a new flight plan.

When level flight is attained at the max L/D speed, the pilot has 3 alternatives when continuing the flight:

- Maintain the maximum L/D speed. This results in altitude increase with weight decrease.
- Maintain a constant altitude while accelerating towards engine inoperative LRC speed. The time for this acceleration at MCT may take ½ hour to 1 ½ hours depending on weight and atmospheric conditions.
- If there is no terrain/obstacle limiting, some altitude may be sacrificed by descending and accelerating to the LRC speed at the lower altitude.

During drift-down, available thrust increases as the aircraft descends. Eventually, at a certain altitude the available thrust will become equal to the airplane drag, and the airplane will level off. This altitude is called the **gross leveloff**. The gross leveloff altitude, when corrected by the 1.1% gradient margins (FAR Part 25 require net flight path capabilities corresponding to reductions of 1.1% for two engine airplanes with one engine inoperative) is called the **net leveloff** and will depend on the atmospheric temperature and the airplane weight.

The drift-down analysis tables show pressure altitude, range, time, fuel burned, indicated Mach number and indicated airspeed till Net Leveloff. Data are presented for various weights, ISA conditions and corrections for ISA deviation.

The associated conditions are:

- Flaps UP
- Gear UP
- Anti-Ice OFF
- Bleeds ON

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DRIFTDOWN TABLES CF34-8E5 ENGINES

Flight Level: **400 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON** Wind: **0 kt**;

WEIGHT (KG) START DRIFTDOWN	INITIAL SPEED (KIAS)	TIME (min)		RANGE (nm)		GROSS LEVEL OFF ALT (ft)	
		ISA 0°C	ISA+10°C	ISA 0°C	ISA+10°C	ISA 0°C	ISA+10°C
35000	197	68,4	65,5	310,0	303,4	20617	20590
33000	191	61,2	59,8	277,6	276,5	22136	22116
31000	185	60,5	59,0	271,6	270,6	23719	23701
29000	179	59,0	58,3	262,6	264,5	25404	25385
27000	173	58,3	56,9	256,4	255,4	27155	27135
25000	166	56,2	54,7	244,3	243,1	29007	28978
23000	160	54,0	52,6	232,1	230,7	30985	30949

Flight Level: **350 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON** Wind: **0 kt**;

WEIGHT (KG) START DRIFTDOWN	INITIAL SPEED (KIAS)	TIME (min)		RANGE (nm)		GROSS LEVEL OFF ALT (ft)	
		ISA 0°C	ISA+10°C	ISA 0°C	ISA+10°C	ISA 0°C	ISA+10°C
35000	196	65,5	62,6	291,4	284,5	20582	20553
33000	191	58,3	56,2	259,1	254,8	22084	22070
31000	185	56,9	55,4	250,4	249,1	23666	23649
29000	179	55,4	54,0	241,6	240,2	25343	25328
27000	173	54,0	52,6	232,7	231,3	27088	27069
25000	166	51,1	49,7	217,9	216,3	28924	28895
23000	160	47,5	46,8	200,1	201,2	30876	30841

Flight Level: **300 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON** Wind: **0 kt**;

WEIGHT (KG) START DRIFTDOWN	INITIAL SPEED (KIAS)	TIME (min)		RANGE (nm)		GROSS LEVEL OFF ALT (ft)	
		ISA 0°C	ISA+10°C	ISA 0°C	ISA+10°C	ISA 0°C	ISA+10°C
35000	196	61,2	58,3	267,5	260,2	20529	20496
33000	191	54,0	52,6	235,5	233,8	22008	21991
31000	185	51,8	50,4	223,9	222,2	23580	23563
29000	179	49,7	49,0	212,4	213,5	25237	25223
27000	173	46,8	46,1	197,9	198,8	26957	26940
25000	166	42,5	41,8	177,5	178,1	28735	28808

Flight Level: **250 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON** Wind: **0 kt**;

WEIGHT (KG) START DRIFTDOWN	INITIAL SPEED (KIAS)	TIME (min)		RANGE (nm)		GROSS LEVEL OFF ALT (ft)	
		ISA 0°C	ISA+10°C	ISA 0°C	ISA+10°C	ISA 0°C	ISA+10°C
35000	196	55,4	52,6	238,0	230,3	20433	20395
33000	191	47,5	46,8	203,2	204,0	21866	21852
31000	185	43,2	42,5	183,1	183,6	23394	23378

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **400 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **35000 kg**; Airspeed: **196,5 KIAS**; Net Leveloff: **16205 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **20617 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
40000	0,0	0,0	0,0	0,687	204,7
26855	61,1	10,1	136,6	0,504	199,0
21435	105,8	20,2	294,6	0,447	197,3
18545	150,5	30,2	489,8	0,420	196,2
17193	193,5	40,3	697,9	0,407	195,3
16538	235,7	50,4	910,8	0,400	194,6
16264	277,4	60,5	1125,8	0,397	193,9
16205	310,0	68,4	1295,2	0,395	193,4

CF34-8E5

Initial: **400 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **35000 kg**; Airspeed: **196,6 KIAS**; Net Leveloff: **16156 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **20590 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
40000	0,0	0,0	0,0	0,687	204,7
27233	58,6	10,1	129,1	0,508	199,1
21238	107,8	20,2	303,1	0,445	197,2
18401	153,2	30,2	503,8	0,418	196,1
17072	196,9	40,3	717,2	0,406	195,3
16422	239,8	50,4	935,1	0,399	194,5
16185	282,2	60,5	1155,4	0,396	193,8
16156	303,4	65,5	1295,9	0,395	193,5

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **400 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **34000 kg**; Airspeed: **196,5 KIAS**; Net Leveloff: **17152 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **21360 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
40000	0,0	0,0	0,0	0,677	201,5
27778	56,8	10,1	124,3	0,507	196,3
21957	104,8	20,2	290,0	0,446	194,5
19178	149,3	30,2	480,7	0,419	193,4
17934	192,1	40,3	684,2	0,407	192,6
17387	234,3	50,4	892,6	0,401	191,9
17179	276,0	60,5	1102,6	0,398	191,2
17152	296,7	65,5	1207,8	0,398	190,9

CF34-8E5

Initial: **400 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **34000 kg**; Airspeed: **193,8 KIAS**; Net Leveloff: **17058 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **21342 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
40000	0,0	0,0	0,0	0,677	201,5
27575	58,0	10,1	127,6	0,505	196,2
21765	106,8	20,2	298,4	0,444	194,4
19044	152,0	30,2	494,6	0,418	193,3
17848	195,6	40,3	703,5	0,406	192,5
17302	238,4	50,4	916,8	0,401	191,8
17086	280,9	60,5	1131,5	0,398	191,1
17058	302,0	65,5	1239,0	0,397	190,8

DRIFT-DOWN ANALYSIS

CF34-8E

Initial: **400 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **33000 kg**; Airspeed: **191,2 KIAS**; Net Leveloff: **18073 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **22136 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
40000	0,0	0,0	0,0	0,677	198,2
28160	56,2	10,1	122,7	0,504	193,4
22535	103,9	20,2	285,1	0,444	191,6
19862	148,1	30,2	471,0	0,419	190,5
18674	190,9	40,3	669,0	0,407	189,8
18204	232,9	50,4	872,3	0,402	189,1
18073	277,6	61,2	1092,2	0,400	188,4

CF34-8E5

Initial: **400 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **33000 kg**; Airspeed: **191,2 KIAS**; Net Leveloff: **18060 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **22116 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
40000	0,0	0,0	0,0	0,677	198,2
27963	57,3	10,1	126,0	0,502	193,3
22350	106,8	20,2	293,3	0,443	191,5
19732	150,8	30,2	484,7	0,418	190,5
18589	194,3	40,3	687,8	0,407	189,7
18155	237,1	50,4	896,3	0,402	189,0
18060	276,5	59,8	1091,7	0,400	188,4

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **400 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **32000 kg**; Airspeed: **188,3 KIAS**; Net Leveloff: **18889 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **22925 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
40000	0,0	0,0	0,0	0,657	194,9
28553	55,6	10,1	121,1	0,501	190,4
23128	102,9	20,2	280,1	0,443	188,7
20566	147,0	30,2	461,2	0,419	187,7
19431	189,6	40,3	653,7	0,407	186,9
18997	231,5	50,4	851,3	0,403	186,2
18889	273,1	60,5	1050,6	0,400	185,6

CF34-8E5

Initial: **400 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **32000 kg**; Airspeed: **188,3 KIAS**; Net Leveloff: **18862 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **22903 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
40000	0,0	0,0	0,0	0,657	194,9
28362	56,7	10,1	124,3	0,498	190,3
22949	104,8	20,2	288,2	0,442	188,6
20441	149,7	30,2	474,6	0,417	187,6
19359	193,0	40,3	672,3	0,407	186,8
18953	235,7	50,4	874,7	0,402	186,2
18862	275,1	59,8	1064,1	0,400	185,6

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **400 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **31000 kg**; Airspeed: **185,3 KIAS**; Net Leveloff: **19687 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **23719 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
40000	0,0	0,0	0,0	0,646	191,6
28959	54,9	10,1	119,5	0,497	187,4
23744	101,9	20,2	275,1	0,442	185,7
21291	145,8	30,2	451,3	0,418	184,8
20211	188,3	40,3	638,1	0,408	184,0
19788	230,1	50,4	829,6	0,403	183,4
19687	271,6	60,5	1022,8	0,401	182,7

CF34-8E5

Initial: **400 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **31000 kg**; Airspeed: **185,3 KIAS**; Net Leveloff: **19676 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **23701 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
40000	0,0	0,0	0,0	0,646	191,6
28774	56,0	10,1	122,7	0,495	187,3
23571	103,9	20,2	283,0	0,440	185,7
21171	148,5	30,2	464,4	0,417	184,7
20136	191,7	40,3	656,3	0,407	183,9
19752	234,3	50,4	852,9	0,402	183,3
19676	270,6	59,0	1022,5	0,401	182,7

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **400 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **30000 kg**; Airspeed: **182,3 KIAS**; Net Leveloff: **20526 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **24551 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
40000	0,0	0,0	0,0	0,636	188,3
29395	54,2	10,1	118,0	0,494	184,3
24388	100,9	20,2	270,0	0,441	182,7
22042	144,6	30,2	441,3	0,418	181,8
21014	187,0	40,3	622,4	0,408	181,1
20621	228,7	50,4	807,9	0,403	180,4
20526	270,1	60,5	994,7	0,401	179,8

CF34-8E5

Initial: **400 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **30000 kg**; Airspeed: **182,3 KIAS**; Net Leveloff: **20505 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **24534 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
40000	0,0	0,0	0,0	0,636	188,3
29202	55,3	10,1	121,2	0,492	184,3
24215	102,8	20,2	277,8	0,439	182,7
21923	147,3	30,2	454,2	0,417	181,7
20944	190,4	40,3	640,3	0,407	181,0
20582	232,9	50,4	830,6	0,403	180,3
20505	269,1	59,0	994,7	0,401	179,8

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **400 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **29000 kg**; Airspeed: **179,3 KIAS**; Net Leveloff: **21388 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **25404 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
40000	0,0	0,0	0,0	0,625	184,9
29826	53,5	10,1	116,5	0,490	181,2
25041	99,9	20,2	265,0	0,440	179,7
22812	143,4	30,2	431,5	0,418	178,8
21836	185,6	40,3	606,9	0,408	178,1
21468	227,2	50,4	786,2	0,404	177,4
21388	262,6	59,0	940,9	0,402	176,9

CF34-8E5

Initial: **400 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **29000 kg**; Airspeed: **179,3 KIAS**; Net Leveloff: **21371 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **25385 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
40000	0,0	0,0	0,0	0,625	184,9
29654	54,6	10,1	119,6	0,489	181,1
24881	101,8	20,2	272,6	0,438	179,6
22702	146,1	30,2	443,9	0,417	178,7
21768	189,1	40,3	624,1	0,407	178,0
21432	231,5	50,4	808,2	0,403	177,4
21371	264,5	58,3	953,6	0,401	176,9

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **400 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **28000 kg**; Airspeed: **176,2 KIAS**; Net Leveloff: **22274 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **26270 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
40000	0,0	0,0	0,0	0,614	181,4
30272	52,8	10,1	115,0	0,487	178,0
25712	98,9	20,2	260,0	0,438	176,6
23603	142,2	30,2	421,6	0,418	175,7
22692	184,2	40,3	591,3	0,408	175,0
22349	225,7	50,4	764,5	0,404	174,4
22274	261,0	59,0	913,9	0,402	173,9

CF34-8E5

Initial: **400 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **28000 kg**; Airspeed: **176,2 KIAS**; Net Leveloff: **22257 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **26253 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
40000	0,0	0,0	0,0	0,614	181,4
30105	53,9	10,1	118,1	0,485	178,0
25558	100,8	20,2	267,5	0,437	176,5
23498	144,9	30,2	433,7	0,417	175,6
22629	187,7	40,3	608,1	0,408	174,9
22314	230,0	50,4	785,8	0,403	174,3
22257	260,0	57,6	913,4	0,402	173,9

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **400 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **27000 kg**; Airspeed: **173,1 KIAS**; Net Leveloff: **23198 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **27155 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
40000	0,0	0,0	0,0	0,603	177,9
30730	52,1	10,1	113,4	0,483	174,8
26403	97,8	20,2	255,1	0,437	173,4
24423	140,9	30,2	411,8	0,417	172,6
23566	182,8	40,3	575,7	0,408	171,9
23256	224,1	50,4	742,8	0,404	171,3
23198	256,4	58,3	874,9	0,403	170,8

CF34-8E5

Initial: **400 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **27000 kg**; Airspeed: **173,1 KIAS**; Net Leveloff: **23185 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **27135 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
40000	0,0	0,0	0,0	0,603	177,9
30570	53,2	10,1	116,5	0,481	174,7
26255	99,7	20,2	262,4	0,436	173,4
24324	143,6	30,2	423,5	0,416	172,5
23508	186,3	40,3	592,0	0,408	171,8
23227	228,4	50,4	763,5	0,404	171,2
23185	255,4	56,9	874,2	0,403	170,8

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **400 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **26000 kg**; Airspeed: **169,9 KIAS**; Net Leveloff: **24147 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **28053 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
40000	0,0	0,0	0,0	0,592	174,4
31202	51,4	10,1	111,8	0,479	171,5
27112	96,7	20,2	250,0	0,436	170,2
25262	139,5	30,2	402,0	0,417	169,4
24479	181,3	40,3	560,4	0,409	168,7
24196	222,6	50,4	721,5	0,405	168,1
24147	251,9	57,6	837,1	0,404	167,7

CF34-8E5

Initial: **400 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **26000 kg**; Airspeed: **169,9 KIAS**; Net Leveloff: **24134 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **28027 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
40000	0,0	0,0	0,0	0,592	174,4
31050	52,4	10,1	114,9	0,477	171,4
26971	98,6	20,2	257,2	0,434	170,1
25169	142,2	30,2	413,4	0,416	169,3
24425	184,8	40,3	576,2	0,408	168,7
24169	226,8	50,4	741,5	0,405	168,1
24134	250,8	56,2	836,3	0,403	167,7

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **400 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **25000 kg**; Airspeed: **166,6 KIAS**; Net Leveloff: **25143 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **29007 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
40000	0,0	0,0	0,0	0,580	170,8
31699	50,6	10,1	110,1	0,475	168,1
27854	95,6	20,2	244,7	0,434	166,9
26131	138,2	30,2	391,9	0,417	166,1
25416	179,8	40,3	545,0	0,409	165,5
25174	220,9	50,4	700,4	0,406	164,9
25143	244,3	56,2	789,5	0,405	164,6

CF34-8E5

Initial: **400 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **25000 kg**; Airspeed: **166,6 KIAS**; Net Leveloff: **25128 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **28978 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
40000	0,0	0,0	0,0	0,580	170,8
31555	51,7	10,1	113,2	0,474	168,1
27718	97,5	20,2	251,7	0,433	166,9
26040	140,9	30,2	403,1	0,416	166,1
25364	183,3	40,3	560,3	0,408	165,4
25148	225,2	50,4	719,7	0,405	164,8
25128	243,1	54,7	788,2	0,404	164,6

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **400 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **24000 kg**; Airspeed: **163,3 KIAS**; Net Leveloff: **26144 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **29971 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
40000	0,0	0,0	0,0	0,569	167,1
32212	49,9	10,1	108,4	0,471	164,7
28625	94,4	20,2	239,3	0,433	163,5
27025	136,8	30,2	381,6	0,416	162,8
26378	178,3	40,3	529,3	0,409	162,2
26165	219,3	50,4	678,9	0,406	161,6
26144	236,8	54,7	743,2	0,405	161,4

CF34-8E5

Initial: **400 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **24000 kg**; Airspeed: **163,3 KIAS**; Net Leveloff: **26124 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **29936 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
40000	0,0	0,0	0,0	0,569	167,1
32076	50,9	10,1	111,4	0,470	164,6
28495	96,3	20,2	246,0	0,432	163,5
26935	139,5	30,2	392,4	0,416	162,7
26324	181,8	40,3	544,0	0,409	162,1
26137	223,6	50,4	697,4	0,406	161,5
26124	238,4	54,0	752,4	0,405	161,3

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **400 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **23000 kg**; Airspeed: **159,9 KIAS**; Net Leveloff: **27172 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **30985 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
40000	0,0	0,0	0,0	0,557	163,4
32746	49,1	10,1	106,6	0,467	161,2
29424	93,2	20,2	233,7	0,431	160,1
27953	135,4	30,2	371,1	0,416	159,4
27363	176,7	40,3	513,2	0,409	158,8
27184	217,5	50,4	657,0	0,407	158,2
27172	232,1	54,0	708,5	0,406	158,0

CF34-8E5

Initial: **400 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **23000 kg**; Airspeed: **159,9 KIAS**; Net Leveloff: **27145 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **30949 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
40000	0,0	0,0	0,0	0,557	163,4
32614	50,1	10,1	109,6	0,466	161,1
29298	95,1	20,2	240,3	0,430	160,1
27862	138,1	30,2	381,5	0,415	159,3
27306	180,2	40,3	527,3	0,409	158,7
27151	221,8	50,4	674,8	0,406	158,2
27145	230,7	52,6	706,5	0,406	158,0

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **400 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **22000 kg**; Airspeed: **156,4 KIAS**; Net Leveloff: **28381 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **32199 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
40000	0,0	0,0	0,0	0,544	159,6
33340	48,3	10,1	104,7	0,463	157,6
30355	92,1	20,2	227,8	0,431	156,6
29054	134,1	30,2	359,7	0,417	155,9
28540	175,3	40,3	495,5	0,411	155,3
28387	216,1	50,4	632,6	0,408	154,8
28381	224,9	52,6	662,0	0,408	154,7

CF34-8E5

Initial: **400 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **22000 kg**; Airspeed: **156,4 KIAS**; Net Leveloff: **28345 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **32158 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
40000	0,0	0,0	0,0	0,544	159,6
33224	49,3	10,1	107,6	0,462	157,6
30241	94,0	20,2	234,1	0,430	156,6
28969	136,8	30,2	369,5	0,416	155,9
28482	178,8	40,3	508,8	0,410	155,3
28345	226,4	51,8	669,5	0,408	154,7

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **350 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **35000 kg**; Airspeed: **196,3 KIAS**; Net Leveloff: **16173 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **20582 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
35000	0,0	0,0	0,0	0,609	202,2
25049	53,5	10,1	141,4	0,484	198,5
20257	100,3	20,2	320,4	0,436	197,0
17987	144,3	30,2	521,1	0,415	196,0
16905	187,0	40,3	731,4	0,404	195,2
16391	229,0	50,4	945,3	0,399	194,5
16203	267,7	59,8	1145,4	0,396	193,9
16173	291,4	65,5	1268,7	0,395	193,5

CF34-8E5

Initial: **350 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **35000 kg**; Airspeed: **196,3 KIAS**; Net Leveloff: **16128 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **20553 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
35000	0,0	0,0	0,0	0,609	202,2
24888	54,5	10,1	145,1	0,483	198,5
20100	102,2	20,2	329,2	0,435	196,9
17874	146,9	30,2	535,4	0,414	195,9
16786	190,4	40,3	750,6	0,403	195,1
16288	233,1	50,4	969,7	0,398	194,4
16138	272,4	59,8	1174,8	0,396	193,8
16128	284,5	62,6	1238,0	0,395	193,6

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **350 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **34000 kg**; Airspeed: **193,6 KIAS**; Net Leveloff: **17119 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **21321 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
35000	0,0	0,0	0,0	0,600	199,1
25394	52,9	10,1	139,8	0,481	195,7
20789	99,4	20,2	315,4	0,435	194,2
18630	143,2	30,2	511,6	0,414	193,2
17678	185,7	40,3	715,5	0,405	192,4
17260	227,7	50,4	926,8	0,400	191,7
17128	266,4	59,8	1122,2	0,398	191,2
17119	278,2	62,6	1182,3	0,397	191,0

CF34-8E5

Initial: **350 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **34000 kg**; Airspeed: **193,5 KIAS**; Net Leveloff: **17024 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **21305 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
35000	0,0	0,0	0,0	0,600	199,1
25237	53,9	10,1	143,4	0,479	195,6
20639	101,2	20,2	324,2	0,433	194,1
18521	145,8	30,2	525,6	0,413	193,1
17601	189,1	40,3	736,9	0,404	192,4
17173	231,8	50,4	950,9	0,399	191,7
17033	271,2	59,8	1150,6	0,397	191,1
17024	283,2	62,6	1212,1	0,397	190,9

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **350 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **33000 kg**; Airspeed: **190,9 KIAS**; Net Leveloff: **18043 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **22084 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
35000	0,0	0,0	0,0	0,591	196,0
25784	52,3	10,1	138,1	0,478	192,7
21374	98,5	20,2	310,1	0,433	191,3
19319	142,1	30,2	501,3	0,414	190,4
18433	184,5	40,3	701,9	0,405	189,6
18105	226,4	50,4	906,3	0,401	189,0
18043	259,1	58,3	1067,9	0,400	188,5

CF34-8E5

Initial: **350 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **33000 kg**; Airspeed: **190,9 KIAS**; Net Leveloff: **18032 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **22070 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
35000	0,0	0,0	0,0	0,591	196,0
25632	53,3	10,1	141,7	0,476	192,7
21231	100,3	20,2	318,7	0,432	191,2
19220	144,7	30,2	515,3	0,413	190,3
18364	187,9	40,3	720,8	0,404	189,6
18071	230,6	50,4	930,5	0,401	188,9
18032	254,8	56,2	1051,0	0,400	188,5

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **350 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **32000 kg**; Airspeed: **188,1 KIAS**; Net Leveloff: **18859 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **22875 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
35000	0,0	0,0	0,0	0,582	192,8
26183	51,7	10,1	136,4	0,475	189,8
21976	97,6	20,2	304,8	0,432	188,4
20028	141,0	30,2	491,0	0,414	187,5
19196	183,3	40,3	686,1	0,405	186,8
18905	225,1	50,4	884,7	0,402	186,1
18859	251,8	56,9	1013,0	0,400	185,7

CF34-8E5

Initial: **350 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **32000 kg**; Airspeed: **188,0 KIAS**; Net Leveloff: **18832 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **22854 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
35000	0,0	0,0	0,0	0,582	192,8
26038	52,7	10,1	139,9	0,473	189,7
21839	99,4	20,2	313,2	0,431	188,4
19931	143,6	30,2	504,7	0,413	187,4
19140	186,7	40,3	704,8	0,405	186,7
18867	229,3	50,4	908,2	0,401	186,0
18832	253,5	56,2	1024,9	0,400	185,7

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **350 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **31000 kg**; Airspeed: **185,1 KIAS**; Net Leveloff: **19656 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **23666 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
35000	0,0	0,0	0,0	0,573	189,6
26598	51,1	10,1	134,7	0,472	186,8
22601	96,7	20,2	299,3	0,431	185,5
20760	139,9	30,2	480,6	0,413	184,6
19972	182,1	40,3	669,8	0,405	183,9
19696	223,7	50,4	862,4	0,402	183,2
19656	250,4	56,9	986,8	0,401	182,8

CF34-8E5

Initial: **350 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **31000 kg**; Airspeed: **185,1 KIAS**; Net Leveloff: **19646 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **23649 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
35000	0,0	0,0	0,0	0,573	189,6
26458	52,1	10,1	138,2	0,470	186,7
22471	98,5	20,2	307,6	0,430	185,4
20669	142,5	30,2	493,9	0,413	184,5
19917	185,5	40,3	688,3	0,405	183,8
19672	227,9	50,4	885,8	0,401	183,2
19646	249,1	55,4	984,9	0,401	182,8

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **350 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **30000 kg**; Airspeed: **182,1 KIAS**; Net Leveloff: **20492 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **24497 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
35000	0,0	0,0	0,0	0,564	186,3
27027	50,4	10,1	133,0	0,468	183,7
23246	95,7	20,2	294,0	0,430	182,5
21510	138,8	30,2	470,1	0,413	181,6
20781	180,8	40,3	653,6	0,406	180,9
20527	222,4	50,4	840,0	0,402	180,3
20492	246,0	56,2	947,0	0,401	180,0

CF34-8E5

Initial: **350 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **30000 kg**; Airspeed: **182,1 KIAS**; Net Leveloff: **20471 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **24478 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
35000	0,0	0,0	0,0	0,564	186,3
26893	51,4	10,1	136,5	0,467	183,7
23121	97,6	20,2	302,1	0,429	182,4
21424	141,4	30,2	483,1	0,412	181,6
20729	184,2	40,3	671,5	0,405	180,9
20497	226,6	50,4	862,7	0,402	180,2
20471	247,7	55,4	958,6	0,401	179,9

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **350 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **29000 kg**; Airspeed: **179,1 KIAS**; Net Leveloff: **21351 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **25343 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
35000	0,0	0,0	0,0	0,554	183,0
27468	49,8	10,1	131,4	0,465	180,6
23910	94,7	20,2	288,6	0,429	179,4
22288	137,6	30,2	459,6	0,413	178,6
21604	179,5	40,3	637,3	0,406	177,9
21377	221,0	50,4	817,6	0,403	177,3
21351	241,6	55,4	908,0	0,402	177,0

CF34-8E5

Initial: **350 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **29000 kg**; Airspeed: **179,1 KIAS**; Net Leveloff: **21336 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **25328 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
35000	0,0	0,0	0,0	0,554	183,0
27339	50,8	10,1	134,8	0,464	180,6
23791	96,6	20,2	296,5	0,428	179,4
22206	140,2	30,2	472,3	0,412	178,5
21555	182,9	40,3	654,7	0,405	177,9
21352	225,2	50,4	839,7	0,402	177,2
21336	240,2	54,0	905,9	0,402	177,0

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **350 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **28000 kg**; Airspeed: **176,0 KIAS**; Net Leveloff: **22235 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **26206 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
35000	0,0	0,0	0,0	0,545	179,7
27921	49,1	10,1	129,7	0,462	177,4
24594	93,8	20,2	283,2	0,428	176,3
23087	136,4	30,2	449,1	0,413	175,5
22464	178,2	40,3	621,0	0,406	174,9
22256	219,5	50,4	795,1	0,403	174,3
22235	237,2	54,7	869,9	0,402	174,0

CF34-8E5

Initial: **350 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **28000 kg**; Airspeed: **176,0 KIAS**; Net Leveloff: **22216 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **26188 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
35000	0,0	0,0	0,0	0,545	179,7
27799	50,1	10,1	133,1	0,460	177,4
24483	95,6	20,2	290,9	0,427	176,3
23011	139,1	30,2	461,5	0,412	175,5
22417	181,6	40,3	637,9	0,405	174,8
22230	223,8	50,4	816,5	0,403	174,2
22216	238,7	54,0	880,4	0,402	174,0

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **350 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **27000 kg**; Airspeed: **172,9 KIAS**; Net Leveloff: **23156 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **27088 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
35000	0,0	0,0	0,0	0,535	176,3
28388	48,5	10,1	128,0	0,458	174,2
25296	92,7	20,2	277,8	0,426	173,2
23910	135,2	30,2	438,6	0,413	172,4
23343	176,8	40,3	604,7	0,406	171,8
23168	218,1	50,4	772,6	0,403	171,2
23156	232,7	54,0	832,8	0,403	171,0

CF34-8E5

Initial: **350 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **27000 kg**; Airspeed: **172,9 KIAS**; Net Leveloff: **23142 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **27069 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
35000	0,0	0,0	0,0	0,535	176,3
28273	49,5	10,1	131,4	0,457	174,2
25192	94,6	20,2	285,4	0,425	173,1
23839	137,8	30,2	450,6	0,412	172,3
23303	180,3	40,3	621,1	0,406	171,7
23152	219,3	49,7	781,0	0,403	171,1
23142	231,3	52,6	830,3	0,403	171,0

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **350 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **26000 kg**; Airspeed: **169,7 KIAS**; Net Leveloff: **24100 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **27976 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
35000	0,0	0,0	0,0	0,525	172,8
28869	47,8	10,1	126,4	0,454	170,9
26019	91,7	20,2	272,4	0,425	169,9
24765	134,0	30,2	428,3	0,412	169,2
24259	175,4	40,3	588,6	0,407	169,6
24100	225,3	52,6	785,3	0,404	167,9

CF34-8E5

Initial: **350 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **26000 kg**; Airspeed: **169,7 KIAS**; Net Leveloff: **24086 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **27951 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
35000	0,0	0,0	0,0	0,525	172,8
28761	48,8	10,1	129,7	0,453	170,9
25922	93,5	20,2	279,8	0,424	169,9
24700	136,6	30,2	440,0	0,412	169,2
24222	178,9	40,3	604,5	0,406	168,5
24086	226,8	51,8	794,2	0,403	167,9

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **350 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **25000 kg**; Airspeed: **166,5 KIAS**; Net Leveloff: **25092 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **28924 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
35000	0,0	0,0	0,0	0,515	169,3
29369	47,1	10,1	124,6	0,450	167,6
26769	90,6	20,2	266,8	0,424	166,6
25641	132,7	30,2	417,8	0,412	165,9
25207	174,0	40,3	572,7	0,407	165,3
25092	217,9	51,1	740,0	0,405	164,7

CF34-8E5

Initial: **350 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **25000 kg**; Airspeed: **166,5 KIAS**; Net Leveloff: **25077 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **28895 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
35000	0,0	0,0	0,0	0,515	169,3
29268	48,1	10,1	127,8	0,449	167,6
26675	92,5	20,2	274,1	0,423	166,6
25580	135,3	30,2	429,1	0,411	165,9
25172	177,4	40,3	588,0	0,406	165,3
25077	216,3	49,7	736,6	0,404	164,8

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **350 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **24000 kg**; Airspeed: **163,1 KIAS**; Net Leveloff: **26087 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **29875 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
35000	0,0	0,0	0,0	0,504	165,7
29890	46,4	10,1	122,6	0,447	164,2
27545	89,5	20,2	261,0	0,422	163,3
26547	131,3	30,2	407,1	0,412	162,6
26173	172,5	40,3	556,3	0,407	162,0
26087	210,5	49,7	695,9	0,405	161,5

CF34-8E5

Initial: **350 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **24000 kg**; Airspeed: **163,2 KIAS**; Net Leveloff: **26069 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **29842 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
35000	0,0	0,0	0,0	0,504	165,7
29795	47,3	10,1	125,8	0,446	164,1
27455	91,4	20,2	268,0	0,421	163,2
26485	134,0	30,2	418,0	0,411	162,6
26137	176,0	40,3	571,1	0,407	162,0
26069	208,7	48,2	692,2	0,405	161,5

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **350 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **23000 kg**; Airspeed: **159,8 KIAS**; Net Leveloff: **27111 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **30876 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
35000	0,0	0,0	0,0	0,494	162,0
30430	45,6	10,1	120,7	0,443	160,7
28354	88,4	20,2	255,1	0,421	159,9
27457	130,0	30,2	396,0	0,412	159,2
27165	171,0	40,3	539,7	0,407	158,7
27111	200,1	47,5	642,9	0,406	158,3

CF34-8E5

Initial: **350 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **23000 kg**; Airspeed: **159,8 KIAS**; Net Leveloff: **27084 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **30841 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
35000	0,0	0,0	0,0	0,494	162,0
30343	46,6	10,1	123,8	0,442	160,7
28270	90,2	20,2	261,8	0,420	159,8
27414	132,6	30,2	406,5	0,411	159,2
27126	174,4	40,3	553,9	0,407	158,6
27084	201,2	46,8	649,1	0,406	158,2

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **350 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **22000 kg**; Airspeed: **156,3 KIAS**; Net Leveloff: **28305 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **32059 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
35000	0,0	0,0	0,0	0,483	158,3
31042	44,9	10,1	118,7	0,439	157,1
29297	87,3	20,2	248,6	0,421	156,4
28584	128,8	30,2	383,9	0,413	155,8
28339	169,7	40,3	521,1	0,409	155,2
28305	193,0	46,1	599,9	0,408	154,9

CF34-8E5

Initial: **350 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **22000 kg**; Airspeed: **156,3 KIAS**; Net Leveloff: **28271 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **32021 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
35000	0,0	0,0	0,0	0,483	158,3
30964	45,8	10,1	121,7	0,438	157,1
29221	89,1	20,2	255,1	0,420	156,3
28525	131,4	30,2	393,8	0,412	155,7
28296	173,1	40,3	534,5	0,408	155,2
28271	193,9	45,4	605,1	0,408	154,9

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **300 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **35000 kg**; Airspeed: **196,1 KIAS**; Net Leveloff: **16125 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **20529 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
30000	0,0	0,0	0,0	0,542	202,3
22648	50,0	10,1	159,0	0,460	197,9
19085	95,5	20,2	348,7	0,425	196,7
17420	138,8	30,2	554,8	0,410	195,8
16603	181,2	40,3	767,1	0,402	195,0
16237	223,0	50,4	982,1	0,397	194,4
16125	267,5	61,2	1213,5	0,395	193,7

CF34-8E5

Initial: **300 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **35000 kg**; Airspeed: **196,1 KIAS**; Net Leveloff: **16087 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **20496 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
30000	0,0	0,0	0,0	0,542	200,3
22528	51,0	10,1	163,1	0,459	197,9
18805	100,4	20,9	372,7	0,423	196,5
17320	141,4	30,2	569,3	0,409	195,7
16491	184,5	40,3	786,4	0,401	195,0
16156	227,0	50,4	1006,8	0,397	194,3
16087	260,2	58,3	1180,8	0,395	193,8

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **300 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **34000 kg**; Airspeed: **193,4 KIAS**; Net Leveloff: **17068 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **21261 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
30000	0,0	0,0	0,0	0,534	197,3
22995	49,5	10,1	157,3	0,457	195,1
19625	94,6	20,2	343,5	0,424	193,9
18089	137,7	30,2	545,1	0,409	193,0
17410	180,0	40,3	753,2	0,402	192,3
17128	221,8	50,4	963,4	0,399	191,6
17068	254,4	58,3	1129,1	0,397	191,1

CF34-8E5

Initial: **300 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **34000 kg**; Airspeed: **193,3 KIAS**; Net Leveloff: **16972 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **21248 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
30000	0,0	0,0	0,0	0,534	197,3
22881	50,4	10,1	161,4	0,455	195,0
19516	96,4	20,2	352,7	0,423	193,8
18009	140,3	30,2	559,5	0,409	192,9
17331	183,3	40,3	772,6	0,402	192,2
17036	225,9	50,4	987,4	0,398	191,5
16972	259,1	58,3	1156,8	0,396	191,0

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **300 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **33000 kg**; Airspeed: **190,7 KIAS**; Net Leveloff: **17996 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **22008 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
30000	0,0	0,0	0,0	0,526	194,3
23384	48,9	10,1	155,5	0,454	192,2
20218	93,7	20,2	337,9	0,423	191,0
18784	136,7	30,2	534,5	0,409	190,2
18196	178,8	40,3	737,5	0,403	189,5
18015	217,6	49,7	928,3	0,400	188,9
17996	235,5	54,0	1016,6	0,400	188,6

CF34-8E5

Initial: **300 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **33000 kg**; Airspeed: **190,7 KIAS**; Net Leveloff: **17987 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **21991 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
30000	0,0	0,0	0,0	0,526	194,3
23277	49,9	10,1	159,6	0,452	192,1
20114	95,5	20,2	346,9	0,422	191,0
18708	139,3	30,2	548,6	0,408	190,1
18146	182,2	40,3	756,8	0,402	189,4
17996	221,7	49,7	952,5	0,400	188,8
17987	233,8	52,6	1012,8	0,400	188,6

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **300 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **32000 kg**; Airspeed: **187,9 KIAS**; Net Leveloff: **18811 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **22792 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
30000	0,0	0,0	0,0	0,518	191,2
23784	48,3	10,1	153,7	0,450	189,2
20826	92,9	20,2	332,2	0,422	188,1
19496	135,7	30,2	523,8	0,409	187,3
18968	177,7	40,3	721,3	0,403	186,6
18820	216,4	49,7	906,7	0,401	186,0
18811	228,2	52,6	963,9	0,400	185,9

CF34-8E5

Initial: **300 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **32000 kg**; Airspeed: **187,8 KIAS**; Net Leveloff: **18783 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **22774 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
30000	0,0	0,0	0,0	0,518	191,2
23683	49,3	10,1	157,7	0,449	189,2
20731	94,6	20,2	341,1	0,421	188,1
19432	138,2	30,2	537,8	0,408	187,3
18925	181,0	40,3	740,1	0,403	186,6
18789	220,4	49,7	929,9	0,400	186,0
18783	229,5	51,8	973,8	0,400	185,8

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **300 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **31000 kg**; Airspeed: **184,9 KIAS**; Net Leveloff: **19607 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **23580 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
30000	0,0	0,0	0,0	0,510	188,0
24202	47,8	10,1	151,9	0,447	186,2
21455	92,0	20,2	326,4	0,421	185,2
20232	134,6	30,2	512,8	0,409	184,4
19741	176,5	40,3	704,5	0,403	183,7
19607	223,9	51,8	925,8	0,401	183,0

CF34-8E5

Initial: **300 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **31000 kg**; Airspeed: **184,9 KIAS**; Net Leveloff: **19597 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **23563 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
30000	0,0	0,0	0,0	0,510	188,0
24107	48,7	10,1	155,8	0,446	186,2
21365	93,7	20,2	335,1	0,420	185,1
20167	137,2	30,2	526,5	0,408	184,3
19707	179,8	40,3	723,2	0,403	183,7
19597	222,2	50,4	921,6	0,401	183,0

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **300 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **30000 kg**; Airspeed: **182,0 KIAS**; Net Leveloff: **20435 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **24398 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
30000	0,0	0,0	0,0	0,502	184,8
24632	47,2	10,1	150,0	0,444	183,2
22104	91,1	20,2	320,6	0,419	182,2
20987	133,5	30,2	501,7	0,408	181,4
20552	175,3	40,3	687,5	0,403	180,8
20435	219,6	51,8	888,4	0,401	180,1

CF34-8E5

Initial: **300 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **30000 kg**; Airspeed: **182,0 KIAS**; Net Leveloff: **20414 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **24382 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
30000	0,0	0,0	0,0	0,502	184,8
24543	48,1	10,1	153,9	0,443	183,1
22020	92,8	20,2	329,1	0,419	182,1
20930	136,1	30,2	515,1	0,408	181,4
20515	178,6	40,3	705,7	0,403	180,7
20414	220,8	50,4	897,8	0,401	180,1

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **300 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **29000 kg**; Airspeed: **179,0 KIAS**; Net Leveloff: **21290 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **25237 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
30000	0,0	0,0	0,0	0,493	181,6
25072	46,6	10,1	148,1	0,441	180,1
22773	90,1	20,2	314,7	0,418	179,1
21762	132,4	30,2	490,6	0,408	178,4
21378	174,0	40,3	670,5	0,404	177,8
21290	212,4	49,7	838,8	0,402	177,2

CF34-8E5

Initial: **300 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **29000 kg**; Airspeed: **179,0 KIAS**; Net Leveloff: **21275 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **25223 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
30000	0,0	0,0	0,0	0,493	181,6
24991	47,5	10,1	152,0	0,440	180,1
22696	91,9	20,2	323,0	0,418	179,1
21707	134,9	30,2	503,6	0,408	178,4
21347	177,4	40,3	688,2	0,403	177,7
21275	213,5	49,0	847,5	0,401	177,2

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **300 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **28000 kg**; Airspeed: **175,9 KIAS**; Net Leveloff: **22164 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **26086 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
30000	0,0	0,0	0,0	0,485	178,3
25528	45,9	10,1	146,3	0,438	176,9
23461	89,2	20,2	308,8	0,417	176,0
22570	131,2	30,2	479,4	0,408	175,3
22235	172,7	40,3	653,4	0,404	174,7
22164	208,1	49,0	803,4	0,402	174,2

CF34-8E5

Initial: **300 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **28000 kg**; Airspeed: **175,9 KIAS**; Net Leveloff: **22146 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **26072 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
30000	0,0	0,0	0,0	0,485	178,3
25453	46,9	10,1	150,0	0,437	176,9
23392	91,0	20,2	316,9	0,416	176,0
22521	133,8	30,2	492,0	0,407	175,3
22204	176,1	40,3	670,5	0,403	174,7
22146	209,1	48,2	811,5	0,402	174,2

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **300 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **27000 kg**; Airspeed: **172,8 KIAS**; Net Leveloff: **23080 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **26957 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
30000	0,0	0,0	0,0	0,476	175,0
26000	45,3	10,1	144,4	0,434	173,7
24177	88,2	20,2	302,8	0,416	172,9
23397	130,1	30,2	468,1	0,408	172,2
23123	171,4	40,3	636,2	0,404	171,6
33080	197,9	46,8	744,7	0,403	171,3

CF34-8E5

Initial: **300 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **27000 kg**; Airspeed: **172,8 KIAS**; Net Leveloff: **23065 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **26940 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
30000	0,0	0,0	0,0	0,476	175,0
25932	46,2	10,1	148,1	0,433	173,7
24114	90,0	20,2	310,7	0,415	172,9
23355	132,6	30,2	480,4	0,407	172,2
23099	174,8	40,3	652,8	0,404	171,6
23065	198,8	46,1	751,7	0,403	171,2

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **300 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **26000 kg**; Airspeed: **169,6 KIAS**; Net Leveloff: **24009 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **27824 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
30000	0,0	0,0	0,0	0,467	171,6
26488	44,7	10,1	142,4	0,431	170,5
24915	87,2	20,2	296,9	0,415	169,7
24260	128,9	30,2	456,9	0,408	169,0
24035	170,1	40,3	619,1	0,404	168,4
24009	190,6	45,4	700,0	0,403	168,2

CF34-8E5

Initial: **300 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **26000 kg**; Airspeed: **169,6 KIAS**; Net Leveloff: **23996 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **27803 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
30000	0,0	0,0	0,0	0,467	171,6
26427	45,6	10,1	146,1	0,430	170,4
24861	89,0	20,2	304,6	0,414	169,6
24223	131,5	30,2	468,8	0,407	169,0
24015	173,5	40,3	635,1	0,404	168,4
23996	191,4	44,6	706,6	0,403	168,1

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **300 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **25000 kg**; Airspeed: **166,4 KIAS**; Net Leveloff: **24991 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **28735 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
30000	0,0	0,0	0,0	0,458	167,1
26997	44,0	10,1	140,4	0,427	167,1
25679	86,2	20,2	290,9	0,414	166,4
25154	127,7	30,2	445,8	0,408	165,8
24991	177,5	42,5	636,1	0,404	165,1

CF34-8E5

Initial: **300 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **25000 kg**; Airspeed: **166,4 KIAS**; Net Leveloff: **24976 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **28708 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
30000	0,0	0,0	0,0	0,458	168,1
26942	44,9	10,1	144,0	0,426	167,1
25630	88,0	20,2	298,4	0,413	166,4
25122	130,2	30,2	457,3	0,407	165,7
24976	178,1	41,8	640,9	0,404	165,1

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **300 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **24000 kg**; Airspeed: **163,1 KIAS**; Net Leveloff: **25968 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **29653 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
30000	0,0	0,0	0,0	0,449	164,6
27529	43,3	10,1	138,2	0,423	163,7
26471	85,2	20,2	284,6	0,412	163,0
26068	126,4	30,2	434,5	0,407	162,5
25968	167,3	40,3	585,4	0,405	161,9

CF34-8E5

Initial: **300 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **24000 kg**; Airspeed: **163,1 KIAS**; Net Leveloff: **25951 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **29624 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
30000	0,0	0,0	0,0	0,449	164,6
27479	44,2	10,1	141,7	0,423	163,7
26425	86,9	20,2	291,9	0,412	163,0
26037	129,0	30,2	445,6	0,407	162,4
25951	167,7	39,6	589,3	0,405	161,9

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **250 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **35000 kg**; Airspeed: **195,9 KIAS**; Net Leveloff: **16042 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **20433 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
25000	0,0	0,0	0,0	0,485	198,9
20187	46,9	10,1	179,5	0,436	197,4
17905	90,9	20,2	380,8	0,415	196,4
16805	133,6	30,2	591,6	0,404	195,6
16274	175,6	40,3	806,1	0,399	194,9
16076	214,3	49,7	1006,9	0,396	194,3
19042	238,0	55,4	1130,6	0,395	193,9

CF34-8E5

Initial: **250 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **35000 kg**; Airspeed: **196,0 KIAS**; Net Leveloff: **16016 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **20395 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
25000	0,0	0,0	0,0	0,485	198,9
20106	47,8	10,1	183,9	0,436	197,3
17825	92,6	20,2	390,4	0,414	196,3
16701	136,1	30,2	606,0	0,403	195,5
16184	178,8	40,3	825,7	0,398	194,8
16027	218,2	49,7	1031,6	0,396	194,2
16016	230,3	52,6	1095,1	0,395	194,0

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **250 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **34000 kg**; Airspeed: **193,3 KIAS**; Net Leveloff: **16978 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **21152 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
25000	0,0	0,0	0,0	0,478	196,0
20541	46,4	10,1	177,6	0,433	194,5
18456	90,1	20,2	375,2	0,414	193,6
17529	132,6	30,2	582,1	0,405	192,8
17117	174,6	40,3	792,2	0,400	192,1
16978	225,1	52,6	1048,7	0,397	191,3

CF34-8E5

Initial: **250 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **34000 kg**; Airspeed: **193,2 KIAS**; Net Leveloff: **16880 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **21142 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
25000	0,0	0,0	0,0	0,478	196,0
20468	47,3	10,1	182,1	0,433	194,5
18381	91,8	20,2	384,6	0,413	193,5
17461	135,1	30,2	596,7	0,404	192,8
17027	177,8	40,3	811,4	0,399	192,1
16880	229,2	52,6	1073,6	0,396	191,3

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **250 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **33000 kg**; Airspeed: **190,6 KIAS**; Net Leveloff: **17906 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **21866 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
25000	0,0	0,0	0,0	0,471	193,0
20937	45,8	10,1	175,6	0,430	191,6
19055	89,3	20,2	369,2	0,413	190,7
18252	131,6	30,2	571,3	0,404	190,0
17960	173,5	40,3	776,8	0,401	189,3
17906	203,2	47,5	924,3	0,399	188,9

CF34-8E5

Initial: **250 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **33000 kg**; Airspeed: **190,6 KIAS**; Net Leveloff: **17891 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **21852 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
25000	0,0	0,0	0,0	0,471	193,0
20871	46,7	10,1	180,0	0,430	191,6
18992	91,0	20,2	378,6	0,412	190,7
18199	134,1	30,2	585,6	0,404	189,9
17935	176,8	40,3	796,5	0,400	189,3
17891	204,0	46,8	932,4	0,399	188,9

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **250 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **32000 kg**; Airspeed: **187,8 KIAS**; Net Leveloff: **18723 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **22628 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
25000	0,0	0,0	0,0	0,464	189,9
21345	45,3	10,1	173,6	0,427	188,7
19672	88,4	20,2	363,0	0,411	187,8
18977	130,6	30,2	560,1	0,404	187,1
18748	172,4	40,3	760,1	0,401	186,5
18723	193,2	45,4	860,4	0,400	186,2

CF34-8E5

Initial: **250 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **32000 kg**; Airspeed: **187,8 KIAS**; Net Leveloff: **18694 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **22612 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
25000	0,0	0,0	0,0	0,464	189,9
21286	46,2	10,1	178,0	0,427	188,7
19615	90,2	20,2	372,4	0,411	187,8
18934	133,1	30,2	574,2	0,404	187,1
18714	175,7	40,3	778,9	0,401	186,4
18694	193,8	44,6	866,9	0,400	186,1

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **250 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **31000 kg**; Airspeed: **184,9 KIAS**; Net Leveloff: **19513 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **23394 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
25000	0,0	0,0	0,0	0,456	186,8
21772	44,7	10,1	171,5	0,425	185,7
20312	87,6	20,2	356,8	0,410	184,9
19708	129,6	30,2	548,4	0,404	184,2
19529	168,3	39,6	728,7	0,401	183,6
19513	183,1	43,2	798,2	0,401	183,4

CF34-8E5

Initial: **250 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **31000 kg**; Airspeed: **184,9 KIAS**; Net Leveloff: **19504 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **23378 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
25000	0,0	0,0	0,0	0,456	186,8
21717	45,6	10,1	175,8	0,424	185,7
20259	89,3	20,2	365,9	0,410	184,9
19675	132,1	30,2	562,6	0,404	184,2
19514	171,5	39,6	747,2	0,401	183,6
19504	183,6	42,5	804,2	0,401	183,4

DRIFT-DOWN ANALYSIS

CF34-8E5

Initial: **250 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **30000 kg**; Airspeed: **181,9 KIAS**; Net Leveloff: **20321 ft**

ISA Deviation: **0°C**; Wind: **0 kt**; Gross Leveloff: **24176 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
25000	0,0	0,0	0,0	0,449	183,7
22213	44,2	10,1	169,4	0,422	182,7
20969	86,8	20,2	350,3	0,409	181,9
20473	128,6	30,2	536,6	0,404	181,2
20330	167,1	39,6	711,3	0,401	180,7
20321	178,9	42,5	765,1	0,401	180,5

CF34-8E5

Initial: **250 FL**; Anti Ice: **OFF**; Bleed/Pack: **ON**

Weight: **30000 kg**; Airspeed: **181,9 KIAS**; Net Leveloff: **20302 ft**

ISA Deviation: **10°C**; Wind: **0 kt**; Gross Leveloff: **24161 ft**

Press Alt (ft)	Range (nm)	Time (min)	Fuel Burned (kg)	Mach	IAS (KIAS)
25000	0,0	0,0	0,0	0,449	183,7
22165	45,1	10,1	173,6	0,421	182,7
20924	89,5	20,2	359,3	0,409	181,9
20438	131,1	30,2	550,3	0,403	181,2
20302	179,4	41,8	770,8	0,401	180,5

EFFECT OF DE-ICING/ANTI-ICING FLUIDS

The fluid must flow-off the surface during takeoff, or it may cause undesirable performance effects. EMBRAER performed flight tests to investigate the effects of approved fluids on performance and handling characteristics.

These tests demonstrated these fluids did not have a measurable effect on takeoff and climb performance.

It is also important that the fluid be applied symmetrically to both wings so as to ensure that the aerodynamic effect of the fluid remaining is the same on both sides of the aircraft.

De-icing and anti-icing procedures with the de-icing and anti-icing fluids list are shown in Operation Manual Part A, Chapter 8.2.4.

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FLIGHT WITH LANDING GEAR DOWN

No data available.

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FOR AIRPLANES WITH 3 OR MORE ENGINES, ONE ENGINE INOPERATIVE

This Chapter is not applicable for ERJ-170.

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FLIGHT CONDUCTED UNDER THE PROVISIONS OF THE CDL

This chapter presents flights conducted under the provision of the CDL and is covered by OM part B Configuration Deviation List Section 8.1.

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EMERGENCY AND ABNORMAL PROCEDURES 3

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SECTION 5

FLIGHT PLANNING

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INTRODUCTION

This section presents:

- page block 5.1 contains climb, cruise, descent and holding performance data in accordance with JAR-OPS 1.245;
- page block 5.2 contains fuel policy in accordance with JAR-OPS 1.255.

In addition, simplified flight planning charts are included.

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DATA AND INSTRUCTION NECESSARY FOR PRE-FLIGHT AND IN-FLIGHT PLANNING

SIMPLIFIED FLIGHT PLANNING

Simplified flight planning charts allow quick determination of estimated trip fuel and time from brake release to landing. The following phases are included: takeoff, climb cruise, descent, approach and landing.

Charts are provided for Long Range Cruise (LRC) and Maximum Speed Cruise (MSC) at constant altitude.

Alternate fuel, holding, reserve fuel and other allowances (APU usage and taxi) should be added to the trip fuel in order to obtain the total fuel required.

To determine trip fuel enter trip ground distance, correct for wind condition and estimated landing weight, move as far as the line indicating cruise pressure altitude, and read the trip fuel.

To determine trip time, enter trip ground distance, correct for wind condition, move as far as the referring cruise pressure altitude, and read the trip time.

For winds greater than those shown, enter in the chart, directly, corrected ground distance, ignore wind correction reference line, to obtain the corrected ground distance, apply the following equation.

$$CGD = GD \times \left(\frac{TAS}{TAS + WIND} \right)$$

Where:

CGD: Corrected ground distance;

GD: Ground distance;

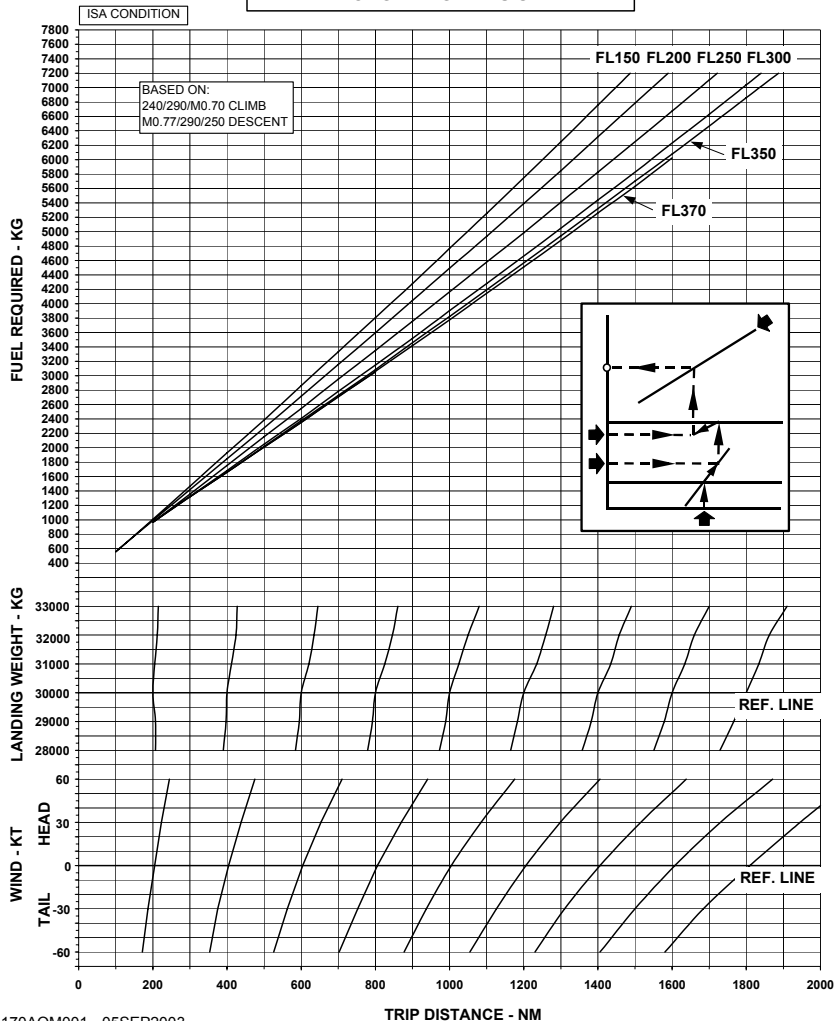
Head wind is negative;

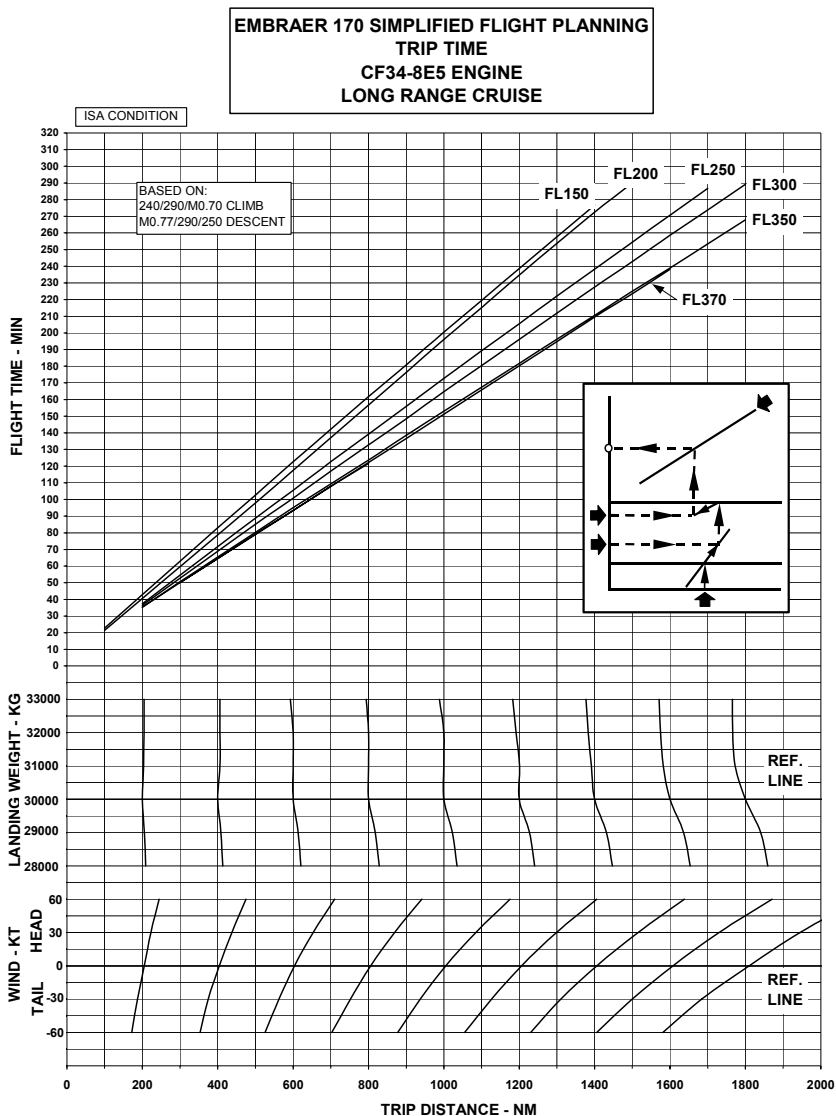
Tail wind is positive.

The alternate fuel is determined by entering the LRC Simplified Flight Planning chart with the alternate distance and wind.

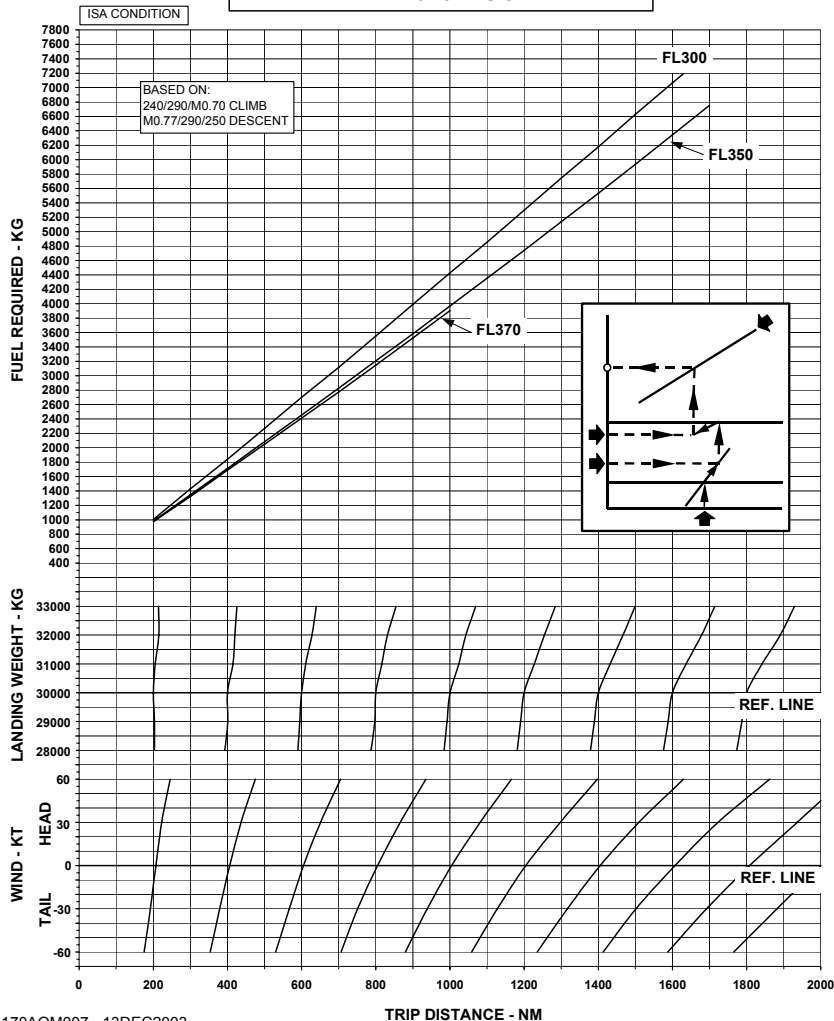
The holding fuel is determined from the holding table in this section. Depending upon national regulations, the holding fuel is normally calculated so that the aircraft can hold for 30 min., at 1500 ft above the alternate airport.

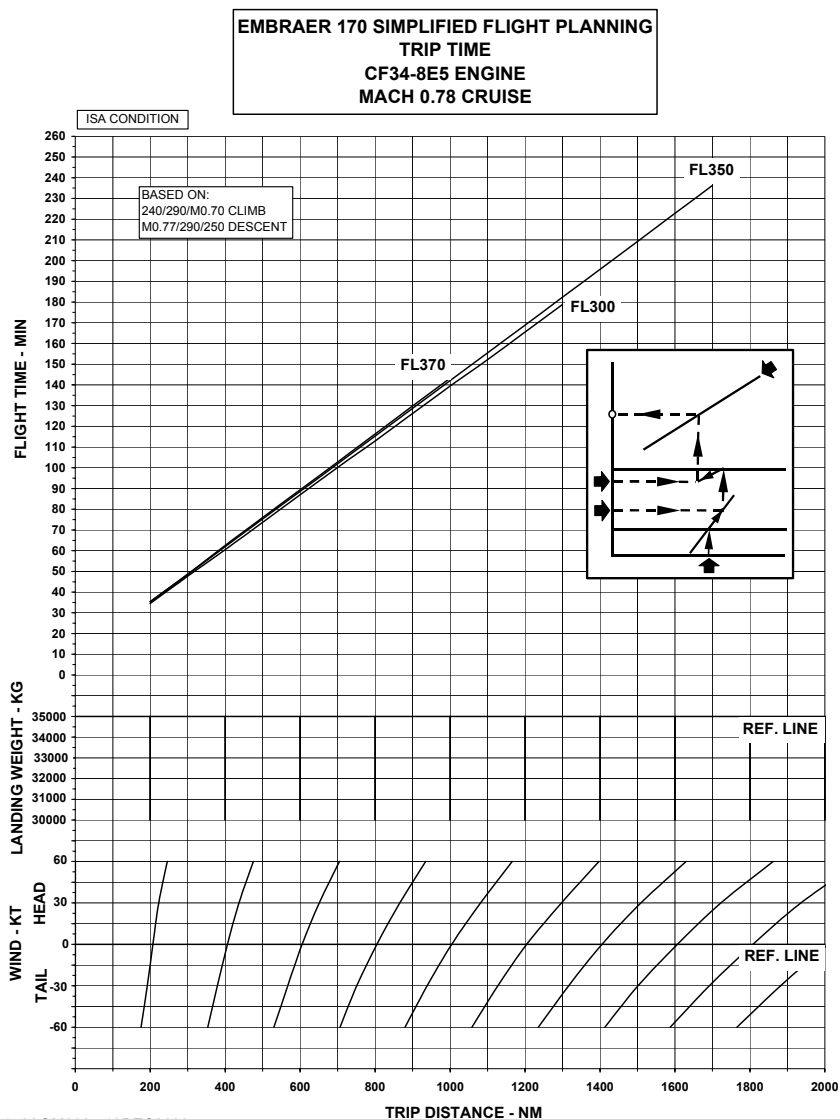
**EMBRAER SIMPLIFIED FLIGHT PLANNING
TRIP FUEL
CF34-8E5 ENGINE
LONG RANGE CRUISE**





EMBRAER 170 SIMPLIFIED FLIGHT PLANNING
TRIP FUEL
CF34-8E5 ENGINE
MACH 0.78 CRUISE





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ENGINE FUEL CONSUMPTION

ENGINE FUEL CONSUMPTION

The following values established for taxi, takeoff, approach and go around fuel consumption should be considered when calculating detailed flight plans.

FUEL CONSUMPTION

ENGINE	PHASE OF FLIGHT	FUEL CONSUMPTION kg/min
CF34-8E5	TAXI	8
	TAKEOFF	73
	APPROACH AND LANDING	17.5
	GO AROUND	73

A typical average value to be used during the flight planning calculation should be considered:

TAKEOFF = 146 kg (2 minutes used);

APPROACH AND LANDING = 70 kg (4 minutes used);

GO AROUND = 146 kg (2 minutes used).

APU FUEL CONSUMPTION

The table below shows the APU fuel consumption on the ground and during level flight at 5000 ft, 15000 ft, and 33000 ft altitudes. The data are calculated for different airspeeds, APU air bleeds and electrical loads.

ALTITUDE (ft)	AIRSPEED (KIAS)	APU AIR BLEED	APU GEN. LOAD (kVA)	APU FUEL FLOW (kg/min)
0	0	0	0	1.5
			40	1.7
		Max.	0	2.1
			40	2.4
5000	170	0	0	1.3
			40	1.5
		Max.	0	1.8
			40	2.0
5000	300	0	0	1.3
			40	1.5
		Max.	0	1.8
			40	2.0
15000	170	0	0	1.0
			40	1.2
		Max.	0	1.4
			40	1.7
15000	320	0	0	1.0
			40	1.2
		Max.	0	1.4
			40	1.7
33000	170	0	0	0.7
			40	0.9
33000	300	0	0	0.7
			40	0.9

FLIGHT PLANNING – FUEL TANKERING

Fuel price variations at different airports may require carrying more fuel than the minimum required on a flight leg. The procedure of loading this extra amount of fuel (or surplus fuel) in order to minimize fuel costs is known as Fuel Tankering.

Since the surplus fuel tankered results in additional fuel burnoff (due to the weight increase) it is important to analyze the costs of the extra fuel transportation operation.

The charts below are designed to determine the break-even fuel cost at destination airport. Above the break-even price it is economically feasible to transport extra fuel from origin airport in order to refuel as minimal as possible at destination airport.

The additional maintenance costs involved with increased weight operations (additional brake and tire wear) are not considered on the charts.

Example

Analyse the possibility to proceed with fuel tankering between two airports distant 500NM from each other, using LRC speed schedule cruising on FL350. Consider the following fuel prices:

Departure Airport: 80 Cents US\$/Gal

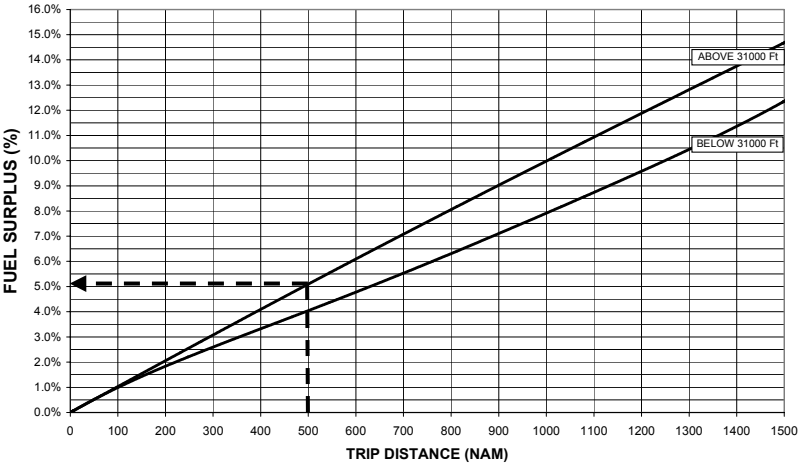
Destination Airport: 100 Cents US\$/Gal

- Considering the “FUEL SURPLUS – LRC” Chart for 500NAM and FL350: FUEL SURPLUS = 5.1%
- Considering the “FUEL DIFFERENTIAL PRICE” Chart for 5.1% surplus and 80 Cents US\$ / Gal at departure airport:

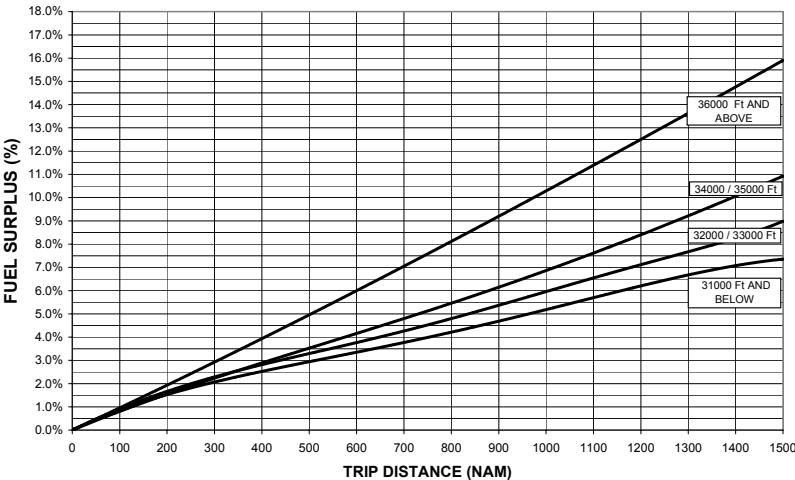
BREAK EVEN Fuel Price at destination = 85 Cents US\$/Gal

Since Fuel on Destination Airport (100 Cents US\$/Gal) is greater than BREAK EVEN Fuel Price (85 Cents US\$/Gal) the fuel tankering operation between these two airports is economically feasible.

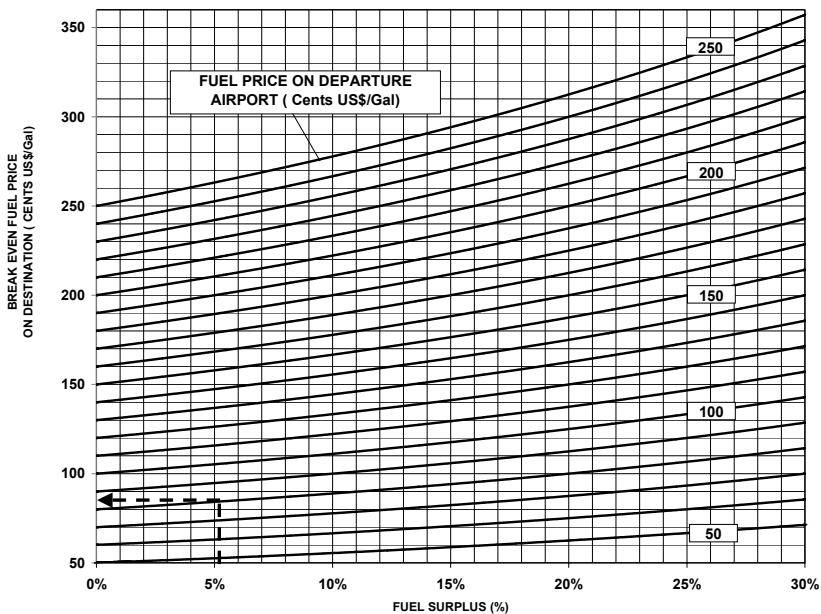
FUEL SURPLUS - Long Range Cruise
EMBRAER 170LR/CF34-8E5 ENGINES



FUEL SURPLUS - M0.78
EMBRAER 170LR/CF34-8E5 ENGINES



BREAK EVEN FUEL PRICE AT STINATION AIRPORT

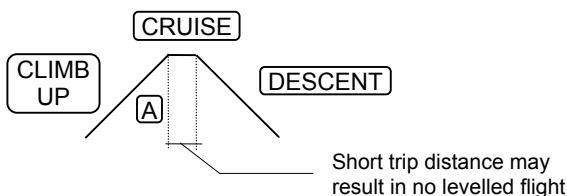


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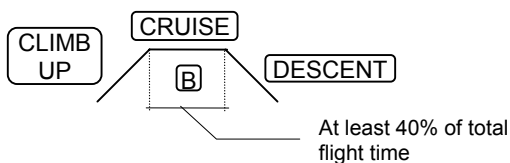
CRUISE - FLIGHT LEVEL TABLE

The table below permits quick determination of the cruise flight level for minimum fuel consumption, based on the trip distance and takeoff weight. For each takeoff weight two different flight levels are calculated (A or B) based on the following assumptions:

- Condition (A): The flight level was calculated based only on minimum fuel consumption. It may result on reduced time in leveled flight for short trip distances.



- Condition (B): The flight level was calculated based on a combination of minimum fuel consumption and at least 40% of the total flight time in cruise.



The table data are presented for ISA condition, all engine operating and Maximum Speed Cruise schedule.

FLIGHT LEVEL - ALL ENGINES OPERATING

CF34-8E5 ENGINES, LONG RANGE CRUISE AND ISA CONDITIONS

TOW (kg)	COND	TRIP DISTANCE (NM)										
		50	75	100	150	200	250	300	350	400	450	500
37000 (*)	A	-	-	-	-	-	-	-	-	-	-	-
	B	-	-	-	-	-	-	-	-	-	-	-
36000 (*)	A	-	-	-	-	-	-	-	-	-	-	-
	B	-	-	-	-	-	-	-	-	-	-	-
35000 (*)	A	-	-	-	-	-	-	-	-	50	130	220
	B	-	-	-	-	-	-	-	-	50	130	220
34000 (*)	A	-	-	-	-	-	150	370	370	370	370	370
	B	-	-	-	-	-	150	290	310	350	370	370
33000	A	70	100	160	250	270	310	380	380	380	380	380
	B	70	100	130	190	230	270	380	380	380	380	380
32000	A	80	100	150	240	310	320	380	380	380	380	380
	B	80	100	140	190	240	270	310	320	330	380	380
31000	A	80	110	160	240	280	330	330	380	380	380	380
	B	80	110	140	180	240	280	320	330	370	380	380
30000	A	80	110	170	230	320	330	340	390	390	390	390
	B	80	110	150	190	250	290	330	340	380	390	390
29000	A	90	100	170	240	310	340	340	400	400	400	400
	B	80	100	150	210	250	300	340	360	390	400	400
28000	A	100	100	180	210	330	340	350	350	400	400	400
	B	90	100	150	210	250	300	350	350	400	400	400
27000	A	80	110	170	230	330	350	360	360	410	410	410
	B	80	110	160	220	270	310	360	360	410	410	410
26000	A	80	110	170	220	340	360	360	360	360	410	410
	B	80	110	160	220	280	320	360	360	360	410	410

(*) Due to the reduced fuel consumption in this trip, the blank spaces are caused by the landing weight going beyond the Maximum Landing Weight (32800 kg).

FLIGHT LEVEL - ALL ENGINES OPERATING

CF34-8E5 ENGINES, MACH 0.78 AND ISA CONDITIONS

TOW (kg)	COND	TRIP DISTANCE (NM)										
		50	75	100	150	200	250	300	350	400	450	500
37000 (*)	A	-	-	-	-	-	-	-	-	-	-	-
	B	-	-	-	-	-	-	-	-	-	-	-
36000 (*)	A	-	-	-	-	-	-	-	-	-	-	-
	B	-	-	-	-	-	-	-	-	-	-	-
35000 (*)	A	-	-	-	-	-	-	-	-	-	-	320
	B	-	-	-	-	-	-	-	-	-	-	320
34000 (*)	A	-	-	-	-	-	330	340	350	350	350	350
	B	-	-	-	-	-	-	300	340	350	350	350
33000	A	-	-	-	290	350	360	360	350	360	360	360
	B	-	-	-	-	-	-	310	340	360	360	360
32000	A	-	-	-	280	350	360	360	360	360	360	360
	B	-	-	-	-	-	-	320	350	360	360	360
31000	A	-	-	-	300	340	370	370	370	370	370	370
	B	-	-	-	-	-	280	330	360	370	370	370
30000	A	-	-	-	300	370	360	370	370	370	370	370
	B	-	-	-	-	-	280	340	370	370	370	370
29000	A	-	-	-	310	360	360	370	370	370	370	370
	B	-	-	-	-	-	290	350	370	370	370	370
28000	A	-	-	-	320	340	370	370	370	370	370	370
	B	-	-	-	-	-	300	360	370	370	370	370
27000	A	-	-	-	330	350	370	370	370	370	370	370
	B	-	-	-	-	-	320	370	370	370	370	370
26000	A	-	-	-	340	360	370	370	370	370	370	370
	B	-	-	-	-	-	330	370	370	370	370	370

(*) Due to the reduced fuel consumption in this trip, the blank spaces are caused by the landing weight going beyond the Maximum Landing Weight (32800 kg).

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CRUISE – ALTITUDE CAPABILITY TABLE

The table below permits quick determination of the altitude capability, based on the initial cruise weight. The table data are presented for various ISA conditions, all engines operating and Maximum Speed Cruise schedule.

The established associated conditions are:

- Flaps..... UP
- Gears..... UP
- Bleeds..... OPEN

CRUISE ALTITUDE CAPABILITY ALL ENGINES OPERATING CF34-8E5 ENGINES, LONG RANGE CRUISE

Weight (kg)	ISA + °C									
	-10	-5	0	5	10	15	20	25	30	35
38000	340	340	340	340	340	330	310	300	300	300
37000	340	350	350	350	350	330	320	310	300	300
36000	340	350	350	350	350	340	320	320	310	300
35000	340	360	360	360	360	350	330	320	310	300
34000	340	360	360	360	360	360	340	330	320	300
33000	340	370	370	370	370	360	350	340	330	330
32000	340	380	370	370	370	370	360	350	330	330
31000	340	380	380	380	380	370	360	350	340	350
30000	340	380	380	390	380	380	370	360	350	360
29000	340	390	390	390	390	380	370	360	360	360
28000	340	400	400	400	390	390	380	370	360	360
27000	340	400	400	400	400	390	380	370	370	360
26000	340	410	410	410	410	400	390	380	370	360
25000	340	410	410	410	410	410	400	390	380	370
24000	340	410	410	410	410	410	400	400	390	380
23000	340	410	410	410	410	410	410	400	400	390
22000	340	410	410	410	410	410	410	410	400	390
21000	340	410	410	410	410	410	410	410	410	400

CRUISE ALTITUDE CAPABILITY ALL ENGINES OPERATING

CF34-8E5 ENGINES, MACH 0.78

	ISA + °C									
Weight (kg)	-10	-5	0	5	10	15	20	25	30	35
38000	320	320	320	320	320	290	-	-	-	-
37000	330	330	330	330	330	300	-	-	-	-
36000	330	330	330	340	340	320	-	-	-	-
35000	340	340	340	340	340	330	-	-	-	-
34000	340	350	350	350	350	340	-	-	-	-
33000	340	360	360	360	360	350	310	-	-	-
32000	340	360	360	360	360	350	330	-	-	-
31000	340	370	370	370	370	360	340	-	-	-
30000	340	370	370	370	370	370	350	-	-	-
29000	340	380	380	380	380	370	360	-	-	-
28000	340	390	390	390	390	380	360	340	-	-
27000	340	390	390	390	390	380	370	360	-	-
26000	340	400	400	400	400	390	380	360	-	-
25000	340	400	400	400	400	390	380	370	-	-
24000	340	410	410	410	410	400	390	370	-	-
23000	340	410	410	410	410	410	390	370	350	-
22000	340	410	410	410	410	410	400	380	360	-
21000	340	410	410	410	410	410	400	390	370	-

CRUISE – WIND ALTITUDE TRADE TABLES

The tables below allow the determination of the break even wind in order to maintain the same specific range at another altitude than the one planned initially. Long Range Cruise or Mach 0.78 tables are provided.

These tables are based on the comparison between ground specific range at the proposed and actual altitudes. They do not consider climb/descent time, fuel and distances. The tables may be used for flight planning analysis or in-flight, where the wind information is available and more accurate.

Evaluation Method

- 1) Check the wind factors for the actual and proposed cruise altitudes.
- 2) Calculate the difference between proposed and actual wind factors. This number may be negative or positive.
- 3) The BREAK EVEN WIND at predicted altitude is the direct wind component (headwinds are negative or tailwinds are positive) at actual altitude plus the factor calculated on step (2).
- 4) Headwinds Evaluation (predicted wind and actual wind are negative): If the wind intensity at the predicted altitude is lower than (3), step climb/descent to the predicted altitude is not economically feasible.
- 5) Tailwinds Evaluation (predicted wind and actual wind are positive): If the wind intensity at the predicted altitude is higher than (3), step climb/descent to the predicted altitude is not economically feasible.

Example

Flying LRC on F280 where the direct wind component is -10 Kt (headwind component), evaluate if it is possible to climb to FL350 where the direct wind component is -20Kt (headwind component). The actual cruise weight is 32000 kg.

Using the WIND ALTITUDE TRADE TABLE for LRC:

- Wind factor on FL350: 10
- Wind factor on FL280: 30
- Difference = 10 (proposed FL) - 30 (actual FL) = -20
- Break Even Wind on FL350 = -10 (actual wind at FL280) - 20 (difference) = -30
- For Tailwinds at proposed altitude: Actual wind on FL350 (-20 kt) > Break Even wind (-30 kt)
- Conclusion: Climb to FL350 is economically feasible.

CRUISE – WIND ALTITUDE TRADE TABLES

CF34-8E5 ENGINES, MACH 0.78

Pressure Altitude (ft)	Weight (kg)									
	27000	28000	29000	30000	31000	32000	33000	34000	35000	36000
39000	0	0	0	-	-	-	-	-	-	-
38000	10	4	3	0	3	7	-	-	-	-
37000	22	16	11	3	0	0	8	-	-	-
36000	33	26	18	11	5	2	0	0	5	-
35000	46	41	33	24	16	10	5	0	0	-
34000	62	53	44	36	27	20	14	5	4	0
33000	79	70	61	50	40	33	25	16	11	6
32000	96	87	75	64	54	47	39	28	23	15
31000	114	104	94	81	70	60	51	40	35	27
30000	132	123	111	99	86	77	67	53	48	40
29000	153	143	131	116	105	94	83	69	62	54
28000	174	162	149	135	123	112	101	87	79	69
27000	195	183	172	156	143	131	119	105	95	85

CF34-8E5 ENGINES, LONG RANGE CRUISE

Pressure Altitude (ft)	Weight (kg)									
	27000	28000	29000	30000	31000	32000	33000	34000	35000	36000
39000	0	0	0	1	4	-	-	-	-	-
38000	3	3	3	0	0	0	6	-	-	-
37000	2	4	7	5	4	1	0	3	-	-
36000	1	4	8	10	9	4	0	0	0	3
35000	2	5	9	11	11	10	6	6	3	0
34000	8	6	9	10	12	13	11	11	8	2
33000	14	13	12	12	13	13	12	14	13	8
32000	21	19	19	17	13	12	11	15	16	12
31000	23	23	22	22	19	14	11	15	15	13
30000	28	26	27	26	24	20	15	14	15	13
29000	35	34	32	31	29	26	21	20	16	12
28000	41	40	39	36	34	30	27	26	22	17
27000	49	47	45	42	42	36	31	31	29	22

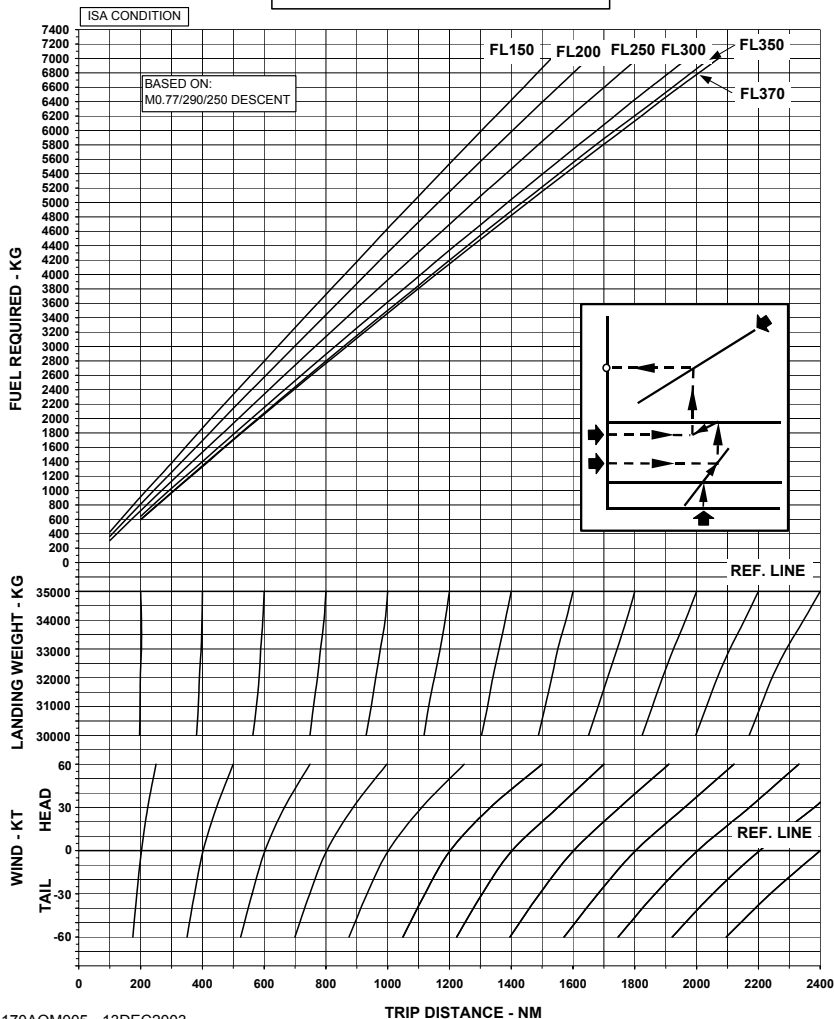
INFLIGHT DIVERSION

These charts are provided for the pilots to determine if the fuel remaining is enough to complete the trip at Long Range Cruise (LRC) mode from one point in cruise to an alternate airport. The charts also enable rapid determination of fuel and time required to proceed to an alternate airport.

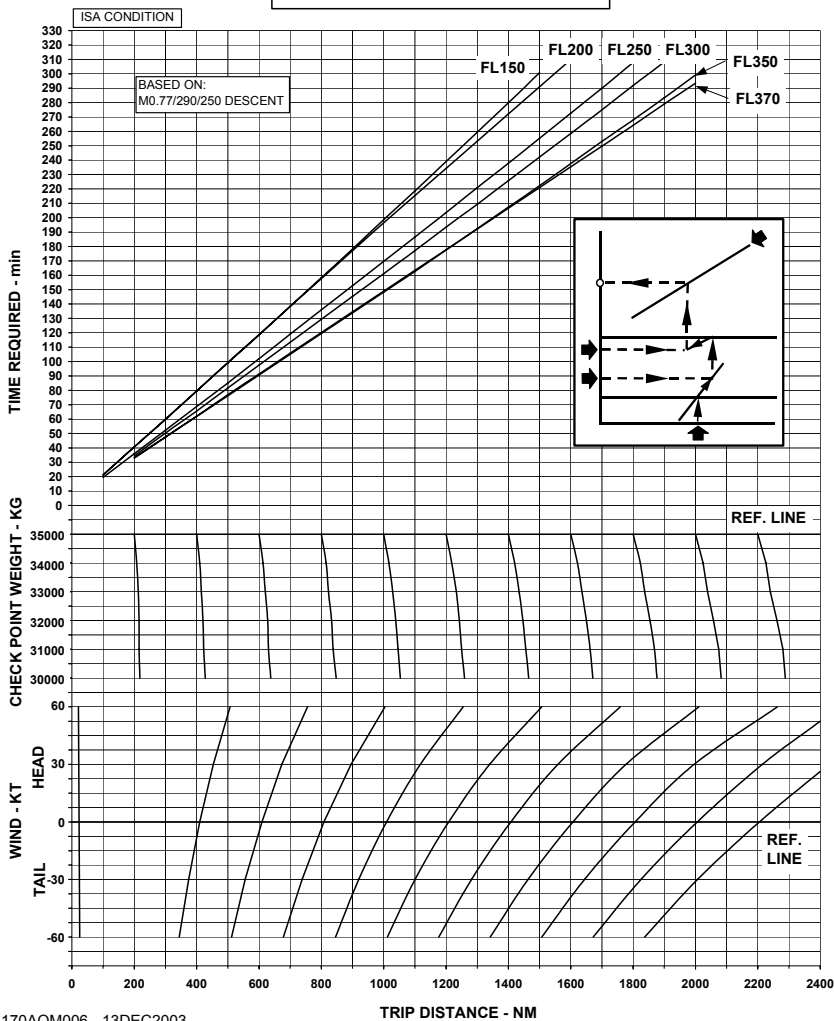
Fuel and time are determined in the same way as the simplified flight planning charts, with distance to destination instead of trip distance, disregarding the climb phase.

Pilots can also use the charts in the opposite direction, i.e., entering the fuel remaining on board and finding the range at a given flight level at LRC.

**EMBRAER 170 INFLIGHT DIVERSION
TRIP FUEL
CF34-8E5 ENGINE
LONG RANGE CRUISE**



**EMBRAER 170 INFLIGHT DIVERSION
TRIP TIME
CF34-8E5 ENGINE
LONG RANGE CRUISE**



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ONE ENGINE INOPERATIVE PERFORMANCE

CRUISE TABLES

The one engine inoperative long range cruise tables show N1, fuel flow, indicated airspeed, true airspeed, indicated Mach number, buffet margin and specific range. Data are presented for various weights, altitudes and corrections for ISA deviation.

The associated conditions are:

- Flaps UP
- Gear UP
- Bleeds OPEN
- Anti-Ice OFF



LONG RANGE CRUISE – ONE ENGINE INOPERATIVE
CF34-8E5 ENGINES

ALTITUDE: 5000 FT TO 17000 FT

CRUISE CONFIGURATION
BLEED: OPEN/ISA CONDITION

WEIGHT (KG)		ALTITUDE (FT)									
			5000	10000	11000	12000	13000	14000	15000	16000	17000
38000	N1	%	83.4	-	-	-	-	-	-	-	-
	FUEL FLOW	KG/H/ENG	1718	-	-	-	-	-	-	-	-
	IAS	KT	256	-	-	-	-	-	-	-	-
	TAS	KT	275	-	-	-	-	-	-	-	-
	INDICATED MACH		0.423	-	-	-	-	-	-	-	-
	BUFFET MARGIN	G	2.02	-	-	-	-	-	-	-	-
	SR	NM/KG	0.160	-	-	-	-	-	-	-	-
37000	N1	%	82.7	-	-	-	-	-	-	-	-
	FUEL FLOW	KG/H/ENG	1667	-	-	-	-	-	-	-	-
	IAS	KT	253	-	-	-	-	-	-	-	-
	TAS	KT	272	-	-	-	-	-	-	-	-
	INDICATED MACH		0.418	-	-	-	-	-	-	-	-
	BUFFET MARGIN	G	2.02	-	-	-	-	-	-	-	-
	SR	NM/KG	0.163	-	-	-	-	-	-	-	-
36000	N1	%	81.9	-	-	-	-	-	-	-	-
	FUEL FLOW	KG/H/ENG	1615	-	-	-	-	-	-	-	-
	IAS	KT	250	-	-	-	-	-	-	-	-
	TAS	KT	268	-	-	-	-	-	-	-	-
	INDICATED MACH		0.412	-	-	-	-	-	-	-	-
	BUFFET MARGIN	G	2.03	-	-	-	-	-	-	-	-
	SR	NM/KG	0.166	-	-	-	-	-	-	-	-

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE FUEL FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 3 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON
INCREASE N1% BY 0.0% AND FUEL FLOW BY 5%.
DECREASE SR% BY 4%.

LONG RANGE CRUISE – ONE ENGINE INOPERATIVE

CF34-8E5 ENGINES

ALTITUDE: 5000 FT TO 17000 FT

CRUISE CONFIGURATION
BLEED: OPEN/ISA CONDITION

WEIGHT (KG)			ALTITUDE (FT)									
			5000	10000	11000	12000	13000	14000	15000	16000	17000	
35000	N1	%	81.0	-	-	-	-	-	-	-	-	-
	FUEL FLOW	KG/H/ENG	1560	-	-	-	-	-	-	-	-	-
	IAS	KT	246	-	-	-	-	-	-	-	-	-
	TAS	KT	264	-	-	-	-	-	-	-	-	-
	INDICATED MACH		0.406	-	-	-	-	-	-	-	-	-
	BUFFET MARGIN	G	2.02	-	-	-	-	-	-	-	-	-
	SR	NM/KG	0.169	-	-	-	-	-	-	-	-	-
34000	N1	%	80.1	84.1	84.8	85.6	-	-	-	-	-	-
	FUEL FLOW	KG/H/ENG	1508	1521	1516	1521	-	-	-	-	-	-
	IAS	KT	243	243	242	242	-	-	-	-	-	-
	TAS	KT	260	280	284	288	-	-	-	-	-	-
	INDICATED MACH		0.401	0.439	0.446	0.454	-	-	-	-	-	-
	BUFFET MARGIN	G	2.03	2.01	1.99	1.99	-	-	-	-	-	-
	SR	NM/KG	0.173	0.184	0.187	0.189	-	-	-	-	-	-
33000	N1	%	79.4	83.3	84.0	84.9	85.6	-	-	-	-	-
	FUEL FLOW	KG/H/ENG	1468	1470	1470	1474	1472	-	-	-	-	-
	IAS	KT	240	239	239	239	238	-	-	-	-	-
	TAS	KT	257	276	280	285	288	-	-	-	-	-
	INDICATED MACH		0.396	0.432	0.440	0.449	0.456	-	-	-	-	-
	BUFFET MARGIN	G	2.04	2.01	2.00	2.01	1.98	-	-	-	-	-
	SR	NM/KG	0.175	0.188	0.191	0.193	0.195	-	-	-	-	-
32000	N1	%	78.5	82.4	83.2	84.0	84.8	85.6	-	-	-	-
	FUEL FLOW	KG/H/ENG	1424	1421	1422	1422	1425	1428	-	-	-	-
	IAS	KT	236	235	235	235	235	235	-	-	-	-
	TAS	KT	254	272	276	280	284	288	-	-	-	-
	INDICATED MACH		0.390	0.426	0.434	0.442	0.450	0.459	-	-	-	-
	BUFFET MARGIN	G	2.04	2.01	2.01	2.00	2.00	1.99	-	-	-	-
	SR	NM/KG	0.178	0.191	0.194	0.197	0.199	0.202	-	-	-	-
31000	N1	%	77.7	81.6	82.4	83.1	83.9	84.8	85.5	86.1	-	-
	FUEL FLOW	KG/H/ENG	1379	1373	1375	1373	1374	1383	1379	1373	-	-
	IAS	KT	233	232	232	231	232	232	231	229	-	-
	TAS	KT	250	268	272	276	280	285	288	291	-	-
	INDICATED MACH		0.385	0.420	0.428	0.435	0.444	0.454	0.459	0.466	-	-
	BUFFET MARGIN	G	2.05	2.01	2.01	2.00	2.00	2.01	1.98	1.95	-	-
	SR	NM/KG	0.181	0.195	0.198	0.201	0.204	0.206	0.209	0.212	-	-

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE F FLOW BY 3% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 3 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON
INCREASE N1% BY 0.1% AND F FLOW BY 5%.
DECREASE SR% BY 5%.

LONG RANGE CRUISE – ONE ENGINE INOPERATIVE

CF34-8E5 ENGINES

ALTITUDE: 5000 FT TO 17000 FT

CRUISE CONFIGURATION
BLEED: OPEN/ISA CONDITION

WEIGHT (KG)			ALTITUDE (FT)										
			5000	10000	11000	12000	13000	14000	15000	16000	17000		
30000	N1	%	76.9	80.8	81.5	82.2	83.0	83.8	84.6	85.5	86.1		
	FUEL FLOW	KG/H/ENG	1338	1327	1328	1323	1326	1326	1332	1336	1329		
	IAS	KT	230	229	228	227	228	228	228	228	226		
	TAS	KT	247	264	268	271	276	280	284	288	291		
	INDICATED MACH		0.380	0.414	0.4210	0.4280	0.436	0.445	0.454	0.462	0.468		
	BUFFET MARGIN	G	2.07	2.03	2.02	2.00	2.00	2.00	2.00	1.99	1.96		
	SR	NM/KG	0.185	0.199	0.2020	0.2050	0.208	0.211	0.213	0.216	0.219		
29000	N1	%	76.0	79.9	80.6	81.3	82.1	82.8	83.6	84.6	85.3		
	FUEL FLOW	KG/H/ENG	1294	1282	1281	1279	1280	1279	1280	1290	1284		
	IAS	KT	227	226	225	224	224	224	224	225	223		
	TAS	KT	244	261	264	267	271	275	280	285	287		
	INDICATED MACH		0.375	0.409	0.4150	0.4220	0.430	0.438	0.447	0.457	0.462		
	BUFFET MARGIN	G	2.08	2.04	2.03	2.01	2.01	2.00	2.00	2.01	1.98		
	SR	NM/KG	0.188	0.204	0.2060	0.2090	0.212	0.215	0.219	0.221	0.224		
28000	N1	%	75.0	78.7	79.6	80.6	81.3	81.9	82.6	83.4	84.3		
	FUEL FLOW	KG/H/ENG	1247	1230	1234	1237	1235	1230	1231	1232	1239		
	IAS	KT	223	222	222	222	221	220	220	220	220		
	TAS	KT	240	256	260	264	267	270	275	279	284		
	INDICATED MACH		0.369	0.401	0.4090	0.4170	0.424	0.430	0.438	0.447	0.456		
	BUFFET MARGIN	G	2.08	2.04	2.04	2.03	2.02	2.00	2.00	1.99	1.99		
	SR	NM/KG	0.192	0.208	0.2110	0.2140	0.217	0.220	0.223	0.226	0.229		
27000	N1	%	73.9	77.7	78.5	79.6	80.3	81.1	81.7	82.4	83.3		
	FUEL FLOW	KG/H/ENG	1196	1188	1182	1190	1189	1187	1185	1181	1186		
	IAS	KT	219	218	218	218	218	217	216	216	216		
	TAS	KT	235	252	256	260	263	267	270	274	279		
	INDICATED MACH		0.362	0.395	0.4020	0.4110	0.417	0.424	0.431	0.438	0.448		
	BUFFET MARGIN	G	2.08	2.05	2.04	2.05	2.03	2.02	2.00	1.99	1.99		
	SR	NM/KG	0.197	0.212	0.2160	0.2190	0.221	0.225	0.228	0.232	0.235		
26000	N1	%	72.8	76.7	77.5	78.2	79.3	80.3	80.9	81.4	82.2		
	FUEL FLOW	KG/H/ENG	1144	1146	1141	1137	1143	1146	1142	1135	1136		
	IAS	KT	215	214	214	214	214	214	213	212	212		
	TAS	KT	231	248	251	255	259	264	266	269	273		
	INDICATED MACH		0.355	0.389	0.3950	0.4020	0.411	0.419	0.425	0.431	0.440		
	BUFFET MARGIN	G	2.08	2.06	2.05	2.04	2.05	2.05	2.02	1.99	1.99		
	SR	NM/KG	0.202	0.216	0.2200	0.2240	0.227	0.230	0.233	0.237	0.241		

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE F FLOW BY 3% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 2 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON
INCREASE N1% BY 0.1% AND F FLOW BY 7%.
DECREASE SR% BY 7%.

LONG RANGE CRUISE – ONE ENGINE INOPERATIVE

CF34-8E5 ENGINES

ALTITUDE: 5000 FT TO 17000 FT

CRUISE CONFIGURATION
BLEED: OPEN/ISA CONDITION

WEIGHT (KG)			ALTITUDE (FT)										
			5000	10000	11000	12000	13000	14000	15000	16000	17000		
25000	N1	%	71.8	75.6	76.4	77.2	78.0	79.0	79.8	80.6	81.3		
	FUEL FLOW	KG/H/ENG	1103	1101	1099	1095	1091	1098	1097	1094	1092		
	IAS	KT	211	211	210	210	210	210	210	209	209		
	TAS	KT	227	244	247	251	254	259	262	265	269		
	INDICATED MACH		0.349	0.382	0.389	0.395	0.403	0.411	0.418	0.425	0.433		
	BUFFET MARGIN	G	2.09	2.07	2.06	2.05	2.04	2.05	2.03	2.02	2.01		
	SR	NM/KG	0.206	0.221	0.225	0.229	0.233	0.236	0.239	0.243	0.246		
24000	N1	%	71.1	74.5	75.3	76.1	76.9	77.6	78.7	79.7	80.4		
	FUEL FLOW	KG/H/ENG	1071	1054	1055	1053	1049	1044	1050	1052	1050		
	IAS	KT	209	206	206	206	206	206	206	206	205		
	TAS	KT	224	239	243	246	250	253	257	261	265		
	INDICATED MACH		0.345	0.374	0.382	0.388	0.395	0.402	0.411	0.419	0.426		
	BUFFET MARGIN	G	2.13	2.07	2.07	2.06	2.05	2.04	2.05	2.04	2.03		
	SR	NM/KG	0.209	0.227	0.230	0.234	0.238	0.242	0.245	0.249	0.252		
23000	N1	%	70.4	73.3	74.1	75.0	75.8	76.5	77.2	78.3	79.3		
	FUEL FLOW	KG/H/ENG	1040	1006	1007	1009	1006	1004	995	998	1005		
	IAS	KT	206	202	202	202	202	202	201	201	202		
	TAS	KT	222	234	237	241	245	248	251	255	260		
	INDICATED MACH		0.341	0.366	0.373	0.381	0.388	0.395	0.401	0.409	0.418		
	BUFFET MARGIN	G	2.17	2.07	2.07	2.07	2.06	2.05	2.03	2.03	2.04		
	SR	NM/KG	0.213	0.233	0.236	0.239	0.243	0.248	0.252	0.256	0.259		
22000	N1	%	69.4	72.1	72.9	73.8	74.6	75.3	76.2	77.0	78.0		
	FUEL FLOW	KG/H/ENG	1007	955	960	962	963	960	955	949	956		
	IAS	KT	204	197	198	198	198	198	197	197	197		
	TAS	KT	219	228	232	236	240	243	247	250	255		
	INDICATED MACH		0.337	0.358	0.366	0.373	0.380	0.387	0.394	0.400	0.409		
	BUFFET MARGIN	G	2.21	2.06	2.07	2.07	2.07	2.06	2.05	2.03	2.04		
	SR	NM/KG	0.217	0.239	0.242	0.246	0.249	0.253	0.258	0.263	0.266		
21000	N1	%	68.3	71.0	71.7	72.5	73.3	74.2	75.1	76.0	76.7		
	FUEL FLOW	KG/H/ENG	969	910	911	913	915	917	914	911	907		
	IAS	KT	200	194	193	193	193	194	193	193	193		
	TAS	KT	215	224	227	231	234	239	242	245	249		
	INDICATED MACH		0.331	0.351	0.357	0.364	0.371	0.379	0.386	0.393	0.400		
	BUFFET MARGIN	G	2.23	2.08	2.07	2.07	2.07	2.07	2.06	2.06	2.05		
	SR	NM/KG	0.222	0.247	0.250	0.253	0.256	0.260	0.265	0.269	0.274		

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE F FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 2 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON
INCREASE N1% BY 0.0% AND F FLOW BY 9%.
DECREASE SR% BY 9%.



LONG RANGE CRUISE – ONE ENGINE INOPERATIVE
CF34-8E5 ENGINES

ALTITUDE: 18000 FT TO 26000 FT

CRUISE CONFIGURATION
BLEED: OPEN/ISA CONDITION

WEIGHT (KG)		ALTITUDE (FT)									
		18000	19000	20000	21000	22000	23000	24000	25000	26000	
37000	N1	%	-	-	-	-	-	-	-	-	-
	FUEL FLOW	KG/H/ENG	-	-	-	-	-	-	-	-	-
	IAS	KT	-	-	-	-	-	-	-	-	-
	TAS	KT	-	-	-	-	-	-	-	-	-
	INDICATED MACH		-	-	-	-	-	-	-	-	-
	BUFFET MARGIN	G	-	-	-	-	-	-	-	-	-
	SR	NM/KG	-	-	-	-	-	-	-	-	-
36000	N1	%	-	-	-	-	-	-	-	-	-
	FUEL FLOW	KG/H/ENG	-	-	-	-	-	-	-	-	-
	IAS	KT	-	-	-	-	-	-	-	-	-
	TAS	KT	-	-	-	-	-	-	-	-	-
	INDICATED MACH		-	-	-	-	-	-	-	-	-
	BUFFET MARGIN	G	-	-	-	-	-	-	-	-	-
	SR	NM/KG	-	-	-	-	-	-	-	-	-

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE F FLOW BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 1 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON
INCREASE N1% BY 0.0% AND F FLOW BY 0%.
DECREASE SR% BY 0%.

LONG RANGE CRUISE – ONE ENGINE INOPERATIVE

CF34-8E5 ENGINES

ALTITUDE: 18000 FT TO 26000 FT

CRUISE CONFIGURATION
BLEED: OPEN/ISA CONDITION

WEIGHT (KG)			ALTITUDE (FT)									
			18000	19000	20000	21000	22000	23000	24000	25000	26000	
35000	N1	%	-	-	-	-	-	-	-	-	-	
	FUEL FLOW	KG/H/ENG	-	-	-	-	-	-	-	-	-	
	IAS	KT	-	-	-	-	-	-	-	-	-	
	TAS	KT	-	-	-	-	-	-	-	-	-	
	INDICATED MACH		-	-	-	-	-	-	-	-	-	
	BUFFET MARGIN	G	-	-	-	-	-	-	-	-	-	
	SR	NM/KG	-	-	-	-	-	-	-	-	-	
34000	N1	%	-	-	-	-	-	-	-	-	-	
	FUEL FLOW	KG/H/ENG	-	-	-	-	-	-	-	-	-	
	IAS	KT	-	-	-	-	-	-	-	-	-	
	TAS	KT	-	-	-	-	-	-	-	-	-	
	INDICATED MACH		-	-	-	-	-	-	-	-	-	
	BUFFET MARGIN	G	-	-	-	-	-	-	-	-	-	
	SR	NM/KG	-	-	-	-	-	-	-	-	-	
33000	N1	%	-	-	-	-	-	-	-	-	-	
	FUEL FLOW	KG/H/ENG	-	-	-	-	-	-	-	-	-	
	IAS	KT	-	-	-	-	-	-	-	-	-	
	TAS	KT	-	-	-	-	-	-	-	-	-	
	INDICATED MACH		-	-	-	-	-	-	-	-	-	
	BUFFET MARGIN	G	-	-	-	-	-	-	-	-	-	
	SR	NM/KG	-	-	-	-	-	-	-	-	-	
32000	N1	%	-	-	-	-	-	-	-	-	-	
	FUEL FLOW	KG/H/ENG	-	-	-	-	-	-	-	-	-	
	IAS	KT	-	-	-	-	-	-	-	-	-	
	TAS	KT	-	-	-	-	-	-	-	-	-	
	INDICATED MACH		-	-	-	-	-	-	-	-	-	
	BUFFET MARGIN	G	-	-	-	-	-	-	-	-	-	
	SR	NM/KG	-	-	-	-	-	-	-	-	-	
31000	N1	%	-	-	-	-	-	-	-	-	-	
	FUEL FLOW	KG/H/ENG	-	-	-	-	-	-	-	-	-	
	IAS	KT	-	-	-	-	-	-	-	-	-	
	TAS	KT	-	-	-	-	-	-	-	-	-	
	INDICATED MACH		-	-	-	-	-	-	-	-	-	
	BUFFET MARGIN	G	-	-	-	-	-	-	-	-	-	
	SR	NM/KG	-	-	-	-	-	-	-	-	-	

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE F FLOW BY 3% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 2 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON
INCREASE N1% BY 0.1% AND F FLOW BY 5%.
DECREASE SR% BY 5%.

LONG RANGE CRUISE – ONE ENGINE INOPERATIVE

CF34-8E5 ENGINES

ALTITUDE: 18000 FT TO 26000 FT

CRUISE CONFIGURATION
BLEED: OPEN/ISA CONDITION

WEIGHT
(KG)

ALTITUDE (FT)

18000 19000 20000 21000 22000 23000 24000 25000 26000

30000	N1	%	-	-	-	-	-	-	-	-	-
	FUEL FLOW	KG/H/ENG	-	-	-	-	-	-	-	-	-
	IAS	KT	-	-	-	-	-	-	-	-	-
	TAS	KT	-	-	-	-	-	-	-	-	-
	INDICATED MACH		-	-	-	-	-	-	-	-	-
	BUFFET MARGIN	G	-	-	-	-	-	-	-	-	-
	SR	NM/KG	-	-	-	-	-	-	-	-	-
29000	N1	%	85.9	-	-	-	-	-	-	-	-
	FUEL FLOW	KG/H/ENG	1278	-	-	-	-	-	-	-	-
	IAS	KT	222	-	-	-	-	-	-	-	-
	TAS	KT	290	-	-	-	-	-	-	-	-
	INDICATED MACH		0.468	-	-	-	-	-	-	-	-
	BUFFET MARGIN	G	1.95	-	-	-	-	-	-	-	-
	SR	NM/KG	0.227	-	-	-	-	-	-	-	-
28000	N1	%	85.2	85.8	-	-	-	-	-	-	-
	FUEL FLOW	KG/H/ENG	1242	1230	-	-	-	-	-	-	-
	IAS	KT	220	218	-	-	-	-	-	-	-
	TAS	KT	288	290	-	-	-	-	-	-	-
	INDICATED MACH		0.465	0.469	-	-	-	-	-	-	-
	BUFFET MARGIN	G	1.99	1.94	-	-	-	-	-	-	-
	SR	NM/KG	0.232	0.235	-	-	-	-	-	-	-
27000	N1	%	84.3	85.0	85.7	-	-	-	-	-	-
	FUEL FLOW	KG/H/ENG	1195	1190	1186	-	-	-	-	-	-
	IAS	KT	217	216	215	-	-	-	-	-	-
	TAS	KT	284	287	290	-	-	-	-	-	-
	INDICATED MACH		0.458	0.465	0.472	-	-	-	-	-	-
	BUFFET MARGIN	G	2.00	1.97	1.95	-	-	-	-	-	-
	SR	NM/KG	0.238	0.241	0.244	-	-	-	-	-	-
26000	N1	%	83.1	84.0	84.9	85.4	-	-	-	-	-
	FUEL FLOW	KG/H/ENG	1141	1147	1151	1115	-	-	-	-	-
	IAS	KT	213	213	213	210	-	-	-	-	-
	TAS	KT	278	283	288	288	-	-	-	-	-
	INDICATED MACH		0.449	0.459	0.469	0.471	-	-	-	-	-
	BUFFET MARGIN	G	2.00	2.00	2.00	1.94	-	-	-	-	-
	SR	NM/KG	0.244	0.247	0.250	0.258	-	-	-	-	-

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE F FLOW BY 3% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 3 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON
INCREASE N1% BY 0.1% AND F FLOW BY 8%.
DECREASE SR% BY 7%.

LONG RANGE CRUISE – ONE ENGINE INOPERATIVE

CF34-8E5 ENGINES

ALTITUDE: 18000 FT TO 26000 FT

CRUISE CONFIGURATION
BLEED: OPEN/ISA CONDITION

WEIGHT (KG)	ALTITUDE (FT)									
	18000 19000 20000210002200023000 24000 25000 26000									
25000	N1	%	81.9	82.9	83.8	84.6	85.4	-	-	-
	FUEL FLOW	KG/H/ENG	1086	1095	1099	1080	1080	-	-	-
	IAS	KT	208	209	209	208	208	-	-	-
	TAS	KT	272	278	282	286	290	-	-	-
	INDICATED MACH		0.439	0.450	0.459	0.467	0.476	-	-	-
	BUFFET MARGIN	G	1.99	2.00	2.00	1.98	1.97	-	-	-
	SR	NM/KG	0.250	0.253	0.257	0.265	0.269	-	-	-
24000	N1	%	81.1	81.8	82.6	83.5	84.4	85.0	-	-
	FUEL FLOW	KG/H/ENG	1046	1046	1050	1034	1038	1030	-	-
	IAS	KT	205	205	205	205	205	203	-	-
	TAS	KT	268	272	277	281	286	288	-	-
	INDICATED MACH		0.433	0.441	0.451	0.460	0.469	0.474	-	-
	BUFFET MARGIN	G	2.01	2.01	2.01	2.00	2.00	1.95	-	-
	SR	NM/KG	0.256	0.260	0.264	0.272	0.275	0.279	-	-
23000	N1	%	80.2	80.8	81.5	82.3	83.2	84.1	84.9	-
	FUEL FLOW	KG/H/ENG	1006	1004	999	982	988	995	995	-
	IAS	KT	202	201	200	200	200	201	201	-
	TAS	KT	264	268	271	275	280	285	289	-
	INDICATED MACH		0.427	0.434	0.441	0.449	0.459	0.470	0.479	-
	BUFFET MARGIN	G	2.04	2.02	2.00	1.99	2.00	2.00	1.99	-
	SR	NM/KG	0.263	0.267	0.271	0.280	0.283	0.287	0.291	-
22000	N1	%	79.0	79.8	80.6	81.3	81.9	83.0	83.7	84.7
	FUEL FLOW	KG/H/ENG	961	961	962	941	935	949	948	951
	IAS	KT	198	197	198	197	195	197	196	196
	TAS	KT	259	263	267	271	273	280	284	288
	INDICATED MACH		0.419	0.426	0.435	0.443	0.448	0.461	0.469	0.478
	BUFFET MARGIN	G	2.05	2.04	2.04	2.02	1.99	2.01	2.00	1.99
	SR	NM/KG	0.270	0.274	0.278	0.288	0.292	0.295	0.299	0.303
21000	N1	%	77.5	78.6	79.5	80.1	80.9	81.6	82.4	83.3
	FUEL FLOW	KG/H/ENG	904	917	920	898	896	894	896	902
	IAS	KT	192	194	194	193	192	192	191	192
	TAS	KT	252	258	263	265	269	272	276	281
	INDICATED MACH		0.407	0.418	0.427	0.434	0.442	0.449	0.457	0.468
	BUFFET MARGIN	G	2.03	2.06	2.06	2.03	2.02	2.00	1.99	1.99
	SR	NM/KG	0.278	0.281	0.285	0.295	0.300	0.305	0.309	0.312

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE F FLOW BY 3% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 3 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON
INCREASE N1% BY 0.1% AND F FLOW BY 9%.
DECREASE SR% BY 8%.



LONG RANGE CRUISE – ONE ENGINE INOPERATIVE
CF34-8E5 ENGINES

ALTITUDE: 27000 FT TO 35000 FT

CRUISE CONFIGURATION
BLEED: OPEN/ISA CONDITION

WEIGHT (KG)			ALTITUDE (FT)									
			27000	28000	29000	30000	31000	32000	33000	34000	35000	
25000	N1	%	-	-	-	-	-	-	-	-	-	
	FUEL FLOW	KG/H/ENG	-	-	-	-	-	-	-	-	-	
	IAS	KT	-	-	-	-	-	-	-	-	-	
	TAS	KT	-	-	-	-	-	-	-	-	-	
	INDICATED MACH		-	-	-	-	-	-	-	-	-	
	BUFFET MARGIN	G	-	-	-	-	-	-	-	-	-	
	SR	NM/KG	-	-	-	-	-	-	-	-	-	
24000	N1	%	-	-	-	-	-	-	-	-	-	
	FUEL FLOW	KG/H/ENG	-	-	-	-	-	-	-	-	-	
	IAS	KT	-	-	-	-	-	-	-	-	-	
	TAS	KT	-	-	-	-	-	-	-	-	-	
	INDICATED MACH		-	-	-	-	-	-	-	-	-	
	BUFFET MARGIN	G	-	-	-	-	-	-	-	-	-	
	SR	NM/KG	-	-	-	-	-	-	-	-	-	
23000	N1	%	-	-	-	-	-	-	-	-	-	
	FUEL FLOW	KG/H/ENG	-	-	-	-	-	-	-	-	-	
	IAS	KT	-	-	-	-	-	-	-	-	-	
	TAS	KT	-	-	-	-	-	-	-	-	-	
	INDICATED MACH		-	-	-	-	-	-	-	-	-	
	BUFFET MARGIN	G	-	-	-	-	-	-	-	-	-	
	SR	NM/KG	-	-	-	-	-	-	-	-	-	
22000	N1	%	-	-	-	-	-	-	-	-	-	
	FUEL FLOW	KG/H/ENG	-	-	-	-	-	-	-	-	-	
	IAS	KT	-	-	-	-	-	-	-	-	-	
	TAS	KT	-	-	-	-	-	-	-	-	-	
	INDICATED MACH		-	-	-	-	-	-	-	-	-	
	BUFFET MARGIN	G	-	-	-	-	-	-	-	-	-	
	SR	NM/KG	-	-	-	-	-	-	-	-	-	
21000	N1	%	-	-	-	-	-	-	-	-	-	
	FUEL FLOW	KG/H/ENG	-	-	-	-	-	-	-	-	-	
	IAS	KT	-	-	-	-	-	-	-	-	-	
	TAS	KT	-	-	-	-	-	-	-	-	-	
	INDICATED MACH		-	-	-	-	-	-	-	-	-	
	BUFFET MARGIN	G	-	-	-	-	-	-	-	-	-	
	SR	NM/KG	-	-	-	-	-	-	-	-	-	

INCREASE/DECREASE N1% BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE F FLOW BY 3% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 3 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON
INCREASE N1% BY 0.1% AND F FLOW BY 9%.
DECREASE SR% BY 8%.

CRUISE - ALTITUDE CAPABILITY TABLE

The table below permits quick determination of the altitude capability, based on the initial cruise weight. The table data are presented for various ISA conditions, one engine inoperative and Long Range Cruise schedule.

The established associated conditions are:

- Flaps UP
- Gears UP
- Bleeds OPEN

CRUISE ALTITUDE CAPABILITY ONE ENGINE INOPERATIVE

CF34-8E5 ENGINES, LONG RANGE CRUISE

Weight (kg)	ISA + °C									
	-10	-5	0	5	10	15	20	25	30	35
38000	60	60	50	50	50	30	20	-	-	-
37000	70	70	70	70	70	40	30	-	-	-
36000	80	80	80	80	80	50	40	-	-	-
35000	100	90	90	90	90	70	50	30	-	-
34000	120	120	120	120	120	80	60	40	-	-
33000	130	130	130	130	130	90	70	50	20	-
32000	140	140	140	140	140	130	80	60	40	-
31000	160	160	160	160	160	150	120	80	50	-
30000	170	170	170	170	170	160	140	90	60	-
29000	180	180	180	180	180	170	150	140	80	-
28000	190	190	190	190	190	180	170	150	100	-
27000	200	200	200	200	200	190	180	160	140	-
26000	210	210	210	210	210	210	190	180	160	-
25000	220	220	220	220	220	220	210	190	170	-
24000	230	230	230	230	230	230	220	200	180	-
23000	240	240	240	240	240	240	230	220	200	-
22000	250	250	250	250	250	250	250	230	210	-
21000	270	260	260	260	260	260	260	250	230	-

HOLDING

The holding tables show indicated airspeed, Mach number, N_1 , fuel flow and fuel consumption for various weights, altitudes, anti-ice on (with and without ice accretion) and off condition. Data are presented in ISA condition for all engines operating configuration.

The associated conditions are:

- Flaps UP
 - Gear UP
 - Bleeds OPEN
 - Airspeed A/I OFF.....Minimum Fuel Consumption or 1.27 V_S,
whichever is higher.
 - Airspeed A/I ON Minimum Fuel Consumption or 210 KIAS,
whichever is higher.
 - Anti-Ice OFF
- ON, AND:
ON (WITH ICE ACCERATION)

HOLDING – ONE ENGINE INOPERATIVE

CF34-8E5 ENGINES

CRUISE CONFIGURATION
BLEED: OPEN
ANTI-ICE: OFF
SPEED: MINIMUM FUEL CONSUMPTION OR 1.27 Vs
STANDARD ATMOSPHERE

WEIGHT (KG)			ALTITUDE (FT)							
			1500	5000	10000	15000	20000	25000	30000	35000
38000	IAS	KT	204	204	205	205	-	-	-	-
	TAS	KT	208	219	237	257	-	-	-	-
	MACH		0.316	0.337	0.371	0.410	-	-	-	-
	N1	%	76.1	79.0	83.2	88.2	-	-	-	-
	FF	KG/H/ENG	1429	1436	1447	1510	-	-	-	-
37000	IAS	KT	201	201	202	203	-	-	-	-
	TAS	KT	205	216	234	253	-	-	-	-
	MACH		0.312	0.333	0.366	0.404	-	-	-	-
	N1	%	75.4	78.2	82.4	87.0	-	-	-	-
	FF	KG/H/ENG	1392	1394	1403	1441	-	-	-	-
36000	IAS	KT	198	199	199	200	-	-	-	-
	TAS	KT	203	213	231	250	-	-	-	-
	MACH		0.308	0.328	0.361	0.399	-	-	-	-
	N1	%	74.8	77.4	81.6	86.0	-	-	-	-
	FF	KG/H/ENG	1355	1350	1357	1386	-	-	-	-
35000	IAS	KT	196	196	196	197	-	-	-	-
	TAS	KT	200	210	227	246	-	-	-	-
	MACH		0.304	0.324	0.356	0.393	-	-	-	-
	N1	%	74.0	76.5	80.8	85.1	-	-	-	-
	FF	KG/H/ENG	1317	1305	1311	1337	-	-	-	-
34000	IAS	KT	193	193	193	194	-	-	-	-
	TAS	KT	197	207	224	243	-	-	-	-
	MACH		0.299	0.319	0.351	0.388	-	-	-	-
	N1	%	73.2	75.6	80.0	84.2	-	-	-	-
	FF	KG/H/ENG	1279	1258	1272	1290	-	-	-	-
33000	IAS	KT	190	190	191	191	192	-	-	-
	TAS	KT	194	204	221	239	260	-	-	-
	MACH		0.295	0.314	0.346	0.382	0.423	-	-	-
	N1	%	72.3	74.9	79.1	83.4	90.0	-	-	-
	FF	KG/H/ENG	1240	1222	1234	1248	1354	-	-	-

FOR HOLDING IN A RACETRACK INCREASE FUEL FLOW BY 5%.

HOLDING – ONE ENGINE INOPERATIVE

CF34-8E5 ENGINES

CRUISE CONFIGURATION

BLEED: OPEN

ANTI-ICE: OFF

SPEED: MINIMUM FUEL CONSUMPTION OR 1.27 Vs.

STANDARD ATMOSPHERE

WEIGHT (KG)			ALTITUDE (FT)							
			1500	5000	10000	15000	20000	25000	30000	35000
32000	IAS	KT	187	187	188	188	189	-	-	-
	TAS	KT	191	201	217	236	256	-	-	-
	MACH		0.290	0.310	0.341	0.376	0.417	-	-	-
	N1	%	71.5	74.1	78.2	82.5	88.5	-	-	-
	FF	KG/H/ENG	1200	1186	1195	1206	1288	-	-	-
31000	IAS	KT	184	184	185	185	186	-	-	-
	TAS	KT	188	198	214	232	252	-	-	-
	MACH		0.286	0.305	0.335	0.370	0.410	-	-	-
	N1	%	70.5	73.3	77.2	81.6	86.9	-	-	-
	FF	KG/H/ENG	1159	1150	1154	1163	1218	-	-	-
30000	IAS	KT	181	181	182	182	183	-	-	-
	TAS	KT	185	195	211	228	248	-	-	-
	MACH		0.281	0.300	0.330	0.364	0.403	-	-	-
	N1	%	69.4	72.4	76.1	80.7	85.2	-	-	-
	FF	KG/H/ENG	1117	1112	1112	1118	1144	-	-	-
29000	IAS	KT	178	178	179	179	180	-	-	-
	TAS	KT	182	192	207	224	244	-	-	-
	MACH		0.276	0.295	0.324	0.358	0.397	-	-	-
	N1	%	68.1	71.4	75.1	79.6	84.1	-	-	-
	FF	KG/H/ENG	1075	1073	1069	1073	1095	-	-	-
28000	IAS	KT	175	175	175	176	177	-	-	-
	TAS	KT	179	188	203	220	239	-	-	-
	MACH		0.272	0.290	0.319	0.352	0.390	-	-	-
	N1	%	67.2	70.4	74.0	78.7	83.0	-	-	-
	FF	KG/H/ENG	1045	1034	1025	1033	1049	-	-	-
27000	IAS	KT	172	172	172	173	173	174	-	-
	TAS	KT	175	185	200	216	235	256	-	-
	MACH		0.267	0.284	0.313	0.345	0.383	0.426	-	-
	N1	%	66.2	69.3	73.1	77.7	82.0	89.7	-	-
	FF	KG/H/ENG	1014	993	989	995	1007	1095	-	-
26000	IAS	KT	168	169	169	169	170	171	-	-
	TAS	KT	172	181	196	212	231	252	-	-
	MACH		0.262	0.279	0.307	0.339	0.376	0.418	-	-
	N1	%	65.2	67.9	72.2	76.7	81.0	87.5	-	-
	FF	KG/H/ENG	982	952	953	955	965	1022	-	-

FOR HOLDING IN A RACETRACK INCREASE FUEL FLOW BY 5%.

HOLDING – ONE ENGINE INOPERATIVE

CF34-8E5 ENGINES

CRUISE CONFIGURATION
BLEED: OPEN
ANTI-ICE: OFF
SPEED: MINIMUM FUEL CONSUMPTION OR 1.27 Vs.
STANDARD ATMOSPHERE

WEIGHT (KG)			ALTITUDE (FT)							
			1500	5000	10000	15000	20000	25000	30000	35000
25000	IAS	KT	165	165	166	166	167	167	-	-
	TAS	KT	169	178	192	208	226	247	-	-
	MACH		0.257	0.274	0.301	0.332	0.368	0.410	-	-
	N1	%	64.2	66.6	71.2	75.6	80.0	85.3	-	-
	FF	KG/H/ENG	948	916	915	914	922	952	-	-
24000	IAS	KT	162	162	162	163	163	164	-	-
	TAS	KT	165	174	188	204	222	242	-	-
	MACH		0.251	0.268	0.295	0.326	0.361	0.402	-	-
	N1	%	63.1	65.6	70.2	74.3	78.6	83.4	-	-
	FF	KG/H/ENG	914	886	876	873	880	887	-	-
23000	IAS	KT	158	159	159	159	160	160	-	-
	TAS	KT	162	171	184	200	217	237	-	-
	MACH		0.246	0.263	0.289	0.319	0.353	0.393	-	-
	N1	%	62.0	64.5	69.0	72.8	77.3	82.1	-	-
	FF	KG/H/ENG	878	855	837	830	840	842	-	-
22000	IAS	KT	155	155	155	156	156	157	157	-
	TAS	KT	158	167	180	195	212	231	253	-
	MACH		0.241	0.257	0.282	0.312	0.345	0.384	0.430	-
	N1	%	60.8	63.4	67.5	71.7	76.1	80.8	89.2	-
	FF	KG/H/ENG	840	822	798	797	803	798	894	-
21000	IAS	KT	151	152	152	152	153	153	154	-
	TAS	KT	155	163	176	191	207	226	247	-
	MACH		0.235	0.251	0.276	0.305	0.338	0.376	0.420	-
	N1	%	59.6	62.2	66.0	70.5	74.8	79.6	86.3	-
	FF	KG/H/ENG	801	788	757	762	764	758	822	-

FOR HOLDING IN A RACETRACK INCREASE FUEL FLOW BY 5%.

HOLDING – ONE ENGINE INOPERATIVE

CF34-8E5 ENGINES

CRUISE CONFIGURATION

BLEED: OPEN

ANTI-ICE: ON

SPEED: MINIMUM FUEL CONSUMPTION OR 210 KIAS

STANDARD ATMOSPHERE

WEIGHT (KG)			ALTITUDE (FT)							
			1500	5000	10000	15000	20000	25000	30000	35000
38000	IAS	KT	210	210	210	210	-	-	-	-
	TAS	KT	215	226	243	262	-	-	-	-
	MACH		0.326	0.347	0.381	0.419	-	-	-	-
	N1	%	76.3	79.2	83.4	88.4	-	-	-	-
	FF	KG/H/ENG	1443	1514	1522	1587	-	-	-	-
37000	IAS	KT	210	210	210	210	-	-	-	-
	TAS	KT	215	226	243	262	-	-	-	-
	MACH		0.326	0.347	0.381	0.419	-	-	-	-
	N1	%	75.8	78.5	82.7	87.3	-	-	-	-
	FF	KG/H/ENG	1414	1478	1485	1529	-	-	-	-
36000	IAS	KT	210	210	210	210	-	-	-	-
	TAS	KT	215	226	243	262	-	-	-	-
	MACH		0.326	0.347	0.381	0.419	-	-	-	-
	N1	%	75.3	77.8	82.0	86.5	-	-	-	-
	FF	KG/H/ENG	1385	1442	1447	1482	-	-	-	-
35000	IAS	KT	210	210	210	210	-	-	-	-
	TAS	KT	215	226	243	262	-	-	-	-
	MACH		0.326	0.347	0.381	0.419	-	-	-	-
	N1	%	74.7	77.2	81.4	85.8	-	-	-	-
	FF	KG/H/ENG	1355	1407	1410	1439	-	-	-	-
34000	IAS	KT	210	210	210	210	-	-	-	-
	TAS	KT	215	226	243	262	-	-	-	-
	MACH		0.326	0.347	0.381	0.419	-	-	-	-
	N1	%	74.1	76.5	80.8	85.0	-	-	-	-
	FF	KG/H/ENG	1327	1371	1381	1399	-	-	-	-
33000	IAS	KT	210	210	210	210	-	-	-	-
	TAS	KT	215	226	243	262	-	-	-	-
	MACH		0.326	0.347	0.381	0.419	-	-	-	-
	N1	%	73.5	76.0	80.3	84.4	-	-	-	-
	FF	KG/H/ENG	1299	1345	1352	1367	-	-	-	-

FOR HOLDING IN A RACETRACK INCREASE FUEL FLOW BY 5%.

HOLDING – ONE ENGINE INOPERATIVE

CF34-8E5 ENGINES

CRUISE CONFIGURATION
BLEED: OPEN
ANTI-ICE: ON
SPEED: MINIMUM FUEL CONSUMPTION OR 210 KIAS
STANDARD ATMOSPHERE

WEIGHT (KG)			ALTITUDE (FT)							
			1500	5000	10000	15000	20000	25000	30000	35000
32000	IAS	KT	210	210	210	210	210	-	-	-
	TAS	KT	215	226	243	262	284	-	-	-
	MACH		0.326	0.347	0.381	0.419	0.462	-	-	-
	N1	%	72.9	75.4	79.7	83.7	89.7	-	-	-
	FF	KG/H/ENG	1271	1319	1323	1338	1426	-	-	-
31000	IAS	KT	210	210	210	210	210	-	-	-
	TAS	KT	215	226	243	262	284	-	-	-
	MACH		0.326	0.347	0.381	0.419	0.462	-	-	-
	N1	%	72.3	74.9	79.0	83.1	88.7	-	-	-
	FF	KG/H/ENG	1243	1296	1298	1312	1382	-	-	-
30000	IAS	KT	210	210	210	210	210	-	-	-
	TAS	KT	215	226	243	262	284	-	-	-
	MACH		0.326	0.347	0.381	0.419	0.462	-	-	-
	N1	%	71.7	74.3	78.3	82.5	87.7	-	-	-
	FF	KG/H/ENG	1215	1273	1274	1286	1342	-	-	-
29000	IAS	KT	210	210	210	210	210	-	-	-
	TAS	KT	215	226	243	262	284	-	-	-
	MACH		0.326	0.347	0.381	0.419	0.462	-	-	-
	N1	%	71.1	73.8	77.6	81.9	86.7	-	-	-
	FF	KG/H/ENG	1187	1250	1250	1261	1304	-	-	-
28000	IAS	KT	210	210	210	210	210	-	-	-
	TAS	KT	215	226	243	262	284	-	-	-
	MACH		0.326	0.347	0.381	0.419	0.462	-	-	-
	N1	%	70.6	73.2	77.0	81.4	85.8	-	-	-
	FF	KG/H/ENG	1169	1228	1227	1239	1266	-	-	-
27000	IAS	KT	210	210	210	210	210	-	-	-
	TAS	KT	215	226	243	262	284	-	-	-
	MACH		0.326	0.347	0.381	0.419	0.462	-	-	-
	N1	%	70.2	72.7	76.5	80.9	85.0	-	-	-
	FF	KG/H/ENG	1152	1208	1210	1220	1235	-	-	-
26000	IAS	KT	210	210	210	210	210	-	-	-
	TAS	KT	215	226	243	262	284	-	-	-
	MACH		0.326	0.347	0.381	0.419	0.462	-	-	-
	N1	%	69.8	72.1	76.0	80.4	84.5	-	-	-
	FF	KG/H/ENG	1135	1188	1193	1200	1212	-	-	-

FOR HOLDING IN A RACETRACK INCREASE FUEL FLOW BY 5%.

HOLDING – ONE ENGINE INOPERATIVE

CF34-8E5 ENGINES

CRUISE CONFIGURATION

BLEED: OPEN

ANTI-ICE: ON

SPEED: MINIMUM FUEL CONSUMPTION OR 210 KIAS

STANDARD ATMOSPHERE

WEIGHT (KG)			ALTITUDE (FT)							
			1500	5000	10000	15000	20000	25000	30000	35000
25000	IAS	KT	210	210	210	210	210	-	-	-
	TAS	KT	215	226	243	262	284	-	-	-
	MACH		0.326	0.347	0.381	0.419	0.462	-	-	-
	N1	%	69.3	71.6	75.6	79.9	83.9	-	-	-
	FF	KG/H/ENG	1118	1171	1177	1179	1189	-	-	-
24000	IAS	KT	210	210	210	210	210	210	-	-
	TAS	KT	215	226	243	262	284	308	-	-
	MACH		0.326	0.347	0.381	0.419	0.462	0.511	-	-
	N1	%	68.8	71.3	75.1	79.4	83.4	89.8	-	-
	FF	KG/H/ENG	1101	1159	1160	1158	1166	1220	-	-
23000	IAS	KT	210	210	210	210	210	210	-	-
	TAS	KT	215	226	243	262	284	308	-	-
	MACH		0.326	0.347	0.381	0.419	0.462	0.511	-	-
	N1	%	68.2	71.0	74.6	78.8	82.9	88.4	-	-
	FF	KG/H/ENG	1084	1147	1143	1138	1145	1174	-	-
22000	IAS	KT	210	210	210	210	210	210	-	-
	TAS	KT	215	226	243	262	284	308	-	-
	MACH		0.326	0.347	0.381	0.419	0.462	0.511	-	-
	N1	%	67.7	70.6	74.1	78.4	82.5	87.3	-	-
	FF	KG/H/ENG	1068	1134	1127	1123	1128	1135	-	-
21000	IAS	KT	210	210	210	210	210	210	-	-
	TAS	KT	215	226	243	262	284	308	-	-
	MACH		0.326	0.347	0.381	0.419	0.462	0.511	-	-
	N1	%	67.2	70.2	73.7	78.0	82.1	86.8	-	-
	FF	KG/H/ENG	1051	1122	1108	1108	1110	1114	-	-

FOR HOLDING IN A RACETRACK INCREASE FUEL FLOW BY 5%.

HOLDING – ONE ENGINE INOPERATIVE

CF34-8E5 ENGINES

CRUISE CONFIGURATION

BLEED: OPEN

ANTI-ICE: ON (WITH ICE ACCRETION)

SPEED: MINIMUM FUEL CONSUMPTION OR 210 KIAS

STANDARD ATMOSPHERE

WEIGHT (KG)			ALTITUDE (FT)							
			1500	5000	10000	15000	20000	25000	30000	35000
38000	IAS	KT	210	220	-	-	-	-	-	-
	TAS	KT	215	236	-	-	-	-	-	-
	MACH		0.326	0.363	-	-	-	-	-	-
	N1	%	76.3	86.6	-	-	-	-	-	-
	FF	KG/H/ENG	1443	1995	-	-	-	-	-	-
37000	IAS	KT	210	217	-	-	-	-	-	-
	TAS	KT	215	233	-	-	-	-	-	-
	MACH		0.326	0.359	-	-	-	-	-	-
	N1	%	75.8	85.8	-	-	-	-	-	-
	FF	KG/H/ENG	1414	1933	-	-	-	-	-	-
36000	IAS	KT	210	214	-	-	-	-	-	-
	TAS	KT	215	230	-	-	-	-	-	-
	MACH		0.326	0.354	-	-	-	-	-	-
	N1	%	75.3	85.0	-	-	-	-	-	-
	FF	KG/H/ENG	1385	1870	-	-	-	-	-	-
35000	IAS	KT	210	211	-	-	-	-	-	-
	TAS	KT	215	227	-	-	-	-	-	-
	MACH		0.326	0.349	-	-	-	-	-	-
	N1	%	74.7	84.1	-	-	-	-	-	-
	FF	KG/H/ENG	1355	1807	-	-	-	-	-	-
34000	IAS	KT	210	210	210	-	-	-	-	-
	TAS	KT	215	226	243	-	-	-	-	-
	MACH		0.326	0.347	0.381	-	-	-	-	-
	N1	%	74.1	83.3	87.6	-	-	-	-	-
	FF	KG/H/ENG	1327	1761	1793	-	-	-	-	-
33000	IAS	KT	210	210	210	-	-	-	-	-
	TAS	KT	215	226	243	-	-	-	-	-
	MACH		0.326	0.347	0.381	-	-	-	-	-
	N1	%	73.5	82.9	87.2	-	-	-	-	-
	FF	KG/H/ENG	1299	1734	1762	-	-	-	-	-

FOR HOLDING IN A RACETRACK INCREASE FUEL FLOW BY 5%.

HOLDING – ONE ENGINE INOPERATIVE

CF34-8E5 ENGINES

CRUISE CONFIGURATION

BLEED: OPEN

ANTI-ICE: ON (WITH ICE ACCRETION)

SPEED: MINIMUM FUEL CONSUMPTION OR 210 KIAS

STANDARD ATMOSPHERE

WEIGHT (KG)			ALTITUDE (FT)							
			1500	5000	10000	15000	20000	25000	30000	35000
32000	IAS	KT	210	210	210	-	-	-	-	-
	TAS	KT	215	226	243	-	-	-	-	-
	MACH		0.326	0.347	0.381	-	-	-	-	-
	N1	%	72.9	82.4	86.7	-	-	-	-	-
	FF	KG/H/ENG	1271	1708	1730	-	-	-	-	-
31000	IAS	KT	210	210	210	-	-	-	-	-
	TAS	KT	215	226	243	-	-	-	-	-
	MACH		0.326	0.347	0.381	-	-	-	-	-
	N1	%	72.3	82.0	86.2	-	-	-	-	-
	FF	KG/H/ENG	1243	1681	1699	-	-	-	-	-
30000	IAS	KT	210	210	210	-	-	-	-	-
	TAS	KT	215	226	243	-	-	-	-	-
	MACH		0.326	0.347	0.381	-	-	-	-	-
	N1	%	71.7	81.6	85.8	-	-	-	-	-
	FF	KG/H/ENG	1215	1655	1667	-	-	-	-	-
29000	IAS	KT	210	210	210	-	-	-	-	-
	TAS	KT	215	226	243	-	-	-	-	-
	MACH		0.326	0.347	0.381	-	-	-	-	-
	N1	%	71.1	81.1	85.3	-	-	-	-	-
	FF	KG/H/ENG	1187	1629	1636	-	-	-	-	-
28000	IAS	KT	210	210	210	210	-	-	-	-
	TAS	KT	215	226	243	262	-	-	-	-
	MACH		0.326	0.347	0.381	0.419	-	-	-	-
	N1	%	70.6	80.7	84.9	89.4	-	-	-	-
	FF	KG/H/ENG	1169	1602	1605	1650	-	-	-	-
27000	IAS	KT	210	210	210	210	-	-	-	-
	TAS	KT	215	226	243	262	-	-	-	-
	MACH		0.326	0.347	0.381	0.419	-	-	-	-
	N1	%	70.2	80.3	84.5	88.9	-	-	-	-
	FF	KG/H/ENG	1152	1576	1583	1621	-	-	-	-
26000	IAS	KT	210	210	210	210	-	-	-	-
	TAS	KT	215	226	243	262	-	-	-	-
	MACH		0.326	0.347	0.381	0.419	-	-	-	-
	N1	%	69.8	79.8	84.1	88.5	-	-	-	-
	FF	KG/H/ENG	1135	1550	1563	1593	-	-	-	-

FOR HOLDING IN A RACETRACK INCREASE FUEL FLOW BY 5%.

HOLDING – ONE ENGINE INOPERATIVE

CF34-8E5 ENGINES

CRUISE CONFIGURATION
BLEED: OPEN
ANTI-ICE: ON (WITH ICE ACCRETION)
SPEED: MINIMUM FUEL CONSUMPTION OR 210 KIAS
STANDARD ATMOSPHERE

WEIGHT (KG)			ALTITUDE (FT)							
			1500	5000	10000	15000	20000	25000	30000	35000
25000	IAS	KT	210	210	210	210	-	-	-	-
	TAS	KT	215	226	243	262	-	-	-	-
	MACH		0.326	0.347	0.381	0.419	-	-	-	-
	N1	%	69.3	79.5	83.7	88.0	-	-	-	-
	FF	KG/H/ENG	1118	1529	1542	1569	-	-	-	-
24000	IAS	KT	210	210	210	210	-	-	-	-
	TAS	KT	215	226	243	262	-	-	-	-
	MACH		0.326	0.347	0.381	0.419	-	-	-	-
	N1	%	68.8	79.2	83.4	87.6	-	-	-	-
	FF	KG/H/ENG	1101	1513	1522	1544	-	-	-	-
23000	IAS	KT	210	210	210	210	-	-	-	-
	TAS	KT	215	226	243	262	-	-	-	-
	MACH		0.326	0.347	0.381	0.419	-	-	-	-
	N1	%	68.2	78.9	83.0	87.2	-	-	-	-
	FF	KG/H/ENG	1084	1497	1502	1519	-	-	-	-
22000	IAS	KT	210	210	210	210	-	-	-	-
	TAS	KT	215	226	243	262	-	-	-	-
	MACH		0.326	0.347	0.381	0.419	-	-	-	-
	N1	%	67.7	78.6	82.6	86.9	-	-	-	-
	FF	KG/H/ENG	1068	1481	1481	1502	-	-	-	-
21000	IAS	KT	210	210	210	210	-	-	-	-
	TAS	KT	215	226	243	262	-	-	-	-
	MACH		0.326	0.347	0.381	0.419	-	-	-	-
	N1	%	67.2	78.3	82.3	86.6	-	-	-	-
	FF	KG/H/ENG	1051	1466	1461	1485	-	-	-	-

FOR HOLDING IN A RACETRACK INCREASE FUEL FLOW BY 5%.

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METHOD OF CALCULATING FUEL NEEDED FOR VARIOUS FLIGHT STAGES

CLIMB

CLIMB SPEEDS

MAXIMUM ANGLE SPEED

This speed is recommended for obstacle clearance in order to reach an altitude on minimum ground distance. The recommended maximum angle speed is related to flaps up, all engines operating and is approximately VFS for all gross weights and altitudes.

MAXIMUM RATE OF CLIMB SPEED

This speed is recommended when maximum rate of climb is desired in order to reach an altitude on minimum climb time. The recommended maximum rate of climb speed is related to flaps up, all engines operating and is the function of gross weights and altitudes as shown in the tables below:

Altitude (ft)	Weight - kg					
	25000	26000	27000	28000	29000	30000
5000	241	241	241	241	241	242
10000	232	233	234	235	236	237
15000	223	223	224	224	228	232
20000	217	219	221	223	223	224
25000	214	215	216	217	219	220
Altitude (ft)	Weight - kg					
	31000	32000	33000	34000	35000	36000
5000	242	245	247	250	250	249
10000	238	241	243	246	246	245
15000	236	238	239	241	241	241
20000	224	228	233	237	236	236
25000	222	226	229	233	232	230

Maintain the speeds above until intercepting Mach 0.60. Then fly with this Mach number until level off.

CLIMB TABLES

The climb planning tables show fuel consumption, distance, and time elapsed from the Sea Level to the top of climb. Data are shown for various weights, ISA deviations and cruise altitudes.

The takeoff fuel consumption is not considered in the following tables.

Tables present the scheduled climb speed according to the autopilot climb mode, i.e.:

- 240 KIAS for altitudes up to 10000 ft, increasing linearly to 290 KIAS at 12000 ft, maintaining 290 KIAS up to 25400 ft and Mach 0.70 above 25400 ft, with the Minimum Rate of Climb equal to 300 ft/min.

The associated conditions are:

- Thrust Mode CLB1
- Flaps..... UP
- Gear UP
- Bleeds OPEN
- Anti-Ice OFF

EXAMPLE:

Given:

Departure Airport Elevation.....3500 ft
Takeoff weight.....35000 kg
ISA Condition
Cruise Altitude.....33000 ft

RESULTS:

Data for 5000 ft (3500 ft + 1500 ft above departure airport) obtained from the climb table:

Fuel: 99 kg
Distance: 6 NM
Time: 1 min

Data provided from the Sea Level to 33000 ft (Top of Climb) table:

Fuel: 867 kg
Distance: 106 NM
Time: 17 min

The fuel, distance and time spent during the climb phase (from 5000 ft to 33000 ft) are:

Fuel: $867 - 99 = 768$ kg
Distance: $106 - 6 = 100$ NM
Time: $17 - 1 = 16$ min

The fuel consumption related to the takeoff phase is provided on the OM part B Section 5.1.b.

CLIMB PLANNING - ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: SEA LEVEL TO 5000 AND 6000 FT

SPEED SCHEDULE: 240 KIAS UP TO 10000 FT, INCREASING LINEARLY TO 290 KIAS AT 12000 FT, MAINTAINING 290 KIAS UP TO 25400 FT AND MACH 0.70 ABOVE 25400 FT.

CRUISE CONFIGURATION

BLEED: OPEN

WEIGHT (KG)			5000 FT ISA + °C					6000 FT ISA + °C				
			-20	-10	0	10	20	-20	-10	0	10	20
38000	FUEL	KG	100	105	109	115	127	120	126	131	138	152
	DISTANCE	NM	6	6	6	7	8	7	7	8	8	10
	TIME	MIN	1	1	2	2	2	2	2	2	2	2
37000	FUEL	KG	97	101	106	111	122	116	121	127	134	147
	DISTANCE	NM	6	6	6	6	8	7	7	7	8	9
	TIME	MIN	1	1	1	2	2	2	2	2	2	2
36000	FUEL	KG	93	97	102	107	118	112	117	123	129	141
	DISTANCE	NM	5	6	6	6	7	7	7	7	7	9
	TIME	MIN	1	1	1	1	2	2	2	2	2	2
35000	FUEL	KG	90	94	99	104	113	108	113	118	124	136
	DISTANCE	NM	5	5	6	6	7	6	7	7	7	9
	TIME	MIN	1	1	1	1	2	2	2	2	2	2
34000	FUEL	KG	87	91	95	100	109	104	109	114	120	131
	DISTANCE	NM	5	5	5	6	7	6	6	7	7	8
	TIME	MIN	1	1	1	1	2	2	2	2	2	2
33000	FUEL	KG	84	88	92	96	105	101	105	110	116	126
	DISTANCE	NM	5	5	5	5	7	6	6	6	7	8
	TIME	MIN	1	1	1	1	2	1	2	2	2	2
32000	FUEL	KG	81	84	88	93	101	97	101	106	112	122
	DISTANCE	NM	5	5	5	5	6	6	6	6	6	8
	TIME	MIN	1	1	1	1	2	1	1	1	2	2
31000	FUEL	KG	78	81	85	89	97	93	97	102	107	117
	DISTANCE	NM	4	5	5	5	6	5	6	6	6	8
	TIME	MIN	1	1	1	1	1	1	1	1	1	2
For Anti- ice ON, increase	FUEL	(%)	3	3	2	0	0	3	3	2	0	0
	DISTANCE	(%)	2	2	1	0	0	2	2	1	0	0
	TIME	(%)	2	2	1	0	0	2	2	1	0	0



CLIMB PLANNING - ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: SEA LEVEL TO 5000 AND 6000 FT

SPEED SCHEDULE: 240 KIAS UP TO 10000 FT, INCREASING LINEARLY TO 290 KIAS AT 12000 FT,
MAINTAINING 290 KIAS UP TO 25400 FT AND MACH 0.70 ABOVE 25400 FT.

CRUISE CONFIGURATION

BLEED: OPEN

WEIGHT (KG)			5000 FT ISA + °C					6000 FT ISA + °C				
			-20	-10	0	10	20	-20	-10	0	10	20
30000	FUEL	KG	75	78	82	86	94	90	94	98	103	112
	DISTANCE	NM	4	4	5	5	6	5	5	6	6	7
	TIME	MIN	1	1	1	1	1	1	1	1	1	2
29000	FUEL	KG	72	75	79	83	90	86	90	94	99	108
	DISTANCE	NM	4	4	4	5	6	5	5	5	6	7
	TIME	MIN	1	1	1	1	1	1	1	1	1	2
28000	FUEL	KG	69	72	76	79	86	83	87	91	95	104
	DISTANCE	NM	4	4	4	4	5	5	5	5	5	7
	TIME	MIN	1	1	1	1	1	1	1	1	1	2
27000	FUEL	KG	66	69	73	76	83	79	83	87	91	99
	DISTANCE	NM	4	4	4	4	5	5	5	5	5	6
	TIME	MIN	1	1	1	1	1	1	1	1	1	1
26000	FUEL	KG	64	66	70	73	79	76	80	83	88	95
	DISTANCE	NM	4	4	4	4	5	4	5	5	5	6
	TIME	MIN	1	1	1	1	1	1	1	1	1	1
25000	FUEL	KG	61	64	67	70	76	73	76	80	84	91
	DISTANCE	NM	3	4	4	4	5	4	4	5	5	6
	TIME	MIN	1	1	1	1	1	1	1	1	1	1
24000	FUEL	KG	58	61	64	67	73	70	73	76	80	87
	DISTANCE	NM	3	3	4	4	5	4	4	4	5	6
	TIME	MIN	1	1	1	1	1	1	1	1	1	1
23000	FUEL	KG	56	58	61	64	69	67	70	73	77	83
	DISTANCE	NM	3	3	3	4	4	4	4	4	4	5
	TIME	MIN	1	1	1	1	1	1	1	1	1	1
22000	FUEL	KG	53	55	58	61	66	64	66	70	73	79
	DISTANCE	NM	3	3	3	3	4	4	4	4	4	5
	TIME	MIN	1	1	1	1	1	1	1	1	1	1
21000	FUEL	KG	50	53	55	58	63	60	63	66	70	75
	DISTANCE	NM	3	3	3	3	4	3	4	4	4	5
	TIME	MIN	1	1	1	1	1	1	1	1	1	1
For												
Anti-	FUEL	(%)	3	3	2	0	0	3	3	2	0	0
ice ON,	DISTANCE	(%)	2	2	1	0	0	2	2	1	0	0
increase	TIME	(%)	2	2	1	0	0	2	2	1	0	0

CLIMB PLANNING - ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: SEA LEVEL TO 7000 AND 8000 FT

SPEED SCHEDULE: 240 KIAS UP TO 10000 FT, INCREASING LINEARLY TO 290 KIAS AT 12000 FT, MAINTAINING 290 KIAS UP TO 25400 FT AND MACH 0.70 ABOVE 25400 FT.

CRUISE CONFIGURATION

BLEED: OPEN

WEIGHT (KG)			7000 FT ISA + °C					8000 FT ISA + °C				
			-20	-10	0	10	20	-20	-10	0	10	20
38000	FUEL	KG	140	147	153	162	178	160	168	176	185	204
	DISTANCE	NM	8	9	9	10	12	10	10	11	11	14
	TIME	MIN	2	2	2	2	3	2	2	3	3	3
37000	FUEL	KG	135	142	148	156	171	155	162	169	179	196
	DISTANCE	NM	8	8	9	9	11	9	10	10	11	13
	TIME	MIN	2	2	2	2	3	2	2	2	3	3
36000	FUEL	KG	131	137	143	151	165	150	156	164	172	189
	DISTANCE	NM	8	8	8	9	11	9	9	10	10	13
	TIME	MIN	2	2	2	2	3	2	2	2	2	3
35000	FUEL	KG	126	132	138	145	159	144	151	158	166	182
	DISTANCE	NM	8	8	8	9	10	9	9	10	10	12
	TIME	MIN	2	2	2	2	2	2	2	2	2	3
34000	FUEL	KG	122	127	133	140	153	139	145	152	160	176
	DISTANCE	NM	7	8	8	8	10	8	9	9	10	12
	TIME	MIN	2	2	2	2	2	2	2	2	2	3
33000	FUEL	KG	117	123	128	135	148	134	140	147	154	169
	DISTANCE	NM	7	7	8	8	10	8	8	9	9	11
	TIME	MIN	2	2	2	2	2	2	2	2	2	3
32000	FUEL	KG	113	118	124	130	142	129	135	141	149	162
	DISTANCE	NM	7	7	7	8	9	8	8	8	9	11
	TIME	MIN	2	2	2	2	2	2	2	2	2	2
31000	FUEL	KG	109	114	119	125	137	124	130	136	143	156
	DISTANCE	NM	6	7	7	7	9	8	8	8	9	10
	TIME	MIN	2	2	2	2	2	2	2	2	2	2
For												
Anti-ice ON, increase	FUEL	(%)	3	3	2	0	0	3	3	2	0	0
	DISTANCE	(%)	2	2	2	0	0	2	2	2	0	0
	TIME	(%)	2	2	2	0	0	2	2	2	0	0

CLIMB PLANNING - ALL ENGINES OPERATING**CF34-8E5 ENGINES****ALTITUDE: SEA LEVEL TO 7000 AND 8000 FT**

SPEED SCHEDULE: 240 KIAS UP TO 10000 FT, INCREASING LINEARLY TO 290 KIAS AT 12000 FT,
MAINTAINING 290 KIAS UP TO 25400 FT AND MACH 0.70 ABOVE 25400 FT.

CRUISE CONFIGURATION

BLEED: OPEN

WEIGHT (KG)			7000 FT ISA + °C					8000 FT ISA + °C				
			-20	-10	0	10	20	-20	-10	0	10	20
30000	FUEL	KG	105	109	114	120	131	120	125	131	138	150
	DISTANCE	NM	6	6	7	7	9	7	8	8	8	10
	TIME	MIN	2	2	2	2	2	2	2	2	2	2
29000	FUEL	KG	101	105	110	116	126	115	120	126	132	144
	DISTANCE	NM	6	6	6	7	8	7	7	8	8	10
	TIME	MIN	1	2	2	2	2	2	2	2	2	2
28000	FUEL	KG	97	101	106	111	121	110	115	121	127	138
	DISTANCE	NM	6	6	6	7	8	7	7	7	8	9
	TIME	MIN	1	1	1	2	2	2	2	2	2	2
27000	FUEL	KG	93	97	101	107	116	106	111	116	122	133
	DISTANCE	NM	5	6	6	6	8	6	7	7	7	9
	TIME	MIN	1	1	1	1	2	2	2	2	2	2
26000	FUEL	KG	89	93	97	102	111	102	106	111	117	127
	DISTANCE	NM	5	5	6	6	7	6	6	7	7	8
	TIME	MIN	1	1	1	1	2	2	2	2	2	2
25000	FUEL	KG	85	89	93	98	106	97	102	106	112	121
	DISTANCE	NM	5	5	5	6	7	6	6	6	7	8
	TIME	MIN	1	1	1	1	2	1	1	2	2	2
24000	FUEL	KG	81	85	89	94	102	93	97	102	107	116
	DISTANCE	NM	5	5	5	5	7	6	6	6	6	8
	TIME	MIN	1	1	1	1	2	1	1	1	2	2
23000	FUEL	KG	78	81	85	89	97	89	93	97	102	111
	DISTANCE	NM	5	5	5	5	6	5	6	6	6	7
	TIME	MIN	1	1	1	1	1	1	1	1	1	2
22000	FUEL	KG	74	77	81	85	92	85	89	93	97	106
	DISTANCE	NM	4	5	5	5	6	5	5	5	6	7
	TIME	MIN	1	1	1	1	1	1	1	1	1	2
21000	FUEL	KG	71	74	77	81	88	81	84	88	93	100
	DISTANCE	NM	4	4	4	5	6	5	5	5	5	7
	TIME	MIN	1	1	1	1	1	1	1	1	1	2

For												
Anti-ice ON, increase	FUEL	(%)	3	3	2	0	0	3	3	2	0	0
	DISTANCE	(%)	2	2	2	0	0	2	2	2	0	0
	TIME	(%)	2	2	2	0	0	2	2	2	0	0

CLIMB PLANNING - ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: SEA LEVEL TO 9000 FT AND 10000 FT

SPEED SCHEDULE: 240 KIAS UP TO 10000 FT, INCREASING LINEARLY TO 290 KIAS AT 12000 FT, MAINTAINING 290 KIAS UP TO 25400 FT AND MACH 0.70 ABOVE 25400 FT.

CRUISE CONFIGURATION

BLEED: OPEN

WEIGHT (KG)			9000 FT ISA + °C					10000 FT ISA + °C				
			-20	-10	0	10	20	-20	-10	0	10	20
38000	FUEL	KG	181	189	198	208	230	201	210	220	232	256
	DISTANCE	NM	11	12	12	13	16	13	13	14	15	18
	TIME	MIN	3	3	3	3	4	3	3	3	3	4
37000	FUEL	KG	174	183	191	201	221	194	203	212	224	247
	DISTANCE	NM	11	11	12	12	15	12	13	13	14	17
	TIME	MIN	3	3	3	3	3	3	3	3	3	4
36000	FUEL	KG	168	176	184	194	213	187	196	205	216	238
	DISTANCE	NM	10	11	11	12	15	12	12	13	14	17
	TIME	MIN	3	3	3	3	3	3	3	3	3	4
35000	FUEL	KG	162	170	178	187	205	181	189	198	208	229
	DISTANCE	NM	10	10	11	11	14	11	12	12	13	16
	TIME	MIN	2	3	3	3	3	3	3	3	3	4
34000	FUEL	KG	157	164	171	180	198	174	182	191	201	220
	DISTANCE	NM	10	10	11	11	13	11	11	12	13	15
	TIME	MIN	2	2	2	3	3	3	3	3	3	3
33000	FUEL	KG	151	158	165	174	190	168	176	184	193	212
	DISTANCE	NM	9	10	10	11	13	11	11	12	12	15
	TIME	MIN	2	2	2	2	3	3	3	3	3	3
32000	FUEL	KG	145	152	159	167	183	162	169	177	186	204
	DISTANCE	NM	9	9	10	10	12	10	11	11	12	14
	TIME	MIN	2	2	2	2	3	2	3	3	3	3
31000	FUEL	KG	140	146	153	161	176	156	163	170	179	196
	DISTANCE	NM	9	9	9	10	12	10	10	11	11	14
	TIME	MIN	2	2	2	2	3	2	2	2	3	3
For												
Anti-	FUEL	(%)	3	3	2	1	0	3	3	3	1	0
ice ON,	DISTANCE	(%)	2	2	2	1	0	2	2	2	2	0
increase	TIME	(%)	2	2	2	1	0	2	2	2	2	0

CLIMB PLANNING - ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: SEA LEVEL TO 9000 AND 10000 FT

SPEED SCHEDULE: 240 KIAS UP TO 10000 FT, INCREASING LINEARLY TO 290 KIAS AT 12000 FT,
MAINTAINING 290 KIAS UP TO 25400 FT AND MACH 0.70 ABOVE 25400 FT.

CRUISE CONFIGURATION

BLEED: OPEN

WEIGHT (KG)			9000 FT ISA + °C					10000 FT ISA + °C				
			-20	-10	0	10	20	-20	-10	0	10	20
30000	FUEL	KG	135	141	147	155	169	150	157	164	172	188
	DISTANCE	NM	8	9	9	9	11	9	10	10	11	13
	TIME	MIN	2	2	2	2	3	2	2	2	2	3
29000	FUEL	KG	129	135	141	149	162	144	150	157	166	181
	DISTANCE	NM	8	8	9	9	11	9	9	10	10	12
	TIME	MIN	2	2	2	2	3	2	2	2	2	3
28000	FUEL	KG	124	130	136	143	156	138	144	151	159	173
	DISTANCE	NM	8	8	8	9	11	9	9	9	10	12
	TIME	MIN	2	2	2	2	2	2	2	2	2	3
27000	FUEL	KG	119	125	130	137	149	132	139	145	153	166
	DISTANCE	NM	7	8	8	8	10	8	9	9	9	11
	TIME	MIN	2	2	2	2	2	2	2	2	2	3
26000	FUEL	KG	114	119	125	132	143	127	133	139	146	159
	DISTANCE	NM	7	7	8	8	10	8	8	9	9	11
	TIME	MIN	2	2	2	2	2	2	2	2	2	2
25000	FUEL	KG	109	114	120	126	137	122	127	133	140	152
	DISTANCE	NM	7	7	7	8	9	8	8	8	9	10
	TIME	MIN	2	2	2	2	2	2	2	2	2	2
24000	FUEL	KG	105	109	114	120	131	116	122	127	134	145
	DISTANCE	NM	6	7	7	7	9	7	8	8	8	10
	TIME	MIN	2	2	2	2	2	2	2	2	2	2
23000	FUEL	KG	100	104	109	115	125	111	116	121	128	139
	DISTANCE	NM	6	6	7	7	8	7	7	7	8	10
	TIME	MIN	2	2	2	2	2	2	2	2	2	2
22000	FUEL	KG	95	100	104	110	119	106	111	116	122	132
	DISTANCE	NM	6	6	6	7	8	7	7	7	7	9
	TIME	MIN	1	1	2	2	2	2	2	2	2	2
21000	FUEL	KG	91	95	99	104	113	101	105	110	116	126
	DISTANCE	NM	5	6	6	6	8	6	6	7	7	9
	TIME	MIN	1	1	1	1	2	2	2	2	2	2
For												
Anti-ice ON, increase	FUEL	(%)	3	3	2	1	0	3	3	2	1	0
	DISTANCE	(%)	2	2	2	1	0	2	2	2	2	0
	TIME	(%)	2	2	2	1	0	2	2	2	2	0

CLIMB PLANNING - ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: SEA LEVEL TO 11000 AND 12000 FT

SPEED SCHEDULE: 240 KIAS UP TO 10000 FT, INCREASING LINEARLY TO 290 KIAS AT 12000 FT, MAINTAINING 290 KIAS UP TO 25400 FT AND MACH 0.70 ABOVE 25400 FT.

CRUISE CONFIGURATION

BLEED: OPEN

WEIGHT (KG)			11000 FT ISA + °C					12000 FT ISA + °C				
			-20	-10	0	10	20	-20	-10	0	10	20
38000	FUEL	KG	236	247	258	272	301	274	287	300	316	352
	DISTANCE	NM	16	16	17	18	22	19	20	21	22	27
	TIME	MIN	4	4	4	4	5	4	4	5	5	6
37000	FUEL	KG	228	238	249	262	290	264	277	289	305	339
	DISTANCE	NM	15	16	16	17	21	18	19	20	21	26
	TIME	MIN	4	4	4	4	5	4	4	4	5	5
36000	FUEL	KG	220	230	240	253	279	255	267	279	294	326
	DISTANCE	NM	14	15	16	16	20	18	18	19	20	25
	TIME	MIN	3	4	4	4	4	4	4	4	4	5
35000	FUEL	KG	212	222	232	244	269	246	258	269	283	314
	DISTANCE	NM	14	15	15	16	19	17	18	19	19	24
	TIME	MIN	3	3	3	4	4	4	4	4	4	5
34000	FUEL	KG	204	214	223	235	259	237	248	259	273	302
	DISTANCE	NM	13	14	15	15	19	16	17	18	19	23
	TIME	MIN	3	3	3	3	4	4	4	4	4	5
33000	FUEL	KG	197	206	215	227	249	229	239	250	263	291
	DISTANCE	NM	13	13	14	15	18	16	16	17	18	22
	TIME	MIN	3	3	3	3	4	4	4	4	4	5
32000	FUEL	KG	189	198	207	218	239	220	230	241	253	280
	DISTANCE	NM	12	13	14	14	17	15	16	17	17	21
	TIME	MIN	3	3	3	3	4	3	4	4	4	5
31000	FUEL	KG	182	191	199	210	230	212	222	232	244	269
	DISTANCE	NM	12	12	13	14	17	15	15	16	17	20
	TIME	MIN	3	3	3	3	4	3	3	4	4	4
For												
Anti-ice ON, increase	FUEL	(%)	3	3	3	2	0	3	3	3	3	0
	DISTANCE	(%)	3	2	2	3	0	3	2	2	4	0
	TIME	(%)	3	2	2	3	0	3	2	2	4	0



CLIMB PLANNING - ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: SEA LEVEL TO 11000 AND 12000 FT

SPEED SCHEDULE: 240 KIAS UP TO 10000 FT, INCREASING LINEARLY TO 290 KIAS AT 12000 FT,
MAINTAINING 290 KIAS UP TO 25400 FT AND MACH 0.70 ABOVE 25400 FT.

CRUISE CONFIGURATION

BLEED: OPEN

WEIGHT (KG)			11000 FT ISA + °C					12000 FT ISA + °C				
			-20	-10	0	10	20	-20	-10	0	10	20
30000	FUEL	KG	175	183	192	202	221	204	213	223	234	258
	DISTANCE	NM	11	12	12	13	16	14	15	15	16	20
	TIME	MIN	3	3	3	3	4	3	3	3	3	4
29000	FUEL	KG	168	176	184	194	212	196	205	214	225	248
	DISTANCE	NM	11	11	12	13	15	14	14	15	15	19
	TIME	MIN	3	3	3	3	3	3	3	3	3	4
28000	FUEL	KG	162	169	177	186	203	188	197	205	216	238
	DISTANCE	NM	11	11	11	12	15	13	14	14	15	18
	TIME	MIN	3	3	3	3	3	3	3	3	3	4
27000	FUEL	KG	155	162	170	179	195	180	189	197	207	228
	DISTANCE	NM	10	11	11	12	14	12	13	13	14	17
	TIME	MIN	2	2	3	3	3	3	3	3	3	4
26000	FUEL	KG	149	156	163	171	187	173	181	189	199	218
	DISTANCE	NM	10	10	11	11	13	12	12	13	14	17
	TIME	MIN	2	2	2	3	3	3	3	3	3	4
25000	FUEL	KG	142	149	156	164	179	165	173	181	190	209
	DISTANCE	NM	9	10	10	11	13	11	12	12	13	16
	TIME	MIN	2	2	2	2	3	3	3	3	3	3
24000	FUEL	KG	136	142	149	157	171	158	166	173	182	199
	DISTANCE	NM	9	9	10	10	12	11	11	12	12	15
	TIME	MIN	2	2	2	2	3	3	3	3	3	3
23000	FUEL	KG	130	136	142	150	163	151	158	165	174	190
	DISTANCE	NM	8	9	9	10	12	10	11	11	12	14
	TIME	MIN	2	2	2	2	3	2	2	3	3	3
22000	FUEL	KG	124	130	135	142	155	144	151	157	166	181
	DISTANCE	NM	8	8	9	9	11	10	10	11	11	14
	TIME	MIN	2	2	2	2	2	2	2	2	2	3
21000	FUEL	KG	118	123	129	136	147	137	143	150	158	172
	DISTANCE	NM	8	8	8	9	11	9	10	10	11	13
	TIME	MIN	2	2	2	2	2	2	2	2	2	3
For												
Anti-ice ON, increase	FUEL	(%)	3	3	3	2	0	3	3	3	3	0
	DISTANCE	(%)	3	2	2	3	0	3	2	2	4	0
	TIME	(%)	2	2	2	3	0	3	2	2	4	0

CLIMB PLANNING - ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: SEA LEVEL TO 13000 AND 14000 FT

SPEED SCHEDULE: 240 KIAS UP TO 10000 FT, INCREASING LINEARLY TO 290 KIAS AT 12000 FT, MAINTAINING 290 KIAS UP TO 25400 FT AND MACH 0.70 ABOVE 25400 FT.

CRUISE CONFIGURATION

BLEED: OPEN

WEIGHT (KG)			13000 FT ISA + °C					14000 FT ISA + °C				
			-20	-10	0	10	20	-20	-10	0	10	20
38000	FUEL	KG	297	311	325	342	383	321	336	351	370	416
	DISTANCE	NM	21	22	23	24	30	24	25	26	27	34
	TIME	MIN	5	5	5	5	6	5	5	5	6	7
37000	FUEL	KG	287	300	314	330	369	310	324	339	356	401
	DISTANCE	NM	21	21	22	23	29	23	24	25	26	33
	TIME	MIN	5	5	5	5	6	5	5	5	5	7
36000	FUEL	KG	277	290	303	318	356	299	313	327	344	386
	DISTANCE	NM	20	21	22	23	28	22	23	24	25	31
	TIME	MIN	4	5	5	5	6	5	5	5	5	6
35000	FUEL	KG	267	279	292	307	342	288	302	315	331	371
	DISTANCE	NM	19	20	21	22	27	21	22	23	24	30
	TIME	MIN	4	4	4	5	6	5	5	5	5	6
34000	FUEL	KG	257	269	281	296	330	278	291	304	319	357
	DISTANCE	NM	18	19	20	21	26	20	21	22	23	29
	TIME	MIN	4	4	4	4	5	4	5	5	5	6
33000	FUEL	KG	248	259	271	285	317	267	280	293	308	344
	DISTANCE	NM	18	18	19	20	25	20	21	21	22	28
	TIME	MIN	4	4	4	4	5	4	4	5	5	6
32000	FUEL	KG	239	250	261	275	305	258	270	282	296	331
	DISTANCE	NM	17	18	19	19	24	19	20	21	22	27
	TIME	MIN	4	4	4	4	5	4	4	4	4	5
31000	FUEL	KG	230	241	251	264	293	248	260	271	285	318
	DISTANCE	NM	16	17	18	19	23	18	19	20	21	26
	TIME	MIN	4	4	4	4	5	4	4	4	4	5
For												
Anti-	FUEL	(%)	3	3	3	3	0	4	3	3	4	1
ice ON,	DISTANCE	(%)	3	2	2	5	1	3	3	2	6	2
increase	TIME	(%)	3	2	2	5	1	3	2	2	5	2



CLIMB PLANNING - ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: SEA LEVEL TO 13000 AND 14000 FT

SPEED SCHEDULE: 240 KIAS UP TO 10000 FT, INCREASING LINEARLY TO 290 KIAS AT 12000 FT,
MAINTAINING 290 KIAS UP TO 25400 FT AND MACH 0.70 ABOVE 25400 FT.

CRUISE CONFIGURATION

BLEED: OPEN

WEIGHT (KG)			13000 FT ISA + °C					14000 FT ISA + °C				
			-20	-10	0	10	20	-20	-10	0	10	20
30000	FUEL	KG	221	231	242	254	282	238	250	261	274	305
	DISTANCE	NM	16	16	17	18	22	18	18	19	20	25
	TIME	MIN	4	4	4	4	5	4	4	4	4	5
29000	FUEL	KG	212	222	232	244	270	229	240	251	264	293
	DISTANCE	NM	15	16	16	17	21	17	18	18	19	24
	TIME	MIN	3	3	4	4	4	4	4	4	4	5
28000	FUEL	KG	204	213	223	235	259	220	230	241	253	281
	DISTANCE	NM	15	15	16	17	20	16	17	18	18	23
	TIME	MIN	3	3	3	4	4	4	4	4	4	5
27000	FUEL	KG	196	205	214	225	248	211	221	231	243	269
	DISTANCE	NM	14	15	15	16	20	15	16	17	18	22
	TIME	MIN	3	3	3	3	4	3	3	4	4	4
26000	FUEL	KG	188	196	205	216	238	202	212	221	233	258
	DISTANCE	NM	13	14	14	15	19	15	15	16	17	21
	TIME	MIN	3	3	3	3	4	3	3	3	4	4
25000	FUEL	KG	180	188	196	207	228	194	203	212	223	247
	DISTANCE	NM	13	13	14	14	18	14	15	15	16	20
	TIME	MIN	3	3	3	3	4	3	3	3	3	4
24000	FUEL	KG	172	180	188	197	218	185	194	203	213	236
	DISTANCE	NM	12	13	13	14	17	14	14	15	15	19
	TIME	MIN	3	3	3	3	4	3	3	3	3	4
23000	FUEL	KG	164	172	179	189	208	177	185	194	204	225
	DISTANCE	NM	12	12	13	13	16	13	13	14	15	18
	TIME	MIN	3	3	3	3	3	3	3	3	3	4
22000	FUEL	KG	156	164	171	180	198	169	177	185	194	214
	DISTANCE	NM	11	12	12	13	15	12	13	13	14	17
	TIME	MIN	3	3	3	3	3	3	3	3	3	4
21000	FUEL	KG	149	156	163	171	188	161	168	176	185	204
	DISTANCE	NM	10	11	11	12	15	12	12	13	13	16
	TIME	MIN	2	2	2	3	3	3	3	3	3	3
For												
Anti-ice ON, increase	FUEL	(%)	3	3	3	3	0	3	3	3	4	1
	DISTANCE	(%)	3	2	2	5	1	3	2	2	5	2
	TIME	(%)	3	2	2	4	1	3	2	2	5	2

CLIMB PLANNING - ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: SEA LEVEL TO 15000 AND 16000 FT

SPEED SCHEDULE: 240 KIAS UP TO 10000 FT, INCREASING LINEARLY TO 290 KIAS AT 12000 FT, MAINTAINING 290 KIAS UP TO 25400 FT AND MACH 0.70 ABOVE 25400 FT.

CRUISE CONFIGURATION

BLEED: OPEN

WEIGHT (KG)			15000 FT ISA + °C					16000 FT ISA + °C				
			-20	-10	0	10	20	-20	-10	0	10	20
38000	FUEL	KG	346	362	378	398	451	371	388	406	427	486
	DISTANCE	NM	26	27	29	30	38	29	30	32	33	42
	TIME	MIN	6	6	6	6	8	6	6	6	7	8
37000	FUEL	KG	333	349	365	383	433	357	374	391	411	467
	DISTANCE	NM	25	26	28	29	36	28	29	30	32	40
	TIME	MIN	5	6	6	6	7	6	6	6	6	8
36000	FUEL	KG	321	336	351	370	417	344	361	377	396	449
	DISTANCE	NM	24	25	27	28	35	27	28	29	31	39
	TIME	MIN	5	5	5	6	7	6	6	6	6	8
35000	FUEL	KG	309	324	339	356	401	332	347	363	382	432
	DISTANCE	NM	24	25	26	27	34	26	27	28	29	37
	TIME	MIN	5	5	5	5	7	5	6	6	6	7
34000	FUEL	KG	298	312	326	343	386	319	335	350	368	415
	DISTANCE	NM	23	24	25	26	32	25	26	27	28	36
	TIME	MIN	5	5	5	5	6	5	5	6	6	7
33000	FUEL	KG	287	301	315	331	371	308	322	337	354	399
	DISTANCE	NM	22	23	24	25	31	24	25	26	27	34
	TIME	MIN	5	5	5	5	6	5	5	5	5	7
32000	FUEL	KG	277	290	303	319	357	296	310	324	341	384
	DISTANCE	NM	21	22	23	24	30	23	24	25	26	33
	TIME	MIN	5	5	5	5	6	5	5	5	5	6
31000	FUEL	KG	266	279	292	307	343	285	299	312	328	369
	DISTANCE	NM	20	21	22	23	29	22	23	24	25	32
	TIME	MIN	4	4	5	5	6	5	5	5	5	6
For												
Anti-	FUEL	(%)	4	3	3	4	2	4	4	3	5	3
ice ON,	DISTANCE	(%)	3	3	2	6	3	3	3	3	7	4
increase	TIME	(%)	3	3	2	6	3	3	3	3	6	4

CLIMB PLANNING - ALL ENGINES OPERATING**CF34-8E5 ENGINES****ALTITUDE: SEA LEVEL TO 15000 AND 16000 FT**

SPEED SCHEDULE: 240 KIAS UP TO 10000 FT, INCREASING LINEARLY TO 290 KIAS AT 12000 FT,
MAINTAINING 290 KIAS UP TO 25400 FT AND MACH 0.70 ABOVE 25400 FT.

CRUISE CONFIGURATION

BLEED: OPEN

WEIGHT (KG)			15000 FT ISA + °C					16000 FT ISA + °C				
			-20	-10	0	10	20	-20	-10	0	10	20
30000	FUEL	KG	256	268	280	295	330	274	287	300	316	354
	DISTANCE	NM	19	20	21	22	28	21	22	23	24	31
	TIME	MIN	4	4	4	4	5	5	5	5	5	6
29000	FUEL	KG	246	258	270	283	316	264	276	289	303	340
	DISTANCE	NM	19	19	20	21	26	21	21	22	23	29
	TIME	MIN	4	4	4	4	5	4	4	5	5	6
28000	FUEL	KG	237	248	259	272	303	253	265	277	291	326
	DISTANCE	NM	18	19	19	20	25	20	21	21	22	28
	TIME	MIN	4	4	4	4	5	4	4	4	4	5
27000	FUEL	KG	227	238	248	261	291	243	254	266	279	313
	DISTANCE	NM	17	18	19	20	24	19	20	21	21	27
	TIME	MIN	4	4	4	4	5	4	4	4	4	5
26000	FUEL	KG	218	228	238	250	279	233	244	255	268	299
	DISTANCE	NM	16	17	18	19	23	18	19	20	21	26
	TIME	MIN	4	4	4	4	5	4	4	4	4	5
25000	FUEL	KG	208	218	228	240	266	223	234	244	256	286
	DISTANCE	NM	16	16	17	18	22	17	18	19	20	25
	TIME	MIN	3	3	4	4	4	4	4	4	4	5
24000	FUEL	KG	199	209	218	229	255	213	223	233	245	274
	DISTANCE	NM	15	16	16	17	21	17	17	18	19	24
	TIME	MIN	3	3	3	3	4	4	4	4	4	5
23000	FUEL	KG	190	199	208	219	243	204	213	223	234	261
	DISTANCE	NM	14	15	16	16	20	16	16	17	18	22
	TIME	MIN	3	3	3	3	4	3	3	4	4	4
22000	FUEL	KG	181	190	198	209	232	194	203	212	223	249
	DISTANCE	NM	14	14	15	16	19	15	16	16	17	21
	TIME	MIN	3	3	3	3	4	3	3	3	3	4
21000	FUEL	KG	173	181	189	198	220	185	194	202	212	237
	DISTANCE	NM	13	14	14	15	18	14	15	16	16	20
	TIME	MIN	3	3	3	3	4	3	3	3	3	4

For												
Anti-	FUEL	(%)	4	3	3	4	2	4	3	3	4	3
ice ON,	DISTANCE	(%)	3	3	2	6	3	3	3	3	6	4
increase	TIME	(%)	3	2	2	5	3	3	3	2	6	4

CLIMB PLANNING - ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: SEA LEVEL TO 17000 AND 18000 FT

SPEED SCHEDULE: 240 KIAS UP TO 10000 FT, INCREASING LINEARLY TO 290 KIAS AT 12000 FT, MAINTAINING 290 KIAS UP TO 25400 FT AND MACH 0.70 ABOVE 25400 FT.

CRUISE CONFIGURATION

BLEED: OPEN

WEIGHT (KG)			17000 FT ISA + °C					18000 FT ISA + °C				
			-20	-10	0	10	20	-20	-10	0	10	20
38000	FUEL	KG	397	416	434	457	523	423	443	463	487	560
	DISTANCE	NM	32	33	35	36	47	35	37	38	40	51
	TIME	MIN	7	7	7	7	9	7	7	7	8	10
37000	FUEL	KG	382	400	418	440	502	408	427	446	469	538
	DISTANCE	NM	31	32	33	35	45	34	35	37	38	49
	TIME	MIN	6	7	7	7	9	7	7	7	7	9
36000	FUEL	KG	368	386	403	424	482	393	411	430	452	517
	DISTANCE	NM	30	31	32	34	43	33	34	35	37	47
	TIME	MIN	6	6	6	7	8	7	7	7	7	9
35000	FUEL	KG	354	371	388	408	463	378	396	414	435	496
	DISTANCE	NM	29	30	31	32	41	31	33	34	35	45
	TIME	MIN	6	6	6	6	8	6	7	7	7	9
34000	FUEL	KG	341	358	374	393	445	364	381	398	418	476
	DISTANCE	NM	27	29	30	31	40	30	31	33	34	44
	TIME	MIN	6	6	6	6	8	6	6	6	7	8
33000	FUEL	KG	329	344	360	378	428	350	367	383	403	457
	DISTANCE	NM	26	27	29	30	38	29	30	31	33	42
	TIME	MIN	5	6	6	6	7	6	6	6	6	8
32000	FUEL	KG	316	331	346	364	411	337	353	369	387	439
	DISTANCE	NM	25	26	28	29	36	28	29	30	32	40
	TIME	MIN	5	5	6	6	7	6	6	6	6	8
31000	FUEL	KG	304	319	333	350	395	324	339	355	372	422
	DISTANCE	NM	24	25	27	28	35	27	28	29	30	38
	TIME	MIN	5	5	5	5	7	5	6	6	6	7
For												
Anti-	FUEL	(%)	4	4	3	5	4	4	4	3	6	4
ice ON,	DISTANCE	(%)	3	3	3	7	5	3	3	3	8	6
increase	TIME	(%)	3	3	3	7	5	3	3	3	7	6



CLIMB PLANNING - ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: SEA LEVEL TO 17000 AND 18000 FT

SPEED SCHEDULE: 240 KIAS UP TO 10000 FT, INCREASING LINEARLY TO 290 KIAS AT 12000 FT,
MAINTAINING 290 KIAS UP TO 25400 FT AND MACH 0.70 ABOVE 25400 FT.

CRUISE CONFIGURATION
BLEED: OPEN

WEIGHT (KG)			17000 FT ISA + °C					18000 FT ISA + °C				
			-20	-10	0	10	20	-20	-10	0	10	20
30000	FUEL	KG	293	307	320	337	379	311	326	341	358	405
	DISTANCE	NM	23	24	25	27	34	26	27	28	29	37
	TIME	MIN	5	5	5	5	6	5	5	5	6	7
29000	FUEL	KG	281	295	308	324	364	299	314	328	344	389
	DISTANCE	NM	23	23	24	26	32	25	26	27	28	35
	TIME	MIN	5	5	5	5	6	5	5	5	5	7
28000	FUEL	KG	270	283	296	311	349	287	301	315	331	373
	DISTANCE	NM	22	23	23	25	31	24	25	26	27	34
	TIME	MIN	5	5	5	5	6	5	5	5	5	6
27000	FUEL	KG	259	272	284	298	335	276	289	302	317	357
	DISTANCE	NM	21	22	23	24	30	23	24	25	26	33
	TIME	MIN	4	4	5	5	6	5	5	5	5	6
26000	FUEL	KG	248	260	272	286	321	264	277	289	304	342
	DISTANCE	NM	20	21	22	23	28	22	23	24	25	31
	TIME	MIN	4	4	4	4	5	4	5	5	5	6
25000	FUEL	KG	238	249	260	274	307	253	265	277	291	327
	DISTANCE	NM	19	20	21	22	27	21	22	23	24	30
	TIME	MIN	4	4	4	4	5	4	4	4	5	6
24000	FUEL	KG	228	238	249	262	293	242	254	265	278	313
	DISTANCE	NM	18	19	20	21	26	20	21	22	23	28
	TIME	MIN	4	4	4	4	5	4	4	4	4	5
23000	FUEL	KG	217	228	238	250	280	231	242	253	266	298
	DISTANCE	NM	17	18	19	20	25	19	20	21	21	27
	TIME	MIN	4	4	4	4	5	4	4	4	4	5
22000	FUEL	KG	207	217	227	238	266	220	231	241	253	284
	DISTANCE	NM	16	17	18	19	24	18	19	20	20	26
	TIME	MIN	3	4	4	4	5	4	4	4	4	5
21000	FUEL	KG	197	206	216	227	253	210	220	230	241	270
	DISTANCE	NM	16	16	17	18	22	17	18	19	19	25
	TIME	MIN	3	3	3	4	4	4	4	4	4	5
For												
Anti- ice ON, increase	FUEL	(%)	4	4	3	5	3	4	4	3	5	4
	DISTANCE	(%)	3	3	3	7	5	3	3	3	7	6
	TIME	(%)	3	3	3	6	4	3	3	3	7	5

CLIMB PLANNING - ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: SEA LEVEL TO 19000 AND 20000 FT

SPEED SCHEDULE: 240 KIAS UP TO 10000 FT, INCREASING LINEARLY TO 290 KIAS AT 12000 FT, MAINTAINING 290 KIAS UP TO 25400 FT AND MACH 0.70 ABOVE 25400 FT.

CRUISE CONFIGURATION

BLEED: OPEN

WEIGHT (KG)			19000 FT ISA + °C					20000 FT ISA + °C				
			-20	-10	0	10	20	-20	-10	0	10	20
38000	FUEL	KG	451	472	493	518	599	479	502	524	551	638
	DISTANCE	NM	38	40	42	44	56	42	44	46	48	62
	TIME	MIN	8	8	8	8	10	8	8	9	9	11
37000	FUEL	KG	434	455	475	499	575	461	483	505	530	613
	DISTANCE	NM	37	39	40	42	54	40	42	44	46	59
	TIME	MIN	7	8	8	8	10	8	8	8	9	11
36000	FUEL	KG	418	438	457	480	552	444	465	486	510	588
	DISTANCE	NM	36	37	39	40	52	39	40	42	44	57
	TIME	MIN	7	7	7	8	10	8	8	8	8	10
35000	FUEL	KG	402	421	440	462	530	427	448	468	491	565
	DISTANCE	NM	34	36	37	39	50	37	39	41	42	55
	TIME	MIN	7	7	7	7	9	7	8	8	8	10
34000	FUEL	KG	387	405	424	445	509	411	431	450	472	542
	DISTANCE	NM	33	34	36	37	48	36	37	39	41	52
	TIME	MIN	7	7	7	7	9	7	7	7	8	9
33000	FUEL	KG	372	390	407	428	488	395	414	432	454	520
	DISTANCE	NM	32	33	34	36	46	34	36	37	39	50
	TIME	MIN	6	6	7	7	8	7	7	7	7	9
32000	FUEL	KG	358	375	392	412	468	380	398	416	437	499
	DISTANCE	NM	30	32	33	34	44	33	35	36	38	48
	TIME	MIN	6	6	6	7	8	7	7	7	7	9
31000	FUEL	KG	344	361	377	396	449	365	382	400	420	478
	DISTANCE	NM	29	30	32	33	42	32	33	34	36	46
	TIME	MIN	6	6	6	6	8	6	6	7	7	8
For												
Anti-ice ON, increase	FUEL	(%)	4	4	3	6	5	4	4	4	6	6
	DISTANCE	(%)	3	3	3	8	7	4	3	3	9	8
	TIME	(%)	3	3	3	8	6	3	3	3	8	7



CLIMB PLANNING - ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: SEA LEVEL TO 19000 AND 20000 FT

SPEED SCHEDULE: 240 KIAS UP TO 10000 FT, INCREASING LINEARLY TO 290 KIAS AT 12000 FT,
MAINTAINING 290 KIAS UP TO 25400 FT AND MACH 0.70 ABOVE 25400 FT.

CRUISE CONFIGURATION

BLEED: OPEN

WEIGHT (KG)			19000 FT ISA + °C					20000 FT ISA + °C				
			-20	-10	0	10	20	-20	-10	0	10	20
30000	FUEL	KG	331	346	362	380	431	351	367	384	403	458
	DISTANCE	NM	28	29	30	32	40	30	32	33	35	44
	TIME	MIN	6	6	6	6	7	6	6	6	6	8
29000	FUEL	KG	318	333	348	365	414	337	353	368	387	440
	DISTANCE	NM	27	28	29	30	39	29	30	32	33	42
	TIME	MIN	5	6	6	6	7	6	6	6	6	8
28000	FUEL	KG	305	320	334	351	397	323	339	354	371	421
	DISTANCE	NM	26	27	28	29	37	28	29	30	32	40
	TIME	MIN	5	5	5	6	7	6	6	6	6	7
27000	FUEL	KG	293	307	320	336	380	310	325	339	356	404
	DISTANCE	NM	25	26	27	28	36	27	28	29	30	39
	TIME	MIN	5	5	5	5	7	5	5	6	6	7
26000	FUEL	KG	281	294	307	322	364	297	311	325	341	387
	DISTANCE	NM	24	25	26	27	34	26	27	28	29	37
	TIME	MIN	5	5	5	5	6	5	5	5	5	7
25000	FUEL	KG	269	281	294	309	348	285	298	311	327	370
	DISTANCE	NM	23	24	25	26	33	25	26	27	28	35
	TIME	MIN	5	5	5	5	6	5	5	5	5	6
24000	FUEL	KG	257	269	281	295	333	272	285	298	313	353
	DISTANCE	NM	22	23	24	25	31	24	25	26	27	34
	TIME	MIN	4	4	5	5	6	5	5	5	5	6
23000	FUEL	KG	245	257	268	282	318	260	272	284	298	337
	DISTANCE	NM	21	22	22	23	30	22	23	24	25	32
	TIME	MIN	4	4	4	4	6	4	5	5	5	6
22000	FUEL	KG	234	245	256	269	303	248	259	271	285	321
	DISTANCE	NM	20	20	21	22	28	21	22	23	24	31
	TIME	MIN	4	4	4	4	5	4	4	4	5	6
21000	FUEL	KG	223	233	244	256	288	236	247	258	271	305
	DISTANCE	NM	19	19	20	21	27	20	21	22	23	29
	TIME	MIN	4	4	4	4	5	4	4	4	4	5
For												
Anti- ice ON, increase	FUEL	(%)	4	4	3	5	5	4	4	3	6	5
	DISTANCE	(%)	3	3	3	8	7	3	3	3	8	7
	TIME	(%)	3	3	3	7	6	3	3	3	8	7

CLIMB PLANNING - ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: SEA LEVEL TO 21000 AND 22000 FT

SPEED SCHEDULE: 240 KIAS UP TO 10000 FT, INCREASING LINEARLY TO 290 KIAS AT 12000 FT, MAINTAINING 290 KIAS UP TO 25400 FT AND MACH 0.70 ABOVE 25400 FT.

CRUISE CONFIGURATION

BLEED: OPEN

WEIGHT (KG)			21000 FT ISA + °C					22000 FT ISA + °C				
			-20	-10	0	10	20	-20	-10	0	10	20
38000	FUEL	KG	508	532	556	584	679	538	564	589	618	722
	DISTANCE	NM	46	48	50	52	68	50	52	54	57	74
	TIME	MIN	9	9	9	9	12	10	10	10	10	13
37000	FUEL	KG	489	512	535	562	652	518	543	567	595	693
	DISTANCE	NM	44	46	48	50	65	48	50	52	54	71
	TIME	MIN	9	9	9	9	12	9	9	10	10	12
36000	FUEL	KG	471	493	515	541	625	498	522	545	572	665
	DISTANCE	NM	42	44	46	48	62	46	48	50	52	68
	TIME	MIN	8	8	9	9	11	9	9	9	9	12
35000	FUEL	KG	453	474	495	520	600	479	502	524	550	638
	DISTANCE	NM	41	42	44	46	60	44	46	48	50	65
	TIME	MIN	8	8	8	8	11	8	9	9	9	11
34000	FUEL	KG	435	456	476	500	576	461	483	504	529	611
	DISTANCE	NM	39	41	42	44	57	43	44	46	48	62
	TIME	MIN	8	8	8	8	10	8	8	9	9	11
33000	FUEL	KG	419	438	458	481	552	443	464	484	508	586
	DISTANCE	NM	38	39	41	43	55	41	43	44	46	60
	TIME	MIN	7	7	8	8	10	8	8	8	8	11
32000	FUEL	KG	402	421	440	462	529	425	446	465	489	562
	DISTANCE	NM	36	38	39	41	52	39	41	43	44	57
	TIME	MIN	7	7	7	8	9	8	8	8	8	10
31000	FUEL	KG	386	405	423	444	507	409	428	447	469	538
	DISTANCE	NM	35	36	38	39	50	38	39	41	43	55
	TIME	MIN	7	7	7	7	9	7	7	8	8	10
For												
Anti-ice ON, increase	FUEL	(%)	4	4	4	7	6	4	4	4	7	7
	DISTANCE	(%)	4	3	3	9	9	4	3	3	10	10
	TIME	(%)	3	3	3	9	8	4	3	3	9	9



CLIMB PLANNING - ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: SEA LEVEL TO 21000 AND 22000 FT

SPEED SCHEDULE: 240 KIAS UP TO 10000 FT, INCREASING LINEARLY TO 290 KIAS AT 12000 FT,
MAINTAINING 290 KIAS UP TO 25400 FT AND MACH 0.70 ABOVE 25400 FT.

CRUISE CONFIGURATION
BLEED: OPEN

WEIGHT (KG)			21000 FT ISA + °C					22000 FT ISA + °C				
			-20	-10	0	10	20	-20	-10	0	10	20
30000	FUEL	KG	371	389	406	426	486	392	411	429	450	516
	DISTANCE	NM	33	35	36	38	48	36	38	39	41	52
	TIME	MIN	6	7	7	7	9	7	7	7	7	9
29000	FUEL	KG	356	373	390	409	466	376	394	412	432	494
	DISTANCE	NM	32	33	35	36	46	35	36	38	39	50
	TIME	MIN	6	6	6	7	8	7	7	7	7	9
28000	FUEL	KG	342	358	374	392	446	361	378	395	414	473
	DISTANCE	NM	31	32	33	35	44	33	35	36	37	48
	TIME	MIN	6	6	6	6	8	6	7	7	7	8
27000	FUEL	KG	327	343	358	376	427	346	362	378	397	452
	DISTANCE	NM	29	30	32	33	42	32	33	34	36	46
	TIME	MIN	6	6	6	6	8	6	6	6	7	8
26000	FUEL	KG	314	329	343	361	409	331	347	362	380	433
	DISTANCE	NM	28	29	30	32	40	30	32	33	34	44
	TIME	MIN	5	6	6	6	7	6	6	6	6	8
25000	FUEL	KG	300	315	329	345	391	317	332	347	364	414
	DISTANCE	NM	27	28	29	30	38	29	30	32	33	42
	TIME	MIN	5	5	5	6	7	6	6	6	6	7
24000	FUEL	KG	287	301	314	330	374	303	317	332	348	395
	DISTANCE	NM	26	27	28	29	37	28	29	30	31	40
	TIME	MIN	5	5	5	5	7	5	5	6	6	7
23000	FUEL	KG	274	287	300	315	357	289	303	317	332	377
	DISTANCE	NM	24	25	26	28	35	26	28	29	30	38
	TIME	MIN	5	5	5	5	6	5	5	5	5	7
22000	FUEL	KG	262	274	286	300	340	276	289	302	317	359
	DISTANCE	NM	23	24	25	26	33	25	26	27	29	36
	TIME	MIN	5	5	5	5	6	5	5	5	5	6
21000	FUEL	KG	249	261	272	286	323	262	275	287	301	342
	DISTANCE	NM	22	23	24	25	32	24	25	26	27	34
	TIME	MIN	4	4	5	5	6	5	5	5	5	6
For												
Anti-ice ON, increase	FUEL	(%)	4	4	4	6	6	4	4	4	6	6
	DISTANCE	(%)	3	3	3	8	8	3	3	3	9	9
	TIME	(%)	3	3	3	8	7	3	3	3	8	8

CLIMB PLANNING - ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: SEA LEVEL TO 23000 AND 24000 FT

SPEED SCHEDULE: 240 KIAS UP TO 10000 FT, INCREASING LINEARLY TO 290 KIAS AT 12000 FT, MAINTAINING 290 KIAS UP TO 25400 FT AND MACH 0.70 ABOVE 25400 FT.

CRUISE CONFIGURATION

BLEED: OPEN

WEIGHT (KG)			23000 FT ISA + °C					24000 FT ISA + °C				
			-20	-10	0	10	20	-20	-10	0	10	20
38000	FUEL	KG	570	597	623	654	768	604	632	660	693	818
	DISTANCE	NM	55	57	59	62	81	60	62	65	67	89
	TIME	MIN	10	10	11	11	14	11	11	11	12	15
37000	FUEL	KG	548	574	600	629	737	580	608	635	666	784
	DISTANCE	NM	52	55	57	59	78	57	60	62	65	85
	TIME	MIN	10	10	10	11	13	11	11	11	11	15
36000	FUEL	KG	527	552	577	605	706	558	584	610	640	751
	DISTANCE	NM	50	53	55	57	74	55	57	60	62	82
	TIME	MIN	9	10	10	10	13	10	10	11	11	14
35000	FUEL	KG	507	531	555	582	677	536	562	587	615	720
	DISTANCE	NM	48	50	52	55	71	53	55	57	60	78
	TIME	MIN	9	9	9	10	12	10	10	10	10	13
34000	FUEL	KG	487	511	533	559	649	515	540	564	591	689
	DISTANCE	NM	46	48	50	52	68	51	53	55	57	75
	TIME	MIN	9	9	9	9	12	9	10	10	10	13
33000	FUEL	KG	468	490	512	537	622	495	518	541	568	660
	DISTANCE	NM	45	46	48	50	65	49	51	53	55	71
	TIME	MIN	8	9	9	9	11	9	9	9	10	12
32000	FUEL	KG	450	471	492	516	596	475	498	520	545	632
	DISTANCE	NM	43	45	46	48	62	47	49	50	53	68
	TIME	MIN	8	8	8	9	11	9	9	9	9	12
31000	FUEL	KG	432	452	472	495	571	456	477	499	523	605
	DISTANCE	NM	41	43	44	46	60	45	46	48	50	65
	TIME	MIN	8	8	8	8	10	8	8	9	9	11
For												
Anti-	FUEL	(%)	4	4	4	7	8	4	4	4	8	9
ice ON,	DISTANCE	(%)	4	3	3	10	11	4	3	3	11	12
increase	TIME	(%)	4	3	3	10	10	4	3	3	10	11



CLIMB PLANNING - ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: SEA LEVEL TO 23000 AND 24000 FT

SPEED SCHEDULE: 240 KIAS UP TO 10000 FT, INCREASING LINEARLY TO 290 KIAS AT 12000 FT,
MAINTAINING 290 KIAS UP TO 25400 FT AND MACH 0.70 ABOVE 25400 FT.

CRUISE CONFIGURATION

BLEED: OPEN

WEIGHT (KG)			23000 FT ISA + °C					24000 FT ISA + °C				
			-20	-10	0	10	20	-20	-10	0	10	20
30000	FUEL	KG	-20	-10	0	10	20	-20	-10	0	10	20
	DISTANCE	NM	414	434	453	475	546	437	458	478	502	579
	TIME	MIN	39 7	41 8	43 8	44 8	57 10	43 8	45 8	46 8	48 8	62 11
29000	FUEL	KG										
	DISTANCE	NM	397	416	434	456	523	419	439	458	481	554
	TIME	MIN	38 7	39 7	41 7	43 8	55 9	41 8	43 8	44 8	46 8	59 10
28000	FUEL	KG										
	DISTANCE	NM	381	399	416	437	500	401	421	439	461	529
	TIME	MIN	36 7	38 7	39 7	41 7	52 9	39 7	41 7	42 8	44 8	57 10
27000	FUEL	KG										
	DISTANCE	NM	364	382	399	419	478	384	403	421	441	506
	TIME	MIN	34 7	36 7	37 7	39 7	50 9	37 7	39 7	41 7	42 7	54 9
26000	FUEL	KG										
	DISTANCE	NM	349	366	382	401	457	368	385	402	422	483
	TIME	MIN	33 6	34 6	36 7	37 7	48 8	36 7	37 7	39 7	40 7	52 9
25000	FUEL	KG										
	DISTANCE	NM	334	350	365	383	437	352	368	385	404	462
	TIME	MIN	31 6	33 6	34 6	36 6	45 8	34 6	36 7	37 7	39 7	49 8
24000	FUEL	KG										
	DISTANCE	NM	319	334	349	367	418	336	352	368	386	441
	TIME	MIN	30 6	31 6	33 6	34 6	43 8	33 6	34 6	35 6	37 7	47 8
23000	FUEL	KG										
	DISTANCE	NM	305	319	333	350	398	321	336	351	368	420
	TIME	MIN	29 5	30 6	31 6	32 6	41 7	31 6	32 6	34 6	35 6	45 8
22000	FUEL	KG										
	DISTANCE	NM	290	304	318	334	379	306	320	335	351	400
	TIME	MIN	27 5	28 5	30 5	31 6	39 7	30 6	31 6	32 6	33 6	43 7
21000	FUEL	KG										
	DISTANCE	NM	276	290	303	317	361	291	305	318	334	381
	TIME	MIN	26 5	27 5	28 5	29 5	37 7	28 5	29 5	31 6	32 6	41 7
For Anti-ice ON, increase												
FUEL (%)												
DISTANCE (%)			4	4	4	7	7	4	4	4	7	8
TIME (%)			4	3	3	9	10	4	3	3	10	11

CLIMB PLANNING - ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: SEA LEVEL TO 25000 AND 26000 FT

SPEED SCHEDULE: 240 KIAS UP TO 10000 FT, INCREASING LINEARLY TO 290 KIAS AT 12000 FT, MAINTAINING 290 KIAS UP TO 25400 FT AND MACH 0.70 ABOVE 25400 FT.

CRUISE CONFIGURATION

BLEED: OPEN

WEIGHT (KG)			25000 FT ISA + °C					26000 FT ISA + °C				
			-19	-10	0	10	20	-18	-10	0	10	20
38000	FUEL	KG	643	670	700	734	873	679	705	736	772	925
	DISTANCE	NM	66	68	71	74	98	71	74	76	80	107
	TIME	MIN	12	12	12	13	16	13	13	13	13	18
37000	FUEL	KG	618	644	672	705	836	652	677	707	741	884
	DISTANCE	NM	63	65	68	71	94	68	70	73	76	102
	TIME	MIN	11	12	12	12	16	12	12	13	13	17
36000	FUEL	KG	593	619	646	677	800	626	650	678	711	845
	DISTANCE	NM	60	63	65	68	90	65	68	70	73	98
	TIME	MIN	11	11	11	12	15	12	12	12	12	16
35000	FUEL	KG	570	594	621	651	765	601	623	651	683	808
	DISTANCE	NM	58	60	62	65	86	63	65	67	70	93
	TIME	MIN	11	11	11	11	14	11	11	12	12	15
34000	FUEL	KG	547	571	596	625	733	576	598	625	655	773
	DISTANCE	NM	55	58	60	62	82	60	62	65	67	89
	TIME	MIN	10	10	11	11	14	11	11	11	11	15
33000	FUEL	KG	525	548	572	600	701	553	574	600	629	739
	DISTANCE	NM	53	55	57	60	78	57	59	62	64	85
	TIME	MIN	10	10	10	10	13	10	11	11	11	14
32000	FUEL	KG	504	526	549	576	671	531	551	575	603	707
	DISTANCE	NM	51	53	55	57	75	55	57	59	62	81
	TIME	MIN	9	9	10	10	13	10	10	10	11	13
31000	FUEL	KG	483	504	527	552	642	509	528	552	578	675
	DISTANCE	NM	49	51	53	55	71	53	54	57	59	77
	TIME	MIN	9	9	9	9	12	9	10	10	10	13
For												
Anti-	FUEL	(%)	4	4	4	9	10	4	4	4	9	12
ice ON,	DISTANCE	(%)	4	3	3	12	14	4	3	3	12	16
increase	TIME	(%)	4	3	3	11	13	4	3	3	12	14



CLIMB PLANNING - ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: SEA LEVEL TO 25000 AND 26000 FT

SPEED SCHEDULE: 240 KIAS UP TO 10000 FT, INCREASING LINEARLY TO 290 KIAS AT 12000 FT,
MAINTAINING 290 KIAS UP TO 25400 FT AND MACH 0.70 ABOVE 25400 FT.

CRUISE CONFIGURATION

BLEED: OPEN

WEIGHT (KG)			25000 FT ISA + °C					26000 FT ISA + °C				
			-19	-10	0	10	20	-18	-10	0	10	20
30000	FUEL	KG	463	483	505	529	614	487	506	528	554	645
	DISTANCE	NM	47	48	50	52	68	50	52	54	56	74
	TIME	MIN	9	9	9	9	11	9	9	9	10	12
29000	FUEL	KG	444	463	484	507	587	467	484	506	531	617
	DISTANCE	NM	45	46	48	50	65	48	50	52	54	70
	TIME	MIN	8	8	9	9	11	9	9	9	9	12
28000	FUEL	KG	425	443	463	486	561	447	464	484	508	589
	DISTANCE	NM	43	44	46	48	62	46	48	49	52	67
	TIME	MIN	8	8	8	8	10	8	8	9	9	11
27000	FUEL	KG	407	424	443	465	535	427	444	463	486	562
	DISTANCE	NM	41	42	44	46	59	44	45	47	49	64
	TIME	MIN	7	8	8	8	10	8	8	8	8	11
26000	FUEL	KG	389	406	424	445	511	408	424	443	465	536
	DISTANCE	NM	39	40	42	44	56	42	43	45	47	61
	TIME	MIN	7	7	7	8	10	8	8	8	8	10
25000	FUEL	KG	372	388	405	425	488	390	405	423	444	511
	DISTANCE	NM	37	39	40	42	54	40	41	43	45	58
	TIME	MIN	7	7	7	7	9	7	7	8	8	10
24000	FUEL	KG	355	370	387	406	465	372	387	404	424	487
	DISTANCE	NM	35	37	38	40	51	38	39	41	43	55
	TIME	MIN	7	7	7	7	9	7	7	7	7	9
23000	FUEL	KG	339	353	369	387	443	355	369	385	404	464
	DISTANCE	NM	34	35	36	38	49	36	38	39	41	52
	TIME	MIN	6	6	6	7	8	7	7	7	7	9
22000	FUEL	KG	323	337	352	369	422	338	351	367	385	442
	DISTANCE	NM	32	33	35	36	46	35	36	37	39	50
	TIME	MIN	6	6	6	6	8	6	6	7	7	8
21000	FUEL	KG	307	320	335	351	402	322	334	349	366	420
	DISTANCE	NM	31	32	33	34	44	33	34	35	37	47
	TIME	MIN	6	6	6	6	7	6	6	6	6	8
For												
Anti-ice ON, increase	FUEL	(%)	4	4	4	8	8	4	4	4	8	9
	DISTANCE	(%)	4	3	3	10	12	4	3	3	11	13
	TIME	(%)	3	3	3	10	11	3	3	3	10	12

CLIMB PLANNING - ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: SEA LEVEL TO 27000 AND 28000 FT

SPEED SCHEDULE: 240 KIAS UP TO 10000 FT, INCREASING LINEARLY TO 290 KIAS AT 12000 FT, MAINTAINING 290 KIAS UP TO 25400 FT AND MACH 0.70 ABOVE 25400 FT.

CRUISE CONFIGURATION

BLEED: OPEN

WEIGHT (KG)			27000 FT ISA + °C					28000 FT ISA + °C				
			-17	-10	0	10	20	-16	-10	0	10	20
38000	FUEL	KG	713	736	769	806	972	747	768	802	841	1019
	DISTANCE	NM	77	79	82	85	116	82	84	88	91	124
	TIME	MIN	14	14	14	14	19	14	15	15	15	20
37000	FUEL	KG	684	706	738	773	928	716	736	769	806	972
	DISTANCE	NM	73	75	78	82	110	79	81	84	87	118
	TIME	MIN	13	13	13	14	18	14	14	14	14	19
36000	FUEL	KG	656	678	708	742	886	687	706	738	773	927
	DISTANCE	NM	70	72	75	78	105	75	77	80	83	112
	TIME	MIN	12	13	13	13	17	13	13	14	14	18
35000	FUEL	KG	629	650	679	712	846	658	677	707	741	885
	DISTANCE	NM	67	69	72	75	100	72	74	77	80	107
	TIME	MIN	12	12	12	13	16	13	13	13	13	17
34000	FUEL	KG	603	623	651	683	809	631	649	678	711	845
	DISTANCE	NM	64	66	69	72	95	69	70	73	76	102
	TIME	MIN	11	12	12	12	16	12	12	12	13	16
33000	FUEL	KG	579	598	625	655	773	605	622	650	681	807
	DISTANCE	NM	62	63	66	69	91	66	67	70	73	97
	TIME	MIN	11	11	11	12	15	12	12	12	12	16
32000	FUEL	KG	555	573	599	628	738	579	596	623	653	770
	DISTANCE	NM	59	61	63	66	87	63	64	67	70	92
	TIME	MIN	10	11	11	11	14	11	11	11	12	15
31000	FUEL	KG	531	549	574	602	705	555	571	596	625	735
	DISTANCE	NM	56	58	60	63	83	60	62	64	67	88
	TIME	MIN	10	10	10	11	14	11	11	11	11	14
For												
Anti-ice ON, increase	FUEL	(%)	4	4	4	10	13	5	4	4	10	14
	DISTANCE	(%)	4	4	3	13	17	4	4	3	14	19
	TIME	(%)	4	3	3	12	16	4	4	3	13	17



CLIMB PLANNING - ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: SEA LEVEL TO 27000 AND 28000 FT

SPEED SCHEDULE: 240 KIAS UP TO 10000 FT, INCREASING LINEARLY TO 290 KIAS AT 12000 FT,
MAINTAINING 290 KIAS UP TO 25400 FT AND MACH 0.70 ABOVE 25400 FT.

CRUISE CONFIGURATION

BLEED: OPEN

WEIGHT (KG)			27000 FT ISA + °C					28000 FT ISA + °C				
			-17	-10	0	10	20	-16	-10	0	10	20
30000	FUEL	KG	509	526	550	576	674	531	546	571	598	702
	DISTANCE	NM	54	55	58	60	79	57	59	61	64	84
	TIME	MIN	10	10	10	10	13	10	10	10	11	14
29000	FUEL	KG	487	504	526	552	643	508	523	546	573	669
	DISTANCE	NM	51	53	55	57	75	55	56	59	61	80
	TIME	MIN	9	9	9	10	12	10	10	10	10	13
28000	FUEL	KG	466	482	503	528	614	486	500	523	548	638
	DISTANCE	NM	49	51	53	55	71	52	54	56	58	76
	TIME	MIN	9	9	9	9	12	9	9	10	10	12
27000	FUEL	KG	446	461	481	505	585	465	478	499	524	609
	DISTANCE	NM	47	48	50	52	68	50	51	53	55	72
	TIME	MIN	8	8	9	9	11	9	9	9	9	12
26000	FUEL	KG	426	440	460	482	558	444	456	477	500	580
	DISTANCE	NM	45	46	48	50	65	48	49	51	53	69
	TIME	MIN	8	8	8	8	11	8	9	9	9	11
25000	FUEL	KG	407	420	439	460	532	423	436	455	477	553
	DISTANCE	NM	43	44	46	48	61	45	46	48	50	65
	TIME	MIN	8	8	8	8	10	8	8	8	8	11
24000	FUEL	KG	388	401	419	439	507	404	415	434	455	526
	DISTANCE	NM	41	42	43	45	58	43	44	46	48	62
	TIME	MIN	7	7	8	8	10	8	8	8	8	10
23000	FUEL	KG	370	382	399	419	482	385	396	414	434	500
	DISTANCE	NM	39	40	41	43	56	41	42	44	46	59
	TIME	MIN	7	7	7	7	9	7	7	8	8	10
22000	FUEL	KG	352	364	380	399	459	366	377	394	413	476
	DISTANCE	NM	37	38	39	41	53	39	40	42	43	56
	TIME	MIN	7	7	7	7	9	7	7	7	7	9
21000	FUEL	KG	335	346	362	379	436	348	358	374	393	452
	DISTANCE	NM	35	36	37	39	50	37	38	40	41	53
	TIME	MIN	6	6	6	7	8	7	7	7	7	9

For												
Anti-	FUEL	(%)	4	4	4	8	10	4	4	4	9	10
ice ON,	DISTANCE	(%)	4	3	3	11	14	4	3	3	12	14
increase	TIME	(%)	3	3	3	11	12	4	3	3	11	13

CLIMB PLANNING - ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: SEA LEVEL TO 29000 AND 30000 FT

SPEED SCHEDULE: 240 KIAS UP TO 10000 FT, INCREASING LINEARLY TO 290 KIAS AT 12000 FT, MAINTAINING 290 KIAS UP TO 25400 FT AND MACH 0.70 ABOVE 25400 FT.

CRUISE CONFIGURATION

BLEED: OPEN

WEIGHT (KG)			29000 FT ISA + °C					30000 FT ISA + °C				
			-15	-10	0	10	20	-14	-10	0	10	20
38000	FUEL	KG	783	801	837	877	1069	822	837	875	916	1122
	DISTANCE	NM	88	90	94	97	134	95	97	100	104	144
	TIME	MIN	15	15	16	16	21	16	16	17	17	23
37000	FUEL	KG	750	767	802	840	1017	786	800	836	876	1066
	DISTANCE	NM	84	86	89	93	127	90	92	96	100	136
	TIME	MIN	15	15	15	15	20	15	16	16	16	22
36000	FUEL	KG	718	735	768	805	970	752	766	800	838	1013
	DISTANCE	NM	81	82	86	89	120	86	88	91	95	129
	TIME	MIN	14	14	14	15	19	15	15	15	16	20
35000	FUEL	KG	688	704	736	771	924	719	733	766	802	965
	DISTANCE	NM	77	79	82	85	114	82	84	87	91	122
	TIME	MIN	13	13	14	14	18	14	14	15	15	19
34000	FUEL	KG	659	675	705	739	882	689	701	733	768	919
	DISTANCE	NM	74	75	78	81	109	79	80	83	87	116
	TIME	MIN	13	13	13	13	17	13	14	14	14	18
33000	FUEL	KG	631	646	676	708	841	659	671	702	735	876
	DISTANCE	NM	70	72	75	78	104	75	76	79	83	110
	TIME	MIN	12	12	13	13	17	13	13	13	14	18
32000	FUEL	KG	605	619	647	678	802	631	643	672	704	835
	DISTANCE	NM	67	69	71	74	98	72	73	76	79	105
	TIME	MIN	12	12	12	12	16	12	12	13	13	17
31000	FUEL	KG	579	592	619	649	765	603	615	643	673	796
	DISTANCE	NM	64	65	68	71	94	68	69	72	75	100
	TIME	MIN	11	11	11	12	15	12	12	12	12	16
For												
Anti-	FUEL	(%)	5	4	4	11	15	5	5	4	12	17
Ice ON,	DISTANCE	(%)	4	4	3	15	20	4	4	4	16	22
increase	TIME	(%)	4	4	3	14	19	4	4	3	15	21

CLIMB PLANNING - ALL ENGINES OPERATING**CF34-8E5 ENGINES****ALTITUDE: SEA LEVEL TO 29000 AND 30000 FT**

SPEED SCHEDULE: 240 KIAS UP TO 10000 FT, INCREASING LINEARLY TO 290 KIAS AT 12000 FT,
MAINTAINING 290 KIAS UP TO 25400 FT AND MACH 0.70 ABOVE 25400 FT.

CRUISE CONFIGURATION

BLEED: OPEN

WEIGHT (KG)			29000 FT ISA + °C					30000 FT ISA + °C				
			-15	-10	0	10	20	-14	-10	0	10	20
30000	FUEL	KG	554	567	593	621	730	577	588	615	644	758
	DISTANCE	NM	61	62	65	68	89	65	66	69	72	95
	TIME	MIN	11	11	11	11	14	11	11	12	12	15
29000	FUEL	KG	530	542	567	594	696	551	562	587	616	723
	DISTANCE	NM	58	60	62	65	85	62	63	66	69	90
	TIME	MIN	10	10	10	11	14	11	11	11	11	14
28000	FUEL	KG	506	518	542	568	663	527	537	561	588	688
	DISTANCE	NM	56	57	59	62	81	59	60	63	65	85
	TIME	MIN	10	10	10	10	13	10	10	11	11	14
27000	FUEL	KG	484	495	518	543	632	503	513	536	562	656
	DISTANCE	NM	53	54	56	59	77	56	57	60	62	81
	TIME	MIN	9	9	10	10	12	10	10	10	10	13
26000	FUEL	KG	462	473	494	518	602	480	489	512	536	624
	DISTANCE	NM	51	52	54	56	73	54	55	57	59	77
	TIME	MIN	9	9	9	9	12	9	9	10	10	12
25000	FUEL	KG	441	451	471	494	573	458	467	488	511	594
	DISTANCE	NM	48	49	51	53	69	51	52	54	56	73
	TIME	MIN	8	9	9	9	11	9	9	9	9	12
24000	FUEL	KG	420	430	449	471	545	436	445	465	487	565
	DISTANCE	NM	46	47	49	51	66	49	49	51	54	69
	TIME	MIN	8	8	8	8	11	8	9	9	9	11
23000	FUEL	KG	400	409	428	449	519	415	423	443	464	537
	DISTANCE	NM	44	44	46	48	62	46	47	49	51	66
	TIME	MIN	8	8	8	8	10	8	8	8	8	11
22000	FUEL	KG	380	390	407	427	493	395	402	421	441	510
	DISTANCE	NM	41	42	44	46	59	44	45	46	48	62
	TIME	MIN	7	7	8	8	10	8	8	8	8	10
21000	FUEL	KG	362	370	387	406	468	375	382	400	419	483
	DISTANCE	NM	39	40	42	43	56	42	42	44	46	59
	TIME	MIN	7	7	7	7	9	7	7	7	8	10

For												
Anti-	FUEL	(%)	4	4	4	9	11	4	4	4	9	12
Ice ON,	DISTANCE	(%)	4	3	3	12	15	4	4	3	13	16
increase	TIME	(%)	4	3	3	12	14	4	3	3	12	15

CLIMB PLANNING - ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: SEA LEVEL TO 31000 AND 32000 FT

SPEED SCHEDULE: 240 KIAS UP TO 10000 FT, INCREASING LINEARLY TO 290 KIAS AT 12000 FT, MAINTAINING 290 KIAS UP TO 25400 FT AND MACH 0.70 ABOVE 25400 FT.

CRUISE CONFIGURATION

BLEED: OPEN

WEIGHT (KG)			31000 FT ISA + °C					32000 FT ISA + °C				
			-13	-10	0	10	20	-12	-10	0	10	20
38000	FUEL	KG	863	876	915	958	1181	909	917	959	1004	1246
	DISTANCE	NM	102	104	108	112	156	111	112	116	121	169
	TIME	MIN	17	17	18	18	24	19	19	19	19	26
37000	FUEL	KG	824	836	873	915	1118	866	874	913	956	1176
	DISTANCE	NM	97	99	103	107	147	105	106	110	115	159
	TIME	MIN	16	17	17	17	23	18	18	18	18	25
36000	FUEL	KG	787	798	834	874	1061	825	833	871	912	1112
	DISTANCE	NM	93	94	98	102	139	100	100	105	109	149
	TIME	MIN	16	16	16	16	22	17	17	17	17	23
35000	FUEL	KG	752	762	797	835	1008	787	794	830	870	1054
	DISTANCE	NM	88	89	93	97	131	95	95	99	103	141
	TIME	MIN	15	15	15	16	21	16	16	16	17	22
34000	FUEL	KG	719	729	762	798	958	751	758	793	830	1000
	DISTANCE	NM	84	85	89	92	124	90	91	94	98	133
	TIME	MIN	14	14	15	15	20	15	15	16	16	21
33000	FUEL	KG	688	697	729	764	912	717	724	757	793	950
	DISTANCE	NM	80	81	84	88	118	86	86	90	94	125
	TIME	MIN	14	14	14	14	19	14	14	15	15	20
32000	FUEL	KG	657	667	697	730	869	685	692	723	758	903
	DISTANCE	NM	76	77	81	84	112	81	82	86	89	119
	TIME	MIN	13	13	13	14	18	14	14	14	14	19
31000	FUEL	KG	629	637	667	698	827	655	661	691	724	859
	DISTANCE	NM	73	74	77	80	106	78	78	81	85	113
	TIME	MIN	12	12	13	13	17	13	13	13	14	18
For												
Anti-ice ON, increase	FUEL	(%)	5	5	4	12	18	5	4	4	12	18
	DISTANCE	(%)	4	4	4	17	25	4	4	3	16	23
	TIME	(%)	4	4	4	16	23	4	4	3	15	22

CLIMB PLANNING - ALL ENGINES OPERATING**CF34-8E5 ENGINES****ALTITUDE: SEA LEVEL TO 31000 AND 32000 FT**SPEED SCHEDULE: 240 KIAS UP TO 10000 FT, INCREASING LINEARLY TO 290 KIAS AT 12000 FT,
MAINTAINING 290 KIAS UP TO 25400 FT AND MACH 0.70 ABOVE 25400 FT.

CRUISE CONFIGURATION

BLEED: OPEN

WEIGHT (KG)			31000 FT ISA + °C					32000 FT ISA + °C				
			-13	-10	0	10	20	-12	-10	0	10	20
30000	FUEL	KG	601	609	637	668	788	625	631	660	692	818
	DISTANCE	NM	69	70	73	76	101	74	74	78	81	107
	TIME	MIN	12	12	12	12	16	13	13	13	13	17
29000	FUEL	KG	574	582	609	638	750	597	603	630	660	778
	DISTANCE	NM	66	67	70	73	95	70	71	74	77	101
	TIME	MIN	11	11	12	12	15	12	12	12	12	16
28000	FUEL	KG	548	556	581	609	714	570	575	601	630	740
	DISTANCE	NM	63	64	66	69	91	67	67	70	73	96
	TIME	MIN	11	11	11	11	14	11	11	12	12	15
27000	FUEL	KG	523	530	555	581	679	543	548	574	601	703
	DISTANCE	NM	60	61	63	66	86	64	64	67	70	91
	TIME	MIN	10	10	11	11	14	11	11	11	11	14
26000	FUEL	KG	499	506	529	555	646	518	523	547	573	669
	DISTANCE	NM	57	58	60	63	82	61	61	64	66	86
	TIME	MIN	10	10	10	10	13	10	10	11	11	14
25000	FUEL	KG	475	482	504	529	615	493	498	521	546	636
	DISTANCE	NM	54	55	57	60	77	58	58	60	63	82
	TIME	MIN	9	9	10	10	12	10	10	10	10	13
24000	FUEL	KG	453	459	480	504	584	470	474	496	520	604
	DISTANCE	NM	52	52	54	57	73	55	55	57	60	77
	TIME	MIN	9	9	9	9	12	9	9	10	10	12
23000	FUEL	KG	431	437	457	479	555	447	451	472	495	573
	DISTANCE	NM	49	50	52	54	69	52	52	54	57	73
	TIME	MIN	8	8	9	9	11	9	9	9	9	12
22000	FUEL	KG	410	415	435	455	527	425	429	448	470	544
	DISTANCE	NM	46	47	49	51	66	49	50	52	54	69
	TIME	MIN	8	8	8	8	11	8	8	9	9	11
21000	FUEL	KG	389	394	413	432	499	403	407	425	446	515
	DISTANCE	NM	44	45	46	48	62	47	47	49	51	66
	TIME	MIN	8	8	8	8	10	8	8	8	8	10
For												
Anti-	FUEL	(%)	4	4	4	10	12	4	4	4	9	12
ice ON,	DISTANCE	(%)	4	4	3	13	17	4	3	3	13	17
increase	TIME	(%)	4	3	3	13	16	3	3	3	12	15

CLIMB PLANNING - ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: SEA LEVEL TO 33000 AND 34000 FT

SPEED SCHEDULE: 240 KIAS UP TO 10000 FT, INCREASING LINEARLY TO 290 KIAS AT 12000 FT, MAINTAINING 290 KIAS UP TO 25400 FT AND MACH 0.70 ABOVE 25400 FT.

CRUISE CONFIGURATION

BLEED: OPEN

WEIGHT (KG)			33000 FT ISA + °C					34000 FT ISA + °C				
			-11	-10	0	10	20	-10	-5	0	10	20
38000	FUEL	KG	959	963	1007	1054	1320	1014	1037	1061	1111	1404
	DISTANCE	NM	120	121	126	131	185	131	134	137	143	204
	TIME	MIN	20	20	20	21	29	22	22	22	22	31
37000	FUEL	KG	911	915	957	1002	1241	961	983	1005	1053	1314
	DISTANCE	NM	114	114	119	124	173	124	126	129	134	189
	TIME	MIN	19	19	19	20	27	20	21	21	21	29
36000	FUEL	KG	867	871	910	953	1169	912	933	954	999	1234
	DISTANCE	NM	108	108	112	117	161	117	119	121	127	176
	TIME	MIN	18	18	18	19	25	19	19	20	20	27
35000	FUEL	KG	825	829	867	908	1105	866	886	906	949	1161
	DISTANCE	NM	102	102	106	111	151	110	112	115	119	164
	TIME	MIN	17	17	17	18	24	18	18	19	19	25
34000	FUEL	KG	786	790	826	865	1045	824	843	862	903	1095
	DISTANCE	NM	97	97	101	105	142	104	106	108	113	153
	TIME	MIN	16	16	16	17	22	17	17	18	18	24
33000	FUEL	KG	749	753	787	825	991	784	802	820	859	1035
	DISTANCE	NM	92	92	96	100	134	98	100	103	107	144
	TIME	MIN	15	15	16	16	21	16	16	17	17	22
32000	FUEL	KG	715	718	751	787	940	746	763	781	818	980
	DISTANCE	NM	87	87	91	95	127	93	95	97	101	136
	TIME	MIN	15	15	15	15	20	15	16	16	16	21
31000	FUEL	KG	682	685	717	751	893	711	727	744	779	928
	DISTANCE	NM	83	83	87	90	120	88	90	92	96	128
	TIME	MIN	14	14	14	14	19	15	15	15	15	20
For												
Anti-	FUEL	(%)	4	4	4	11	17	4	4	4	11	16
ice ON,	DISTANCE	(%)	4	4	3	15	22	3	3	3	14	21
increase	TIME	(%)	4	4	3	14	21	3	3	3	14	20



CLIMB PLANNING - ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: SEA LEVEL TO 33000 AND 34000 FT

SPEED SCHEDULE: 240 KIAS UP TO 10000 FT, INCREASING LINEARLY TO 290 KIAS AT 12000 FT,
MAINTAINING 290 KIAS UP TO 25400 FT AND MACH 0.70 ABOVE 25400 FT.

CRUISE CONFIGURATION
BLEED: OPEN

WEIGHT (KG)			33000 FT ISA + °C					34000 FT ISA + °C				
			-11	-10	0	10	20	-10	-5	0	10	20
30000	FUEL	KG	651	654	684	717	848	677	693	709	743	881
	DISTANCE	NM	79	79	82	86	113	84	86	87	91	121
	TIME	MIN	13	13	14	14	18	14	14	14	15	19
29000	FUEL	KG	621	624	652	684	806	646	660	675	708	836
	DISTANCE	NM	75	75	78	82	107	80	81	83	87	114
	TIME	MIN	13	13	13	13	17	13	13	14	14	18
28000	FUEL	KG	592	595	622	652	766	615	629	644	675	794
	DISTANCE	NM	71	71	74	78	102	76	77	79	82	108
	TIME	MIN	12	12	12	13	16	13	13	13	13	17
27000	FUEL	KG	564	567	593	622	728	586	600	613	643	753
	DISTANCE	NM	68	68	71	74	96	72	73	75	78	102
	TIME	MIN	11	11	12	12	15	12	12	12	13	16
26000	FUEL	KG	538	540	565	592	692	558	571	584	612	715
	DISTANCE	NM	64	64	67	70	91	68	70	71	74	96
	TIME	MIN	11	11	11	11	14	11	12	12	12	15
25000	FUEL	KG	512	514	538	564	657	531	543	556	582	679
	DISTANCE	NM	61	61	64	66	86	65	66	67	70	91
	TIME	MIN	10	10	11	11	14	11	11	11	11	14
24000	FUEL	KG	487	489	512	537	624	505	517	528	554	644
	DISTANCE	NM	58	58	61	63	82	61	63	64	67	86
	TIME	MIN	10	10	10	10	13	10	10	11	11	14
23000	FUEL	KG	463	465	487	510	592	480	491	502	526	610
	DISTANCE	NM	55	55	57	60	77	58	59	61	63	81
	TIME	MIN	9	9	10	10	12	10	10	10	10	13
22000	FUEL	KG	440	442	462	485	561	455	466	477	500	578
	DISTANCE	NM	52	52	54	57	73	55	56	57	60	77
	TIME	MIN	9	9	9	9	12	9	9	9	10	12
21000	FUEL	KG	417	419	439	460	531	432	442	452	474	547
	DISTANCE	NM	49	49	51	54	69	52	53	54	56	73
	TIME	MIN	8	8	9	9	11	9	9	9	9	11
For												
Anti-ice ON, increase	FUEL	(%)	4	4	4	9	12	4	4	4	9	11
	DISTANCE	(%)	3	3	3	12	16	3	3	3	12	15
	TIME	(%)	3	3	3	12	15	3	3	3	11	14

CLIMB PLANNING - ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: SEA LEVEL TO 35000 AND 36000 FT

SPEED SCHEDULE: 240 KIAS UP TO 10000 FT, INCREASING LINEARLY TO 290 KIAS AT 12000 FT, MAINTAINING 290 KIAS UP TO 25400 FT AND MACH 0.70 ABOVE 25400 FT.

CRUISE CONFIGURATION

BLEED: OPEN

WEIGHT (KG)			35000 FT ISA + °C					36000 FT ISA + °C				
			-9	-5	0	10	20	-8	-5	0	10	20
38000	FUEL	KG	1077	1097	1122	1176	-	1159	1175	1202	1261	-
	DISTANCE	NM	144	147	150	157	-	162	164	168	175	-
	TIME	MIN	24	24	24	25	-	26	26	27	27	-
37000	FUEL	KG	1017	1036	1059	1110	1398	1083	1098	1124	1178	-
	DISTANCE	NM	135	137	140	146	208	149	151	155	161	-
	TIME	MIN	22	22	22	23	32	24	24	25	25	-
36000	FUEL	KG	962	980	1002	1050	1306	1019	1033	1057	1108	1391
	DISTANCE	NM	127	129	132	137	192	139	141	144	150	213
	TIME	MIN	21	21	21	22	29	23	23	23	23	32
35000	FUEL	KG	912	929	950	995	1224	962	975	998	1046	1296
	DISTANCE	NM	119	121	124	129	179	130	132	135	140	196
	TIME	MIN	20	20	20	20	27	21	21	22	22	30
34000	FUEL	KG	865	881	901	944	1151	910	923	944	990	1213
	DISTANCE	NM	112	114	117	122	166	122	124	126	132	181
	TIME	MIN	18	19	19	19	26	20	20	20	21	28
33000	FUEL	KG	821	836	855	897	1084	862	874	894	938	1138
	DISTANCE	NM	106	108	110	115	155	115	116	119	124	168
	TIME	MIN	17	18	18	18	24	19	19	19	19	26
32000	FUEL	KG	780	795	813	852	1023	817	829	848	889	1071
	DISTANCE	NM	100	102	104	108	145	108	109	112	117	157
	TIME	MIN	17	17	17	17	22	18	18	18	18	24
31000	FUEL	KG	742	756	773	810	967	775	786	804	843	1009
	DISTANCE	NM	95	96	98	103	137	102	103	105	110	147
	TIME	MIN	16	16	16	16	21	17	17	17	17	23
For												
Anti-	FUEL	(%)	4	4	4	11	15	4	4	4	10	15
ice ON,	DISTANCE	(%)	3	3	3	13	19	3	3	3	13	18
increase	TIME	(%)	3	3	3	13	19	3	3	3	12	17



CLIMB PLANNING - ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: SEA LEVEL TO 35000 AND 36000 FT

SPEED SCHEDULE: 240 KIAS UP TO 10000 FT, INCREASING LINEARLY TO 290 KIAS AT 12000 FT,
MAINTAINING 290 KIAS UP TO 25400 FT AND MACH 0.70 ABOVE 25400 FT.

CRUISE CONFIGURATION
BLEED: OPEN

WEIGHT (KG)			35000 FT ISA + °C					36000 FT ISA + °C				
			-9	-5	0	10	20	-8	-5	0	10	20
30000	FUEL	KG	706	719	735	771	915	736	746	764	801	952
	DISTANCE	NM	90	91	93	97	128	96	97	99	104	137
	TIME	MIN	15	15	15	15	20	16	16	16	16	21
29000	FUEL	KG	672	684	700	733	867	699	709	726	761	900
	DISTANCE	NM	85	86	88	92	121	91	92	94	98	129
	TIME	MIN	14	14	14	15	19	15	15	15	16	20
28000	FUEL	KG	639	651	666	698	822	665	674	689	723	852
	DISTANCE	NM	80	82	84	87	114	86	87	89	93	121
	TIME	MIN	13	13	14	14	18	14	14	14	15	19
27000	FUEL	KG	608	620	634	665	780	632	641	655	687	806
	DISTANCE	NM	76	78	79	83	108	81	82	84	88	114
	TIME	MIN	13	13	13	13	17	13	13	14	14	18
26000	FUEL	KG	579	590	603	632	739	601	609	623	653	764
	DISTANCE	NM	72	74	75	78	102	77	78	80	83	108
	TIME	MIN	12	12	12	13	16	13	13	13	13	17
25000	FUEL	KG	550	561	574	601	701	571	579	592	621	724
	DISTANCE	NM	69	70	71	74	96	73	74	75	79	102
	TIME	MIN	11	12	12	12	15	12	12	12	13	16
24000	FUEL	KG	523	533	545	571	664	542	549	562	589	685
	DISTANCE	NM	65	66	67	70	91	69	70	71	74	96
	TIME	MIN	11	11	11	11	14	11	11	12	12	15
23000	FUEL	KG	497	506	518	543	629	514	521	533	559	649
	DISTANCE	NM	61	62	64	67	86	65	66	67	70	90
	TIME	MIN	10	10	10	11	13	11	11	11	11	14
22000	FUEL	KG	471	480	491	515	596	488	494	506	530	614
	DISTANCE	NM	58	59	60	63	81	61	62	64	66	85
	TIME	MIN	10	10	10	10	13	10	10	10	11	13
21000	FUEL	KG	447	455	465	488	564	462	468	479	502	580
	DISTANCE	NM	55	56	57	60	76	58	59	60	63	80
	TIME	MIN	9	9	9	10	12	10	10	10	10	13
For												
Anti-ice ON, increase	FUEL	(%)	4	4	4	9	11	4	4	3	8	11
	DISTANCE	(%)	3	3	3	11	14	3	3	3	11	14
	TIME	(%)	3	3	3	11	14	3	3	3	10	13

CLIMB PLANNING - ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: SEA LEVEL TO 37000 AND 38000 FT

SPEED SCHEDULE: 240 KIAS UP TO 10000 FT, INCREASING LINEARLY TO 290 KIAS AT 12000 FT, MAINTAINING 290 KIAS UP TO 25400 FT AND MACH 0.70 ABOVE 25400 FT.

CRUISE CONFIGURATION

BLEED: OPEN

WEIGHT (KG)			37000 FT ISA + °C					38000 FT ISA + °C				
			-8	-5	0	10	20	-8	-5	0	10	20
38000	FUEL	KG	-	-	-	-	-	-	-	-	-	-
	DISTANCE	NM	-	-	-	-	-	-	-	-	-	-
	TIME	MIN	-	-	-	-	-	-	-	-	-	-
37000	FUEL	KG	-	-	-	-	-	-	-	-	-	-
	DISTANCE	NM	-	-	-	-	-	-	-	-	-	-
	TIME	MIN	-	-	-	-	-	-	-	-	-	-
36000	FUEL	KG	-	1107	1134	1189	-	-	-	-	-	-
	DISTANCE	NM	-	158	161	169	-	-	-	-	-	-
	TIME	MIN	-	25	26	26	-	-	-	-	-	-
35000	FUEL	KG	1021	1035	1060	1112	-	-	-	-	-	-
	DISTANCE	NM	144	145	149	156	-	-	-	-	-	-
	TIME	MIN	23	23	24	24	-	-	-	-	-	-
34000	FUEL	KG	961	974	997	1046	1293	1027	1042	1066	1119	-
	DISTANCE	NM	134	135	138	145	201	150	152	155	162	-
	TIME	MIN	22	22	22	23	31	24	24	25	25	-
33000	FUEL	KG	907	919	941	987	1207	961	975	998	1047	-
	DISTANCE	NM	125	127	129	135	185	138	140	143	150	-
	TIME	MIN	20	20	21	21	28	22	22	23	23	-
32000	FUEL	KG	857	869	890	933	1130	904	917	938	984	1206
	DISTANCE	NM	117	119	121	127	172	128	130	133	139	192
	TIME	MIN	19	19	19	20	26	21	21	21	22	29
31000	FUEL	KG	811	823	842	883	1061	852	865	885	928	1125
	DISTANCE	NM	110	111	114	119	159	120	122	124	130	176
	TIME	MIN	18	18	18	19	24	19	20	20	20	27
For												
Anti-	FUEL	(%)	4	4	3	10	14	3	3	3	9	13
ice ON,	DISTANCE	(%)	3	3	3	12	17	3	3	2	11	15
increase	TIME	(%)	3	3	3	12	16	3	3	2	11	15



CLIMB PLANNING - ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: SEA LEVEL TO 37000 AND 38000 FT

SPEED SCHEDULE: 240 KIAS UP TO 10000 FT, INCREASING LINEARLY TO 290 KIAS AT 12000 FT,
MAINTAINING 290 KIAS UP TO 25400 FT AND MACH 0.70 ABOVE 25400 FT.

CRUISE CONFIGURATION

BLEED: OPEN

WEIGHT (KG)			37000 FT ISA + °C					38000 FT ISA + °C				
			-8	-5	0	10	20	-8	-5	0	10	20
30000	FUEL	KG	768	779	797	836	997	805	816	836	877	1053
	DISTANCE	NM	103	105	107	112	149	112	114	116	122	163
	TIME	MIN	17	17	17	18	23	18	18	19	19	25
29000	FUEL	KG	728	739	756	793	940	761	772	790	828	987
	DISTANCE	NM	97	99	101	105	139	105	107	109	114	151
	TIME	MIN	16	16	16	17	21	17	17	17	18	23
28000	FUEL	KG	691	700	717	752	887	720	730	747	784	928
	DISTANCE	NM	92	93	95	99	130	99	100	102	107	141
	TIME	MIN	15	15	15	16	20	16	16	16	17	22
27000	FUEL	KG	655	664	680	713	838	681	691	707	742	874
	DISTANCE	NM	87	88	90	94	122	93	94	96	101	131
	TIME	MIN	14	14	14	15	19	15	15	15	16	20
26000	FUEL	KG	622	631	645	677	792	645	654	670	702	824
	DISTANCE	NM	82	83	85	88	115	87	89	91	95	123
	TIME	MIN	13	14	14	14	18	14	14	15	15	19
25000	FUEL	KG	590	599	612	642	749	611	620	634	665	777
	DISTANCE	NM	77	78	80	84	108	82	83	85	89	115
	TIME	MIN	13	13	13	13	17	13	14	14	14	18
24000	FUEL	KG	560	568	581	609	709	579	587	601	631	734
	DISTANCE	NM	73	74	76	79	102	78	79	80	84	108
	TIME	MIN	12	12	12	13	16	13	13	13	13	17
23000	FUEL	KG	531	538	551	578	670	549	557	569	597	693
	DISTANCE	NM	69	70	71	75	96	73	74	76	79	102
	TIME	MIN	11	11	12	12	15	12	12	12	13	16
22000	FUEL	KG	503	510	522	547	634	519	527	539	565	655
	DISTANCE	NM	65	66	67	70	90	69	70	71	75	96
	TIME	MIN	11	11	11	11	14	11	11	12	12	15
21000	FUEL	KG	476	483	494	518	598	491	498	510	535	618
	DISTANCE	NM	61	62	64	66	85	65	66	67	70	90
	TIME	MIN	10	10	10	11	13	11	11	11	11	14

For												
Anti-	FUEL	(%)	4	4	3	8	10	3	3	3	8	10
ice ON,	DISTANCE	(%)	3	3	3	10	13	3	3	2	10	13
increase	TIME	(%)	3	3	3	10	13	3	3	2	9	12

CLIMB PLANNING - ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: SEA LEVEL TO 39000 AND 40000 FT

SPEED SCHEDULE: 240 KIAS UP TO 10000 FT, INCREASING LINEARLY TO 290 KIAS AT 12000 FT, MAINTAINING 290 KIAS UP TO 25400 FT AND MACH 0.70 ABOVE 25400 FT.

CRUISE CONFIGURATION

BLEED: OPEN

WEIGHT (KG)			39000 FT ISA + °C					40000 FT ISA + °C				
			-8	-5	0	10	20	-8	-5	0	10	20
38000	FUEL	KG	-	-	-	-	-	-	-	-	-	-
	DISTANCE	NM	-	-	-	-	-	-	-	-	-	-
	TIME	MIN	-	-	-	-	-	-	-	-	-	-
37000	FUEL	KG	-	-	-	-	-	-	-	-	-	-
	DISTANCE	NM	-	-	-	-	-	-	-	-	-	-
	TIME	MIN	-	-	-	-	-	-	-	-	-	-
36000	FUEL	KG	-	-	-	-	-	-	-	-	-	-
	DISTANCE	NM	-	-	-	-	-	-	-	-	-	-
	TIME	MIN	-	-	-	-	-	-	-	-	-	-
35000	FUEL	KG	-	-	-	-	-	-	-	-	-	-
	DISTANCE	NM	-	-	-	-	-	-	-	-	-	-
	TIME	MIN	-	-	-	-	-	-	-	-	-	-
34000	FUEL	KG	-	-	-	-	-	-	-	-	-	-
	DISTANCE	NM	-	-	-	-	-	-	-	-	-	-
	TIME	MIN	-	-	-	-	-	-	-	-	-	-
33000	FUEL	KG	-	-	-	-	-	-	-	-	-	-
	DISTANCE	NM	-	-	-	-	-	-	-	-	-	-
	TIME	MIN	-	-	-	-	-	-	-	-	-	-
32000	FUEL	KG	963	977	1000	1050	-	-	-	-	-	-
	DISTANCE	NM	143	145	149	156	-	-	-	-	-	-
	TIME	MIN	23	23	24	24	-	-	-	-	-	-
31000	FUEL	KG	901	914	936	983	-	-	-	-	-	-
	DISTANCE	NM	132	134	137	144	-	-	-	-	-	-
	TIME	MIN	21	22	22	22	-	-	-	-	-	-
For Anti- ice ON, increase	FUEL	(%)	3	3	3	9	Average Correction N/A N/A	Average Correction N/A N/A	Average Correction N/A N/A	Average Correction N/A N/A	Average Correction N/A N/A	Average Correction N/A N/A
	DISTANCE	(%)	2	2	2	10						
	TIME	(%)	2	2	2	10						

CLIMB PLANNING - ALL ENGINES OPERATING**CF34-8E5 ENGINES****ALTITUDE: SEA LEVEL TO 39000 AND 40000 FT**SPEED SCHEDULE: 240 KIAS UP TO 10000 FT, INCREASING LINEARLY TO 290 KIAS AT 12000 FT,
MAINTAINING 290 KIAS UP TO 25400 FT AND MACH 0.70 ABOVE 25400 FT.

CRUISE CONFIGURATION

BLEED: OPEN

WEIGHT (KG)			39000 FT ISA + °C					40000 FT ISA + °C				
			-8	-5	0	10	20	-8	-5	0	10	20
30000	FUEL	KG	847	859	880	924	1125	900	914	936	984	-
	DISTANCE	NM	123	125	128	134	183	137	139	143	150	-
	TIME	MIN	20	20	20	21	28	22	22	23	23	-
29000	FUEL	KG	798	810	829	870	1048	843	855	876	920	-
	DISTANCE	NM	115	116	119	125	168	127	129	132	138	-
	TIME	MIN	19	19	19	19	26	20	21	21	21	-
28000	FUEL	KG	753	764	782	820	979	791	803	822	864	1046
	DISTANCE	NM	107	109	111	116	155	118	119	122	128	175
	TIME	MIN	17	18	18	18	24	19	19	19	20	26
27000	FUEL	KG	711	721	738	774	917	744	755	773	812	972
	DISTANCE	NM	100	102	104	109	144	109	111	114	119	160
	TIME	MIN	16	16	17	17	22	18	18	18	19	24
26000	FUEL	KG	671	681	697	731	861	701	711	728	764	907
	DISTANCE	NM	94	95	97	102	133	102	103	106	111	147
	TIME	MIN	15	15	16	16	20	17	17	17	17	22
25000	FUEL	KG	635	644	659	691	810	661	670	686	720	848
	DISTANCE	NM	88	89	91	96	124	95	97	99	103	136
	TIME	MIN	14	14	15	15	19	15	16	16	16	21
24000	FUEL	KG	600	609	623	653	762	623	632	647	679	795
	DISTANCE	NM	83	84	86	90	116	89	90	92	97	126
	TIME	MIN	14	14	14	14	18	14	15	15	15	19
23000	FUEL	KG	567	576	589	618	719	588	596	610	641	747
	DISTANCE	NM	78	79	81	84	109	83	85	87	91	117
	TIME	MIN	13	13	13	13	17	14	14	14	14	18
22000	FUEL	KG	537	544	557	584	678	555	563	576	605	703
	DISTANCE	NM	73	74	76	79	102	78	79	81	85	109
	TIME	MIN	12	12	12	13	16	13	13	13	13	17
21000	FUEL	KG	507	514	526	552	638	524	531	544	570	661
	DISTANCE	NM	69	70	71	75	96	73	74	76	80	102
	TIME	MIN	11	11	12	12	15	12	12	12	13	16
For												
Anti-ice ON, increase	FUEL	(%)	3	3	3	8	10	3	3	3	7	9
	DISTANCE	(%)	3	2	2	9	12	2	2	2	9	11
	TIME	(%)	3	2	2	9	11	2	2	2	9	11

CLIMB PLANNING - ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: SEA LEVEL TO 41000 FT

SPEED SCHEDULE: 240 KIAS UP TO 10000 FT, INCREASING LINEARLY TO 290 KIAS AT 12000 FT,
MAINTAINING 290 KIAS UP TO 25400 FT AND MACH 0.70 ABOVE 25400 FT.

CRUISE CONFIGURATION

BLEED: OPEN

WEIGHT (KG)		41000 FT ISA + °C				
		-8	-5	0	10	20
30000	FUEL	-	-	-	-	-
	DISTANCE	-	-	-	-	-
	TIME	-	-	-	-	-
29000	FUEL	900	914	937	986	-
	DISTANCE	143	145	149	157	-
	TIME	23	23	23	24	-
28000	FUEL	838	850	871	916	-
	DISTANCE	131	133	136	143	-
	TIME	21	21	21	22	-
27000	FUEL	784	795	815	856	-
	DISTANCE	121	122	125	132	-
	TIME	19	20	20	20	-
26000	FUEL	735	746	764	803	965
	DISTANCE	112	113	116	122	165
	TIME	18	18	18	19	25
25000	FUEL	690	700	717	753	896
	DISTANCE	104	105	108	113	151
	TIME	17	17	17	18	23
24000	FUEL	649	658	674	708	835
	DISTANCE	96	98	100	105	138
	TIME	16	16	16	16	21
23000	FUEL	610	619	634	666	780
	DISTANCE	90	91	93	98	128
	TIME	15	15	15	15	19
22000	FUEL	575	583	597	627	731
	DISTANCE	84	85	87	91	118
	TIME	14	14	14	14	18
21000	FUEL	541	549	562	590	686
	DISTANCE	78	80	81	85	110
	TIME	13	13	13	13	17
For						
Anti-ice ON, increase	FUEL	3	3	3	7	9
	DISTANCE	2	2	2	8	11
	TIME	2	2	2	8	10

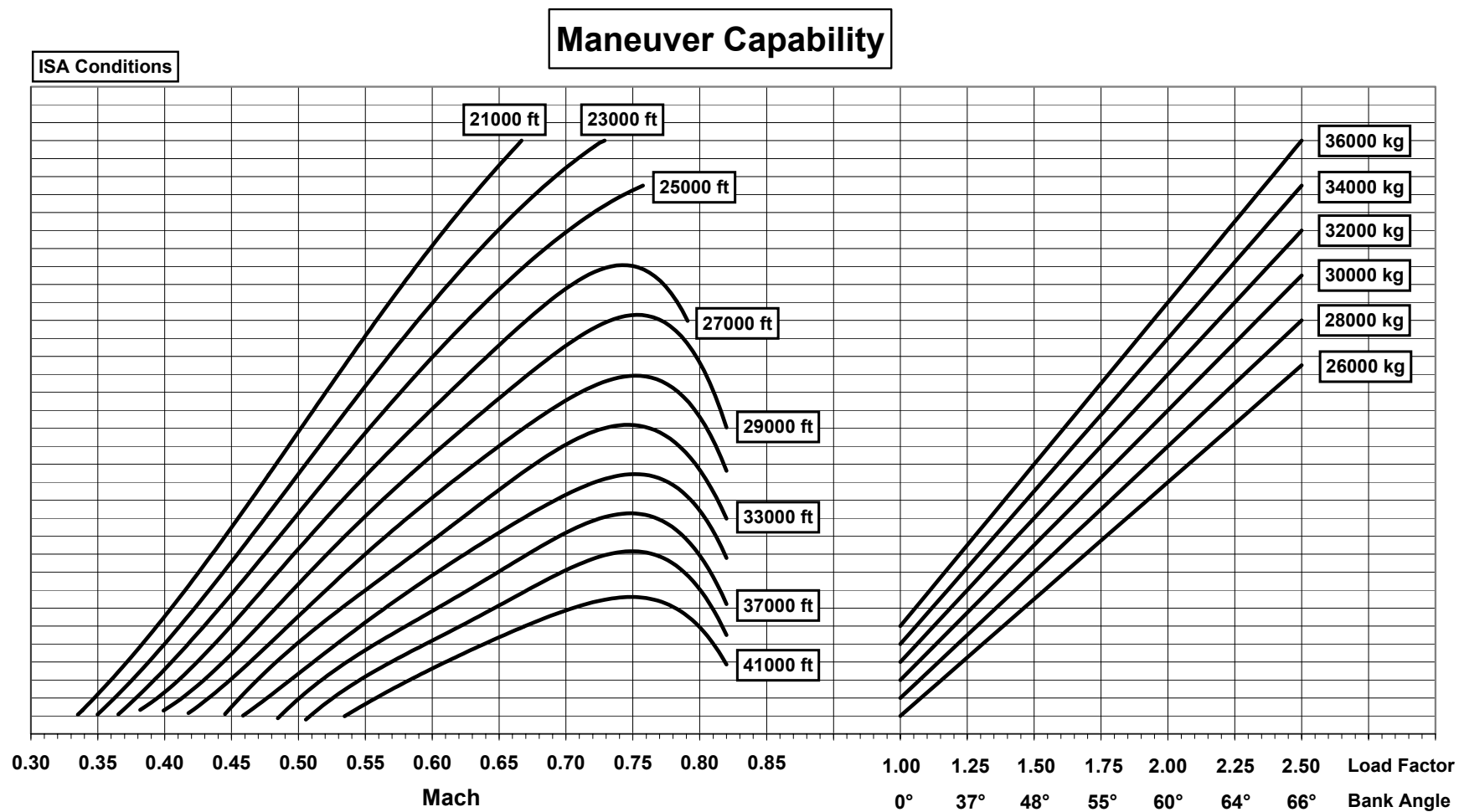
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CRUISE

BUFFET ONSET CHART

This chart provides the buffet margin (maneuver capability) and associated bank angles for a variety of cruise altitudes and weights as function of Mach number.

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LONG RANGE CRUISE AND FIXED SPEED CRUISE TABLES

These tables show N1, fuel flow, indicated airspeed, true airspeed, indicated Mach number, buffet margin and specific range. Data are presented for various weights ISA conditions and corrections for ISA deviation.

In the long range cruise schedule, all engines operating the airplane is flown at a speed corresponding to a specific range equal to 99% of maximum specific range. It is used when range is the main factor.

LONG RANGE CRUISE – ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: 5000 FT TO 17000 FT

CRUISE CONFIGURATION
BLEED: OPEN/ISA CONDITION

WEIGHT (KG)

ALTITUDE (FT)

5000 10000 11000 12000 13000 14000 15000 16000 17000

38000	N1	%	65.4	68.3	69.1	69.9	70.5	71.2	72.4	73.7	74.7
	FUEL FLOW	KG/H/ENG	861	831	828	822	822	821	837	851	857
	IAS	KT	269	266	265	265	263	260	263	267	269
	TAS	KT	289	306	311	315	317	319	327	337	344
	INDICATED MACH		0.444	0.480	0.489	0.496	0.502	0.507	0.523	0.540	0.553
	BUFFET MARGIN	G	2.23	2.15	2.14	2.13	2.09	2.05	2.09	2.14	2.16
	SR	NM/KG	0.168	0.184	0.188	0.191	0.193	0.194	0.196	0.198	0.201
37000	N1	%	64.7	67.5	68.4	69.2	69.8	70.6	71.6	72.7	73.9
	FUEL FLOW	KG/H/ENG	838	807	806	803	799	800	807	821	830
	IAS	KT	265	262	262	262	260	259	259	262	264
	TAS	KT	285	302	307	311	314	317	322	331	339
	INDICATED MACH		0.438	0.473	0.482	0.491	0.498	0.504	0.514	0.530	0.545
	BUFFET MARGIN	G	2.22	2.14	2.14	2.14	2.11	2.08	2.08	2.12	2.15
	SR	NM/KG	0.170	0.187	0.190	0.194	0.197	0.198	0.199	0.201	0.204
36000	N1	%	64.0	66.7	67.6	68.5	69.1	69.9	70.7	71.5	72.9
	FUEL FLOW	KG/H/ENG	818	785	784	782	778	778	779	784	801
	IAS	KT	262	258	258	258	258	257	255	255	260
	TAS	KT	282	298	302	307	311	315	317	322	333
	INDICATED MACH		0.433	0.467	0.476	0.485	0.493	0.501	0.507	0.516	0.535
	BUFFET MARGIN	G	2.24	2.14	2.14	2.14	2.13	2.11	2.07	2.07	2.13
	SR	NM/KG	0.172	0.190	0.193	0.196	0.200	0.202	0.204	0.206	0.208

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE FUEL FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 2 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON
INCREASE N1% BY 0.0% AND FUEL FLOW BY 6%.
DECREASE SR% BY 6%.

LONG RANGE CRUISE – ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: 5000 FT TO 17000 FT

CRUISE CONFIGURATION
BLEED: OPEN/ISA CONDITION

WEIGHT (KG)			ALTITUDE (FT)									
			5000	10000	11000	12000	13000	14000	15000	16000	17000	
35000	N1	%	63.2	65.9	66.8	67.6	68.4	69.2	69.8	70.5	71.9	
	FUEL FLOW	KG/H/ENG	797	761	761	759	758	755	754	752	771	
	IAS	KT	259	254	254	254	255	255	252	250	254	
	TAS	KT	278	294	298	302	308	312	314	316	326	
	INDICATED MACH		0.428	0.460	0.469	0.477	0.487	0.496	0.501	0.506	0.524	
	BUFFET MARGIN	G	2.24	2.14	2.14	2.13	2.14	2.13	2.09	2.05	2.11	
	SR	NM/KG	0.174	0.193	0.196	0.199	0.203	0.207	0.208	0.210	0.212	
34000	N1	%	62.4	65.3	65.9	66.7	67.7	68.5	69.0	69.7	70.8	
	FUEL FLOW	KG/H/ENG	775	742	737	735	737	737	730	728	737	
	IAS	KT	256	251	251	250	251	252	250	248	248	
	TAS	KT	274	290	294	298	303	309	311	313	318	
	INDICATED MACH		0.422	0.454	0.462	0.470	0.480	0.491	0.496	0.501	0.512	
	BUFFET MARGIN	G	2.25	2.15	2.14	2.13	2.14	2.15	2.11	2.07	2.07	
	SR	NM/KG	0.177	0.195	0.199	0.203	0.206	0.209	0.213	0.215	0.216	
33000	N1	%	61.8	64.7	65.3	66.0	66.9	67.8	68.3	69.0	69.9	
	FUEL FLOW	KG/H/ENG	758	724	718	713	715	716	710	707	710	
	IAS	KT	253	248	247	247	247	248	247	246	245	
	TAS	KT	271	287	290	294	299	304	308	311	314	
	INDICATED MACH		0.418	0.449	0.456	0.463	0.474	0.484	0.491	0.498	0.505	
	BUFFET MARGIN	G	2.27	2.17	2.15	2.13	2.14	2.15	2.12	2.10	2.08	
	SR	NM/KG	0.179	0.198	0.202	0.206	0.209	0.213	0.217	0.220	0.221	
32000	N1	%	61.1	64.1	64.8	65.4	66.1	67.0	67.6	68.3	69.1	
	FUEL FLOW	KG/H/ENG	740	706	701	694	694	695	691	684	685	
	IAS	KT	250	245	245	244	244	245	244	243	242	
	TAS	KT	268	283	287	290	295	300	304	307	311	
	INDICATED MACH		0.413	0.444	0.451	0.458	0.467	0.477	0.485	0.492	0.500	
	BUFFET MARGIN	G	2.28	2.18	2.17	2.15	2.15	2.16	2.14	2.11	2.09	
	SR	NM/KG	0.181	0.201	0.205	0.209	0.212	0.216	0.220	0.224	0.227	
31000	N1	%	60.4	63.5	64.2	64.8	65.4	66.2	66.9	67.6	68.2	
	FUEL FLOW	KG/H/ENG	722	687	683	678	675	675	671	665	662	
	IAS	KT	247	242	242	241	241	241	241	239	239	
	TAS	KT	265	280	284	287	291	296	300	303	307	
	INDICATED MACH		0.408	0.439	0.446	0.453	0.462	0.471	0.479	0.485	0.494	
	BUFFET MARGIN	G	2.30	2.20	2.19	2.17	2.17	2.17	2.15	2.12	2.11	
	SR	NM/KG	0.183	0.204	0.208	0.212	0.216	0.219	0.223	0.228	0.232	

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE F FLOW BY 3% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 2 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON
INCREASE N1% BY 0.2% AND F FLOW BY 7%.
DECREASE SR% BY 6%.

LONG RANGE CRUISE – ALL ENGINES OPERATING**CF34-8E5 ENGINES****ALTITUDE: 5000 FT TO 17000 FT**CRUISE CONFIGURATION
BLEED: OPEN/ISA CONDITION**WEIGHT
(KG)****ALTITUDE (FT)**

5000 10000 11000 12000 13000 14000 15000 16000 17000

30000	N1	%	59.7	62.8	63.5	64.2	64.8	65.4	66.2	67.0	67.6
	FUEL FLOW	KG/H/ENG	703	669	665	660	658	656	651	646	645
	IAS	KT	243	239	239	238	239	239	237	237	236
	TAS	KT	261	277	280	284	288	293	296	299	304
	INDICATED MACH		0.402	0.433	0.4410	0.4480	0.457	0.466	0.472	0.480	0.489
	BUFFET MARGIN	G	2.31	2.22	2.21	2.19	2.19	2.19	2.16	2.14	2.14
	SR	NM/KG	0.186	0.207	0.2110	0.2150	0.219	0.223	0.227	0.232	0.236
29000	N1	%	59.0	62.1	62.9	63.5	64.2	64.9	65.6	66.4	66.9
	FUEL FLOW	KG/H/ENG	683	649	646	642	642	641	634	629	625
	IAS	KT	240	236	236	235	236	236	235	234	233
	TAS	KT	258	273	277	280	285	290	293	296	300
	INDICATED MACH		0.396	0.428	0.4350	0.4420	0.452	0.461	0.468	0.475	0.482
	BUFFET MARGIN	G	2.32	2.24	2.23	2.21	2.22	2.22	2.19	2.17	2.15
	SR	NM/KG	0.189	0.210	0.2140	0.2180	0.222	0.226	0.231	0.236	0.240
28000	N1	%	58.2	61.5	62.2	62.8	63.6	64.3	65.1	65.9	66.3
	FUEL FLOW	KG/H/ENG	663	633	628	622	626	628	621	614	608
	IAS	KT	236	234	233	232	234	235	233	232	231
	TAS	KT	254	271	274	276	282	288	291	294	297
	INDICATED MACH		0.390	0.424	0.4300	0.4360	0.447	0.458	0.465	0.472	0.477
	BUFFET MARGIN	G	2.33	2.28	2.25	2.23	2.25	2.27	2.24	2.22	2.18
	SR	NM/KG	0.191	0.214	0.2180	0.2220	0.225	0.229	0.234	0.239	0.244
27000	N1	%	57.5	61.2	61.5	62.0	63.0	63.8	64.6	65.5	65.8
	FUEL FLOW	KG/H/ENG	644	624	612	603	610	614	609	603	593
	IAS	KT	233	233	231	229	231	233	232	231	229
	TAS	KT	250	270	271	272	280	286	289	293	294
	INDICATED MACH		0.385	0.423	0.4260	0.4300	0.443	0.454	0.462	0.470	0.473
	BUFFET MARGIN	G	2.36	2.34	2.29	2.24	2.29	2.32	2.30	2.28	2.23
	SR	NM/KG	0.194	0.216	0.2210	0.2260	0.229	0.233	0.238	0.243	0.248
26000	N1	%	56.8	60.8	61.1	61.4	62.4	63.3	64.2	65.0	65.2
	FUEL FLOW	KG/H/ENG	627	613	600	589	596	602	597	592	580
	IAS	KT	230	232	229	227	229	232	231	230	227
	TAS	KT	247	268	269	270	277	284	288	292	292
	INDICATED MACH		0.381	0.420	0.4230	0.4270	0.439	0.452	0.459	0.467	0.470
	BUFFET MARGIN	G	2.39	2.40	2.35	2.30	2.34	2.38	2.36	2.34	2.28
	SR	NM/KG	0.197	0.219	0.2240	0.2300	0.233	0.236	0.241	0.246	0.252

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE FUEL FLOW BY 3% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 4 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.FOR ANTI-ICE ON
INCREASE N1% BY 0.0% AND F FLOW BY 9%.
DECREASE SR% BY 9%.

LONG RANGE CRUISE – ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: 5000 FT TO 17000 FT

CRUISE CONFIGURATION
BLEED: OPEN/ISA CONDITION

WEIGHT (KG)			ALTITUDE (FT)										
			5000	10000	11000	12000	13000	14000	15000	16000	17000		
25000	N1	%	56.3	60.3	60.7	61.0	61.9	62.7	63.6	64.2	64.7		
	FUEL FLOW	KG/H/ENG	613	601	591	578	583	589	583	575	568		
	IAS	KT	228	230	228	226	228	230	229	227	225		
	TAS	KT	245	266	268	269	276	282	285	287	290		
	INDICATED MACH		0.378	0.417	0.4210	0.4240	0.437	0.449	0.455	0.460	0.466		
	BUFFET MARGIN	G	2.45	2.47	2.42	2.36	2.41	2.44	2.41	2.37	2.33		
	SR	NM/KG	0.200	0.221	0.2270	0.2330	0.236	0.240	0.244	0.250	0.255		
24000	N1	%	55.9	59.6	60.1	60.6	61.3	62.0	62.7	63.3	64.0		
	FUEL FLOW	KG/H/ENG	604	587	578	569	570	569	565	558	553		
	IAS	KT	227	228	226	225	226	226	225	223	223		
	TAS	KT	244	263	265	268	273	278	281	283	287		
	INDICATED MACH		0.375	0.413	0.4170	0.4230	0.432	0.442	0.448	0.454	0.461		
	BUFFET MARGIN	G	2.50	2.50	2.47	2.44	2.46	2.46	2.44	2.39	2.38		
	SR	NM/KG	0.202	0.224	0.2300	0.2350	0.239	0.244	0.248	0.253	0.259		
23000	N1	%	55.6	58.7	59.4	59.9	60.6	61.1	61.5	62.2	63.1		
	FUEL FLOW	KG/H/ENG	595	570	564	556	555	550	540	537	536		
	IAS	KT	226	224	224	222	222	222	219	219	219		
	TAS	KT	243	259	262	265	269	272	274	277	282		
	INDICATED MACH		0.373	0.406	0.4130	0.4180	0.427	0.433	0.437	0.444	0.454		
	BUFFET MARGIN	G	2.50	2.50	2.50	2.50	2.49	2.47	2.42	2.40	2.40		
	SR	NM/KG	0.204	0.227	0.2330	0.2380	0.243	0.248	0.253	0.258	0.263		
22000	N1	%	55.2	57.7	58.6	59.2	59.7	59.8	60.3	60.8	61.9		
	FUEL FLOW	KG/H/ENG	586	550	548	542	537	525	519	511	513		
	IAS	KT	225	220	220	220	218	215	214	212	214		
	TAS	KT	241	254	259	262	264	264	267	269	275		
	INDICATED MACH		0.371	0.398	0.4070	0.4140	0.419	0.420	0.426	0.431	0.443		
	BUFFET MARGIN	G	2.50	2.50	2.50	2.50	2.50	2.42	2.39	2.36	2.39		
	SR	NM/KG	0.206	0.231	0.2360	0.2420	0.246	0.251	0.257	0.263	0.268		
21000	N1	%	54.6	56.4	57.4	58.3	58.4	58.4	59.1	59.8	60.5		
	FUEL FLOW	KG/H/ENG	574	527	526	527	514	500	496	491	488		
	IAS	KT	222	214	215	217	213	208	207	207	207		
	TAS	KT	239	248	253	258	258	256	259	263	267		
	INDICATED MACH		0.368	0.388	0.3980	0.4080	0.408	0.407	0.414	0.421	0.430		
	BUFFET MARGIN	G	2.50	2.50	2.50	2.50	2.50	2.39	2.37	2.36	2.36		
	SR	NM/KG	0.208	0.235	0.2400	0.2450	0.250	0.256	0.261	0.267	0.274		

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE FUEL FLOW BY 3% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 4 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON
INCREASE N1% BY 0.0% AND F FLOW BY 10%.
DECREASE SR% BY 9%.

LONG RANGE CRUISE – ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: 18000 FT TO 26000 FT

CRUISE CONFIGURATION
BLEED: OPEN/ISA CONDITION

**WEIGHT
(KG)**

ALTITUDE (FT)

5000 10000 11000 12000 13000 14000 15000 16000 17000

38000	N1	%	75.5	76.1	76.6	77.2	77.7	78.3	79.2	79.7	80.3
	FUEL FLOW	KG/H/ENG	857	852	844	824	816	813	816	807	800
	IAS	KT	269	268	267	266	264	263	263	260	258
	TAS	KT	349	354	357	362	366	370	376	377	381
	INDICATED MACH		0.564	0.573	0.582	0.591	0.600	0.609	0.622	0.627	0.635
	BUFFET MARGIN	G	2.16	2.14	2.11	2.09	2.06	2.04	2.03	1.96	1.91
	SR	NM/KG	0.204	0.208	0.212	0.220	0.224	0.227	0.230	0.234	0.238
37000	N1	%	74.9	75.5	76.1	76.7	77.2	77.8	78.4	79.1	79.8
	FUEL FLOW	KG/H/ENG	835	832	825	805	798	794	792	787	782
	IAS	KT	266	265	264	263	262	261	260	258	256
	TAS	KT	346	350	354	358	362	367	371	375	378
	INDICATED MACH		0.558	0.568	0.576	0.586	0.595	0.604	0.614	0.622	0.631
	BUFFET MARGIN	G	2.17	2.15	2.13	2.11	2.08	2.06	2.04	2.00	1.95
	SR	NM/KG	0.207	0.211	0.214	0.223	0.227	0.231	0.234	0.238	0.242
36000	N1	%	74.1	74.9	75.6	76.2	76.7	77.2	77.8	78.5	79.2
	FUEL FLOW	KG/H/ENG	810	810	807	787	779	775	773	767	763
	IAS	KT	262	262	262	261	259	258	258	256	254
	TAS	KT	341	346	351	355	359	363	368	371	375
	INDICATED MACH		0.550	0.561	0.571	0.581	0.589	0.599	0.609	0.617	0.626
	BUFFET MARGIN	G	2.17	2.16	2.15	2.13	2.09	2.08	2.06	2.02	1.98
	SR	NM/KG	0.210	0.214	0.218	0.226	0.230	0.235	0.238	0.242	0.246

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE F FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 2 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON
INCREASE N1% BY 0% AND F FLOW BY 6%.
DECREASE SR% BY 6%.

LONG RANGE CRUISE – ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: 18000 FT TO 26000 FT

CRUISE CONFIGURATION
BLEED: OPEN/ISA CONDITION

WEIGHT (KG)			ALTITUDE (FT)									
			5000	10000	11000	12000	13000	14000	15000	16000	17000	
35000	N1	%	73.2	74.2	75.0	75.6	76.1	76.7	77.1	77.8	78.6	
	FUEL FLOW	KG/H/ENG	782	786	786	767	760	758	752	746	742	
	IAS	KT	257	258	259	258	256	256	255	253	251	
	TAS	KT	335	342	347	351	355	360	365	367	371	
	INDICATED MACH		0.541	0.554	0.5650	0.5740	0.583	0.594	0.603	0.610	0.619	
	BUFFET MARGIN	G	2.15	2.16	2.16	2.14	2.11	2.10	2.08	2.03	2.01	
	SR	NM/KG	0.214	0.217	0.2210	0.2290	0.233	0.238	0.242	0.246	0.250	
34000	N1	%	72.2	73.3	74.2	74.9	75.6	76.1	76.5	77.1	77.9	
	FUEL FLOW	KG/H/ENG	754	760	762	746	742	739	734	724	721	
	IAS	KT	252	254	255	254	254	253	252	250	249	
	TAS	KT	329	336	342	347	352	356	361	363	367	
	INDICATED MACH		0.531	0.544	0.5570	0.5670	0.577	0.587	0.597	0.604	0.613	
	BUFFET MARGIN	G	2.13	2.15	2.16	2.15	2.13	2.12	2.09	2.05	2.02	
	SR	NM/KG	0.218	0.221	0.2250	0.2330	0.237	0.241	0.246	0.251	0.255	
33000	N1	%	71.0	72.2	73.2	74.2	75.1	75.5	75.9	76.5	77.2	
	FUEL FLOW	KG/H/ENG	719	729	733	724	723	720	716	706	699	
	IAS	KT	246	248	249	251	251	250	249	248	246	
	TAS	KT	321	329	335	342	348	353	357	360	363	
	INDICATED MACH		0.518	0.533	0.5460	0.5600	0.571	0.581	0.591	0.598	0.606	
	BUFFET MARGIN	G	2.09	2.13	2.14	2.15	2.15	2.13	2.11	2.07	2.04	
	SR	NM/KG	0.223	0.225	0.2290	0.2360	0.241	0.245	0.249	0.255	0.260	
32000	N1	%	69.9	71.1	72.3	73.3	74.3	74.8	75.2	75.9	76.7	
	FUEL FLOW	KG/H/ENG	688	696	706	698	701	699	695	688	683	
	IAS	KT	241	242	245	246	247	247	246	245	244	
	TAS	KT	314	321	329	336	343	348	352	356	361	
	INDICATED MACH		0.508	0.520	0.5360	0.5500	0.563	0.573	0.583	0.592	0.602	
	BUFFET MARGIN	G	2.07	2.09	2.13	2.14	2.16	2.14	2.12	2.09	2.08	
	SR	NM/KG	0.228	0.230	0.2330	0.2410	0.245	0.249	0.253	0.259	0.264	
31000	N1	%	69.0	70.1	71.4	72.5	73.5	74.1	74.5	75.3	76.1	
	FUEL FLOW	KG/H/ENG	663	669	678	673	677	678	676	671	665	
	IAS	KT	238	238	240	242	243	243	243	242	241	
	TAS	KT	310	315	323	331	338	343	348	353	357	
	INDICATED MACH		0.501	0.511	0.5260	0.5400	0.554	0.566	0.576	0.586	0.596	
	BUFFET MARGIN	G	2.08	2.08	2.11	2.14	2.15	2.15	2.14	2.12	2.10	
	SR	NM/KG	0.234	0.236	0.2380	0.2460	0.249	0.253	0.258	0.263	0.268	

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE F FLOW BY 3% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 2 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON
INCREASE N1% BY 0% AND F FLOW BY 7%.
DECREASE SR% BY 7%.

LONG RANGE CRUISE – ALL ENGINES OPERATING**CF34-8E5 ENGINES****ALTITUDE: 18000 FT TO 26000 FT**CRUISE CONFIGURATION
BLEED: OPEN/ISA CONDITION**WEIGHT
(KG)****ALTITUDE (FT)**

5000 10000 11000 12000 13000 14000 15000 16000 17000

30000	N1	%	68.1	69.4	70.6	71.6	72.6	73.2	73.8	74.8	75.7
	FUEL FLOW	KG/H/ENG	638	648	656	648	653	653	653	654	653
	IAS	KT	235	236	237	238	239	239	239	240	240
	TAS	KT	306	313	319	325	332	337	342	349	355
	INDICATED MACH		0.495	0.508	0.519	0.531	0.545	0.555	0.566	0.580	0.593
	BUFFET MARGIN	G	2.10	2.12	2.13	2.14	2.15	2.14	2.14	2.15	2.14
	SR	NM/KG	0.240	0.241	0.243	0.251	0.254	0.258	0.262	0.267	0.272
29000	N1	%	67.4	68.6	70.0	70.8	71.7	72.4	73.0	74.2	75.2
	FUEL FLOW	KG/H/ENG	618	627	639	626	627	631	630	636	639
	IAS	KT	231	234	236	234	234	235	235	237	239
	TAS	KT	302	310	318	321	326	332	337	346	353
	INDICATED MACH		0.488	0.503	0.518	0.524	0.534	0.547	0.557	0.574	0.589
	BUFFET MARGIN	G	2.11	2.16	2.19	2.15	2.14	2.15	2.14	2.17	2.19
	SR	NM/KG	0.245	0.248	0.249	0.256	0.260	0.263	0.267	0.272	0.277
28000	N1	%	66.8	67.9	69.2	70.0	70.9	71.5	72.1	73.3	74.5
	FUEL FLOW	KG/H/ENG	602	607	619	606	605	605	604	615	622
	IAS	KT	229	231	234	232	231	231	230	233	236
	TAS	KT	299	307	315	318	321	326	330	340	350
	INDICATED MACH		0.483	0.497	0.513	0.519	0.527	0.537	0.546	0.565	0.583
	BUFFET MARGIN	G	2.15	2.18	2.23	2.19	2.16	2.15	2.13	2.18	2.22
	SR	NM/KG	0.249	0.252	0.255	0.262	0.266	0.269	0.273	0.277	0.281
27000	N1	%	66.2	67.3	68.4	69.3	70.2	70.8	71.3	72.4	73.5
	FUEL FLOW	KG/H/ENG	585	592	599	588	588	585	579	593	602
	IAS	KT	226	229	231	231	230	228	225	229	232
	TAS	KT	296	303	311	316	319	322	324	335	344
	INDICATED MACH		0.478	0.492	0.507	0.516	0.524	0.530	0.536	0.556	0.574
	BUFFET MARGIN	G	2.18	2.21	2.25	2.24	2.21	2.17	2.12	2.19	2.24
	SR	NM/KG	0.253	0.256	0.260	0.269	0.272	0.275	0.280	0.282	0.286
26000	N1	%	65.7	66.6	67.6	68.3	69.3	70.0	70.7	71.5	72.3
	FUEL FLOW	KG/H/ENG	572	577	581	567	568	564	563	573	581
	IAS	KT	225	226	228	228	227	225	224	226	228
	TAS	KT	294	300	307	312	316	318	322	330	339
	INDICATED MACH		0.475	0.487	0.499	0.509	0.519	0.524	0.532	0.548	0.565
	BUFFET MARGIN	G	2.24	2.25	2.27	2.26	2.26	2.20	2.18	2.21	2.25
	SR	NM/KG	0.257	0.260	0.264	0.275	0.279	0.282	0.286	0.288	0.291

INCREASE/DECREASE N1% BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE F FLOW BY 3% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 4 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.FOR ANTI-ICE ON
INCREASE N1% BY 0% AND F FLOW BY 9%.
DECREASE SR% BY 8%.

LONG RANGE CRUISE – ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: 18000 FT TO 26000 FT

CRUISE CONFIGURATION
BLEED: OPEN/ISA CONDITION

WEIGHT (KG)			ALTITUDE (FT)									
			5000	10000	11000	12000	13000	14000	15000	16000	17000	
25000	N1	%	65.2	65.9	66.6	67.5	68.2	69.2	70.1	70.6	71.1	
	FUEL FLOW	KG/H/ENG	560	560	561	549	547	546	547	553	559	
	IAS	KT	224	224	223	224	224	223	222	223	224	
	TAS	KT	293	297	301	307	312	316	320	326	332	
	INDICATED MACH		0.473	0.481	0.491	0.501	0.511	0.520	0.529	0.541	0.554	
	BUFFET MARGIN	G	2.30	2.29	2.28	2.28	2.28	2.26	2.24	2.24	2.25	
	SR	NM/KG	0.261	0.265	0.268	0.279	0.285	0.289	0.292	0.294	0.297	
24000	N1	%	64.7	65.1	65.5	66.4	67.3	68.2	69.3	69.3	69.4	
	FUEL FLOW	KG/H/ENG	548	542	536	528	527	527	530	528	528	
	IAS	KT	222	220	217	219	220	220	221	218	216	
	TAS	KT	291	292	293	300	306	312	318	319	322	
	INDICATED MACH		0.469	0.474	0.478	0.490	0.502	0.514	0.525	0.530	0.537	
	BUFFET MARGIN	G	2.36	2.31	2.25	2.27	2.28	2.30	2.30	2.24	2.20	
	SR	NM/KG	0.265	0.270	0.274	0.284	0.290	0.296	0.300	0.302	0.305	
23000	N1	%	63.9	64.2	64.5	65.3	66.1	67.2	68.1	67.9	67.7	
	FUEL FLOW	KG/H/ENG	533	525	517	507	504	508	508	502	495	
	IAS	KT	219	216	213	214	214	216	217	213	209	
	TAS	KT	287	287	288	294	298	306	313	312	311	
	INDICATED MACH		0.463	0.466	0.469	0.480	0.489	0.505	0.517	0.519	0.519	
	BUFFET MARGIN	G	2.40	2.33	2.27	2.27	2.26	2.31	2.32	2.24	2.14	
	SR	NM/KG	0.269	0.274	0.279	0.290	0.296	0.301	0.308	0.311	0.314	
22000	N1	%	62.9	63.1	63.4	64.2	64.8	66.1	67.1	66.5	66.6	
	FUEL FLOW	KG/H/ENG	515	506	499	486	480	487	489	477	471	
	IAS	KT	215	212	210	209	208	211	213	208	205	
	TAS	KT	282	282	283	287	290	299	306	305	305	
	INDICATED MACH		0.455	0.457	0.461	0.469	0.475	0.493	0.507	0.507	0.510	
	BUFFET MARGIN	G	2.42	2.34	2.29	2.27	2.23	2.30	2.33	2.23	2.16	
	SR	NM/KG	0.274	0.279	0.284	0.295	0.302	0.307	0.313	0.320	0.324	
21000	N1	%	61.5	61.9	62.3	63.1	63.7	64.5	65.5	65.4	65.6	
	FUEL FLOW	KG/H/ENG	491	484	480	468	461	461	463	456	450	
	IAS	KT	209	207	206	205	203	204	206	203	201	
	TAS	KT	274	275	278	282	284	290	296	298	300	
	INDICATED MACH		0.442	0.446	0.453	0.460	0.466	0.477	0.490	0.495	0.501	
	BUFFET MARGIN	G	2.40	2.34	2.31	2.29	2.25	2.26	2.29	2.23	2.19	
	SR	NM/KG	0.279	0.284	0.289	0.301	0.308	0.314	0.320	0.327	0.334	

INCREASE/DECREASE N1% BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE F FLOW BY 3% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 3 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON
INCREASE N1% BY 0% AND F FLOW BY 9%.
DECREASE SR% BY 8%

LONG RANGE CRUISE – ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: 27000 FT TO 35000 FT

CRUISE CONFIGURATION
BLEED: OPEN/ISA CONDITION

**WEIGHT
(KG)**

ALTITUDE (FT)

5000 10000 11000 12000 13000 14000 15000 16000 17000

38000	N1	%	80.8	81.6	82.8	84.0	85.0	85.8	86.5	87.0	-
	FUEL FLOW	KG/H/ENG	794	799	821	841	851	854	845	821	-
	IAS	KT	256	255	258	261	261	260	256	246	-
	TAS	KT	383	388	399	409	416	422	422	414	-
	INDICATED MACH		0.642	0.653	0.674	0.694	0.710	0.722	0.726	0.715	-
	BUFFET MARGIN	G	1.86	1.82	1.81	1.79	1.74	1.66	1.59	1.51	-
	SR	NM/KG	0.242	0.243	0.243	0.243	0.245	0.247	0.250	0.252	-
37000	N1	%	80.2	80.8	81.9	83.1	84.2	85.3	86.0	86.3	87.3
	FUEL FLOW	KG/H/ENG	774	768	786	806	825	837	829	804	797
	IAS	KT	254	252	253	255	258	260	256	247	240
	TAS	KT	380	383	392	402	412	421	422	416	411
	INDICATED MACH		0.637	0.645	0.662	0.682	0.703	0.721	0.725	0.718	0.714
	BUFFET MARGIN	G	1.89	1.84	1.82	1.80	1.78	1.71	1.63	1.56	1.48
	SR	NM/KG	0.246	0.250	0.249	0.249	0.250	0.252	0.254	0.259	0.258
36000	N1	%	79.7	80.4	81.1	82.2	83.4	84.5	85.4	85.8	86.7
	FUEL FLOW	KG/H/ENG	756	752	753	771	790	808	810	793	785
	IAS	KT	252	250	249	250	253	256	254	249	243
	TAS	KT	378	381	386	394	405	416	420	418	416
	INDICATED MACH		0.633	0.642	0.652	0.669	0.690	0.712	0.722	0.723	0.721
	BUFFET MARGIN	G	1.92	1.87	1.83	1.81	1.79	1.75	1.68	1.60	1.53
	SR	NM/KG	0.250	0.254	0.256	0.256	0.256	0.257	0.259	0.264	0.265

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE F FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 2 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON
INCREASE N1% BY 0.0% AND F FLOW BY 6%.
DECREASE SR% BY 6%.

LONG RANGE CRUISE – ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: 27000 FT TO 35000 FT

CRUISE CONFIGURATION
BLEED: OPEN/ISA CONDITION

WEIGHT (KG)			ALTITUDE (FT)									
			27000	28000	29000	30000	31000	32000	33000	34000	35000	
35000	N1	%	79.2	79.9	80.3	81.2	82.4	83.6	84.6	85.4	86.1	
	FUEL FLOW	KG/H/ENG	739	734	727	734	756	774	785	786	773	
	IAS	KT	250	248	246	245	248	251	252	251	245	
	TAS	KT	375	379	381	386	397	408	416	421	420	
	INDICATED MACH		0.628	0.637	0.644	0.656	0.677	0.698	0.716	0.728	0.728	
	BUFFET MARGIN	G	1.96	1.91	1.85	1.81	1.80	1.79	1.72	1.65	1.57	
	SR	NM/KG	0.254	0.258	0.262	0.263	0.263	0.263	0.265	0.268	0.271	
34000	N1	%	78.6	79.2	79.8	80.4	81.5	82.7	83.8	84.9	85.5	
	FUEL FLOW	KG/H/ENG	718	715	709	706	722	739	757	772	757	
	IAS	KT	247	246	244	242	243	245	248	251	245	
	TAS	KT	371	375	378	383	390	400	411	422	419	
	INDICATED MACH		0.622	0.631	0.639	0.649	0.665	0.684	0.706	0.729	0.727	
	BUFFET MARGIN	G	1.99	1.94	1.89	1.84	1.81	1.80	1.77	1.69	1.62	
	SR	NM/KG	0.258	0.263	0.267	0.271	0.270	0.270	0.271	0.273	0.277	
33000	N1	%	77.9	78.6	79.2	79.9	80.6	81.7	82.9	84.0	84.9	
	FUEL FLOW	KG/H/ENG	698	695	691	688	690	705	723	739	741	
	IAS	KT	245	243	242	240	239	240	243	246	244	
	TAS	KT	367	371	375	380	384	392	403	414	418	
	INDICATED MACH		0.616	0.625	0.634	0.644	0.655	0.671	0.692	0.714	0.726	
	BUFFET MARGIN	G	2.01	1.97	1.92	1.88	1.83	1.81	1.79	1.74	1.66	
	SR	NM/KG	0.263	0.267	0.272	0.276	0.278	0.278	0.279	0.280	0.282	
32000	N1	%	77.2	77.9	78.6	79.2	79.8	80.8	81.9	83.1	84.2	
	FUEL FLOW	KG/H/ENG	677	674	672	668	665	673	688	705	720	
	IAS	KT	242	241	239	238	236	236	237	240	243	
	TAS	KT	363	368	372	376	380	386	394	405	416	
	INDICATED MACH		0.609	0.619	0.628	0.638	0.647	0.661	0.678	0.700	0.721	
	BUFFET MARGIN	G	2.03	2.00	1.96	1.91	1.86	1.83	1.80	1.79	1.72	
	SR	NM/KG	0.269	0.273	0.277	0.281	0.285	0.287	0.287	0.287	0.289	
31000	N1	%	76.6	77.2	77.8	78.5	79.3	80.1	81.0	82.0	83.3	
	FUEL FLOW	KG/H/ENG	658	654	651	648	649	650	658	668	687	
	IAS	KT	240	238	236	235	235	235	234	234	237	
	TAS	KT	360	364	367	372	378	384	388	395	407	
	INDICATED MACH		0.604	0.612	0.621	0.631	0.643	0.657	0.668	0.683	0.707	
	BUFFET MARGIN	G	2.06	2.02	1.99	1.94	1.91	1.87	1.82	1.79	1.76	
	SR	NM/KG	0.274	0.278	0.282	0.287	0.291	0.295	0.295	0.296	0.296	

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE F FLOW BY 3% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 2 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON
INCREASE N1% BY 0% AND F FLOW BY 7%.
DECREASE SR% BY 7%.

LONG RANGE CRUISE – ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: 27000 FT TO 35000 FT

CRUISE CONFIGURATION
BLEED: OPEN/ISA CONDITION

**WEIGHT
(KG)**

ALTITUDE (FT)

27000 28000 29000 30000 31000 32000 33000 34000 35000

30000	N1	%	76.1	76.5	77.2	77.8	78.6	79.4	80.0	81.0	82.3
	FUEL FLOW	KG/H/ENG	643	633	632	628	630	633	629	635	653
	IAS	KT	238	235	234	232	232	232	230	229	232
	TAS	KT	358	360	364	367	374	380	383	388	399
	INDICATED MACH		0.600	0.605	0.615	0.623	0.637	0.651	0.658	0.669	0.691
	BUFFET MARGIN	G	2.10	2.04	2.02	1.98	1.94	1.91	1.85	1.80	1.79
	SR	NM/KG	0.278	0.284	0.288	0.293	0.296	0.301	0.304	0.305	0.305
29000	N1	%	75.6	76.0	76.5	77.1	77.8	78.6	79.3	80.3	81.3
	FUEL FLOW	KG/H/ENG	628	617	613	608	610	614	609	614	623
	IAS	KT	236	233	232	229	229	230	228	228	227
	TAS	KT	355	357	360	363	369	376	379	386	392
	INDICATED MACH		0.595	0.601	0.609	0.616	0.629	0.644	0.652	0.666	0.679
	BUFFET MARGIN	G	2.14	2.08	2.05	2.00	1.98	1.95	1.89	1.85	1.81
	SR	NM/KG	0.283	0.289	0.294	0.299	0.302	0.306	0.312	0.314	0.315
28000	N1	%	74.9	75.5	75.9	76.4	77.1	77.8	78.5	79.2	80.3
	FUEL FLOW	KG/H/ENG	614	605	595	588	591	595	592	587	593
	IAS	KT	234	232	229	227	227	227	226	224	223
	TAS	KT	352	355	357	359	365	372	376	380	385
	INDICATED MACH		0.590	0.598	0.604	0.609	0.622	0.636	0.646	0.656	0.668
	BUFFET MARGIN	G	2.18	2.14	2.08	2.03	2.02	1.98	1.94	1.88	1.84
	SR	NM/KG	0.287	0.293	0.300	0.305	0.309	0.312	0.318	0.324	0.325
27000	N1	%	74.2	75.1	75.3	75.8	76.4	77.0	77.7	78.4	79.2
	FUEL FLOW	KG/H/ENG	597	593	582	571	575	576	573	570	568
	IAS	KT	231	231	228	225	225	224	223	222	221
	TAS	KT	349	354	355	357	363	367	372	376	381
	INDICATED MACH		0.584	0.595	0.599	0.605	0.618	0.629	0.639	0.650	0.661
	BUFFET MARGIN	G	2.21	2.19	2.13	2.08	2.07	2.03	1.98	1.93	1.88
	SR	NM/KG	0.292	0.298	0.305	0.312	0.315	0.319	0.324	0.330	0.335
26000	N1	%	73.3	74.2	74.7	75.3	75.7	76.1	76.9	77.6	78.4
	FUEL FLOW	KG/H/ENG	579	575	567	560	558	557	554	552	550
	IAS	KT	228	228	226	224	223	221	220	219	218
	TAS	KT	344	349	352	355	359	363	367	372	377
	INDICATED MACH		0.577	0.587	0.594	0.603	0.612	0.621	0.631	0.642	0.654
	BUFFET MARGIN	G	2.24	2.22	2.18	2.14	2.11	2.07	2.02	1.97	1.93
	SR	NM/KG	0.297	0.303	0.310	0.317	0.322	0.326	0.331	0.337	0.343

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE F FLOW BY 3% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 3 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON
INCREASE N1% BY 0.0% AND F FLOW BY 8%.
DECREASE SR% BY 7%.

LONG RANGE CRUISE – ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: 27000 FT TO 35000 FT

CRUISE CONFIGURATION
BLEED: OPEN/ISA CONDITION

WEIGHT (KG)			ALTITUDE (FT)										
			27000	28000	29000	30000	31000	32000	33000	34000	35000		
25000	N1	%	72.2	73.2	74.0	74.8	75.0	75.3	76.0	76.7	77.6		
	FUEL FLOW	KG/H/ENG	559	555	553	548	543	537	535	533	533		
	IAS	KT	224	224	224	223	221	218	217	216	216		
	TAS	KT	338	343	349	354	356	358	363	367	373		
	INDICATED MACH		0.567	0.578	0.589	0.600	0.607	0.613	0.623	0.634	0.647		
	BUFFET MARGIN	G	2.25	2.24	2.22	2.20	2.15	2.10	2.06	2.01	1.97		
	SR	NM/KG	0.303	0.309	0.315	0.322	0.328	0.333	0.339	0.344	0.350		
24000	N1	%	70.8	72.1	73.1	74.0	74.3	74.5	75.2	75.9	76.7		
	FUEL FLOW	KG/H/ENG	533	535	535	533	529	519	516	514	513		
	IAS	KT	218	220	220	220	219	215	214	213	212		
	TAS	KT	330	338	344	350	353	353	358	363	368		
	INDICATED MACH		0.553	0.568	0.581	0.594	0.602	0.604	0.615	0.626	0.638		
	BUFFET MARGIN	G	2.23	2.25	2.25	2.25	2.21	2.12	2.10	2.06	2.02		
	SR	NM/KG	0.310	0.315	0.321	0.328	0.333	0.340	0.347	0.352	0.358		
23000	N1	%	69.3	70.8	72.0	73.0	73.5	73.8	74.3	75.0	75.8		
	FUEL FLOW	KG/H/ENG	504	510	514	516	513	502	498	496	494		
	IAS	KT	212	214	216	217	216	212	211	210	209		
	TAS	KT	320	329	338	345	348	349	353	358	362		
	INDICATED MACH		0.537	0.553	0.570	0.586	0.594	0.597	0.607	0.619	0.629		
	BUFFET MARGIN	G	2.19	2.23	2.26	2.28	2.24	2.16	2.14	2.12	2.07		
	SR	NM/KG	0.318	0.323	0.328	0.334	0.340	0.347	0.354	0.361	0.367		
22000	N1	%	67.9	69.4	70.8	71.9	72.4	72.9	73.6	74.3	74.8		
	FUEL FLOW	KG/H/ENG	475	483	494	496	491	484	482	480	474		
	IAS	KT	205	208	212	213	211	208	208	208	206		
	TAS	KT	311	320	331	339	341	343	349	354	357		
	INDICATED MACH		0.520	0.538	0.560	0.575	0.581	0.587	0.599	0.611	0.619		
	BUFFET MARGIN	G	2.16	2.21	2.28	2.30	2.25	2.18	2.18	2.16	2.11		
	SR	NM/KG	0.327	0.331	0.335	0.341	0.347	0.354	0.361	0.369	0.376		
21000	N1	%	66.8	68.0	69.4	70.7	71.4	72.1	72.8	73.5	74.0		
	FUEL FLOW	KG/H/ENG	452	456	465	475	470	465	465	464	456		
	IAS	KT	202	202	205	209	206	204	205	205	203		
	TAS	KT	306	311	321	332	334	337	343	349	352		
	INDICATED MACH		0.512	0.523	0.542	0.563	0.569	0.576	0.590	0.603	0.610		
	BUFFET MARGIN	G	2.19	2.18	2.24	2.31	2.26	2.21	2.21	2.20	2.15		
	SR	NM/KG	0.338	0.341	0.345	0.349	0.355	0.362	0.369	0.377	0.385		

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE F FLOW BY 3% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 2 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON
INCREASE N1% BY 0% AND F FLOW BY 9%.
DECREASE SR% BY 7%.



LONG RANGE CRUISE – ALL ENGINES OPERATING
CF34-8E5 ENGINES

ALTITUDE: 36000 FT TO 41000 FT

CRUISE CONFIGURATION
BLEED: OPEN/ISA CONDITION

WEIGHT (KG)			ALTITUDE (FT)						
			36000	37000	38000	39000	40000	41000	
38000	N1	%	-	-	-	-	-	-	
	FUEL FLOW	KG/H/ENG	-	-	-	-	-	-	
	IAS	KT	-	-	-	-	-	-	
	TAS	KT	-	-	-	-	-	-	
	INDICATED MACH		-	-	-	-	-	-	
	BUFFET MARGIN	G	-	-	-	-	-	-	
	SR	NM/KG	-	-	-	-	-	-	
37000	N1	%	-	-	-	-	-	-	
	FUEL FLOW	KG/H/ENG	-	-	-	-	-	-	
	IAS	KT	-	-	-	-	-	-	
	TAS	KT	-	-	-	-	-	-	
	INDICATED MACH		-	-	-	-	-	-	
	BUFFET MARGIN	G	-	-	-	-	-	-	
	SR	NM/KG	-	-	-	-	-	-	
36000	N1	%	-	-	-	-	-	-	
	FUEL FLOW	KG/H/ENG	-	-	-	-	-	-	
	IAS	KT	-	-	-	-	-	-	
	TAS	KT	-	-	-	-	-	-	
	INDICATED MACH		-	-	-	-	-	-	
	BUFFET MARGIN	G	-	-	-	-	-	-	
	SR	NM/KG	-	-	-	-	-	-	

INCREASE/DECREASE N1% BY 0% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE F FLOW BY 0% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 0 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON
INCREASE N1% BY 0.0% AND F FLOW BY 0%.
DECREASE SR% BY 0%.

LONG RANGE CRUISE – ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: 36000 FT TO 41000 FT

CRUISE CONFIGURATION
BLEED: OPEN/ISA CONDITION

WEIGHT (KG)			ALTITUDE (FT)						
				36000	37000	38000	39000	40000	41000
35000	N1	%	86.7	-	-	-	-	-	-
	FUEL FLOW	KG/H/ENG	751	-	-	-	-	-	-
	IAS	KT	234	-	-	-	-	-	-
	TAS	KT	410	-	-	-	-	-	-
	INDICATED MACH		0.714	-	-	-	-	-	-
	BUFFET MARGIN	G	1.49	-	-	-	-	-	-
	SR	NM/KG	0.273	-	-	-	-	-	-
34000	N1	%	85.9	-	-	-	-	-	-
	FUEL FLOW	KG/H/ENG	734	-	-	-	-	-	-
	IAS	KT	236	-	-	-	-	-	-
	TAS	KT	412	-	-	-	-	-	-
	INDICATED MACH		0.718	-	-	-	-	-	-
	BUFFET MARGIN	G	1.54	-	-	-	-	-	-
	SR	NM/KG	0.281	-	-	-	-	-	-
33000	N1	%	85.5	86.7	-	-	-	-	-
	FUEL FLOW	KG/H/ENG	728	721	-	-	-	-	-
	IAS	KT	240	232	-	-	-	-	-
	TAS	KT	418	414	-	-	-	-	-
	INDICATED MACH		0.728	0.722	-	-	-	-	-
	BUFFET MARGIN	G	1.59	1.51	-	-	-	-	-
	SR	NM/KG	0.287	0.287	-	-	-	-	-
32000	N1	%	85.0	86.0	-	-	-	-	-
	FUEL FLOW	KG/H/ENG	720	707	-	-	-	-	-
	IAS	KT	242	234	-	-	-	-	-
	TAS	KT	421	417	-	-	-	-	-
	INDICATED MACH		0.734	0.728	-	-	-	-	-
	BUFFET MARGIN	G	1.64	1.56	-	-	-	-	-
	SR	NM/KG	0.292	0.295	-	-	-	-	-
31000	N1	%	84.4	85.4	86.1	-	-	-	-
	FUEL FLOW	KG/H/ENG	701	692	674	-	-	-	-
	IAS	KT	240	234	225	-	-	-	-
	TAS	KT	419	418	412	-	-	-	-
	INDICATED MACH		0.730	0.728	0.718	-	-	-	-
	BUFFET MARGIN	G	1.69	1.61	1.53	-	-	-	-
	SR	NM/KG	0.298	0.302	0.306	-	-	-	-

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE F FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 2 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON
INCREASE N1% BY 0.1% AND F FLOW BY 0%.
DECREASE SR% BY 0%.

LONG RANGE CRUISE – ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: 36000 FT TO 41000 FT

CRUISE CONFIGURATION
BLEED: OPEN/ISA CONDITION

WEIGHT (KG)		ALTITUDE (FT)		36000	37000	38000	39000	40000	41000
30000	N1	%		83.5	84.7	85.6	-	-	-
	FUEL FLOW	KG/H/ENG		668	674	670	-	-	-
	IAS	KT		234	233	230	-	-	-
	TAS	KT		409	416	419	-	-	-
	INDICATED MACH			0.714	0.726	0.731	-	-	-
	BUFFET MARGIN	G		1.74	1.66	1.59	-	-	-
	SR	NM/KG		0.306	0.309	0.313	-	-	-
29000	N1	%		82.4	84.0	85.2	86.4	-	-
	FUEL FLOW	KG/H/ENG		635	656	663	661	-	-
	IAS	KT		229	232	232	228	-	-
	TAS	KT		400	415	424	425	-	-
	INDICATED MACH			0.698	0.723	0.739	0.741	-	-
	BUFFET MARGIN	G		1.79	1.72	1.64	1.56	-	-
	SR	NM/KG		0.315	0.316	0.319	0.321	-	-
28000	N1	%		81.2	82.9	84.6	85.6	86.4	-
	FUEL FLOW	KG/H/ENG		596	624	649	643	630	-
	IAS	KT		222	227	232	227	219	-
	TAS	KT		389	406	423	424	419	-
	INDICATED MACH			0.679	0.707	0.738	0.738	0.731	-
	BUFFET MARGIN	G		1.79	1.78	1.70	1.62	1.54	-
	SR	NM/KG		0.326	0.325	0.326	0.329	0.332	-
27000	N1	%		80.4	81.8	83.4	85.0	85.9	-
	FUEL FLOW	KG/H/ENG		576	593	614	629	625	-
	IAS	KT		221	222	225	227	223	-
	TAS	KT		388	398	412	424	426	-
	INDICATED MACH			0.675	0.693	0.718	0.739	0.743	-
	BUFFET MARGIN	G		1.84	1.82	1.76	1.68	1.60	-
	SR	NM/KG		0.336	0.335	0.335	0.337	0.341	-
26000	N1	%		79.4	80.9	82.2	83.9	85.4	86.0
	FUEL FLOW	KG/H/ENG		553	568	581	603	617	599
	IAS	KT		219	219	219	223	225	216
	TAS	KT		384	392	401	417	430	423
	INDICATED MACH			0.669	0.684	0.700	0.728	0.750	0.737
	BUFFET MARGIN	G		1.89	1.85	1.82	1.74	1.66	1.59
	SR	NM/KG		0.347	0.346	0.345	0.346	0.348	0.353

INCREASE/DECREASE N1% BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE F FLOW BY 3% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 5 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON
INCREASE N1% BY 0.1% AND F FLOW BY 0%.
DECREASE SR% BY 0%.

LONG RANGE CRUISE – ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: 36000 FT TO 41000 FT

CRUISE CONFIGURATION
BLEED: OPEN/ISA CONDITION

WEIGHT (KG)			ALTITUDE (FT)							
			36000	37000	38000	39000	40000	41000		
25000	N1	%	78.4	79.5	80.9	82.5	84.2	85.3		
	FUEL FLOW	KG/H/ENG	531	537	545	566	588	585		
	IAS	KT	215	214	212	216	220	216		
	TAS	KT	378	384	390	404	421	423		
	INDICATED MACH		0.659	0.669	0.680	0.705	0.734	0.737		
	BUFFET MARGIN	G	1.93	1.87	1.82	1.80	1.73	1.65		
	SR	NM/KG	0.356	0.358	0.358	0.357	0.358	0.362		
24000	N1	%	77.5	78.3	79.7	81.2	82.6	84.1		
	FUEL FLOW	KG/H/ENG	512	508	516	529	542	559		
	IAS	KT	212	208	208	208	209	212		
	TAS	KT	373	375	382	392	402	416		
	INDICATED MACH		0.650	0.654	0.666	0.683	0.701	0.726		
	BUFFET MARGIN	G	1.97	1.89	1.85	1.82	1.79	1.72		
	SR	NM/KG	0.364	0.369	0.371	0.370	0.371	0.372		
23000	N1	%	76.5	77.4	78.3	79.7	81.1	82.8		
	FUEL FLOW	KG/H/ENG	491	488	485	496	505	524		
	IAS	KT	208	205	202	203	202	206		
	TAS	KT	367	369	373	382	390	404		
	INDICATED MACH		0.639	0.644	0.650	0.666	0.680	0.705		
	BUFFET MARGIN	G	2.01	1.94	1.87	1.84	1.80	1.78		
	SR	NM/KG	0.373	0.378	0.384	0.385	0.386	0.385		
22000	N1	%	75.5	76.5	77.4	78.5	80.0	81.5		
	FUEL FLOW	KG/H/ENG	471	469	466	467	480	493		
	IAS	KT	204	202	199	198	199	200		
	TAS	KT	360	364	368	374	385	394		
	INDICATED MACH		0.628	0.634	0.641	0.652	0.671	0.688		
	BUFFET MARGIN	G	2.06	1.99	1.92	1.87	1.85	1.82		
	SR	NM/KG	0.383	0.388	0.394	0.400	0.401	0.400		
21000	N1	%	74.6	75.6	76.6	77.5	78.5	80.0		
	FUEL FLOW	KG/H/ENG	451	449	450	448	448	459		
	IAS	KT	201	198	197	195	194	194		
	TAS	KT	355	358	364	369	374	383		
	INDICATED MACH		0.618	0.625	0.635	0.643	0.653	0.668		
	BUFFET MARGIN	G	2.10	2.04	1.99	1.92	1.87	1.84		
	SR	NM/KG	0.393	0.399	0.405	0.411	0.417	0.417		

INCREASE/DECREASE N1% BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE F FLOW BY 3% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 2 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON
INCREASE N1% BY 0.1% AND F FLOW BY 0%.
DECREASE SR BY 0%.

320 KIAS CRUISE – ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: 5000 FT TO 17000 FT

CRUISE CONFIGURATION
BLEED: OPEN/ISA CONDITION

**WEIGHT
(KG)**

ALTITUDE (FT)

5000 10000 11000 12000 13000 14000 15000 16000 17000

38000	N1	%	-	75.1	75.9	76.6	77.4	78.3	79.0	79.8	80.4
	FUEL FLOW	KG/H/ENG	-	1110	1106	1102	1109	1114	1115	1115	1116
	IAS	KT	-	320	320	320	320	320	320	320	320
	TAS	KT	-	368	373	379	384	390	395	401	407
	INDICATED MACH		-	0.576	0.587	0.598	0.608	0.620	0.631	0.643	0.655
	BUFFET MARGIN	G	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
	SR	NM/KG	-	0.166	0.169	0.172	0.173	0.175	0.177	0.180	0.182
37000	N1	%	-	75.0	75.8	76.5	77.2	78.0	78.8	79.6	80.2
	FUEL FLOW	KG/H/ENG	-	1104	1101	1097	1097	1103	1107	1107	1108
	IAS	KT	-	320	320	320	320	320	320	320	320
	TAS	KT	-	368	373	379	384	390	395	401	407
	INDICATED MACH		-	0.576	0.587	0.598	0.608	0.620	0.631	0.643	0.655
	BUFFET MARGIN	G	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
	SR	NM/KG	-	0.167	0.169	0.172	0.175	0.177	0.179	0.181	0.184
36000	N1	%	-	74.9	75.6	76.4	77.0	77.7	78.6	79.4	80.1
	FUEL FLOW	KG/H/ENG	-	1099	1096	1093	1089	1092	1097	1099	1100
	IAS	KT	-	320	320	320	320	320	320	320	320
	TAS	KT	-	368	373	379	384	390	395	401	407
	INDICATED MACH		-	0.576	0.587	0.598	0.608	0.620	0.631	0.643	0.655
	BUFFET MARGIN	G	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
	SR	NM/KG	-	0.167	0.170	0.173	0.176	0.178	0.180	0.182	0.185

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE F FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 1 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON
INCREASE N1% BY 0.0% AND F FLOW BY 4%.
DECREASE SR% BY 4%.

320 KIAS CRUISE – ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: 5000 FT TO 17000 FT

CRUISE CONFIGURATION
BLEED: OPEN/ISA CONDITION

WEIGHT (KG)

ALTITUDE (FT)

5000 10000 11000 12000 13000 14000 15000 16000 17000

35000	N1	%	-	74.8	75.5	76.3	76.9	77.5	78.3	79.2	79.9
	FUEL FLOW	KG/H/ENG	-	1094	1091	1088	1085	1081	1086	1090	1092
	IAS	KT	-	320	320	320	320	320	320	320	320
	TAS	KT	-	368	373	379	384	390	395	401	407
	INDICATED MACH		-	0.576	0.587	0.598	0.608	0.620	0.631	0.643	0.655
	BUFFET MARGIN	G	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
	SR	NM/KG	-	0.168	0.171	0.174	0.177	0.180	0.182	0.184	0.186
34000	N1	%	-	74.7	75.4	76.2	76.8	77.4	78.1	78.9	79.7
	FUEL FLOW	KG/H/ENG	-	1091	1087	1084	1081	1078	1076	1080	1084
	IAS	KT	-	320	320	320	320	320	320	320	320
	TAS	KT	-	368	373	379	384	390	395	401	407
	INDICATED MACH		-	0.576	0.587	0.598	0.608	0.620	0.631	0.643	0.655
	BUFFET MARGIN	G	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
	SR	NM/KG	-	0.169	0.172	0.175	0.178	0.181	0.184	0.186	0.188
33000	N1	%	-	74.6	75.4	76.1	76.7	77.3	78.0	78.7	79.5
	FUEL FLOW	KG/H/ENG	-	1087	1083	1079	1077	1074	1070	1070	1074
	IAS	KT	-	320	320	320	320	320	320	320	320
	TAS	KT	-	368	373	379	384	390	395	401	407
	INDICATED MACH		-	0.576	0.587	0.598	0.608	0.620	0.631	0.643	0.655
	BUFFET MARGIN	G	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
	SR	NM/KG	-	0.169	0.172	0.175	0.178	0.181	0.185	0.187	0.189
32000	N1	%	-	74.6	75.3	76.0	76.6	77.2	77.9	78.5	79.3
	FUEL FLOW	KG/H/ENG	-	1084	1080	1075	1073	1070	1067	1063	1065
	IAS	KT	-	320	320	320	320	320	320	320	320
	TAS	KT	-	368	373	379	384	390	395	401	407
	INDICATED MACH		-	0.576	0.587	0.598	0.608	0.620	0.631	0.643	0.655
	BUFFET MARGIN	G	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
	SR	NM/KG	-	0.170	0.173	0.176	0.179	0.182	0.185	0.189	0.191
31000	N1	%	-	74.5	75.2	75.9	76.5	77.2	77.8	78.4	79.1
	FUEL FLOW	KG/H/ENG	-	1080	1077	1073	1069	1066	1063	1060	1056
	IAS	KT	-	320	320	320	320	320	320	320	320
	TAS	KT	-	368	373	379	384	390	395	401	407
	INDICATED MACH		-	0.576	0.587	0.598	0.608	0.620	0.631	0.643	0.655
	BUFFET MARGIN	G	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
	SR	NM/KG	-	0.170	0.173	0.176	0.180	0.183	0.186	0.189	0.193

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE F FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 1 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON
INCREASE N1% BY 0.0% AND F FLOW BY 4%.
DECREASE SR% BY 4%.

320 KIAS CRUISE – ALL ENGINES OPERATING**CF34-8E5 ENGINES****ALTITUDE: 5000 FT TO 17000 FT**CRUISE CONFIGURATION
BLEED: OPEN/ISA CONDITION**WEIGHT
(KG)****ALTITUDE (FT)**

5000 10000 11000 12000 13000 14000 15000 16000 17000

30000	N1	%	-	74.4	75.1	75.9	76.5	77.1	77.7	78.3	79.0
	FUEL FLOW	KG/H/ENG	-	1077	1074	1070	1066	1062	1060	1056	1053
	IAS	KT	-	320	320	320	320	320	320	320	320
	TAS	KT	-	368	373	379	384	390	395	401	407
	INDICATED MACH		-	0.576	0.5870	0.5980	0.608	0.620	0.631	0.643	0.655
	BUFFET MARGIN	G	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
	SR	NM/KG	-	0.171	0.1740	0.1770	0.180	0.183	0.187	0.190	0.193
29000	N1	%	-	74.3	75.1	75.8	76.4	77.0	77.6	78.3	78.9
	FUEL FLOW	KG/H/ENG	-	1074	1070	1067	1063	1060	1056	1053	1050
	IAS	KT	-	320	320	320	320	320	320	320	320
	TAS	KT	-	368	373	379	384	390	395	401	407
	INDICATED MACH		-	0.576	0.5870	0.5980	0.608	0.620	0.631	0.643	0.655
	BUFFET MARGIN	G	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
	SR	NM/KG	-	0.171	0.1740	0.1770	0.181	0.184	0.187	0.190	0.194
28000	N1	%	-	74.3	75.0	75.7	76.4	77.0	77.6	78.2	78.8
	FUEL FLOW	KG/H/ENG	-	1070	1067	1064	1061	1057	1054	1050	1047
	IAS	KT	-	320	320	320	320	320	320	320	320
	TAS	KT	-	368	373	379	384	390	395	401	407
	INDICATED MACH		-	0.576	0.5870	0.5980	0.608	0.620	0.631	0.643	0.655
	BUFFET MARGIN	G	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
	SR	NM/KG	-	0.172	0.1750	0.1780	0.181	0.184	0.188	0.191	0.194
27000	N1	%	-	74.2	74.9	75.7	76.3	76.9	77.5	78.1	78.8
	FUEL FLOW	KG/H/ENG	-	1069	1064	1061	1058	1055	1052	1048	1044
	IAS	KT	-	320	320	320	320	320	320	320	320
	TAS	KT	-	368	373	379	384	390	395	401	407
	INDICATED MACH		-	0.576	0.5870	0.5980	0.608	0.620	0.631	0.643	0.655
	BUFFET MARGIN	G	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
	SR	NM/KG	-	0.172	0.1750	0.1780	0.181	0.185	0.188	0.191	0.195
26000	N1	%	-	74.2	74.9	75.6	76.2	76.9	77.5	78.1	78.7
	FUEL FLOW	KG/H/ENG	-	1067	1063	1058	1056	1053	1049	1046	1042
	IAS	KT	-	320	320	320	320	320	320	320	320
	TAS	KT	-	368	373	379	384	390	395	401	407
	INDICATED MACH		-	0.576	0.5870	0.5980	0.608	0.620	0.631	0.643	0.655
	BUFFET MARGIN	G	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
	SR	NM/KG	-	0.172	0.1760	0.1790	0.182	0.185	0.188	0.192	0.195

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE F FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 1 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.FOR ANTI-ICE ON
INCREASE N1% BY 0.0% AND F FLOW BY 4%.
DECREASE SR% BY 4%.

320 KIAS CRUISE – ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: 5000 FT TO 17000 FT

CRUISE CONFIGURATION
BLEED: OPEN/ISA CONDITION

WEIGHT (KG)			ALTITUDE (FT)									
			5000	10000	11000	12000	13000	14000	15000	16000	17000	
25000	N1	%	-	74.1	74.9	75.6	76.2	76.8	77.4	78.1	78.7	
	FUEL FLOW	KG/H/ENG	-	1066	1062	1057	1053	1050	1047	1044	1040	
	IAS	KT	-	320	320	320	320	320	320	320	320	
	TAS	KT	-	368	373	379	384	390	395	401	407	
	INDICATED MACH		-	0.576	0.5870	0.598	0.608	0.620	0.631	0.643	0.655	
	BUFFET MARGIN	G	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	
	SR	NM/KG	-	0.173	0.1760	0.1790	0.182	0.185	0.189	0.192	0.196	
24000	N1	%	-	74.1	74.8	75.6	76.2	76.7	77.4	78.0	78.6	
	FUEL FLOW	KG/H/ENG	-	1064	1060	1056	1052	1048	1045	1042	1039	
	IAS	KT	-	320	320	320	320	320	320	320	320	
	TAS	KT	-	368	373	379	384	390	395	401	407	
	INDICATED MACH		-	0.576	0.5870	0.598	0.608	0.620	0.631	0.643	0.655	
	BUFFET MARGIN	G	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	
	SR	NM/KG	-	0.173	0.1760	0.1790	0.183	0.186	0.189	0.192	0.196	
23000	N1	%	-	74.1	74.8	75.5	76.1	76.7	77.3	78.0	78.6	
	FUEL FLOW	KG/H/ENG	-	1063	1059	1055	1051	1047	1043	1040	1037	
	IAS	KT	-	320	320	320	320	320	320	320	320	
	TAS	KT	-	368	373	379	384	390	395	401	407	
	INDICATED MACH		-	0.576	0.5870	0.598	0.608	0.620	0.631	0.643	0.655	
	BUFFET MARGIN	G	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	
	SR	NM/KG	-	0.173	0.1760	0.1790	0.183	0.186	0.189	0.193	0.196	
22000	N1	%	-	74.0	74.8	75.5	76.1	76.7	77.3	77.9	78.6	
	FUEL FLOW	KG/H/ENG	-	1061	1058	1054	1050	1047	1043	1039	1036	
	IAS	KT	-	320	320	320	320	320	320	320	320	
	TAS	KT	-	368	373	379	384	390	395	401	407	
	INDICATED MACH		-	0.576	0.5870	0.598	0.608	0.620	0.631	0.643	0.655	
	BUFFET MARGIN	G	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	
	SR	NM/KG	-	0.173	0.1760	0.1800	0.183	0.186	0.190	0.193	0.197	
21000	N1	%	-	74.0	74.7	75.5	76.1	76.7	77.3	77.9	78.5	
	FUEL FLOW	KG/H/ENG	-	1060	1056	1053	1049	1046	1042	1039	1034	
	IAS	KT	-	320	320	320	320	320	320	320	320	
	TAS	KT	-	368	373	379	384	390	395	401	407	
	INDICATED MACH		-	0.576	0.5870	0.598	0.608	0.620	0.631	0.643	0.655	
	BUFFET MARGIN	G	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	
	SR	NM/KG	-	0.174	0.1770	0.1800	0.183	0.186	0.190	0.193	0.197	

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE F FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 1 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON
INCREASE N1% BY 0.0% AND F FLOW BY 4%.
DECREASE SR% BY 4%.

320 KIAS CRUISE – ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: 18000 FT TO 26000 FT

CRUISE CONFIGURATION
BLEED: OPEN/ISA CONDITION

**WEIGHT
(KG)**

ALTITUDE (FT)

18000 19000 20000 21000 22000 23000 24000 25000 26000

38000	N1	%	81.1	81.7	82.4	83.2	83.9	84.7	85.4	86.2	86.9
	FUEL FLOW	KG/H/ENG	1116	1118	1120	1103	1106	1113	1120	1129	1136
	IAS	KT	320	320	320	320	320	320	320	320	320
	TAS	KT	413	419	425	432	438	445	451	458	465
	INDICATED MACH		0.667	0.680	0.692	0.706	0.719	0.733	0.747	0.761	0.776
	BUFFET MARGIN	G	2.50	2.50	2.50	2.50	2.50	2.49	2.38	2.27	2.16
	SR	NM/KG	0.185	0.187	0.190	0.196	0.198	0.200	0.202	0.203	0.205
37000	N1	%	80.9	81.6	82.3	83.0	83.7	84.5	85.2	86.0	86.7
	FUEL FLOW	KG/H/ENG	1108	1110	1112	1095	1098	1104	1110	1119	1126
	IAS	KT	320	320	320	320	320	320	320	320	320
	TAS	KT	413	419	425	432	438	445	451	458	465
	INDICATED MACH		0.667	0.680	0.692	0.706	0.719	0.733	0.747	0.761	0.776
	BUFFET MARGIN	G	2.50	2.50	2.50	2.50	2.50	2.50	2.45	2.34	2.22
	SR	NM/KG	0.186	0.189	0.191	0.197	0.199	0.201	0.203	0.205	0.206
36000	N1	%	80.7	81.4	82.1	82.8	83.5	84.3	85.1	85.8	86.5
	FUEL FLOW	KG/H/ENG	1100	1102	1104	1087	1090	1095	1101	1110	1117
	IAS	KT	320	320	320	320	320	320	320	320	320
	TAS	KT	413	419	425	432	438	445	451	458	465
	INDICATED MACH		0.667	0.680	0.692	0.706	0.719	0.733	0.747	0.761	0.776
	BUFFET MARGIN	G	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.40	2.28
	SR	NM/KG	0.188	0.190	0.193	0.199	0.201	0.203	0.205	0.206	0.208

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE F FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 1 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON
INCREASE N1% BY 0.0% AND F FLOW BY 4%.
DECREASE SR% BY 4%.

320 KIAS CRUISE – ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: 18000 FT TO 26000 FT

CRUISE CONFIGURATION
BLEED: OPEN/ISA CONDITION

WEIGHT (KG)			ALTITUDE (FT)										
			18000	19000	20000	21000	22000	23000	24000	25000	26000		
35000	N1	%	80.6	81.2	81.9	82.6	83.3	84.1	84.9	85.6	86.3		
	FUEL FLOW	KG/H/ENG	1093	1094	1096	1079	1082	1086	1092	1101	1107		
	IAS	KT	320	320	320	320	320	320	320	320	320		
	TAS	KT	413	419	425	432	438	445	451	458	465		
	INDICATED MACH		0.667	0.680	0.692	0.706	0.719	0.733	0.747	0.761	0.776		
	BUFFET MARGIN	G	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.47	2.35		
	SR	NM/KG	0.189	0.192	0.194	0.200	0.202	0.205	0.207	0.208	0.210		
34000	N1	%	80.4	81.1	81.7	82.4	83.2	83.9	84.7	85.4	86.1		
	FUEL FLOW	KG/H/ENG	1085	1086	1088	1071	1074	1078	1083	1092	1097		
	IAS	KT	320	320	320	320	320	320	320	320	320		
	TAS	KT	413	419	425	432	438	445	451	458	465		
	INDICATED MACH		0.667	0.680	0.692	0.706	0.719	0.733	0.747	0.761	0.776		
	BUFFET MARGIN	G	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.42		
	SR	NM/KG	0.190	0.193	0.196	0.202	0.204	0.206	0.208	0.210	0.212		
33000	N1	%	80.3	80.9	81.6	82.3	83.0	83.7	84.5	85.2	85.9		
	FUEL FLOW	KG/H/ENG	1077	1078	1080	1063	1066	1070	1075	1083	1088		
	IAS	KT	320	320	320	320	320	320	320	320	320		
	TAS	KT	413	419	425	432	438	445	451	458	465		
	INDICATED MACH		0.667	0.680	0.692	0.706	0.719	0.733	0.747	0.761	0.776		
	BUFFET MARGIN	G	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.49		
	SR	NM/KG	0.192	0.194	0.197	0.203	0.206	0.208	0.210	0.212	0.214		
32000	N1	%	80.1	80.7	81.4	82.1	82.8	83.5	84.3	85.0	85.7		
	FUEL FLOW	KG/H/ENG	1068	1070	1072	1055	1058	1062	1066	1073	1078		
	IAS	KT	320	320	320	320	320	320	320	320	320		
	TAS	KT	413	419	425	432	438	445	451	458	465		
	INDICATED MACH		0.667	0.680	0.692	0.706	0.719	0.733	0.747	0.761	0.776		
	BUFFET MARGIN	G	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50		
	SR	NM/KG	0.193	0.196	0.198	0.205	0.207	0.209	0.212	0.213	0.216		
31000	N1	%	79.9	80.6	81.2	81.9	82.6	83.3	84.0	84.8	85.5		
	FUEL FLOW	KG/H/ENG	1059	1062	1064	1047	1050	1053	1058	1064	1068		
	IAS	KT	320	320	320	320	320	320	320	320	320		
	TAS	KT	413	419	425	432	438	445	451	458	465		
	INDICATED MACH		0.667	0.680	0.692	0.706	0.719	0.733	0.747	0.761	0.776		
	BUFFET MARGIN	G	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50		
	SR	NM/KG	0.195	0.197	0.200	0.206	0.209	0.211	0.213	0.215	0.218		

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE F FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 1 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON
INCREASE N1% BY 0.0% AND F FLOW BY 4%.
DECREASE SR% BY 4%.

320 KIAS CRUISE – ALL ENGINES OPERATING**CF34-8E5 ENGINES****ALTITUDE: 18000 FT TO 26000 FT**CRUISE CONFIGURATION
BLEED: OPEN/ISA CONDITION**WEIGHT
(KG)****ALTITUDE (FT)**

18000 19000 20000 21000 22000 23000 24000 25000 26000

30000	N1	%	79.6	80.4	81.1	81.7	82.4	83.1	83.8	84.6	85.3
	FUEL FLOW	KG/H/ENG	1050	1054	1056	1039	1042	1045	1049	1054	1059
	IAS	KT	320	320	320	320	320	320	320	320	320
	TAS	KT	413	419	425	432	438	445	451	458	465
	INDICATED MACH		0.667	0.680	0.692	0.706	0.719	0.733	0.747	0.761	0.776
	BUFFET MARGIN	G	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
	SR	NM/KG	0.197	0.199	0.201	0.208	0.210	0.213	0.215	0.217	0.220
29000	N1	%	79.6	80.2	80.9	81.6	82.2	82.9	83.6	84.4	85.1
	FUEL FLOW	KG/H/ENG	1046	1045	1048	1031	1034	1037	1040	1045	1049
	IAS	KT	320	320	320	320	320	320	320	320	320
	TAS	KT	413	419	425	432	438	445	451	458	465
	INDICATED MACH		0.667	0.680	0.692	0.706	0.719	0.733	0.747	0.761	0.776
	BUFFET MARGIN	G	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
	SR	NM/KG	0.197	0.201	0.203	0.209	0.212	0.215	0.217	0.219	0.222
28000	N1	%	79.5	80.1	80.7	81.4	82.1	82.7	83.4	84.2	84.9
	FUEL FLOW	KG/H/ENG	1044	1041	1040	1024	1026	1028	1032	1036	1039
	IAS	KT	320	320	320	320	320	320	320	320	320
	TAS	KT	413	419	425	432	438	445	451	458	465
	INDICATED MACH		0.667	0.680	0.692	0.706	0.719	0.733	0.747	0.761	0.776
	BUFFET MARGIN	G	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
	SR	NM/KG	0.198	0.201	0.204	0.210	0.214	0.216	0.219	0.221	0.224
27000	N1	%	79.4	80.0	80.6	81.2	81.9	82.5	83.2	84.0	84.7
	FUEL FLOW	KG/H/ENG	1041	1038	1035	1017	1018	1020	1023	1027	1031
	IAS	KT	320	320	320	320	320	320	320	320	320
	TAS	KT	413	419	425	432	438	445	451	458	465
	INDICATED MACH		0.667	0.680	0.692	0.706	0.719	0.733	0.747	0.761	0.776
	BUFFET MARGIN	G	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
	SR	NM/KG	0.198	0.202	0.205	0.212	0.215	0.218	0.221	0.223	0.226
26000	N1	%	79.4	80.0	80.6	81.1	81.8	82.4	83.0	83.8	84.5
	FUEL FLOW	KG/H/ENG	1038	1036	1033	1012	1012	1013	1015	1018	1022
	IAS	KT	320	320	320	320	320	320	320	320	320
	TAS	KT	413	419	425	432	438	445	451	458	465
	INDICATED MACH		0.667	0.680	0.692	0.706	0.719	0.733	0.747	0.761	0.776
	BUFFET MARGIN	G	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
	SR	NM/KG	0.199	0.202	0.206	0.213	0.216	0.220	0.222	0.225	0.228

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE F FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 1 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.FOR ANTI-ICE ON
INCREASE N1% BY 0.0% AND F FLOW BY 4%.
DECREASE SR% BY 4%.

320 KIAS CRUISE – ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: 18000 FT TO 26000 FT

CRUISE CONFIGURATION
BLEED: OPEN/ISA CONDITION

WEIGHT (KG)			ALTITUDE (FT)										
			18000	19000	20000	21000	22000	23000	24000	25000	26000		
25000	N1	%	79.3	79.9	80.5	81.1	81.6	82.3	82.9	83.5	84.2		
	FUEL FLOW	KG/H/ENG	1036	1034	1031	1010	1007	1008	1007	1009	1013		
	IAS	KT	320	320	320	320	320	320	320	320	320		
	TAS	KT	413	419	425	432	438	445	451	458	465		
	INDICATED MACH		0.667	0.680	0.692	0.706	0.719	0.733	0.747	0.761	0.776		
	BUFFET MARGIN	G	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50		
	SR	NM/KG	0.199	0.203	0.206	0.214	0.218	0.221	0.224	0.227	0.230		
24000	N1	%	79.3	79.9	80.5	81.0	81.6	82.2	82.8	83.4	84.0		
	FUEL FLOW	KG/H/ENG	1035	1032	1029	1008	1006	1003	1003	1002	1004		
	IAS	KT	320	320	320	320	320	320	320	320	320		
	TAS	KT	413	419	425	432	438	445	451	458	465		
	INDICATED MACH		0.667	0.680	0.692	0.706	0.719	0.733	0.747	0.761	0.776		
	BUFFET MARGIN	G	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50		
	SR	NM/KG	0.200	0.203	0.207	0.214	0.218	0.222	0.225	0.229	0.232		
23000	N1	%	79.2	79.8	80.4	81.0	81.6	82.1	82.7	83.3	83.8		
	FUEL FLOW	KG/H/ENG	1034	1031	1027	1006	1004	1002	999	998	996		
	IAS	KT	320	320	320	320	320	320	320	320	320		
	TAS	KT	413	419	425	432	438	445	451	458	465		
	INDICATED MACH		0.667	0.680	0.692	0.706	0.719	0.733	0.747	0.761	0.776		
	BUFFET MARGIN	G	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50		
	SR	NM/KG	0.200	0.203	0.207	0.215	0.218	0.222	0.226	0.230	0.233		
22000	N1	%	79.2	79.8	80.4	81.0	81.5	82.1	82.6	83.2	83.8		
	FUEL FLOW	KG/H/ENG	1032	1029	1026	1005	1002	1000	998	995	994		
	IAS	KT	320	320	320	320	320	320	320	320	320		
	TAS	KT	413	419	425	432	438	445	451	458	465		
	INDICATED MACH		0.667	0.680	0.692	0.706	0.719	0.733	0.747	0.761	0.776		
	BUFFET MARGIN	G	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50		
	SR	NM/KG	0.200	0.204	0.207	0.215	0.219	0.222	0.226	0.230	0.234		
21000	N1	%	79.2	79.8	80.4	81.0	81.5	82.1	82.6	83.2	83.7		
	FUEL FLOW	KG/H/ENG	1031	1028	1025	1004	1001	999	997	994	992		
	IAS	KT	320	320	320	320	320	320	320	320	320		
	TAS	KT	413	419	425	432	438	445	451	458	465		
	INDICATED MACH		0.667	0.680	0.692	0.706	0.719	0.733	0.747	0.761	0.776		
	BUFFET MARGIN	G	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50		
	SR	NM/KG	0.200	0.204	0.207	0.215	0.219	0.223	0.226	0.230	0.235		

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE F FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 1 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON
INCREASE N1% BY 0.0% AND F FLOW BY 4%.
DECREASE SR% BY 4%.

MACH 0.78 CRUISE – ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: 27000 FT TO 35000 FT

CRUISE CONFIGURATION
BLEED: OPEN

**WEIGHT
(KG)**

ALTITUDE (FT)

27000 28000 29000 30000 31000 32000 33000 34000 35000

38000	N1	%	87.2	87.2	87.4	87.5	87.8	88.1	-	-	-
	FUEL FLOW	KG/H/ENG	1111	1076	1044	1014	985	960	-	-	-
	IAS	KT	315	309	302	296	289	283	-	-	-
	TAS	KT	466	464	462	460	458	456	-	-	-
	INDICATED MACH		0.780	0.780	0.780	0.780	0.780	0.780	-	-	-
	BUFFET MARGIN	G	2.07	1.98	1.89	1.81	1.73	1.65	-	-	-
	SR	NM/KG	0.209	0.215	0.221	0.227	0.232	0.237	-	-	-
37000	N1	%	87.0	87.0	87.1	87.3	87.5	87.7	88.2	-	-
	FUEL FLOW	KG/H/ENG	1102	1065	1033	1002	973	946	928	-	-
	IAS	KT	315	309	302	296	289	283	277	-	-
	TAS	KT	466	464	462	460	458	456	454	-	-
	INDICATED MACH		0.780	0.780	0.780	0.780	0.780	0.780	0.780	-	-
	BUFFET MARGIN	G	2.12	2.03	1.94	1.85	1.77	1.69	1.62	-	-
	SR	NM/KG	0.211	0.218	0.223	0.229	0.235	0.241	0.245	-	-
36000	N1	%	86.8	86.7	86.8	87.0	87.1	87.3	87.6	-	-
	FUEL FLOW	KG/H/ENG	1092	1055	1022	991	962	934	909	-	-
	IAS	KT	315	309	302	296	289	283	277	-	-
	TAS	KT	466	464	462	460	458	456	454	-	-
	INDICATED MACH		0.780	0.780	0.780	0.780	0.780	0.780	0.780	-	-
	BUFFET MARGIN	G	2.18	2.09	1.99	1.91	1.82	1.74	1.66	-	-
	SR	NM/KG	0.213	0.220	0.226	0.232	0.238	0.244	0.250	-	-

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE F FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 1 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON
INCREASE N1% BY 0.1% AND F FLOW BY 4%.
DECREASE SR% BY 4%.

MACH 0.78 CRUISE – ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTTITUDE: 27000 FT TO 35000 FT

CRUISE CONFIGURATION

BLEED: OPEN

WEIGHT
(KG)

ALTTITUDE (FT)

			27000	28000	29000	30000	31000	32000	33000	34000	35000
35000	N1	%	86.5	86.5	86.6	86.7	86.8	87.0	87.2	87.6	-
	FUEL FLOW	KG/H/ENG	1083	1046	1011	979	950	923	896	876	-
	IAS	KT	315	309	302	296	289	283	277	271	-
	TAS	KT	466	464	462	460	458	456	454	452	-
	INDICATED MACH		0.780	0.780	0.7800	0.7800	0.780	0.780	0.780	0.780	-
	BUFFET MARGIN	G	2.24	2.15	2.05	1.96	1.87	1.79	1.71	1.63	-
	SR	NM/KG	0.215	0.222	0.2280	0.2350	0.241	0.247	0.253	0.258	-
34000	N1	%	86.3	86.3	86.3	86.4	86.5	86.6	86.9	87.1	87.8
	FUEL FLOW	KG/H/ENG	1073	1036	1001	968	939	911	885	859	846
	IAS	KT	315	309	302	296	289	283	277	271	264
	TAS	KT	466	464	462	460	458	456	454	452	450
	INDICATED MACH		0.780	0.780	0.7800	0.7800	0.780	0.780	0.780	0.780	0.780
	BUFFET MARGIN	G	2.31	2.21	2.11	2.02	1.93	1.84	1.76	1.68	1.60
	SR	NM/KG	0.217	0.224	0.2310	0.2380	0.244	0.250	0.256	0.263	0.266
33000	N1	%	86.1	86.1	86.1	86.1	86.2	86.3	86.5	86.7	87.1
	FUEL FLOW	KG/H/ENG	1063	1026	992	958	927	899	873	847	826
	IAS	KT	315	309	302	296	289	283	277	271	264
	TAS	KT	466	464	462	460	458	456	454	452	450
	INDICATED MACH		0.780	0.780	0.7800	0.7800	0.780	0.780	0.780	0.780	0.780
	BUFFET MARGIN	G	2.38	2.28	2.18	2.08	1.99	1.90	1.81	1.73	1.65
	SR	NM/KG	0.219	0.226	0.2330	0.2400	0.247	0.253	0.260	0.266	0.272
32000	N1	%	85.9	85.9	85.9	85.8	85.9	85.9	86.1	86.3	86.6
	FUEL FLOW	KG/H/ENG	1054	1017	982	948	916	888	861	836	812
	IAS	KT	315	309	302	296	289	283	277	271	264
	TAS	KT	466	464	462	460	458	456	454	452	450
	INDICATED MACH		0.780	0.780	0.7800	0.7800	0.780	0.780	0.780	0.780	0.780
	BUFFET MARGIN	G	2.45	2.35	2.24	2.14	2.05	1.96	1.87	1.78	1.70
	SR	NM/KG	0.221	0.228	0.2350	0.2420	0.250	0.257	0.263	0.270	0.277
31000	N1	%	85.7	85.6	85.6	85.6	85.6	85.6	85.8	85.9	86.1
	FUEL FLOW	KG/H/ENG	1044	1007	972	938	907	876	850	824	800
	IAS	KT	315	309	302	296	289	283	277	271	264
	TAS	KT	466	464	462	460	458	456	454	452	450
	INDICATED MACH		0.780	0.780	0.7800	0.7800	0.780	0.780	0.780	0.780	0.780
	BUFFET MARGIN	G	2.50	2.42	2.32	2.21	2.11	2.02	1.93	1.84	1.75
	SR	NM/KG	0.223	0.230	0.2370	0.2450	0.252	0.260	0.267	0.274	0.281

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE F FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 1 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON

INCREASE N1% BY 0.3% AND F FLOW BY 5%.

DECREASE SR% BY 4%.

MACH 0.78 CRUISE – ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: 27000 FT TO 35000 FT

CRUISE CONFIGURATION
BLEED: OPEN

**WEIGHT
(KG)**

ALTITUDE (FT)

27000 28000 29000 30000 31000 32000 33000 34000 35000

30000	N1	%	85.5	85.4	85.4	85.3	85.4	85.5	85.7
	FUEL FLOW	KG/H/ENG	1035	997	963	928	898	866	839
	IAS	KT	315	309	302	296	289	283	277
	TAS	KT	466	464	462	460	458	456	454
	INDICATED MACH		0.780	0.780	0.780	0.780	0.780	0.780	0.780
	BUFFET MARGIN	G	2.50	2.50	2.39	2.29	2.19	2.09	1.99
29000	SR	NM/KG	0.225	0.232	0.240	0.248	0.255	0.263	0.270
	N1	%	85.3	85.2	85.2	85.1	85.1	85.1	85.3
	FUEL FLOW	KG/H/ENG	1025	988	954	918	889	856	829
	IAS	KT	315	309	302	296	289	283	277
	TAS	KT	466	464	462	460	458	456	454
	INDICATED MACH		0.780	0.780	0.780	0.780	0.780	0.780	0.780
28000	BUFFET MARGIN	G	2.50	2.50	2.48	2.37	2.26	2.16	2.06
	SR	NM/KG	0.227	0.235	0.242	0.250	0.258	0.266	0.274
	N1	%	85.0	85.0	84.9	84.8	84.8	84.8	85.0
	FUEL FLOW	KG/H/ENG	1016	978	945	910	879	847	819
	IAS	KT	315	309	302	296	289	283	277
	TAS	KT	466	464	462	460	458	456	454
27000	INDICATED MACH		0.780	0.780	0.780	0.780	0.780	0.780	0.780
	BUFFET MARGIN	G	2.50	2.50	2.50	2.45	2.34	2.24	2.13
	SR	NM/KG	0.229	0.237	0.244	0.253	0.260	0.269	0.277
	N1	%	84.8	84.7	84.7	84.6	84.6	84.5	84.5
	FUEL FLOW	KG/H/ENG	1006	969	935	901	870	839	810
	IAS	KT	315	309	302	296	289	283	277
26000	TAS	KT	466	464	462	460	458	456	454
	INDICATED MACH		0.780	0.780	0.780	0.780	0.780	0.780	0.780
	BUFFET MARGIN	G	2.50	2.50	2.50	2.50	2.43	2.32	2.21
	SR	NM/KG	0.231	0.239	0.247	0.255	0.263	0.272	0.280
	N1	%	84.6	84.5	84.4	84.4	84.3	84.3	84.2
	FUEL FLOW	KG/H/ENG	996	960	925	892	861	830	801
25000	IAS	KT	315	309	302	296	289	283	277
	TAS	KT	466	464	462	460	458	456	454
	INDICATED MACH		0.780	0.780	0.780	0.780	0.780	0.780	0.780
	BUFFET MARGIN	G	2.50	2.50	2.50	2.50	2.50	2.41	2.30
	SR	NM/KG	0.234	0.242	0.249	0.258	0.266	0.274	0.283
	N1	%	84.2	84.2	84.2	84.2	84.2	84.2	84.2

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE F FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 1 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON
INCREASE N1% BY 0.2% AND F FLOW BY 5%.
DECREASE SR% BY 5%.

MACH 0.78 CRUISE – ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: 27000 FT TO 35000 FT

CRUISE CONFIGURATION

BLEED: OPEN

WEIGHT (KG)

ALTITUDE (FT)

			27000	28000	29000	30000	31000	32000	33000	34000	35000
25000	N1	%	84.4	84.3	84.2	84.1	84.1	84.0	84.0	84.0	84.0
	FUEL FLOW	KG/H/ENG	987	951	916	883	852	821	792	764	737
	IAS	KT	315	309	302	296	289	283	277	271	264
	TAS	KT	466	464	462	460	458	456	454	452	450
	INDICATED MACH		0.780	0.780	0.780	0.780	0.780	0.780	0.780	0.780	0.780
	BUFFET MARGIN	G	2.50	2.50	2.50	2.50	2.50	2.50	2.39	2.28	2.18
	SR	NM/KG	0.236	0.244	0.252	0.260	0.269	0.277	0.286	0.296	0.305
24000	N1	%	84.1	84.0	83.9	83.9	83.8	83.8	83.7	83.7	83.7
	FUEL FLOW	KG/H/ENG	978	942	907	874	843	813	783	755	728
	IAS	KT	315	309	302	296	289	283	277	271	264
	TAS	KT	466	464	462	460	458	456	454	452	450
	INDICATED MACH		0.780	0.780	0.780	0.780	0.780	0.780	0.780	0.780	0.780
	BUFFET MARGIN	G	2.50	2.50	2.50	2.50	2.50	2.50	2.49	2.38	2.27
	SR	NM/KG	0.238	0.246	0.254	0.263	0.272	0.280	0.290	0.299	0.309
23000	N1	%	83.9	83.8	83.7	83.6	83.6	83.5	83.5	83.4	83.4
	FUEL FLOW	KG/H/ENG	969	933	898	865	834	804	775	747	719
	IAS	KT	315	309	302	296	289	283	277	271	264
	TAS	KT	466	464	462	460	458	456	454	452	450
	INDICATED MACH		0.780	0.780	0.780	0.780	0.780	0.780	0.780	0.780	0.780
	BUFFET MARGIN	G	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.48	2.36
	SR	NM/KG	0.240	0.249	0.257	0.266	0.274	0.284	0.293	0.302	0.312
22000	N1	%	83.7	83.6	83.5	83.4	83.3	83.2	83.2	83.2	83.1
	FUEL FLOW	KG/H/ENG	961	924	889	856	825	795	766	738	711
	IAS	KT	315	309	302	296	289	283	277	271	264
	TAS	KT	466	464	462	460	458	456	454	452	450
	INDICATED MACH		0.780	0.780	0.780	0.780	0.780	0.780	0.780	0.780	0.780
	BUFFET MARGIN	G	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.47
	SR	NM/KG	0.242	0.251	0.260	0.268	0.277	0.287	0.296	0.306	0.316
21000	N1	%	83.7	83.4	83.2	83.1	83.1	83.0	82.9	82.9	82.8
	FUEL FLOW	KG/H/ENG	959	916	880	847	816	785	757	729	702
	IAS	KT	315	309	302	296	289	283	277	271	264
	TAS	KT	466	464	462	460	458	456	454	452	450
	INDICATED MACH		0.780	0.780	0.780	0.780	0.780	0.780	0.780	0.780	0.780
	BUFFET MARGIN	G	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
	SR	NM/KG	0.243	0.253	0.262	0.271	0.281	0.290	0.300	0.310	0.320

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE F FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 1 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON

INCREASE N1% BY 0.1% AND F FLOW BY 5%.

DECREASE SR% BY 5%.



MACH 0.78 CRUISE – ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: 36000 FT TO 41000 FT

CRUISE CONFIGURATION
BLEED: OPEN

WEIGHT (KG)		ALTITUDE (FT)						
			36000	37000	38000	39000	40000	41000
35000	N1	%	-	-	-	-	-	-
	FUEL FLOW	KG/H/ENG	-	-	-	-	-	-
	IAS	KT	-	-	-	-	-	-
	TAS	KT	-	-	-	-	-	-
	INDICATED MACH		-	-	-	-	-	-
	BUFFET MARGIN	G	-	-	-	-	-	-
	SR	NM/KG	-	-	-	-	-	-
34000	N1	%	-	-	-	-	-	-
	FUEL FLOW	KG/H/ENG	-	-	-	-	-	-
	IAS	KT	-	-	-	-	-	-
	TAS	KT	-	-	-	-	-	-
	INDICATED MACH		-	-	-	-	-	-
	BUFFET MARGIN	G	-	-	-	-	-	-
	SR	NM/KG	-	-	-	-	-	-
33000	N1	%	87.8	-	-	-	-	-
	FUEL FLOW	KG/H/ENG	815	-	-	-	-	-
	IAS	KT	258	-	-	-	-	-
	TAS	KT	448	-	-	-	-	-
	INDICATED MACH		0.780	-	-	-	-	-
	BUFFET MARGIN	G	1.57	-	-	-	-	-
	SR	NM/KG	0.275	-	-	-	-	-
32000	N1	%	87.0	-	-	-	-	-
	FUEL FLOW	KG/H/ENG	795	-	-	-	-	-
	IAS	KT	258	-	-	-	-	-
	TAS	KT	448	-	-	-	-	-
	INDICATED MACH		0.780	-	-	-	-	-
	BUFFET MARGIN	G	1.62	-	-	-	-	-
	SR	NM/KG	0.281	-	-	-	-	-
31000	N1	%	86.3	87.4	-	-	-	-
	FUEL FLOW	KG/H/ENG	777	770	-	-	-	-
	IAS	KT	258	252	-	-	-	-
	TAS	KT	448	447	-	-	-	-
	INDICATED MACH		0.780	0.780	-	-	-	-
	BUFFET MARGIN	G	1.67	1.59	-	-	-	-
	SR	NM/KG	0.288	0.291	-	-	-	-

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE F FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 1 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON
INCREASE N1% BY 0.1% AND F FLOW BY 0%.
DECREASE SR% BY 0%.

MACH 0.78 CRUISE – ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: 36000 FT TO 41000 FT

CRUISE CONFIGURATION
BLEED: OPEN

WEIGHT (KG)			ALTITUDE (FT)							
				36000	37000	38000	39000	40000	41000	
30000	N1	%		85.9	86.7	-	-	-	-	
	FUEL FLOW	KG/H/ENG		764	750	-	-	-	-	
	IAS	KT		258	252	-	-	-	-	
	TAS	KT		448	447	-	-	-	-	
	INDICATED MACH			0.780	0.780	-	-	-	-	
	BUFFET MARGIN	G		1.73	1.65	-	-	-	-	
	SR	NM/KG		0.293	0.298	-	-	-	-	
29000	N1	%		85.4	86.2	87.0	-	-	-	
	FUEL FLOW	KG/H/ENG		752	737	725	-	-	-	
	IAS	KT		258	252	247	-	-	-	
	TAS	KT		448	447	447	-	-	-	
	INDICATED MACH			0.780	0.780	0.780	-	-	-	
	BUFFET MARGIN	G		1.79	1.70	1.62	-	-	-	
	SR	NM/KG		0.298	0.304	0.308	-	-	-	
28000	N1	%		85.0	85.7	86.3	87.4	-	-	
	FUEL FLOW	KG/H/ENG		740	725	708	700	-	-	
	IAS	KT		258	252	247	241	-	-	
	TAS	KT		448	447	447	447	-	-	
	INDICATED MACH			0.780	0.780	0.780	0.780	-	-	
	BUFFET MARGIN	G		1.85	1.76	1.68	1.60	-	-	
	SR	NM/KG		0.302	0.308	0.316	0.319	-	-	
27000	N1	%		84.6	85.3	85.8	86.5	-	-	
	FUEL FLOW	KG/H/ENG		730	714	696	681	-	-	
	IAS	KT		258	252	247	241	-	-	
	TAS	KT		448	447	447	447	-	-	
	INDICATED MACH			0.780	0.780	0.780	0.780	-	-	
	BUFFET MARGIN	G		1.92	1.83	1.74	1.66	-	-	
	SR	NM/KG		0.307	0.313	0.322	0.328	-	-	
26000	N1	%		84.3	84.9	85.3	86.0	86.8	-	
	FUEL FLOW	KG/H/ENG		720	703	683	670	657	-	
	IAS	KT		258	252	247	241	235	-	
	TAS	KT		448	447	447	447	447	-	
	INDICATED MACH			0.780	0.780	0.780	0.780	0.780	-	
	BUFFET MARGIN	G		1.99	1.90	1.81	1.73	1.65	-	
	SR	NM/KG		0.311	0.318	0.327	0.334	0.341	-	

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE F FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 1 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON
INCREASE N1% BY 0.3% AND F FLOW BY 1%.
DECREASE SR% BY 1%.

MACH 0.78 CRUISE – ALL ENGINES OPERATING**CF34-8E5 ENGINES****ALTITUDE: 36000 FT TO 41000 FT**

CRUISE CONFIGURATION

BLEED: OPEN

WEIGHT (KG)		ALTITUDE (FT)									
				36000	37000	38000	39000	40000	41000		
25000	N1	%		84.0	84.5	84.8	85.6	86.1	-		
	FUEL FLOW	KG/H/ENG		711	692	672	659	642	-		
	IAS	KT		258	252	247	241	235	-		
	TAS	KT		448	447	447	447	447	-		
	INDICATED MACH			0.780	0.780	0.780	0.780	0.780	-		
	BUFFET MARGIN	G		2.07	1.98	1.88	1.80	1.71	-		
	SR	NM/KG		0.315	0.323	0.333	0.340	0.348	-		
24000	N1	%		83.7	84.1	84.4	85.1	85.5	86.3		
	FUEL FLOW	KG/H/ENG		702	681	662	648	630	619		
	IAS	KT		258	252	247	241	235	230		
	TAS	KT		448	447	447	447	447	447		
	INDICATED MACH			0.780	0.780	0.780	0.780	0.780	0.780		
	BUFFET MARGIN	G		2.16	2.06	1.96	1.87	1.78	1.70		
	SR	NM/KG		0.319	0.328	0.338	0.345	0.355	0.362		
23000	N1	%		83.4	83.7	84.1	84.6	85.0	85.7		
	FUEL FLOW	KG/H/ENG		693	672	652	637	618	608		
	IAS	KT		258	252	247	241	235	230		
	TAS	KT		448	447	447	447	447	447		
	INDICATED MACH			0.780	0.780	0.780	0.780	0.780	0.780		
	BUFFET MARGIN	G		2.25	2.15	2.05	1.95	1.86	1.77		
	SR	NM/KG		0.323	0.333	0.343	0.351	0.362	0.368		
22000	N1	%		83.1	83.4	83.7	84.2	84.5	85.2		
	FUEL FLOW	KG/H/ENG		685	664	644	626	608	598		
	IAS	KT		258	252	247	241	235	230		
	TAS	KT		448	447	447	447	447	447		
	INDICATED MACH			0.780	0.780	0.780	0.780	0.780	0.780		
	BUFFET MARGIN	G		2.36	2.25	2.14	2.04	1.94	1.85		
	SR	NM/KG		0.327	0.337	0.347	0.357	0.368	0.374		
21000	N1	%		82.8	83.1	83.4	83.8	84.1	84.7		
	FUEL FLOW	KG/H/ENG		676	655	635	617	599	587		
	IAS	KT		258	252	247	241	235	230		
	TAS	KT		448	447	447	447	447	447		
	INDICATED MACH			0.780	0.780	0.780	0.780	0.780	0.780		
	BUFFET MARGIN	G		2.47	2.35	2.24	2.14	2.04	1.94		
	SR	NM/KG		0.331	0.341	0.352	0.363	0.373	0.381		

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.

INCREASE/DECREASE F FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.

INCREASE/DECREASE TAS BY 1 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON

INCREASE N1% BY 0.3% AND F FLOW BY 1%.

DECREASE SR% BY 1%.

MACH 0.80 CRUISE – ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: 27000 FT TO 35000 FT

CRUISE CONFIGURATION
BLEED: OPEN

WEIGHT (KG)		ALTITUDE (FT)									
			27000	28000	29000	30000	31000	32000	33000	34000	35000
38000	N1	%	-	88.6	-	-	-	-	-	-	-
	FUEL FLOW	KG/H/ENG	-	1153	-	-	-	-	-	-	-
	IAS	KT	-	317	-	-	-	-	-	-	-
	TAS	KT	-	475	-	-	-	-	-	-	-
	INDICATED MACH		-	0.799	-	-	-	-	-	-	-
	BUFFET MARGIN	G	-	1.91	-	-	-	-	-	-	-
	SR	NM/KG	-	0.206	-	-	-	-	-	-	-
37000	N1	%	-	88.4	88.7	-	-	-	-	-	-
	FUEL FLOW	KG/H/ENG	-	1143	1113	-	-	-	-	-	-
	IAS	KT	-	317	310	-	-	-	-	-	-
	TAS	KT	-	476	473	-	-	-	-	-	-
	INDICATED MACH		-	0.800	0.800	-	-	-	-	-	-
	BUFFET MARGIN	G	-	1.96	1.88	-	-	-	-	-	-
	SR	NM/KG	-	0.208	0.213	-	-	-	-	-	-
36000	N1	%	-	88.2	88.4	88.6	-	-	-	-	-
	FUEL FLOW	KG/H/ENG	-	1134	1098	1070	-	-	-	-	-
	IAS	KT	-	317	310	304	-	-	-	-	-
	TAS	KT	-	476	473	471	-	-	-	-	-
	INDICATED MACH		-	0.800	0.800	0.800	-	-	-	-	-
	BUFFET MARGIN	G	-	2.02	1.93	1.84	-	-	-	-	-
	SR	NM/KG	-	0.210	0.216	0.220	-	-	-	-	-

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE F FLOW BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 1 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON
INCREASE N1% BY 0.0% AND F FLOW BY 0%.
DECREASE SR% BY 0%.

MACH 0.80 CRUISE – ALL ENGINES OPERATING**CF34-8E5 ENGINES****ALTITUDE: 27000 FT TO 35000 FT**

CRUISE CONFIGURATION

BLEED: OPEN

**WEIGHT
(KG)****ALTITUDE (FT)**

27000 28000 29000 30000 31000 32000 33000 34000 35000

35000	N1	%	-	88.0	88.1	88.3	88.6	-	-	-	-
	FUEL FLOW	KG/H/ENG	-	1126	1087	1055	1028	-	-	-	-
	IAS	KT	-	317	310	304	297	-	-	-	-
	TAS	KT	-	476	473	471	469	-	-	-	-
	INDICATED MACH		-	0.800	0.8000	0.8000	0.800	-	-	-	-
	BUFFET MARGIN	G	-	2.07	1.98	1.90	1.81	-	-	-	-
	SR	NM/KG	-	0.211	0.2180	0.2230	0.228	-	-	-	-
34000	N1	%	-	87.8	87.9	87.9	88.2	88.5	89.0	-	-
	FUEL FLOW	KG/H/ENG	-	1117	1078	1040	1013	987	964	-	-
	IAS	KT	-	317	310	304	297	291	284	-	-
	TAS	KT	-	476	473	471	469	467	465	-	-
	INDICATED MACH		-	0.800	0.8000	0.8000	0.800	0.800	0.800	-	-
	BUFFET MARGIN	G	-	2.14	2.04	1.95	1.86	1.78	1.70	-	-
	SR	NM/KG	-	0.213	0.2200	0.2270	0.232	0.237	0.241	-	-
33000	N1	%	-	87.7	87.7	87.7	87.8	88.1	88.5	-	-
	FUEL FLOW	KG/H/ENG	-	1109	1070	1031	998	972	949	-	-
	IAS	KT	-	317	310	304	297	291	284	-	-
	TAS	KT	-	476	473	471	469	467	465	-	-
	INDICATED MACH		-	0.800	0.8000	0.8000	0.800	0.800	0.800	-	-
	BUFFET MARGIN	G	-	2.20	2.10	2.01	1.92	1.83	1.75	-	-
	SR	NM/KG	-	0.214	0.2210	0.2290	0.235	0.240	0.245	-	-
32000	N1	%	-	87.5	87.5	87.4	87.5	87.6	88.0	88.3	-
	FUEL FLOW	KG/H/ENG	-	1100	1061	1022	986	957	934	910	-
	IAS	KT	-	317	310	304	297	291	284	278	-
	TAS	KT	-	476	473	471	469	467	465	463	-
	INDICATED MACH		-	0.800	0.8000	0.8000	0.800	0.800	0.800	0.800	-
	BUFFET MARGIN	G	-	2.27	2.17	2.07	1.98	1.89	1.81	1.72	-
	SR	NM/KG	-	0.216	0.2230	0.2310	0.238	0.244	0.249	0.254	-
31000	N1	%	-	87.3	87.3	87.2	87.2	87.2	87.6	87.8	88.3
	FUEL FLOW	KG/H/ENG	-	1092	1052	1014	977	942	918	895	874
	IAS	KT	-	317	310	304	297	291	284	278	272
	TAS	KT	-	476	473	471	469	467	465	463	461
	INDICATED MACH		-	0.800	0.8000	0.8000	0.800	0.800	0.800	0.800	0.800
	BUFFET MARGIN	G	-	2.34	2.24	2.14	2.04	1.95	1.86	1.78	1.70
	SR	NM/KG	-	0.218	0.2250	0.2330	0.240	0.248	0.253	0.259	0.264

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.

INCREASE/DECREASE F FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.

INCREASE/DECREASE TAS BY 1 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON

INCREASE N1% BY 0.5% AND F FLOW BY 6%.

DECREASE SR% BY 5%.

MACH 0.80 CRUISE – ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: 27000 FT TO 35000 FT

CRUISE CONFIGURATION
BLEED: OPEN

WEIGHT (KG)

ALTITUDE (FT)

				27000	28000	29000	30000	31000	32000	33000	34000	35000
30000	N1	%	-	87.1	87.1	87.0	87.0	87.0	87.1	87.4	87.8	
	FUEL FLOW	KG/H/ENG	-	1083	1044	1005	969	933	903	879	858	
	IAS	KT	-	317	310	304	297	291	284	278	272	
	TAS	KT	-	476	473	471	469	467	465	463	461	
	INDICATED MACH		-	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800	
	BUFFET MARGIN	G	-	2.42	2.31	2.21	2.11	2.02	1.93	1.84	1.75	
	SR	NM/KG	-	0.219	0.227	0.235	0.242	0.250	0.258	0.263	0.269	
29000	N1	%	-	86.8	86.9	86.8	86.8	86.7	86.7	86.9	87.3	
	FUEL FLOW	KG/H/ENG	-	1072	1035	996	960	925	891	864	843	
	IAS	KT	-	317	310	304	297	291	284	278	272	
	TAS	KT	-	476	473	471	469	467	465	463	461	
	INDICATED MACH		-	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800	
	BUFFET MARGIN	G	-	2.50	2.39	2.29	2.19	2.09	1.99	1.90	1.81	
	SR	NM/KG	-	0.222	0.229	0.237	0.245	0.253	0.261	0.268	0.274	
28000	N1	%	-	86.5	86.6	86.6	86.5	86.5	86.5	86.4	86.7	
	FUEL FLOW	KG/H/ENG	-	1058	1025	988	951	916	882	850	827	
	IAS	KT	-	317	310	304	297	291	284	278	272	
	TAS	KT	-	476	473	471	469	467	465	463	461	
	INDICATED MACH		-	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800	
	BUFFET MARGIN	G	-	2.50	2.48	2.37	2.26	2.16	2.06	1.97	1.88	
	SR	NM/KG	-	0.225	0.231	0.239	0.247	0.255	0.264	0.273	0.279	
27000	N1	%	-	86.2	86.3	86.3	86.3	86.2	86.2	86.1	86.2	
	FUEL FLOW	KG/H/ENG	-	1045	1011	979	942	907	873	841	811	
	IAS	KT	-	317	310	304	297	291	284	278	272	
	TAS	KT	-	476	473	471	469	467	465	463	461	
	INDICATED MACH		-	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800	
	BUFFET MARGIN	G	-	2.50	2.50	2.46	2.35	2.24	2.14	2.04	1.95	
	SR	NM/KG	-	0.228	0.234	0.241	0.249	0.258	0.266	0.275	0.284	
26000	N1	%	-	85.9	86.0	86.0	86.1	86.0	85.9	85.8	85.8	
	FUEL FLOW	KG/H/ENG	-	1031	998	965	933	898	865	832	802	
	IAS	KT	-	317	310	304	297	291	284	278	272	
	TAS	KT	-	476	473	471	469	467	465	463	461	
	INDICATED MACH		-	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800	
	BUFFET MARGIN	G	-	2.50	2.50	2.50	2.44	2.33	2.22	2.12	2.02	
	SR	NM/KG	-	0.231	0.237	0.244	0.251	0.260	0.269	0.278	0.288	

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE F FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 1 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON
INCREASE N1% BY 0.6% AND F FLOW BY 5%.
DECREASE SR% BY 5%.

MACH 0.80 CRUISE – ALL ENGINES OPERATING**CF34-8E5 ENGINES****ALTITUDE: 27000 FT TO 35000 FT**

CRUISE CONFIGURATION

BLEED: OPEN

**WEIGHT
(KG)****ALTITUDE (FT)**

27000 28000 29000 30000 31000 32000 33000 34000 35000

25000	N1	%	-	85.6	85.7	85.6	85.7	85.7	85.7	85.5	85.6
	FUEL FLOW	KG/H/ENG	-	1017	984	951	921	889	856	823	793
	IAS	KT	-	317	310	304	297	291	284	278	272
	TAS	KT	-	476	473	471	469	467	465	463	461
	INDICATED MACH		-	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800
	BUFFET MARGIN	G	-	2.50	2.50	2.50	2.50	2.42	2.31	2.20	2.10
	SR	NM/KG	-	0.234	0.241	0.248	0.255	0.263	0.272	0.282	0.291
24000	N1	%	-	85.3	85.3	85.3	85.3	85.4	85.4	85.2	85.3
	FUEL FLOW	KG/H/ENG	-	1004	971	937	908	877	848	814	785
	IAS	KT	-	317	310	304	297	291	284	278	272
	TAS	KT	-	476	473	471	469	467	465	463	461
	INDICATED MACH		-	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800
	BUFFET MARGIN	G	-	2.50	2.50	2.50	2.50	2.50	2.41	2.30	2.19
	SR	NM/KG	-	0.237	0.244	0.252	0.259	0.266	0.274	0.285	0.294
23000	N1	%	-	85.0	85.0	84.9	85.0	85.0	85.1	84.9	85.0
	FUEL FLOW	KG/H/ENG	-	990	958	923	894	863	837	805	776
	IAS	KT	-	317	310	304	297	291	284	278	272
	TAS	KT	-	476	473	471	469	467	465	463	461
	INDICATED MACH		-	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800
	BUFFET MARGIN	G	-	2.50	2.50	2.50	2.50	2.50	2.50	2.40	2.29
	SR	NM/KG	-	0.240	0.247	0.255	0.262	0.271	0.278	0.288	0.297
22000	N1	%	-	84.7	84.7	84.6	84.6	84.6	84.7	84.7	84.7
	FUEL FLOW	KG/H/ENG	-	978	945	911	881	851	823	795	768
	IAS	KT	-	317	310	304	297	291	284	278	272
	TAS	KT	-	476	473	471	469	467	465	463	461
	INDICATED MACH		-	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800
	BUFFET MARGIN	G	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.39
	SR	NM/KG	-	0.243	0.251	0.259	0.266	0.275	0.283	0.291	0.300
21000	N1	%	-	84.5	84.3	84.3	84.3	84.3	84.3	84.3	84.3
	FUEL FLOW	KG/H/ENG	-	968	932	899	868	839	810	783	757
	IAS	KT	-	317	310	304	297	291	284	278	272
	TAS	KT	-	476	473	471	469	467	465	463	461
	INDICATED MACH		-	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800
	BUFFET MARGIN	G	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
	SR	NM/KG	-	0.246	0.254	0.262	0.270	0.279	0.287	0.296	0.304

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.

INCREASE/DECREASE F FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.

INCREASE/DECREASE TAS BY 1 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON

INCREASE N1% BY 0.5% AND F FLOW BY 5%.

DECREASE SR% BY 5%.

MACH 0.80 CRUISE – ALL ENGINES OPERATING

CF34-8E5 ENGINES

ALTITUDE: 27000 FT TO 35000 FT

CRUISE CONFIGURATION

BLEED: OPEN

WEIGHT (KG)		ALTITUDE (FT)						
			36000	37000	38000	39000	40000	41000
30000	N1	%	88.2	-	-	-	-	-
	FUEL FLOW	KG/H/ENG	837	-	-	-	-	-
	IAS	KT	266	-	-	-	-	-
	TAS	KT	459	-	-	-	-	-
	INDICATED MACH		0.800	-	-	-	-	-
	BUFFET MARGIN	G	1.67	-	-	-	-	-
	SR	NM/KG	0.274	-	-	-	-	-
29000	N1	%	87.6	-	-	-	-	-
	FUEL FLOW	KG/H/ENG	821	-	-	-	-	-
	IAS	KT	266	-	-	-	-	-
	TAS	KT	459	-	-	-	-	-
	INDICATED MACH		0.800	-	-	-	-	-
	BUFFET MARGIN	G	1.73	-	-	-	-	-
	SR	NM/KG	0.279	-	-	-	-	-
28000	N1	%	87.0	87.9	-	-	-	-
	FUEL FLOW	KG/H/ENG	805	791	-	-	-	-
	IAS	KT	266	260	-	-	-	-
	TAS	KT	459	459	-	-	-	-
	INDICATED MACH		0.800	0.800	-	-	-	-
	BUFFET MARGIN	G	1.79	1.71	-	-	-	-
	SR	NM/KG	0.285	0.290	-	-	-	-
27000	N1	%	86.4	87.2	-	-	-	-
	FUEL FLOW	KG/H/ENG	789	775	-	-	-	-
	IAS	KT	266	260	-	-	-	-
	TAS	KT	459	459	-	-	-	-
	INDICATED MACH		0.800	0.800	-	-	-	-
	BUFFET MARGIN	G	1.86	1.77	-	-	-	-
	SR	NM/KG	0.291	0.296	-	-	-	-
26000	N1	%	85.8	86.6	87.4	-	-	-
	FUEL FLOW	KG/H/ENG	773	759	745	-	-	-
	IAS	KT	266	260	254	-	-	-
	TAS	KT	459	459	459	-	-	-
	INDICATED MACH		0.800	0.800	0.800	-	-	-
	BUFFET MARGIN	G	1.93	1.84	1.75	-	-	-
	SR	NM/KG	0.297	0.302	0.308	-	-	-

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE F FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.
INCREASE/DECREASE TAS BY 1 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON

INCREASE N1% BY 1.0% AND F FLOW BY 4%.

DECREASE SR% BY 3%.

MACH 0.80 CRUISE – ALL ENGINES OPERATING**CF34-8E5 ENGINES****ALTITUDE: 36000 FT TO 41000 FT**

CRUISE CONFIGURATION

BLEED: OPEN

WEIGHT (KG)		ALTITUDE (FT)						
		36000	37000	38000	39000	40000	41000	
25000	N1	%	85.4	86.1	86.8	87.6	85.4	-
	FUEL FLOW	KG/H/ENG	762	744	729	716	762	-
	IAS	KT	266	260	254	248	266	-
	TAS	KT	459	459	459	459	459	-
	INDICATED MACH		0.800	0.800	0.800	0.800	0.800	-
	BUFFET MARGIN	G	2.00	1.91	1.82	1.74	2.00	-
	SR	NM/KG	0.301	0.308	0.315	0.321	0.301	-
24000	N1	%	85.1	85.6	86.1	86.9	87.7	-
	FUEL FLOW	KG/H/ENG	752	732	713	700	688	-
	IAS	KT	266	260	254	248	242	-
	TAS	KT	459	459	459	459	459	-
	INDICATED MACH		0.800	0.800	0.800	0.800	0.800	-
	BUFFET MARGIN	G	2.09	1.99	1.90	1.81	1.72	-
	SR	NM/KG	0.305	0.313	0.322	0.328	0.334	-
23000	N1	%	84.8	85.3	85.6	86.3	87.0	-
	FUEL FLOW	KG/H/ENG	744	724	699	685	672	-
	IAS	KT	266	260	254	248	242	-
	TAS	KT	459	459	459	459	459	-
	INDICATED MACH		0.800	0.800	0.800	0.800	0.800	-
	BUFFET MARGIN	G	2.18	2.08	1.98	1.89	1.80	-
	SR	NM/KG	0.308	0.317	0.328	0.335	0.342	-
22000	N1	%	84.5	85.0	85.2	85.7	86.3	87.1
	FUEL FLOW	KG/H/ENG	737	715	690	671	656	644
	IAS	KT	266	260	254	248	242	237
	TAS	KT	459	459	459	459	459	459
	INDICATED MACH		0.800	0.800	0.800	0.800	0.800	0.800
	BUFFET MARGIN	G	2.28	2.17	2.07	1.97	1.88	1.79
	SR	NM/KG	0.312	0.321	0.332	0.342	0.350	0.356
21000	N1	%	84.3	84.7	84.9	85.4	85.7	86.4
	FUEL FLOW	KG/H/ENG	729	707	682	663	641	629
	IAS	KT	266	260	254	248	242	237
	TAS	KT	459	459	459	459	459	459
	INDICATED MACH		0.800	0.800	0.800	0.800	0.800	0.800
	BUFFET MARGIN	G	2.39	2.27	2.17	2.07	1.97	1.88
	SR	NM/KG	0.315	0.325	0.337	0.346	0.358	0.365

INCREASE/DECREASE N1% BY 1% PER 5°C ABOVE/BELOW ISA CONDITIONS.

INCREASE/DECREASE F FLOW BY 2% PER 5°C ABOVE/BELOW ISA CONDITIONS.

INCREASE/DECREASE TAS BY 1 KT PER 5°C ABOVE/BELOW ISA CONDITIONS.

FOR ANTI-ICE ON

INCREASE N1% BY 1.0% AND F FLOW BY 4%.

DECREASE SR% BY 3%.

ECONOMIC CRUISE TABLES

These tables provide the economic speed schedules (Mach numbers) for a variety of altitudes, weights as function of cost index. The values as calculated for zero wind, ISA conditions and all engines operating.

The cost index represents the ratio of Time Related Costs (Currency/min) per Fuel Related Costs (Currency/kg) and is a way to express the Direct Operational Costs of an operator.

Flying on economic cruise schedule the operator will minimize the direct operational cost of the cruise phase for a given cost index.

ECONOMIC CRUISE – ALL ENGINES OPERATING**CF34-8E5 ENGINES**ISA CONDITIONS
ZERO WIND

Altitude: 27000 ft

CRUISE MACH NUMBER

WT(kg)	COST INDEX														
	0	5	10	15	20	25	30	35	40	45	50	60	70	80	90
27000	0.55	0.61	0.64	0.68	0.76	0.77	0.77	0.77	0.78	0.78	0.78	0.78	0.78	0.78	0.79
28000	0.56	0.61	0.65	0.68	0.76	0.77	0.77	0.77	0.78	0.78	0.78	0.78	0.78	0.78	0.79
29000	0.57	0.61	0.65	0.68	0.76	0.76	0.77	0.77	0.78	0.78	0.78	0.78	0.78	0.78	0.79
30000	0.57	0.62	0.65	0.69	0.76	0.76	0.77	0.77	0.78	0.78	0.78	0.78	0.78	0.78	0.79
31000	0.58	0.62	0.66	0.69	0.76	0.76	0.77	0.77	0.78	0.78	0.78	0.78	0.78	0.78	0.79
32000	0.58	0.63	0.66	0.70	0.75	0.76	0.77	0.77	0.78	0.78	0.78	0.78	0.78	0.78	0.79
33000	0.59	0.63	0.66	0.70	0.75	0.76	0.77	0.77	0.78	0.78	0.78	0.78	0.78	0.78	0.78
34000	0.59	0.64	0.67	0.70	0.75	0.76	0.77	0.77	0.78	0.78	0.78	0.78	0.78	0.78	0.78
35000	0.59	0.64	0.67	0.71	0.74	0.77	0.77	0.77	0.78	0.78	0.78	0.78	0.78	0.78	0.78
36000	0.60	0.65	0.68	0.71	0.74	0.77	0.77	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
37000	0.61	0.65	0.69	0.71	0.74	0.77	0.77	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78

Altitude: 29000 ft

CRUISE MACH NUMBER

WT (kg)	COST INDEX														
	0	5	10	15	20	25	30	35	40	45	50	60	70	80	90
27000	0.57	0.63	0.66	0.70	0.77	0.78	0.79	0.79	0.80	0.80	0.80	0.80	0.81	0.81	0.81
28000	0.58	0.63	0.66	0.70	0.77	0.78	0.79	0.79	0.79	0.79	0.80	0.80	0.80	0.81	0.81
29000	0.58	0.63	0.67	0.70	0.77	0.78	0.78	0.79	0.79	0.79	0.80	0.80	0.80	0.80	0.81
30000	0.59	0.63	0.67	0.70	0.77	0.78	0.78	0.79	0.79	0.79	0.79	0.80	0.80	0.80	0.81
31000	0.59	0.64	0.67	0.71	0.77	0.78	0.78	0.79	0.79	0.79	0.79	0.80	0.80	0.80	0.81
32000	0.60	0.64	0.68	0.72	0.77	0.78	0.78	0.79	0.79	0.79	0.79	0.80	0.80	0.80	0.81
33000	0.60	0.65	0.69	0.73	0.76	0.77	0.78	0.79	0.79	0.79	0.80	0.80	0.80	0.81	0.81
34000	0.60	0.65	0.69	0.73	0.76	0.77	0.78	0.79	0.79	0.79	0.80	0.80	0.80	0.81	0.81
35000	0.61	0.66	0.69	0.73	0.76	0.77	0.78	0.79	0.79	0.80	0.80	0.80	0.80	0.80	0.80
36000	0.61	0.67	0.70	0.73	0.76	0.77	0.78	0.79	0.79	0.80	0.80	0.80	0.80	0.80	0.80
37000	0.63	0.68	0.71	0.74	0.76	0.77	0.78	0.79	0.80	0.80	0.80	0.80	0.80	0.80	0.80

ECONOMIC CRUISE – ALL ENGINES OPERATING

CF34-8E5 ENGINES

ISA CONDITIONS
ZERO WIND

Altitude: 31000 ft										CRUISE MACH NUMBER									
WT (kg)	COST INDEX																		
	0	5	10	15	20	25	30	35	40	45	50	60	70	80	90	100	110	120	130
27000	0.59	0.64	0.68	0.72	0.77	0.78	0.79	0.79	0.79	0.80	0.80	0.80	0.80	0.81	0.81	0.81	0.81	0.81	0.81
28000	0.60	0.64	0.68	0.73	0.77	0.78	0.79	0.79	0.79	0.79	0.80	0.80	0.80	0.81	0.81	0.81	0.81	0.81	0.81
29000	0.60	0.65	0.69	0.75	0.77	0.78	0.78	0.79	0.79	0.79	0.80	0.80	0.80	0.80	0.81	0.81	0.81	0.81	0.81
30000	0.60	0.65	0.69	0.75	0.77	0.78	0.78	0.79	0.79	0.79	0.80	0.80	0.80	0.80	0.81	0.81	0.81	0.81	0.81
31000	0.60	0.66	0.70	0.74	0.77	0.78	0.78	0.79	0.79	0.79	0.80	0.80	0.80	0.81	0.81	0.81	0.81	0.81	0.81
32000	0.61	0.66	0.70	0.75	0.77	0.78	0.78	0.79	0.79	0.79	0.80	0.80	0.80	0.81	0.81	0.81	0.81	0.81	0.81
33000	0.62	0.67	0.71	0.75	0.76	0.77	0.78	0.79	0.79	0.79	0.80	0.80	0.81	0.81	0.81	0.81	0.81	0.81	0.81
34000	0.63	0.68	0.72	0.75	0.76	0.77	0.78	0.79	0.79	0.80	0.80	0.80	0.81	0.81	0.81	0.81	0.81	0.81	0.81
35000	0.64	0.69	0.73	0.75	0.76	0.78	0.79	0.79	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
36000	0.66	0.70	0.73	0.75	0.77	0.78	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
37000	0.67	0.71	0.73	0.75	0.78	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80

Altitude: 33000 ft										CRUISE MACH NUMBER									
WT (kg)	COST INDEX																		
	0	5	10	15	20	25	30	35	40	45	50	60	70	80	90	100	110	120	130
27000	0.61	0.66	0.70	0.76	0.78	0.78	0.79	0.79	0.79	0.80	0.80	0.80	0.80	0.81	0.81	0.81	0.81	0.81	0.81
28000	0.61	0.66	0.71	0.76	0.77	0.78	0.79	0.79	0.79	0.79	0.80	0.80	0.80	0.81	0.81	0.81	0.81	0.81	0.81
29000	0.61	0.67	0.72	0.76	0.77	0.78	0.78	0.79	0.79	0.79	0.80	0.80	0.80	0.81	0.81	0.81	0.81	0.81	0.81
30000	0.62	0.68	0.72	0.76	0.77	0.78	0.78	0.79	0.79	0.79	0.80	0.80	0.81	0.81	0.81	0.81	0.81	0.81	0.81
31000	0.63	0.69	0.73	0.76	0.77	0.78	0.78	0.79	0.79	0.80	0.80	0.80	0.81	0.81	0.81	0.81	0.81	0.81	0.81
32000	0.64	0.70	0.74	0.76	0.77	0.78	0.78	0.79	0.79	0.80	0.80	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
33000	0.66	0.71	0.74	0.76	0.77	0.78	0.78	0.79	0.79	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
34000	0.68	0.72	0.74	0.76	0.77	0.78	0.79	0.79	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
35000	0.68	0.72	0.74	0.76	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
36000	0.69	0.72	0.75	0.77	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
37000	0.69	0.72	0.75	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78

ECONOMIC CRUISE – ALL ENGINES OPERATING**CF34-8E5 ENGINES**ISA CONDITIONS
ZERO WIND

Altitude: 35000 ft CRUISE MACH NUMBER

WT (kg)	COST INDEX																		
	0	5	10	15	20	25	30	35	40	45	50	60	70	80	90	100	110	120	130
27000	0.62	0.68	0.73	0.76	0.77	0.78	0.79	0.79	0.79	0.80	0.80	0.80	0.81	0.81	0.81	0.81	0.81	0.81	0.81
28000	0.63	0.70	0.74	0.76	0.77	0.78	0.79	0.79	0.79	0.80	0.80	0.80	0.81	0.81	0.81	0.81	0.81	0.81	0.81
29000	0.65	0.71	0.74	0.76	0.77	0.78	0.79	0.79	0.79	0.80	0.80	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
30000	0.66	0.72	0.74	0.76	0.77	0.78	0.79	0.79	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
31000	0.68	0.72	0.75	0.76	0.77	0.78	0.79	0.79	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
32000	0.69	0.73	0.75	0.77	0.78	0.79	0.79	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
33000	0.70	0.73	0.75	0.77	0.78	0.79	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
34000	0.69	0.73	0.75	0.77	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
35000	0.70	0.73	0.75	0.76	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
36000	0.69	0.72	0.73	0.74	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
37000	0.69	0.71	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72

Altitude: 37000 ft CRUISE MACH NUMBER

WT (kg)		COST INDEX																		
		0	5	10	15	20	25	30	35	40	45	50	60	70	80	90	100	110	120	130
27000		0.66	0.72	0.75	0.76	0.78	0.78	0.79	0.79	0.80	0.80	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
28000		0.68	0.73	0.75	0.77	0.78	0.78	0.79	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
29000		0.69	0.73	0.75	0.77	0.78	0.79	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
30000		0.70	0.73	0.76	0.78	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
31000		0.70	0.73	0.76	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
32000		0.70	0.73	0.75	0.76	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
33000		0.69	0.71	0.73	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74
34000		0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
35000		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
36000		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
37000		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

ECONOMIC CRUISE – ALL ENGINES OPERATING

CF34-8E5 ENGINES

ISA CONDITIONS
ZERO WIND

Altitude: 39000 ft											CRUISE MACH NUMBER									
WT (kg)	COST INDEX																			
	0	5	10	15	20	25	30	35	40	45	50	60	70	80	90	100	110	120	130	
27000	0.70	0.74	0.77	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	
28000	0.70	0.74	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	
29000	0.71	0.73	0.75	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	
30000	0.69	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	
31000	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	
32000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
33000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
34000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
35000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
36000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
37000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Altitude: 41000 ft													CRUISE MACH NUMBER									
WT (kg)	COST INDEX																					
	0	5	10	15	20	25	30	35	40	45	50	60	70	80	90	100	110	120	130			
27000	0.69	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71			
28000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
29000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
30000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
31000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
32000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
33000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
34000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
35000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
36000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
37000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			

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DESCENT

The descent table shows fuel consumption, distance and time from the top of descent to sea level for various cruise altitudes. The data are calculated for flight idle thrust setting, maintaining Mach 0.77 or 290 KIAS up to 10000 ft and 250 KIAS below 10000 ft.

The approach and landing fuel consumption is not considered in the following tables.

The associated conditions are:

- Flaps UP
- Gear UP
- Bleeds OPEN
- Anti-Ice OFF

EXAMPLE:

Given:

Arrival Airport Elevation 3500 ft
Top of Descent Weight 29000 kg
ISA Condition
Cruise Altitude 35000 ft

RESULTS

Data provided from 35000 ft (Top of Descent) to Sea Level table:

Fuel: 93 kg
Distance: 78 NM
Time: 14 min

Data for 5000 ft (3500 ft + 1500 ft above arrival airport) obtained from the 5000 ft descent table:

Fuel: 26 kg
Distance: 12 NM
Time: 3 min

The fuel, distance and time spent during the descent phase (from 35000 ft to 5000 ft) are:

Fuel: $93 - 26 = 67$ kg
Distance: $78 - 12 = 66$ NM
Time: $14 - 3 = 11$ min

The fuel consumption related to the approach and landing phase is provided on the OM part B Section 5.1.b.

DESCENT – ALL ENGINES OPERATING

CF34-8E5 ENGINES

CRUISE CONFIGURATION
BLEED: OPEN
FLIGHT IDLE
AIRSPEED: M .77 / 290 KIAS / 250 KIAS
ISA CONDITIONS

WEIGHT (KG)

TOP OF DESCENT (FT)

			5000	10000	15000	20000	25000	30000	35000	40000
38000	FUEL	KG	30	54	73	85	95	103	109	116
	DISTANCE	NM	14	28	44	56	69	82	92	103
	TIME	MIN	3	6	9	11	13	15	16	18
37000	FUEL	KG	30	53	73	84	94	102	108	114
	DISTANCE	NM	14	28	43	55	68	81	91	102
	TIME	MIN	3	6	9	11	13	15	16	17
36000	FUEL	KG	30	53	72	83	93	101	106	113
	DISTANCE	NM	14	28	43	55	67	80	89	101
	TIME	MIN	3	6	9	11	13	14	16	17
35000	FUEL	KG	29	52	71	82	91	99	105	111
	DISTANCE	NM	14	27	42	54	66	78	88	99
	TIME	MIN	3	6	9	11	13	14	16	17
34000	FUEL	KG	29	51	70	81	90	98	103	110
	DISTANCE	NM	13	27	41	53	65	77	87	98
	TIME	MIN	3	6	9	11	12	14	15	17
33000	FUEL	KG	28	51	68	79	88	96	101	108
	DISTANCE	NM	13	26	41	52	64	76	85	96
	TIME	MIN	3	6	9	10	12	14	15	17
32000	FUEL	KG	28	50	67	78	87	94	99	106
	DISTANCE	NM	13	26	40	51	62	74	83	95
	TIME	MIN	3	6	8	10	12	13	15	16
31000	FUEL	KG	27	49	66	76	85	92	97	104
	DISTANCE	NM	13	26	39	50	61	73	82	93
	TIME	MIN	3	6	8	10	12	13	14	16
30000	FUEL	KG	27	48	65	75	83	90	95	102
	DISTANCE	NM	13	25	38	49	60	71	80	91
	TIME	MIN	3	6	8	10	11	13	14	16
29000	FUEL	KG	26	47	63	73	81	88	93	100
	DISTANCE	NM	12	25	38	48	58	69	78	89
	TIME	MIN	3	6	8	10	11	13	14	15

DESCENT – ALL ENGINES OPERATING**CF34-8E5 ENGINES**

CRUISE CONFIGURATION

BLEED: OPEN

FLIGHT IDLE

AIRSPEED: M .77 / 290 KIAS / 250 KIAS

ISA CONDITIONS

**WEIGHT
(KG)****TOP OF DESCENT
(FT)**

5000 10000 15000 20000 25000 30000 35000 40000

28000	FUEL	KG	26	46	62	71	79	86	91	98
	DISTANCE	NM	12	24	37	47	57	68	76	87
	TIME	MIN	3	5	8	9	11	12	13	15
27000	FUEL	KG	25	45	60	69	77	84	89	95
	DISTANCE	NM	12	23	36	45	55	66	74	85
	TIME	MIN	3	5	7	9	11	12	13	15
26000	FUEL	KG	24	44	58	67	75	81	86	92
	DISTANCE	NM	11	23	35	44	54	64	72	82
	TIME	MIN	3	5	7	9	10	12	13	14
25000	FUEL	KG	24	42	57	65	73	79	83	90
	DISTANCE	NM	11	22	34	43	52	62	70	80
	TIME	MIN	3	5	7	9	10	11	12	14
24000	FUEL	KG	23	41	55	63	70	76	81	87
	DISTANCE	NM	11	21	32	41	50	60	67	77
	TIME	MIN	2	5	7	8	10	11	12	13
23000	FUEL	KG	22	40	53	61	68	74	78	84
	DISTANCE	NM	10	21	31	40	49	58	65	75
	TIME	MIN	2	5	7	8	9	11	12	13
22000	FUEL	KG	21	38	51	59	65	71	75	81
	DISTANCE	NM	10	20	30	38	47	56	63	72
	TIME	MIN	2	4	6	8	9	10	11	12
21000	FUEL	KG	21	37	49	57	63	68	72	78
	DISTANCE	NM	10	19	29	37	45	53	60	69
	TIME	MIN	2	4	6	7	9	10	11	12

HOLDING

The holding tables show indicated airspeed, Mach number, N_1 , fuel flow and fuel consumption for various weights, altitudes, anti-ice on (with and without ice accretion) and off condition. Data are presented in ISA condition for all engines operating configuration.

The associated conditions are:

- Flaps UP
- Gear UP
- Bleeds OPEN
- Airspeed A/I OFF Minimum Fuel Consumption or 1.27 V_S ,
whichever is higher.
- Airspeed A/I ON Minimum Fuel Consumption or 210 KIAS,
whichever is higher.
- Anti-Ice.....OFF
ON, AND:
ON (WITH ICE ACCERATION)

HOLDING – ALL ENGINES OPERATING**CF34-8E5 ENGINES**

CRUISE CONFIGURATION

BLEED: OPEN

ANTI-ICE: OFF

SPEED: MINIMUM FUEL CONSUMPTION or 1.27 Vs

STANDARD ATMOSPHERE

**WEIGHT
(KG)****ALTITUDE (FT)**

1500 5000 10000 15000 20000 25000 30000 35000

38000	IAS	KT	204	204	205	205	206	208	209	211
	TAS	KT	208	219	237	257	279	304	333	366
	MACH		0.316	0.337	0.371	0.410	0.454	0.505	0.565	0.635
	N1	%	57.3	59.8	63.8	68.1	73.0	76.3	81.3	87.2
	F F	KG/H/ENG	716	701	682	687	707	682	710	755

37000	IAS	KT	201	201	202	203	204	205	206	208
	TAS	KT	205	216	234	253	275	300	328	361
	MACH		0.312	0.333	0.366	0.404	0.448	0.499	0.557	0.626
	N1	%	56.7	59.1	63.1	67.1	72.3	75.8	80.4	85.6
	F F	KG/H/ENG	701	684	665	661	688	664	683	714

36000	IAS	KT	198	199	199	200	201	202	203	205
	TAS	KT	203	213	231	250	271	296	324	356
	MACH		0.308	0.328	0.361	0.399	0.442	0.492	0.550	0.618
	N1	%	56.2	58.4	62.3	66.3	71.6	75.1	79.5	84.9
	F F	KG/H/ENG	685	665	646	639	668	647	656	694

35000	IAS	KT	196	196	196	197	198	199	200	202
	TAS	KT	200	210	227	246	268	292	319	351
	MACH		0.304	0.324	0.356	0.393	0.436	0.485	0.542	0.609
	N1	%	55.6	57.7	61.6	65.6	70.8	74.5	78.4	84.2
	F F	KG/H/ENG	669	647	628	621	647	629	629	674

34000	IAS	KT	193	193	193	194	195	196	197	199
	TAS	KT	197	207	224	243	264	288	315	346
	MACH		0.299	0.319	0.351	0.388	0.429	0.478	0.534	0.600
	N1	%	55.0	57.0	60.9	64.8	70.1	73.8	77.3	83.4
	F F	KG/H/ENG	652	628	612	603	625	612	603	653

FOR HOLDING IN A RACETRACK INCREASE FUEL FLOW BY 5%.

HOLDING – ALL ENGINES OPERATING

CF34-8E5 ENGINES

CRUISE CONFIGURATION
BLEED: OPEN
ANTI-ICE: OFF
SPEED: MINIMUM FUEL CONSUMPTION or 1.27 Vs
STANDARD ATMOSPHERE

WEIGHT (KG)

ALTITUDE (FT)

			1500	5000	10000	15000	20000	25000	30000	35000
33000	IAS	KT	190	190	191	191	192	193	194	196
	TAS	KT	194	204	221	239	260	283	310	341
	MACH		0.295	0.314	0.346	0.382	0.423	0.471	0.526	0.591
	N1	%	54.3	56.4	60.3	64.1	69.1	73.1	76.5	82.7
	F F	KG/H/ENG	636	613	596	587	604	596	586	632
32000	IAS	KT	187	187	188	188	189	190	191	193
	TAS	KT	191	201	217	236	256	279	305	336
	MACH		0.290	0.310	0.341	0.376	0.417	0.464	0.518	0.582
	N1	%	53.6	55.8	59.5	63.3	68.1	72.3	75.8	81.7
	F F	KG/H/ENG	620	598	581	571	583	581	570	607
31000	IAS	KT	184	184	185	185	186	187	188	190
	TAS	KT	188	198	214	232	252	275	301	330
	MACH		0.286	0.305	0.335	0.370	0.410	0.456	0.510	0.573
	N1	%	52.8	55.1	58.7	62.5	67.0	71.5	75.0	80.7
	F F	KG/H/ENG	603	582	566	556	560	564	554	581
30000	IAS	KT	181	181	182	182	183	184	185	186
	TAS	KT	185	195	211	228	248	270	296	325
	MACH		0.281	0.300	0.330	0.364	0.403	0.449	0.502	0.564
	N1	%	52.0	54.4	57.8	61.6	65.8	70.6	74.2	79.5
	F F	KG/H/ENG	586	568	550	540	536	547	538	556
29000	IAS	KT	178	178	179	179	180	181	182	183
	TAS	KT	182	192	207	224	244	266	291	320
	MACH		0.276	0.295	0.324	0.358	0.397	0.441	0.493	0.554
	N1	%	51.2	53.6	56.9	60.7	64.8	69.7	73.4	78.4
	F F	KG/H/ENG	569	553	534	523	518	529	521	531

FOR HOLDING IN A RACETRACK INCREASE FUEL FLOW BY 5%.

HOLDING – ALL ENGINES OPERATING**CF34-8E5 ENGINES**

CRUISE CONFIGURATION

BLEED: OPEN

ANTI-ICE: OFF

SPEED: MINIMUM FUEL CONSUMPTION or 1.27 Vs

STANDARD ATMOSPHERE

**WEIGHT
(KG)****ALTITUDE (FT)**

1500 5000 10000 15000 20000 25000 30000 35000

28000	IAS	KT	175	175	175	176	177	177	178	180
	TAS	KT	179	188	203	220	239	261	286	314
	MACH		0.272	0.290	0.319	0.352	0.390	0.434	0.485	0.545
	N1	%	50.6	52.8	56.0	59.9	63.8	68.7	72.5	77.1
	F F	KG/H/ENG	556	537	517	508	501	510	505	505
27000	IAS	KT	172	172	172	173	173	174	175	176
	TAS	KT	175	185	200	216	235	256	281	308
	MACH		0.267	0.284	0.313	0.345	0.383	0.426	0.476	0.535
	N1	%	49.9	51.9	55.3	59.1	62.8	67.7	71.6	75.8
	F F	KG/H/ENG	544	522	504	493	484	489	488	478
26000	IAS	KT	168	169	169	169	170	171	172	173
	TAS	KT	172	181	196	212	231	252	275	303
	MACH		0.262	0.279	0.307	0.339	0.376	0.418	0.467	0.525
	N1	%	49.1	51.0	54.3	58.1	61.8	66.5	70.7	75.0
	F F	KG/H/ENG	530	506	490	477	468	468	473	461
25000	IAS	KT	165	165	166	166	167	167	168	169
	TAS	KT	169	178	192	208	226	247	270	297
	MACH		0.257	0.274	0.301	0.332	0.368	0.410	0.458	0.515
	N1	%	48.2	50.1	53.1	57.2	60.8	65.3	69.9	74.2
	F F	KG/H/ENG	517	491	475	460	451	444	456	444
24000	IAS	KT	162	162	162	163	163	164	165	166
	TAS	KT	165	174	188	204	222	242	265	291
	MACH		0.251	0.268	0.295	0.326	0.361	0.402	0.449	0.504
	N1	%	47.2	49.2	51.9	56.1	59.7	64.0	69.1	73.3
	F F	KG/H/ENG	502	479	460	443	434	421	439	428

FOR HOLDING IN A RACETRACK INCREASE FUEL FLOW BY 5%.

HOLDING – ALL ENGINES OPERATING

CF34-8E5 ENGINES

CRUISE CONFIGURATION
BLEED: OPEN
ANTI-ICE: OFF
SPEED: MINIMUM FUEL CONSUMPTION or 1.27 Vs
STANDARD ATMOSPHERE

WEIGHT (KG)			ALTITUDE (FT)							
			1500	5000	10000	15000	20000	25000	30000	35000
23000	IAS	KT	158	159	159	159	160	160	161	162
	TAS	KT	162	171	184	200	217	237	259	285
	MACH		0.246	0.263	0.289	0.319	0.353	0.393	0.439	0.494
	N1	%	46.2	48.3	50.7	54.9	58.7	62.9	68.1	72.4
	F F	KG/H/ENG	487	466	444	425	417	403	420	411
22000	IAS	KT	155	155	155	156	156	157	157	158
	TAS	KT	158	167	180	195	212	231	253	278
	MACH		0.241	0.257	0.282	0.312	0.345	0.384	0.430	0.483
	N1	%	45.2	47.2	49.4	53.8	57.7	61.8	67.1	71.5
	F F	KG/H/ENG	471	452	427	411	402	387	400	395
21000	IAS	KT	151	152	152	152	153	153	154	155
	TAS	KT	155	163	176	191	207	226	247	272
	MACH		0.235	0.251	0.276	0.305	0.338	0.376	0.420	0.472
	N1	%	44.0	46.1	48.0	52.6	56.7	60.6	65.9	70.5
	F F	KG/H/ENG	454	437	410	397	386	371	378	379

FOR HOLDING IN A RACETRACK INCREASE FUEL FLOW BY 5%.

HOLDING – ALL ENGINES OPERATING**CF34-8E5 ENGINES**

CRUISE CONFIGURATION

BLEED: OPEN

ANTI-ICE: ON

SPEED: MINIMUM FUEL CONSUMPTION or 210 KIAS

STANDARD ATMOSPHERE

**WEIGHT
(KG)****ALTITUDE (FT)**

			1500	5000	10000	15000	20000	25000	30000	35000
38000	IAS	KT	210	210	210	210	210	210	210	211
	TAS	KT	215	226	243	262	284	308	334	366
	MACH		0.326	0.347	0.381	0.419	0.462	0.511	0.567	0.635
	N1	%	57.5	59.9	63.9	68.3	73.0	76.3	81.3	87.2
	FF	KG/H/ENG	766	759	740	744	759	728	757	802
	FC	KG/H	1531	1519	1480	1487	1518	1457	1514	1604
37000	IAS	KT	210	210	210	210	210	210	210	210
	TAS	KT	215	226	243	262	284	308	334	364
	MACH		0.326	0.347	0.381	0.419	0.462	0.511	0.567	0.631
	N1	%	57.0	59.4	63.3	67.5	72.4	75.8	80.5	85.6
	FF	KG/H/ENG	755	746	725	721	742	713	732	762
	FC	KG/H	1511	1492	1451	1443	1483	1426	1464	1523
36000	IAS	KT	210	210	210	210	210	210	210	210
	TAS	KT	215	226	243	262	284	308	334	364
	MACH		0.326	0.347	0.381	0.419	0.462	0.511	0.567	0.631
	N1	%	56.6	58.8	62.7	66.8	71.8	75.2	79.7	84.9
	FF	KG/H/ENG	745	732	711	704	724	698	707	744
	FC	KG/H	1490	1465	1421	1407	1449	1395	1415	1488
35000	IAS	KT	210	210	210	210	210	210	210	210
	TAS	KT	215	226	243	262	284	308	334	364
	MACH		0.326	0.347	0.381	0.419	0.462	0.511	0.567	0.631
	N1	%	56.1	58.3	62.1	66.2	71.2	74.7	78.8	84.2
	FF	KG/H/ENG	734	718	696	687	707	683	684	726
	FC	KG/H	1469	1437	1392	1374	1414	1365	1369	1452
34000	IAS	KT	210	210	210	210	210	210	210	210
	TAS	KT	215	226	243	262	284	308	334	364
	MACH		0.326	0.347	0.381	0.419	0.462	0.511	0.567	0.631
	N1	%	55.7	57.7	61.6	65.5	70.6	74.1	77.9	83.5
	FF	KG/H/ENG	724	704	685	671	690	668	661	709
	FC	KG/H	1448	1408	1369	1341	1380	1336	1323	1417

FOR HOLDING IN A RACETRACK INCREASE FUEL FLOW BY 5%.

HOLDING – ALL ENGINES OPERATING

CF34-8E5 ENGINES

CRUISE CONFIGURATION
BLEED: OPEN
ANTI-ICE: ON
SPEED: MINIMUM FUEL CONSUMPTION or 210 KIAS
STANDARD ATMOSPHERE

WEIGHT (KG)			ALTITUDE (FT)							
			1500	5000	10000	15000	20000	25000	30000	35000
33000	IAS	KT	210	210	210	210	210	210	210	210
	TAS	KT	215	226	243	262	284	308	334	364
	MACH		0.326	0.347	0.381	0.419	0.462	0.511	0.567	0.631
	N1	%	55.3	57.3	61.2	65.0	69.9	73.6	77.4	82.9
	FF	KG/H/ENG	713	693	673	657	673	655	648	692
	FC	KG/H	1427	1386	1346	1315	1345	1310	1295	1385
32000	IAS	KT	210	210	210	210	210	210	210	210
	TAS	KT	215	226	243	262	284	308	334	364
	MACH		0.326	0.347	0.381	0.419	0.462	0.511	0.567	0.631
	N1	%	54.8	56.9	60.7	64.5	69.2	73.0	76.9	82.2
	FF	KG/H/ENG	702	683	662	645	656	643	635	673
	FC	KG/H	1405	1366	1323	1291	1312	1286	1269	1347
31000	IAS	KT	210	210	210	210	210	210	210	210
	TAS	KT	215	226	243	262	284	308	334	364
	MACH		0.326	0.347	0.381	0.419	0.462	0.511	0.567	0.631
	N1	%	54.3	56.5	60.2	63.9	68.5	72.4	76.4	81.4
	FF	KG/H/ENG	692	672	650	633	640	631	622	653
	FC	KG/H	1383	1345	1300	1267	1280	1262	1243	1306
30000	IAS	KT	210	210	210	210	210	210	210	210
	TAS	KT	215	226	243	262	284	308	334	364
	MACH		0.326	0.347	0.381	0.419	0.462	0.511	0.567	0.631
	N1	%	53.8	56.1	59.7	63.4	67.7	71.9	75.9	80.6
	FF	KG/H/ENG	679	662	638	622	624	619	608	633
	FC	KG/H	1359	1324	1277	1243	1248	1238	1217	1266
29000	IAS	KT	210	210	210	210	210	210	210	210
	TAS	KT	215	226	243	262	284	308	334	364
	MACH		0.326	0.347	0.381	0.419	0.462	0.511	0.567	0.631
	N1	%	53.2	55.7	59.1	62.8	67.0	71.3	75.4	79.7
	FF	KG/H/ENG	667	652	627	610	609	607	595	614
	FC	KG/H	1334	1303	1254	1220	1217	1214	1191	1227

FOR HOLDING IN A RACETRACK INCREASE FUEL FLOW BY 5%.

HOLDING – ALL ENGINES OPERATING**CF34-8E5 ENGINES**

CRUISE CONFIGURATION

BLEED: OPEN

ANTI-ICE: ON

SPEED: MINIMUM FUEL CONSUMPTION or 210 KIAS

STANDARD ATMOSPHERE

WEIGHT (KG)			ALTITUDE (FT)							
			1500	5000	10000	15000	20000	25000	30000	35000
28000	IAS	KT	210	210	210	210	210	210	210	210
	TAS	KT	215	226	243	262	284	308	334	364
	MACH		0.326	0.347	0.381	0.419	0.462	0.511	0.567	0.631
	N1	%	52.9	55.2	58.5	62.3	66.3	70.7	74.8	78.9
	FF	KG/H/ENG	660	641	616	600	594	595	582	594
	FC	KG/H	1319	1282	1231	1201	1187	1190	1165	1189
27000	IAS	KT	210	210	210	210	210	210	210	210
	TAS	KT	215	226	243	262	284	308	334	364
	MACH		0.326	0.347	0.381	0.419	0.462	0.511	0.567	0.631
	N1	%	52.6	54.8	58.1	61.9	65.8	70.1	74.1	78.0
	FF	KG/H/ENG	652	631	607	591	581	583	570	576
	FC	KG/H	1304	1262	1215	1183	1163	1166	1140	1153
26000	IAS	KT	210	210	210	210	210	210	210	210
	TAS	KT	215	226	243	262	284	308	334	364
	MACH		0.326	0.347	0.381	0.419	0.462	0.511	0.567	0.631
	N1	%	52.2	54.3	57.8	61.5	65.4	69.5	73.5	77.4
	FF	KG/H/ENG	644	620	599	582	572	571	561	565
	FC	KG/H	1289	1241	1199	1165	1144	1142	1122	1130
25000	IAS	KT	210	210	210	210	210	210	210	210
	TAS	KT	215	226	243	262	284	308	334	364
	MACH		0.326	0.347	0.381	0.419	0.462	0.511	0.567	0.631
	N1	%	51.9	53.9	57.4	61.0	64.9	68.8	73.0	76.9
	FF	KG/H/ENG	637	612	591	573	563	559	552	554
	FC	KG/H	1273	1224	1183	1147	1126	1118	1104	1109
24000	IAS	KT	210	210	210	210	210	210	210	210
	TAS	KT	215	226	243	262	284	308	334	364
	MACH		0.326	0.347	0.381	0.419	0.462	0.511	0.567	0.631
	N1	%	51.6	53.6	57.0	60.6	64.4	68.1	72.5	76.4
	FF	KG/H/ENG	629	606	583	564	554	547	543	544
	FC	KG/H	1258	1211	1166	1129	1108	1094	1086	1088

FOR HOLDING IN A RACETRACK INCREASE FUEL FLOW BY 5%.

HOLDING – ALL ENGINES OPERATING

CF34-8E5 ENGINES

CRUISE CONFIGURATION
BLEED: OPEN
ANTI-ICE: ON (WITH ICE ACCRETION)
SPEED: MINIMUM FUEL CONSUMPTION or 210 KIAS
STANDARD ATMOSPHERE

WEIGHT (KG)			ALTITUDE (FT)							
			1500	5000	10000	15000	20000	25000	30000	35000
38000	IAS	KT	219	220	221	222	223	224	-	-
	TAS	KT	224	236	255	276	300	328	-	-
	MACH		0.341	0.363	0.400	0.441	0.489	0.544	-	-
	N1	%	63.9	66.6	70.4	75.1	79.5	83.2	-	-
	FF	KG/H/ENG	948	936	923	941	957	945	-	-
	FC	KG/H	1896	1871	1845	1883	1914	1890	-	-
37000	IAS	KT	217	217	218	219	220	221	-	-
	TAS	KT	221	233	252	273	296	323	-	-
	MACH		0.336	0.359	0.395	0.436	0.483	0.537	-	-
	N1	%	63.2	65.9	69.8	74.1	78.8	82.5	-	-
	FF	KG/H/ENG	926	911	897	910	934	920	-	-
	FC	KG/H	1852	1821	1794	1820	1867	1839	-	-
36000	IAS	KT	214	214	215	216	217	218	220	-
	TAS	KT	218	230	248	269	292	319	349	-
	MACH		0.332	0.354	0.389	0.430	0.476	0.530	0.592	-
	N1	%	62.5	65.2	69.0	73.3	78.1	81.8	87.1	-
	FF	KG/H/ENG	904	886	873	882	910	894	941	-
	FC	KG/H	1808	1772	1746	1765	1820	1789	1882	-
35000	IAS	KT	211	211	212	212	214	215	217	-
	TAS	KT	215	227	245	265	288	314	344	-
	MACH		0.327	0.349	0.384	0.424	0.469	0.522	0.584	-
	N1	%	61.8	64.4	68.2	72.4	77.3	81.2	85.7	-
	FF	KG/H/ENG	881	862	851	857	885	870	901	-
	FC	KG/H	1762	1724	1701	1713	1771	1739	1803	-
34000	IAS	KT	210	210	210	210	210	212	213	-
	TAS	KT	215	226	243	262	284	310	339	-
	MACH		0.326	0.347	0.381	0.419	0.463	0.515	0.576	-
	N1	%	61.3	63.7	67.6	71.6	76.5	80.4	84.5	-
	FF	KG/H/ENG	866	845	835	833	860	845	862	-
	FC	KG/H	1733	1689	1670	1667	1721	1690	1723	-

FOR HOLDING IN A RACETRACK INCREASE FUEL FLOW BY 5%.

HOLDING – ALL ENGINES OPERATING

CF34-8E5 ENGINES

CRUISE CONFIGURATION

BLEED: OPEN

ANTI-ICE: ON (WITH ICE ACCRETION)

SPEED: MINIMUM FUEL CONSUMPTION or 210 KIAS

STANDARD ATMOSPHERE

WEIGHT (KG)			ALTITUDE (FT)							
			1500	5000	10000	15000	20000	25000	30000	35000
33000	IAS	KT	210	210	210	210	210	210	210	-
	TAS	KT	215	226	243	262	284	308	334	-
	MACH		0.326	0.347	0.381	0.419	0.462	0.511	0.567	-
	N1	%	60.9	63.3	67.2	71.2	76.0	79.8	83.7	-
	FF	KG/H/ENG	854	835	824	821	843	827	834	-
	FC	KG/H	1707	1671	1648	1642	1687	1654	1667	-
32000	IAS	KT	210	210	210	210	210	210	210	-
	TAS	KT	215	226	243	262	284	308	334	-
	MACH		0.326	0.347	0.381	0.419	0.462	0.511	0.567	-
	N1	%	60.5	62.9	66.8	70.7	75.5	79.4	83.2	-
	FF	KG/H/ENG	841	826	814	810	828	814	820	-
	FC	KG/H	1682	1653	1627	1619	1655	1629	1639	-
31000	IAS	KT	210	210	210	210	210	210	210	-
	TAS	KT	215	226	243	262	284	308	334	-
	MACH		0.326	0.347	0.381	0.419	0.462	0.511	0.567	-
	N1	%	60.0	62.5	66.4	70.3	75.0	79.0	82.8	-
	FF	KG/H/ENG	829	817	803	798	812	802	806	-
	FC	KG/H	1658	1635	1606	1596	1624	1604	1611	-
30000	IAS	KT	210	210	210	210	210	210	210	-
	TAS	KT	215	226	243	262	284	308	334	-
	MACH		0.326	0.347	0.381	0.419	0.462	0.511	0.567	-
	N1	%	59.6	62.1	66.0	69.9	74.3	78.5	82.4	-
	FF	KG/H/ENG	817	808	792	786	796	789	792	-
	FC	KG/H	1634	1617	1585	1573	1591	1579	1583	-
29000	IAS	KT	210	210	210	210	210	210	210	-
	TAS	KT	215	226	243	262	284	308	334	-
	MACH		0.326	0.347	0.381	0.419	0.462	0.511	0.567	-
	N1	%	59.1	61.7	65.6	69.5	73.8	78.1	81.9	-
	FF	KG/H/ENG	805	799	782	774	779	777	778	-
	FC	KG/H	1609	1598	1563	1549	1559	1554	1555	-

FOR HOLDING IN A RACETRACK INCREASE FUEL FLOW BY 5%.

HOLDING – ALL ENGINES OPERATING

CF34-8E5 ENGINES

CRUISE CONFIGURATION
BLEED: OPEN
ANTI-ICE: ON (WITH ICE ACCRETION)
SPEED: MINIMUM FUEL CONSUMPTION or 210 KIAS
STANDARD ATMOSPHERE

WEIGHT (KG)			ALTITUDE (FT)							
			1500	5000	10000	15000	20000	25000	30000	35000
28000	IAS	KT	210	210	210	210	210	210	210	210
	TAS	KT	215	226	243	262	284	308	334	364
	MACH		0.326	0.347	0.381	0.419	0.462	0.511	0.567	0.631
	N1	%	58.8	61.3	65.2	69.1	73.2	77.6	81.5	87.2
	FF	KG/H/ENG	798	790	771	765	763	764	764	800
	FC	KG/H	1595	1580	1542	1529	1526	1528	1527	1600
27000	IAS	KT	210	210	210	210	210	210	210	210
	TAS	KT	215	226	243	262	284	308	334	364
	MACH		0.326	0.347	0.381	0.419	0.462	0.511	0.567	0.631
	N1	%	58.6	60.9	64.9	68.7	72.7	77.2	81.0	86.2
	FF	KG/H/ENG	791	781	764	756	750	752	750	775
	FC	KG/H	1582	1562	1527	1511	1500	1503	1499	1550
26000	IAS	KT	210	210	210	210	210	210	210	210
	TAS	KT	215	226	243	262	284	308	334	364
	MACH		0.326	0.347	0.381	0.419	0.462	0.511	0.567	0.631
	N1	%	58.3	60.5	64.6	68.4	72.3	76.7	80.7	85.6
	FF	KG/H/ENG	785	772	756	746	740	739	739	760
	FC	KG/H	1569	1544	1513	1492	1480	1478	1479	1521
25000	IAS	KT	210	210	210	210	210	210	210	210
	TAS	KT	215	226	243	262	284	308	334	364
	MACH		0.326	0.347	0.381	0.419	0.462	0.511	0.567	0.631
	N1	%	58.0	60.2	64.3	68.0	72.0	76.3	80.4	85.0
	FF	KG/H/ENG	778	765	748	737	730	727	729	747
	FC	KG/H	1556	1529	1496	1473	1460	1453	1458	1494
24000	IAS	KT	210	210	210	210	210	210	210	210
	TAS	KT	215	226	243	262	284	308	334	364
	MACH		0.326	0.347	0.381	0.419	0.462	0.511	0.567	0.631
	N1	%	57.7	59.9	63.9	67.7	71.6	75.8	80.1	84.5
	FF	KG/H/ENG	772	759	740	727	720	714	719	734
	FC	KG/H	1543	1518	1480	1454	1440	1427	1438	1467

FOR HOLDING IN A RACETRACK INCREASE FUEL FLOW BY 5%.

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SECTION 6

MASS AND BALANCE

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INTRODUCTION

This Section contains information to that already presented in the Weight and Balance manual (WB-145/1162).

This supplementary information is intended to assist the operator in defining the weight and balance system and constrained CG limits.

This Section provides instructions referring to the weighting and loading of the ERJ-170 airplane models.

The Basic Weight value obtained during the airplane weighting procedures should be used as point of departure for each loading operation.

Based on the contained information, the operator can determine the airplane weight and CG at any time of flight.

Mass values for passengers and baggage - JAR-OPS 1.620

Mass and balance documentation - JAR-OPS 1.625.

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STANDARD TERMS AND DEFINITIONS

EQUIPPED EMPTY WEIGHT (EEW) OR MANUFACTURER EMPTY WEIGHT (MEW)

It is the weight of structure, power plant, instruments, interior furnishings, systems, optional, portable, and emergency equipment and other items of equipment that are an integral part of the airplane configuration. It is essentially a dry weight, including only those fluids contained in closed systems such as oxygen, fire extinguisher agent, landing gear shock absorber fluid, etc.

BASIC WEIGHT (BW)

This is the weight of the aircraft prepared for service and includes the actual weight of the aircraft including its fixed equipment, unusable fuel and configuration equipment with galley structures.

Basic Weight (BW) is published:

- on sheet C3 of IATA AHM560,
- in aircraft weighing report stored in cockpit documents.

DOW DRY OPERATING WEIGHT

Dry Operating Weight consists of:

- Basic Weight BW
- crew weight
- crew baggage
- pantry weight
- fuel ballast weight

OW OPERATING WEIGHT

Operating Weight includes Dry Operating Weight (DOW) and Take-off Fuel (TOF).

ZERO FUEL WEIGHT (ZFW)

Actual weight of loaded aircraft without fuel.

PAYLOAD OR TOTAL TRAFFIC LOAD

This is the weight of passengers, baggage and cargo.

MAXIMUM ALLOWABLE PAYLOAD

It is the maximum approved weight that can be loaded into the airplane. Maximum payload is the Maximum Zero Fuel Weight (MZFW) less Dry Operating Weight (DOW).

MAXIMUM DESIGN ZERO FUEL WEIGHT (MZFW)

This is the maximum authorized weight before usable fuel be loaded. The MZFW is related to airplane structural limitations.

MAXIMUM DESIGN RAMP WEIGHT (MRW)

This is the maximum authorized ramp weight.

MAXIMUM DESIGN TAKEOFF WEIGHT (MTOW)

This is the maximum authorized weight for takeoff.

MAXIMUM DESIGN LANDING WEIGHT (MLW)

This is the maximum authorized weight for landing.

MINIMUM OPERATING WEIGHT (MOW)

This is the minimum authorized weight to operate the airplane.

CENTER OF GRAVITY (CG)

This is the position where the mass of the aircraft is considered concentrated for balance purposes. It is normally referred to in terms of %MAC.

AIRPLANE DATUM

This is a plane perpendicular to the fuselage centerline from where all arm measurements are taken.

MEAN AERODYNAMIC CHORD (MAC)

This is the chord of an imaginary rectangular airfoil with the same area of the actual wing and which produces the same resulting force vectors of the actual wing. The aircraft forward and aft CG limits are referred to in terms of %MAC.

INDEX SYSTEM

This is a convention for presenting aircraft or body moments. It is the moment of the body converted to a different measuring system.

CALCULATION SYSTEM

GENERAL DATA

The general data presented in this section are intended to be used for specific weight and balance calculations and are equivalent to the information contained in the Weight & Balance Manual.

MAXIMUM GROSS WEIGHTS AND CENTER OF GRAVITY LIMITS

Refer to OM part B Section 6.1.c.

INDEX SYSTEM

When determining the aircraft centre of gravity (**COG**) position it is necessary to make calculations adding and/or subtracting the moment caused by each individual item loaded in the aircraft.

Moment is weight multiplied by the distance to a reference point. If the moment of the aircraft and of the items loaded on it are computed in the reference to the aircraft datum, very long numeric expressions would result. That is the reason to use Index System for weight and balance purposes.

The Index System is a convention for presenting aircraft or body moments on a different measuring system which allows the operator to complete the following pre-flight weight and balance requirements:

1. Calculation of total load (passengers and cargo), based upon Zero Fuel Weight, Landing Weight and Takeoff Weight allowances;
2. Ensure that the certified weight and centre of gravity limits are not exceeded during all operations;
3. Determination of the horizontal stabilizer trim settings for takeoff;

NOTE: - Weight units are kilograms, balance units are meters.

To calculate Index value the following formula is used:

$$\text{I.U.} = \frac{W * [\%MAC * \frac{MAC}{100} + \text{LEMAC} - \text{R.Sta.}]}{C} + K$$

where:

I.U. - Index;

W - actual weight;

% MAC - actual % MAC value;

MAC = 3,194 m - length of the Mean Aerodynamic Chord;

LEMAC = 12,925 m - Leading Edge of Mean Aerodynamic Chord;

R.Sta. = 13,800 m - Reference Station; a point around which all index values are calculated;

C = 400 - a constant used as a denominator to convert moment values into index values;

K = 70 - a constant used as a plus value to avoid negative index figures.

It is only used when computing the aircraft Basic Index (BI), and is not used when computing individual bodies index influence.

To calculate **BI** for Embraer ERJ170 having % MAC and BW use the following equation:

$$BI = \frac{BW * \{[\%MAC * 0,03194] - 0.875\}}{400} + 70$$

where:

BW = Basic Weight

INDEX INFLUENCE

Index influence is the variation of index when a body is loaded or unloaded from the aircraft. It is referred in index units per kilogram (I.U. / kg) for variable weight bodies (cargo, catering, baggage, etc.); index units per passenger when computing passenger influence or index units for fixed weight bodies (e.g. cockpit/cabin crew).

To calculate **Index Influence** for Embraer ERJ170 use the following equation:

$$I.U. = \frac{Weight * (Arm - 13,8)}{400}$$

or

$$I.U. = \frac{Weight * \{[\%MAC * 0,03194] - 0.875\}}{400}$$

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INFORMATION AND INSTRUCTION FOR COMPLETION OF MASS AND BALANCE DOCUMENTATION INCLUDING MANUAL AND COMPUTER TYPES

GENERAL

Manual Loadsheets being used by LOT Polish Airlines are in accordance with AHM516 format.

Computer Loadsheet presented in following example is in AHM517 format.

The example attached on the next pages shows the way to prepare a manual Loadsheet for ERJ-170 and how to read computer loadsheet.

All weights are in kilograms.

Data in the shaded areas on the Loadsheet constitute the Loadmessage (LDM).

LOADSHEET

ERJ-170

70 seats

LOADSHEET &
LOADMESSAGE

LOT
POLSKIE LINIE LOTNICZE - POLISH AIRLINES

Priority
QU

Addresses
BCNAPLO

Recharge/Date/Time
LO/22/1930

Units
MS LDM

A/C Registration
LO437

Version
SF-LDA C22Y48

Crew
2/2/1

Originator
MAMKKLO

Date
22 APR 2005

BASIC WEIGHT
Crew 2 / 2
Pantry 360 / 240

Dry Operating Weight
Take-off fuel
7150 - 150 TX

Operating Weight

MAXIMUM WEIGHTS FOR
Take-off fuel

ALLOWED WEIGHT FOR
TAKE-OFF
(lowest of a, b, c)

Operating Weight

ALLOWED TRAFFIC LOAD

ZERO FUEL
29600
7000

TAKE-OFF
36600
35990
29256

LANDING
32800
5000
37800
6734

Dest.
BCN

No. of Passengers
M F GULI
30 20 5

Cab
BAG

Total

Distribution weight
1 2 3 0

Remarks
PAX Y PAD Y
37
8/37 /
PAD /

Total Passenger Weight
→ +

TOTAL TRAFFIC LOAD →

Dry Operating Weight → +

ZERO FUEL WEIGHT →

Take-off fuel → +

TAKE-OFF WEIGHT →

Landing Weight →

LAST MINUTE CHANGES

Seating Conditions

Total number of passengers

Notes

Balance Conditions % MAC

ZFW

TOW

1

2

3

4

5

6

7

8

13

MANUAL LOADSHEET DESCRIPTION

To prepare manual Loadsheets execute the following steps:

Before completion of the Loadsheets, check the actual Weight Limits then fill in the proper fields on the Loadsheets:

(A)

MTOW – Maximum Take Off Weight;

(B)

MLAW – Maximum Landing Weight;

① ADDRESSES AND HEADING	
Priority	- priority indicator (e.g. QU);
Addresses	- SITA addresses for Loadmessage LDM (e.g. ZRHAPLO);
Originator	- SITA addresses of originator (e.g. WAWKKLO);
Recharge	- recharge facility (e.g. LO);
Date/Time	- date and time group (e.g. 101020);
Initials	- initials of the agent preparing Loadsheets;
LDM	- standard message indicator (LOADMESSAGE);
Flight No	- flight number/identifier (e.g. LO411);
A/C Registration	- aircraft registration;
Version	- version/configuration code of the aircraft;
Crew	- number of crew excluding crew travelling as passengers;
Date	- date of preparing the Loadsheets;

② OPERATING WEIGHT CALCULATION	
BASIC WEIGHT	Basic Weight includes all fixed equipment, system fluids, unusable fuel - and configuration equipment including galley structure; Basic Weight is specified in section 6.1.d page 1 of this document;
Crew	- total weight of crew members;
Pantry	- weight of pantry and additional unmanifested catering material transported in the galley(s);
2a	- spare line for adjustments to the Basic Weight;
DRY OPERATING WEIGHT	DOW - Basic Weight plus Operational items, e.g. crew, flight equipment and pantry;
Take-off fuel	- the amount of fuel on board less fuel consumed before takeoff;
.....	- total fuel in tanks minus taxi fuel;
OPERATING WEIGHT	- the sum of DOW and Take-off Fuel;

3 ALLOWED TRAFFIC LOAD CALCULATION	
MAXIMUM WEIGHTS FOR:	
ZERO FUEL	- MZFW - Maximum Design Zero Fuel Weight
TAKE-OFF	- MTOW - Maximum Design Take-off Weight or Operational Take-off Weight, whichever is lower;
LANDING	- MLAW - Maximum Design Landing Weight or Operational Landing Weight, whichever is lower;
Trip fuel	- the amount of fuel planned to be consumed from take-off to the airport of first intended landing;
ALLOWED WEIGHT FOR TAKE-OFF	- use the lowest of items: a, b or c;
Operating Weight	- copy the Operating Weight value from section 2 ;
ALLOWED TRAFFIC LOAD	- a difference between the lowest ALLOWED WEIGHT FOR TAKE-OFF and Operating Weight ;

4 LOAD INFORMATION	
Dest.	
- airport of destination – IATA code;	
4a No. of Passengers /transit/	- Total number of transit passengers, including PADs;
	M - male; F - female; CH - children; I - infants;
4b No. of Passengers /joining /	- total number of joining passengers, including PADs; (M, F, CH, I – as above)
4c No. of Passengers	- total number of outgoing passengers; sum of 4a and 4b and LMC;
Note:	If there is a deadload to this destination, but no passengers, "0" figures must be filled in. If there is no traffic load to this destination, enter "NIL"
Cab. Bag.	cabin baggage not included in standard passenger weight: - - transit passengers; - - joining passengers; - - total cabin baggage;
4d	- total number of passengers as per /M, F, CH, I/
4e PAX C/Y	- seats occupied by transit passengers per class, including PADs;
4f PAX C/Y	- seats occupied by joining passengers per class, including PADs;
4g PAX/ /	- total seats occupied by outgoing passengers per class, including PADs and LMC
4h PAD C/Y	- seats occupied by transit PADs per class;
4i PAD C/Y	- seats occupied by joining PADs per class;

④j	PAD/ /	total seats occupied by outgoing PADs by class, including - LMC. Group figure of each class to be separated by an oblique. All PADs are included in the CY distribution;
④k		- additional remarks applying three-letter codes (e.g. AVI/6/30);
④l		total number of seats occupied by passengers per class; - sum of ④e and ④f ;
Note: On multileg flights enter above data (steps: ④a , ④b and ④c) for every destination <u>separately</u> .		

⑤	TOTAL – Weight calculations	
Tr B C M .T		- weight of transit deadload (to be obtained from incoming LDM or Loadsheel); - weight of joining <u>baggage</u> <u>excluding Cabin baggage</u> ; - weight of joining <u>cargo</u> ; - weight of joining <u>mail</u> ; - total weight of deadload;
⑤a		- total weight of load (sum of load for all flight legs);
Total Passenger Weight		- total passenger weight calculated according to the standard (or alternate) passenger weight;
TOTAL TRAFFIC LOAD		the total weight of passengers, baggage, cargo and mail. - Operational items not included in DOW (e.g. pallets, nets) must be added to the cargo weight figures;

⑥	It is recommended to check underload/overload before calculating ZFW,TOW and LAW	
ALLOWED TRAFFIC LOAD		- rewrite ALLOWED TRAFFIC LOAD value from section ③ ;
TOTAL TRAFFIC LOAD		- copy TOTAL TRAFFIC LOAD value from section ⑤ ;
UNDERLOAD BEFORE LMC		- ALLOWED TRAFFIC LOAD minus TOTAL TRAFFIC LOAD ;

⑤	continued.....	
Dry Operating Weight		- Basic Weight (BW) plus Operational items (e.g. crew, flight equipment and pantry);
ZERO FUEL WEIGHT		- actual Zero Fuel Weight; - sum of TOTAL TRAFFIC LOAD and DRY OPERATING WEIGHT ;
Take-off fuel		- the amount of fuel on board less fuel consumed before takeoff;
TAKE-OFF WEIGHT		- actual Take-Off Weight; - sum of ZERO FUEL WEIGHT and Take-off fuel ;
Trip fuel		- the amount of fuel planned to be consumed from take-off to the airport of first intended landing;
LANDING WEIGHT		- actual Landing Weight; - TAKE-OFF WEIGHT and Trip fuel ;

7 DISTRIBUTION WEIGHT	
Distribute the load by compartments and by load category (Tr-transit load to this destination; B-baggage; C-cargo; M-mail);	
7a	- distribution of load in compartments;
8 PASSENGER DISTRIBUTION	
Seating Conditions PAX SOC	- number of seats occupied by passengers per sector; - number of seats occupied by cargo per sector;
Total number of passengers	- total number of passengers on board; sum of 4d and LMC;
SI SUPPLEMENTARY INFORMATION to be included in LDM. (plain text format)	
Notes	- information not transmitted with LDM;

TRIM CHART

INDEX CALCULATION		−	+
BASIC INDEX			6 6
Crew		5	
Pantry		8	5
Sub - Total		13	7 1
DRY OPERATING INDEX			5 8
Compt. 1 Max 457 kG	3 5 0 7		
Compt. 2 Max 913 kG	5 0 1 0		
Compt. 3 Max 686 kG	0 0 0 3		
Compt. 4 Max 344 kG	2 0 0 3		
FWD Pax Compt. A	18 1 7		
AFT Pax Compt. C	22 2 3		
Sub - Total	34 8 7		
ZERO FUEL INDEX			5 3
Take-off Fuel Index	1 4		
TAKE-OFF INDEX			3 9
Last Minute Changes			
CORRECTED TAKE-OFF INDEX			

PAX CABIN CONFIGURATION - 70 SEATS
ERJ 170

A - Flight Attendant
D - Door
G - Galley
LA - Lavatory
W - Wardrobe

14	TAKE-OFF WEIGHT	35231		FLAPS FOR TAKE-OFF	2	STAB TRIM FOR TAKE-OFF	-4.1

Prepared by: **16** M. Szostek

Approved by: **15**

INDEX UNIT	0	10	20	30	40	50	60	70			
FLAP 1	-6.0	-6.0	-5.5	-5.0	-5.0	-4.5	-4.0	-3.5	-3.0	-3.0	-2.5
FLAP 2	-6.0	-6.0	-5.5	-5.0	-4.5	-4.0	-3.5	-3.0	-3.0	-2.5	-2.0
FLAP 4	-6.0	-5.5	-5.0	-4.5	-4.0	-3.5	-3.0	-2.5	-2.0	-1.5	-1.0

MAX. TAKE OFF WEIGHT 35990 kG
MAX. LANDING WEIGHT 28800 kG
MAX. ZERO FUEL WEIGHT 29400 kG

① - FERRY FLIGHT ONLY

AREA NOT ALLOWED FOR TAKE-OFF

INDEX AND WEIGHT CORRECTION TABLE FOR CREW

Cockpit Crew / Cabin Crew	2 / 2	2 / 0	3 / 2	3 / 0
Weight (kG)	320	170	405	255
Index Units	- 5	- 5	- 7	- 7

FUEL INDEX TABLE

Weight (kG)	Index Units
0 - 320	0
321 - 650	- 1
651 - 1140	- 2
1141 - 1460	- 3
1461 - 1950	- 4
1951 - 2430	- 5
2431 - 2760	- 6
2761 - 3250	- 7
3251 - 3730	- 8
3731 - 4220	- 9
4221 - 4700	- 10
4701 - 5350	- 11
5351 - 5840	- 12
5841 - 6490	- 13
6491 - 8430	- 14
8431 - 8920	- 13
8921 - 9250	- 12
9251 - 9470	- 11

ERJ 170

INDEX CORRECTION
FOR PANTRY

FWD Galley		AFT Galley	
Weight (kG)	Index Units	Weight (kG)	Index Units
0 - 23	0	0 - 23	0
24 - 67	- 1	24 - 69	1
68 - 111	- 2	70 - 113	2
112 - 155	- 3	114 - 159	3
156 - 199	- 4	160 - 205	4
200 - 245	- 5	206 - 249	5
246 - 289	- 6	250 - 295	6
290 - 333	- 7	296 - 341	7
334 - 377	- 8	342 - 353	8
378 - 421	- 9		
422 - 444	- 10		

BAGGAGE - CARGO INDEX TABLES

COMPT. 1		COMPT. 2		COMPT. 3		COMPT. 4	
Weight (kG)	Index Units	Weight (kG)	Index Units	Weight (kG)	Index Units	Weight (kG)	Index Units
0 - 29	0	0 - 39	0	0 - 49	0	0 - 29	0
30 - 79	- 1	40 - 119	- 1	50 - 139	1	30 - 89	1
80 - 129	- 2	120 - 189	- 2	140 - 229	2	90 - 149	2
130 - 179	- 3	190 - 259	- 3	230 - 309	3	150 - 209	3
180 - 229	- 4	260 - 339	- 4	310 - 399	4	210 - 269	4
230 - 279	- 5	340 - 409	- 5	400 - 489	5	270 - 329	5
280 - 329	- 6	410 - 489	- 6	490 - 579	6	330 - 344	6
330 - 369	- 6	490 - 559	- 7	580 - 669	7		
370 - 419	- 8	560 - 629	- 8	670 - 686	8		
420 - 457	- 9	630 - 709	- 9				
		710 - 779	- 10				
		780 - 859	- 11				
		860 - 913	- 12				

PAX INDEX TABLE

ALL FLIGHTS EXCEPT HOLIDAY CHARTERS				HOLIDAY CHARTERS ONLY			
COMPT. A 22 Max PAX		COMPT. B 24 Max PAX		COMPT. C 24 Max PAX		COMPT. A 22 Max PAX	
PAX	Index Unit	PAX	Index Unit	PAX	Index Unit	PAX	Index Unit
1	- 1	1	1	1	- 1	1	1
2	- 2	2	2	2	- 2	2	2
3	- 3	3	3	3	- 3	3	3
4	- 4	4	4	4	- 4	4	4
5	- 5	5	5	5	- 5	5	5
6	- 6	6	6	6	- 6	6	6
7	- 7	7	7	7	- 7	7	7
8	- 8	8	8	8	- 8	8	8
9	- 9	9	9	9	- 9	9	9
10	- 10	10	10	10	- 10	10	9
11	- 11	11	11	11	- 11	11	10
12	- 12	12	12	12	- 12	12	11
13	- 13	13	13	13	- 13	13	12
14	- 14	14	14	14	- 14	14	13
15	- 15	15	15	15	- 15	15	14
16	- 16	16	16	16	- 16	16	15
17	- 17	17	17	17	- 17	17	16
18	- 18	18	18	18	- 18	18	17
19	- 19	19	19	19	- 19	19	18
20	- 20	20	20	20	- 20	20	19
21	- 21	21	21	21	- 21	21	20
22	- 22	22	22	22	- 22	22	21
		23	23			23	22
		24	24			24	23
		25	25			25	24

TRIM CHART - INDEX CALCULATION

9 DRY OPERATING INDEX	
BASIC INDEX	- Basic Index as integer; Basic Index is specified on page of this document;
Crew	- index correction for crew;
Pantry	- index correction for pantry;
9a ...empty field...	- spare line for index corrections for adjustments to the Basic Index included in Dry Operating Weight (field 2a);
Sub-Total	- sum of index corrections "-" and "+" ;
9b ...empty field...	- copy <u>negative</u> value from Sub-Total field;
DRY OPERATING INDEX	- Index correction at Dry Operating Weight. Algebraic sum of index corrections "-" and "+" ;

10 ZERO FUEL INDEX	
Comp.	- weight of deadload in compartment (e.g. 1,2,..6) and correlated index correction;
Pax. Comp. A,B,C, etc.	- index correction for passengers in section A, B, C etc.
Sub-Total	- sum of index corrections "-" and "+" ;
10a ...empty field...	- copy <u>negative</u> value from Sub-Total field;
ZERO FUEL INDEX	- index at Zero Fuel Weight;

11 TAKE-OFF INDEX	
Take-off Fuel Index	- index correction for Take-off Fuel Weight;
TAKE-OFF INDEX	- index at Take-Off Weight;

12**COG Envelope****12a**

draw the horizontal lines for actual:
Zero Fuel Weight (ZFW) and Take-Off Weight (TOW) referring
to the weight scale; take ZFW and TOW values from section
5;

12b

mark the proper index value on the weight line referring to the
index unit scale;
- separately for ZFW and TOW;
take ZFW and TOW index values from sections **10** and **11**;

12c

go to the **% MAC** scale in the way shown on the example
(dotted line);
- read and write proper % MAC values at ZFW and TOW into
fields of section **13**;

12d

- read and write actual Stab Trim for Take-Off value into field of
section **15**;

NOTE:

**Check if ZFW and TOW index values are inside the operational COG
limits (not shaded area).**

If not, correct load distribution and/or passenger distribution.

13**Balance Conditions % MAC****ZFW
TOW**

- balance condition in % MAC at ZFW;
- balance condition in % MAC at TOW;

14**TAKE-OFF WEIGHT**

Actual Take-Off Weight;
rewrite TOW value from section **5**;

15**STAB TRIM FOR TAKE-OFF**

Stabilizer position for Take-Off;

16**Prepared by:**

Loadsheet agent's signature;

Approved by:

Captain's approval (signature);

LMC LAST MINUTE CHANGES	
The changes in the weight of the traffic load (passengers, baggage, cargo and mail) or in its distribution are to be recorded in the LMC box of the Loadsheel. If the changes in the number of passengers and/or in the weight of the deadload do not exceed the LMC tolerances specified for the aircraft type concerned, the previously calculated balance conditions need not be corrected.	
Dest.	- destination of the LMC;
Specification	- kind of LMC, (e.g. B-baggage, C-cargo, M-mail, PAX-passenger(s), CREW-crew);
Cpt.	- Passenger cabin sector code or compartment number;
+/-	- identification of onload (+) or offload (-);
Weight	- weight of LMC stated in "Specification";
LMC Total +/-	- identification of LMC, "+" or "-"; weight of TOTAL LMC;

INDEX CORRECTION TABLES
On the back page of the Loadsheel there are Index Correction Tables, from which proper index correction values are to be taken. - INDEX AND WEIGHT CORRECTION TABLE FOR CREW; - PAX INDEX TABLE; - FUEL INDEX TABLE; - INDEX CORRECTION FOR LOAD IN PAX COMPARTMENTS; - PAX COMPARTMENTS; - INDEX CORRECTION FOR PANTRY; - BAGGAGE – CARGO INDEX TABLES;



COMPUTER LOADSHEET DESCRIPTION

LOADSHEET
ALL WEIGHTS IN KILOS
FROM/TO FLIGHT
WAW VIE L0123X/22

CHECKED:MSZOSTEK
APPROVED: 46
A/C REG
SPLDC
VERSION
C30Y39
WEIGHT
1/355
DISTRIBUTION
1/350 2/335
3/670 4/0
PASSENGER/CABIN BAG
5110
CY 30/39
TTL 69
CAB 0
TOTAL TRAFFIC LOAD
6465
DRY OPERATING WEIGHT
22226
ZERO FUEL WEIGHT
28691
TAKE OFF FUEL
3400
TAKE OFF WEIGHT
32091
TRIP FUEL
1800
LANDING WEIGHT
30291

7
DATE
22JUL04
CREW
2/2

9
EDNO
1
TIME
1418

BALANCE AND SEATING CONDITIONS
DOI 57,57
LIZFW 56,25
MACZFW 21,39
LITOW 48,35
MACTOW 18,95
(ONE EIGHT.NINE FIVE)
STABTO -4,01 FLAPS 1
(MINUS FOUR.ZERO ONE)
-3,51 FLAPS 2
(MINUS THREE.FIVE ONE)
0A 22 0B 8 0B 16 0C 23

LAST MINUTE CHANGES
DEST SPEC CL/CPT PLUS MINUS
37 38 39 40
.....
.....
.....
.....
.....

UNDERLOAD BEFORE LMC 909
LMC TOTAL + -

SERVICE WEIGHT ADJ WGT/IND
ADDITIONS
N I L
DEDUCTIONS
N I L
CAPTAINS INFORMATION BEFORE LMC
ZFWLIM: FWD +36,72 / AFT +58,51

DEADLOAD BREAKDOWN
TTL 1 2 3 4 0
-VIE
T 0
B 70/ 980 25/ 350 15/ 210 30/ 420
C 250 250
E 0
M 125 125

1355 350 335 670 0 0

PASSENGER BREAKDOWN
TOTAL PER CLASS PER CATEGORY
-VIE 69 30/39 30/25/14/0
END OF LOADSHEET

TABLE OF FORMAT / **COMPUTER LOADSHEET**

PART 1		HEADING
1	FROM	Three-letter IATA airport code of airport of movement
2	TO	Three-letter IATA code of station of first intended landing
3	FLIGHT	Flight number / identifier
4	A/C-REG	Aircraft registration
5	VERSION	Version/Configuration code of aircraft used by carrier
6	CREW	Number of crew, excluding crew travelling as passengers
7	DATE	Self-explanatory
8	TIME	Four-digit value of local time when this edition was produced
9	EDNO	Edition number
PART 2		LOAD AND DISTRIBUTION
10	LOAD WEIGHT	Total of weight of deadload in compartments
11	DISTRIBUTION	Total weight of deadload per compartment and/or position of unitised load
12	PASSENGER/ CABIN BAG WEIGHT	Total passenger weight calculated according to company procedures based on the figures of items 13, 14, 15, 16 and 18
13		Total number of males
14		Total number of females
15		Total number of children
16		Total number of infants
17	TTL	Total number of passengers on board. Sum of the items 13, 14, 15 and 16.
18	CAB	Weight of cabin baggage not included in passenger weight
19		Total number of seats in First Class occupied by outgoing passengers including PADs
20		Total number of seats in Business Class occupied by outgoing passengers including PADs
21		Total number of seats in Economy Class occupied by outgoing passengers including PADs
22		Seats occupied by cargo, baggage and/or mail per class
23		Fitted seats not available for passengers or deadload
24	TOTAL TRAFFIC LOAD	The total weight of passengers, baggage, cargo and mail. Operational items not included in DOW, e.g. pallets, nets, must be added to the cargo weight figures

PART 3		GROSS WEIGHT CALCULATION
25	DRY OPERATING WEIGHT	The "Basic Weight" plus "Operational items", e.g. crew, crew baggage, flight equipment and pantry, company specification and is equal to "Operation Empty Weight"
26	ZERO FUEL WEIGHT ACTUAL	Actual Zero Fuel Weight; sum of ref. Nos. 24 and 25
27	ZERO FUEL WEIGHT MAX	Maximum Design Zero Fuel Weight
28	TAKE OFF FUEL	The amount of fuel on board less the fuel consumed before take-off
29	TAKE OFF WEIGHT ACTUAL	Actual Take-off Weight; sum of Ref. Nos. 26 and 28
30	TAKE OFF WEIGHT MAX	The "Maximum Design Take-off Weight" or "Operational Take-off Weight", whichever is lower
31	TRIP FUEL	The amount of fuel planned to be consumed from take-off to the first intended landing
32	LANDING WEIGHT ACTUAL	Actual Landing Weight; Ref. No. 29 minus Ref. No. 31
33	LANDING WEIGHT MAX	The "Maximum Design Landing Weight" or the "Operational Landing Weight", whichever is lower
34	L	Indicator showing which of the maximum weights is limiting the allowed traffic load
35	UNDERLOAD BEFORE LMC	Difference between maximum and actual gross weight indicated by "L"
PART 4		BALANCE AND SEATING CONDITIONS
36	BALANCE AND SEATING CONDITIONS	According to carriers requirements. Use standard abbreviations for balance according to AHM 516 and AHM 050
	BI	Basic Index
	DOI	Dry Operating Index
	LIZFW	Index value at Zero Fuel Weight
	LITOW	Index value at Take-off Weight
	LILAW	Index value at Landing Weight
	MACZFW	Center of Gravity (COG) position in % of Mean Aerodynamic Chord (%MAC) at Zero Fuel Weight
	MACTOW	Center of Gravity (COG) position in % of Mean Aerodynamic Chord (%MAC) at Take-off Weight
	MACLAW	Center of Gravity (COG) position in % of Mean Aerodynamic Chord (%MAC) at Landing Weight
	A.....B.....C..... etc.	Passenger distribution by cabin sections (A, B, C, etc....)

	SEATROW TRIM	Passenger cabin trim option (Seatrow, Area, Class)
	LMC – Last Minute Changes	
37	DEST	Destination of LMC
38	SPEC	Kind of LMC
39	CL/CPT	Class/Compartment and/or position of unitised load
40	WEIGHT/IND	(+/-) Weight and (+/-) Index correction of LMC stated in Ref. No. 38
41	LMC TOTAL	Total weight of all LMC (+/-)
	PART 5	CAPTAIN'S INFORMATION / NOTES
42		LDM – Loadmessage
	PART 6	LOADMESSAGE BEFORE LMC
43	SI	Supplementary Information
		Weight of deadload:
		C - cargo
		M - mail
44		B - baggage: pieces/weight
		O - other load
		T - transit load
	PART 6	LOADMESSAGE BEFORE LMC
45	CHECKED	Loadsheel agent's signature (required)
46	APPROVED	Signature of authorised person (required)
47	ADJ	Ref. No. 41 affects Ref. No. 47. Entry to be made according to company regulations.

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LIMITING MASSES AND CENTRE OF GRAVITY

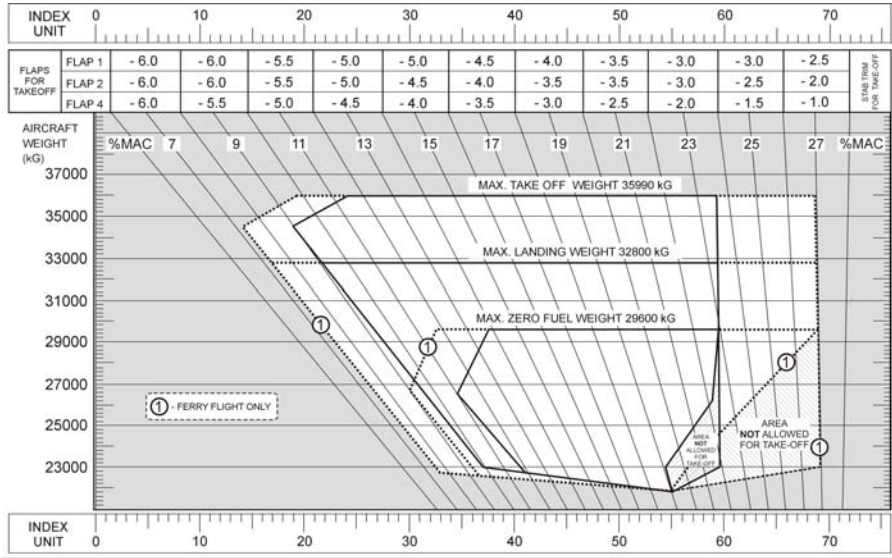
ERJ-170 – LIMITING MASSES

A/C REG. MARKS	AIRCRAFT WEIGHT LIMITATIONS				
	maximum weights				
	Ramp /Taxi	Design Take-off wet *)	Design Take-off dry	Zero fuel	Design Landing
SP-LDA	36150		35990	29600	32800
SP-LDB	36150		35990	29600	32800
SP-LDC	36150		35990	29600	32800
SP-LDD	36150		35990	29600	32800
SP-LDE	36150		35990	29600	32800
SP-LDF	36150		35990	29600	32800
SP-LDG	36150		35990	29600	32800
SP-LDH	36150		35990	29600	32800
SP-LDI	36150		35990	29600	32800
SP-LDK	36150		35990	29600	32800

*) Valid for Take-Off with Water-Injection



ERJ-170 - CENTRE OF GRAVITY OPERATIONAL
ENVELOPE



DRY OPERATING MASS AND CORRESPONDING CENTRE OF GRAVITY OR INDEX

AIRCRAFT REGISTRATIONS, WEIGHT AND INDEX DETAILS

NOTE: For details see EDP-SYSTEM SEMI-PERMANENT DATA Part "C"
Sheet C3 Type ERJ-170 or Weight and Balance Report inserted
into Airplane Log Book.

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GENERAL INFORMATIONS 0

LIMITATIONS 1

NORMAL PROCEDURES 2

EMERGENCY AND ABNORMAL PROCEDURES 3

PERFORMANCE 4

FLIGHT PLANNING 5

MASS AND BALANCE 6

LOADING 7

CONFIGURATION DEVIATION LIST 8

MINIMUM EQUIPMENT LIST 9

EMERGENCY INFORMATION 10

EMERGENCY EVACUATION 11

SECTION 7

LOADING

TABLE OF CONTENTS

	Page:	Block	No
Introduction	7.1.1		1
Basic Loading Principles	7.1.2		1
External Dimensions	7.1.a		1
Cabin Cross Section	7.1.b		1
Interior Arrangement	7.1.c		1
Carry-on Baggage	7.1.d		1
Cargo Doors	7.1.e		1
Cargo Compartment	7.1.f		1
Cargo Nets	7.1.g		1
Live Animals' Transportation	7.1.h		1

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INTRODUCTION

This Section contains airplane dimensions, interior arrangement data for loading purposes and loading capacity information in the passenger cabin and baggage compartment.

Instructions for loading and unloading the airplane and live animals transportation are also included in this Section.

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BASIC LOADING PRINCIPLES

Proper loading of an aircraft must guarantee that:

- Centre of Gravity position is within limits,
- all load on an aircraft is correctly secured to prevent any movement because of accelerations imposed on it by the movement of the aircraft on the ground and in the air,
- all requirements concerning package dimensions, area limitations and linear limitations are met.

In the case of carrying piece of cargo which weight exceeds area limitations (maximum floor loading), it is necessary to calculate the area of spreader to be used, to decrease the weight of the load pressing upon an area of the compartment floor. The above is applied in bulk compartments.

The manufacturer, comparing the size of a piece of cargo with size of door openings, provides maximum package chart to establish that the package can be accommodated in the compartment as well as pass through the door opening.

Restricted articles because of their inherent characteristics (radioactive, flammable materials, dry ice, poison etc.) may be carried on board aircraft only under condition that IATA Dangerous Goods Regulations are strictly adhered to.

When loading an aircraft following conditions must be taken into consideration:

- load destined for the various stations en route must be easily accessible, loaded in the reverse order of destination
- load for the same destination should preferably be stowed in the same hold.
- baggage should be loaded last so that it is available for offload first at its destination
- business passenger baggage should be equipped with appropriate baggage tags and loaded separately

The weight and balance calculations are applied to define the **Centre of Gravity – COG** location of a loaded aircraft.

The Centre of Gravity of an aircraft must be located in a specific area, within the limits given by the aircraft manufacturer.

The proper position of COG is the base of safe and economic flight.

It is prohibited to operate aircraft with COG out of limits.

ERJ-170	
DESIGN WEIGHTS	
MAXIMUM TAXI WEIGHT (MTXW)	36150 kg
MAXIMUM TAKE-OFF WEIGHT (MTOW)	35990 kg
MAXIMUM LANDING WEIGHT (MLAW)	32800 kg
MAXIMUM ZERO FUEL WEIGHT (MZFW)	29600 kg
MAXIMUM FUEL LOAD	9470 kg
CREW	
COCKPIT CREW – STANDARD (MAXIMUM)	2 (3)
CABIN CREW - FWD/AFT (TTL)	
- STANDARD	1 / 1 (2)
- MAXIMUM	
PANTRY	SEE AHM560 SHEET C12
PAX CABIN	
VERSION	CY 70
PAX SECTOR A:	22
PAX SECTOR B:	24
PAX SECTOR C:	24
CARGO COMPARTMENTS (gross weight)	
FWD 1	457 kg (A - 137 kg / B – 320 kg)
FWD 2	913 kg (C-457 kg / D–240 kg / E–216 kg)
AFT 3	686 kg (A - 342 kg / B – 344 kg)
AFT 4	344 kg (C - 172 kg / D – 172 kg)
CARGO COMPT. AVAILABLE VOLUME	
FWD 1 + 2	8.7 m ³
FWD 3 + 4	5.8 m ³
CARGO DOOR DIMENSIONS	
FWD	1.10 m x 0.90 m
AFT	0.99 m x (0.78:0.87) m
MAXIMUM FLOOR LOAD	
MAIN DECK	200 kg/m ²
COMPARTMENTS	488 kg/m ²

LOADING INSTRUCTION / REPORT

Loading Instruction/Report is a two part document prepared for each type of an aircraft.

- Loading Instruction part is to instruct the Loading Supervisor about load distribution,
- Loading Report part must be completed by the Loading Supervisor to confirm that the aircraft has been loaded in accordance with the given instructions. Loading Supervisors are not allowed to deviate from the instructions unless confirmation has been obtained from the Loadsheets Agent. Deviations from the instructions must be clearly shown in the report.

For ERJ-170 form of Loading Instruction/Report is in accordance with IATA AHM 515.



LOADING INSTRUCTION / REPORT

ALL WEIGHTS IN KILOGRAMS

ERJ-170

STATION:	FLIGHT NO:	A/C REG.:	DATE:	DESTINATION:	PREPARED BY:

CABIN LOAD**HOLD 4**

MAX 344 KGS

HOLD 3

MAX 686 KGS

HOLD 2

MAX 913 KGS

HOLD 1

MAX 457 KGS

ARRIVAL / OFFLOADING REPORT

	PCS	WGHT		PCS	WGHT		PCS	WGHT		PCS	WGHT
BC	_____	_____	BC	_____	_____	BC	_____	_____	BC	_____	_____
BT	_____	_____	BT	_____	_____	BT	_____	_____	BT	_____	_____
BY	_____	_____	BY	_____	_____	BY	_____	_____	BY	_____	_____
C	_____	_____	C	_____	_____	C	_____	_____	C	_____	_____
M	_____	_____	M	_____	_____	M	_____	_____	M	_____	_____
TOTAL KGS:	_____			_____			_____			_____	

LOADING INSTRUCTION**AFT**

TOTAL KGS:	TOTAL KGS:	TOTAL KGS:	TOTAL KGS:	TOTAL KGS:

FORWARD**LOADING REPORT**

TOTAL KGS:	TOTAL KGS:	TOTAL KGS:	TOTAL KGS:	TOTAL KGS:

SPECIAL INSTRUCTIONS

THIS AIRCRAFT HAS BEEN LOADED IN ACCORDANCE WITH ABOVE INSTRUCTIONS INCLUDING DEVIATIONS RECORDED.
CONTAINERS, PALLETS, BULK LOAD AND/OR DANGEROUS GOODS HAVE BEEN SECURED IN ACCORDANCE WITH COMPANY REGULATIONS.

LOADING SUPERVISOR :

NAME _____ SIGNATURE _____

LOADING INSTRUCTION/REPORT - DESCRIPTION

HEADING

Station	- Three-letter IATA airport code of issuing station
Flight	- Flight number for which the instruction is issued
A/C Reg.	- Aircraft registration
Date	- Local date e.g. 05 JUN94
Destination	- Three-letter IATA airport code(s) of route station(s)
Prepared by	- Name in capital letters of Loadsheet Agent.

INSTRUCTION OF ONLOADING

Loading Instruction/Report is to be filled for each compartment taking into consideration the compartments weight limitations, its volume and the structural strength limits.

The Loading Instructions must be completed by the Loadsheet Agent.

The information specified on it must include details of the load per compartment as follows:

- for multi-sector flights the destinations using three-letters IATA codes
- followed by category of load e.g. Baggage (B), Cargo (C), Mail (M)
- followed by weight and, if necessary number of pieces
- followed by specific handling code(s) in case of special load

The Loading Report must be completed by the Loading Supervisor while loading is in progress.

The information specified on it must include actual load details per compartment or deviations from original instructions.

SPECIAL INSTRUCTIONS

The Special Instructions must be completed by the Loadsheet Agent.

This part is to instruct the Loading Supervisor about:

- goods which require special handling or stowage, e.g. live animals, dangerous goods, etc.
- supporting of heavy items
- securing items which may cause a hazard
- relocation of transit load
- load to be located in passenger cabin

and any other information which is useful for the Loading Supervisor e.g. summary of planned onload.

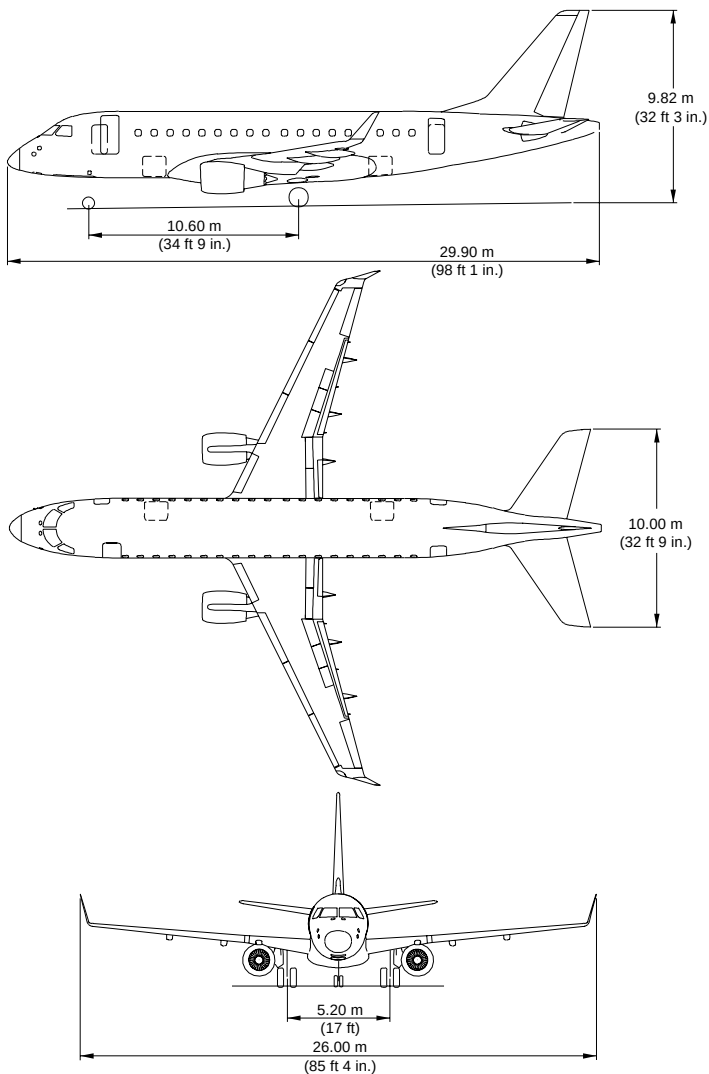
SIGNATURES

This part is designed for confirmation that the aircraft has been loaded in accordance with the instructions, including the deviations shown on the report, and that the load has been secured in accordance with company instructions.

Signature of responsible Loadsheet Agent and name and signature of responsible Loading Supervisor must be placed.

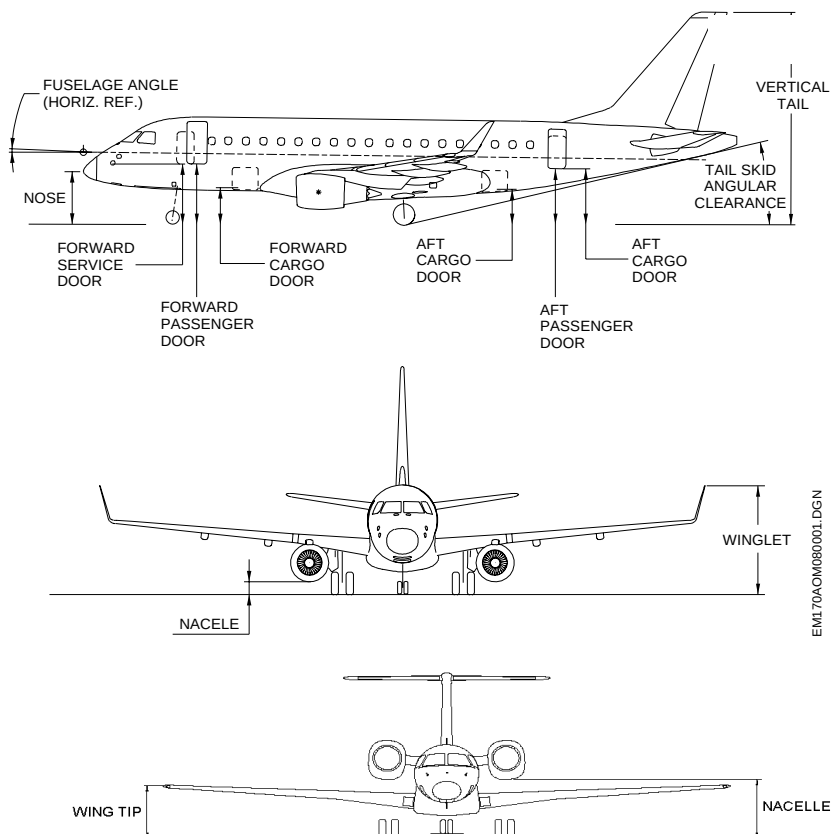
EXTERNAL DIMENSIONS

ERJ-170 THREE VIEW DRAWING



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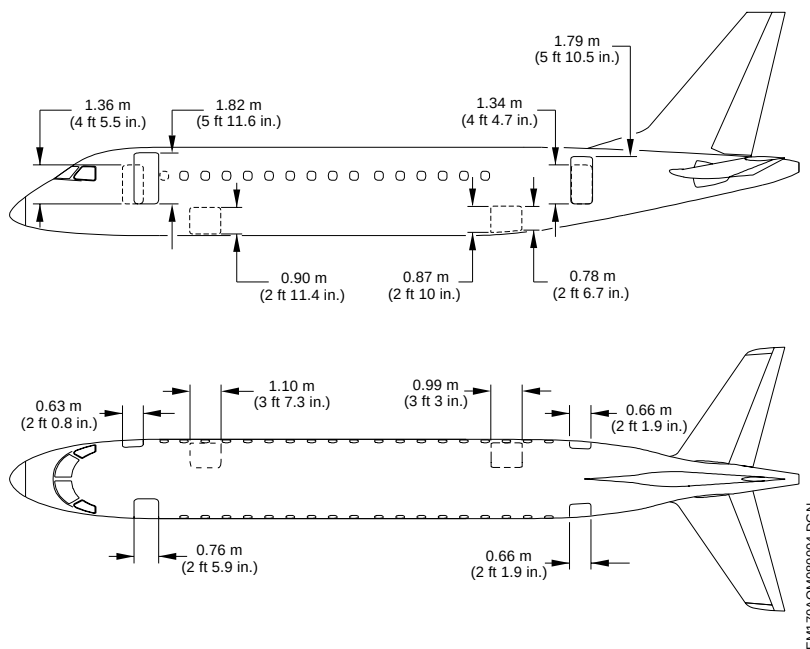
ERJ-170 GROUND CLEARANCES



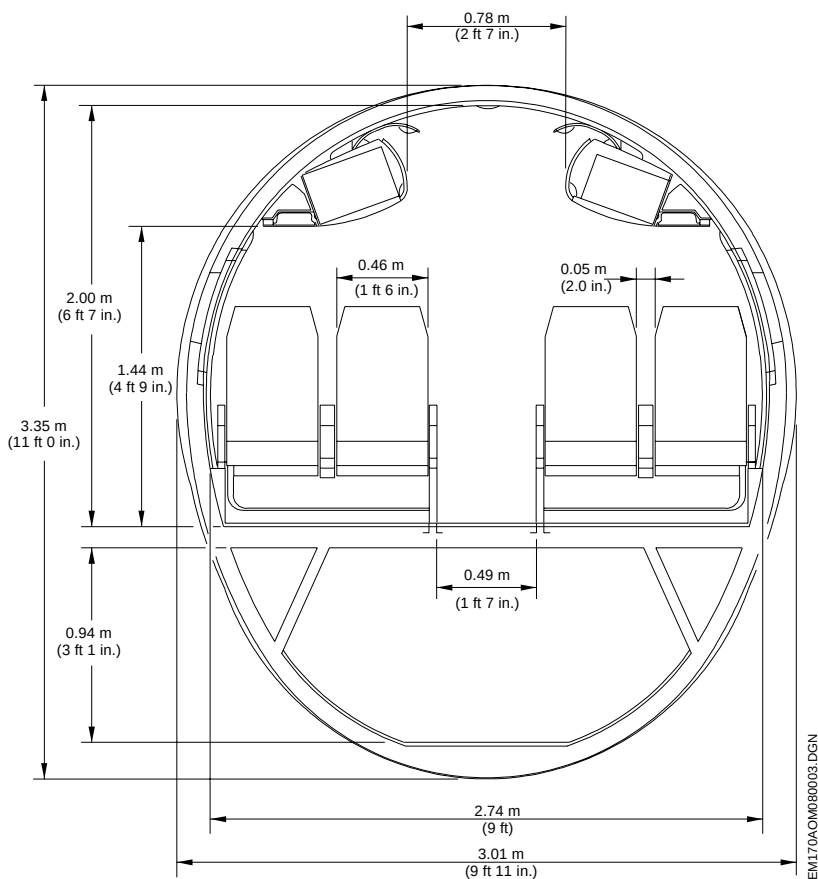
VERTICAL GROUND CLEARANCES TABLE

VERTICAL CLEARANCE	MINIMUM	MAXIMUM
Aft Cargo Door	1.44 m (4 ft 9 in)	1.60 m (5 ft 3 in)
Aft Passenger Door	2.40 m (7 ft 10 in)	2.59 m (8 ft 6 in)
Aft Service Door	2.40 m (7 ft 10 in)	2.59 m (8 ft 6 in)
Forward Cargo Door	1.47 m (4 ft 10 in)	1.56 m (5 ft 1 in)
Forward Passenger Door	2.54 m (8 ft 4 in)	2.63 m (8 ft 7 in)
Forward Service Door	2.54 m (8 ft 4 in)	2.64 m (8 ft 8 in)
Fuselage Angle	0°	0.6°
Nacelle	0.48 m (1 ft 6 in)	0.57 m (1 ft 10 in)
Nose	2.13 m (7 ft)	2.24 m (7 ft 5 in)
Tailskid Angular Clearance	12.3°	13.4°
Vertical Tail	9.56 m (31 ft 4 in)	9.83 m (32 ft 3 in)
Winglet	4.47 m (14 ft 8 in)	4.62 m (15 ft 2 in)

ERJ-170 DOOR CLEARANCES



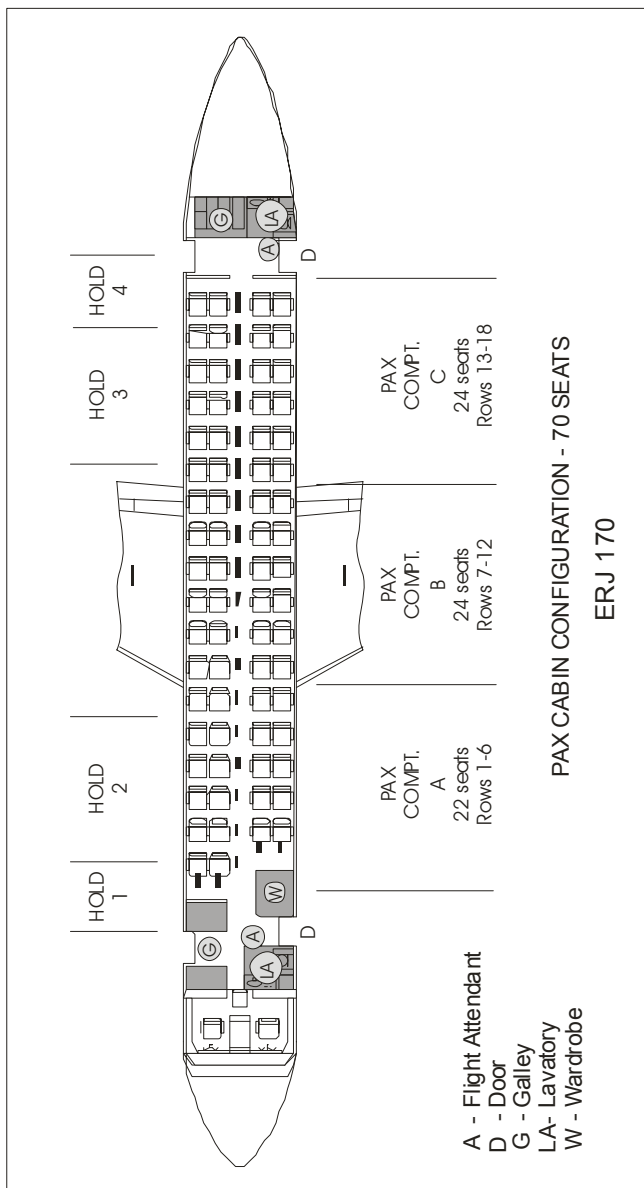
STANDARD CABIN CROSS SECTION



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INTERIOR ARRANGEMENT

ERJ-170 CONFIGURATION OPTION



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CARRY-ON BAGGAGE

Carry-on volumes may be stowed in the overhead bins and in the wardrobe.

There is no specific requirement for underseat carry-on volumes; however a maximum of 0.04 m³ (1.4 ft³) or 9.0 kg (20.0 lb) is allowable, provided the volume is properly restrained to avoid sliding.

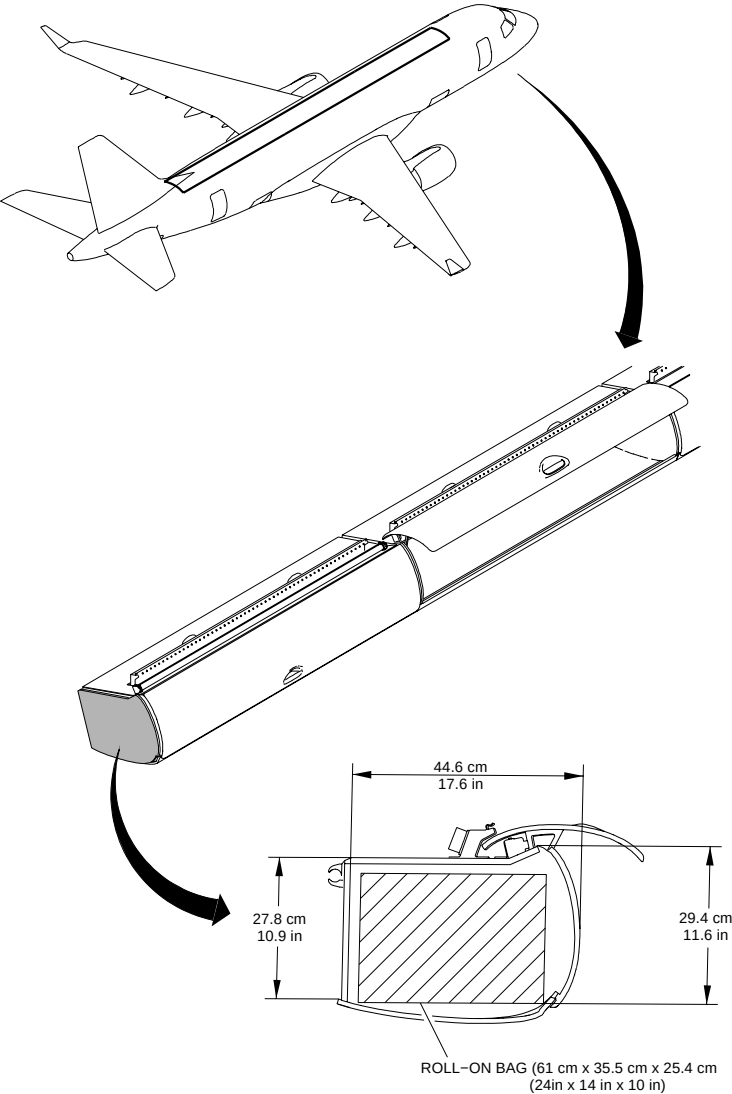
OVERHEAD BINS

The overhead bins comprise of eight standard overhead bin assemblies and one long overhead bin assembly, on both sides of the passenger cabin. An additional short overhead bin assembly is installed on the right side of the passenger cabin.

Overhead stowage compartments provide carry-on provisions for roll-on bags (61 cm x 35.5 cm x 25.4 cm or 24 in x 14 in x 10 in size). The bins present a total volume of 3.9 m³ (137.7 cu.ft).

OVERHEAD BINS CAPACITY AND LENGTH

Overhead Bin	Length	Capacity
Standard	1.62 m (64 in)	36.3 kg (80 lb)
Long	1.72 m (68 in)	36.3 kg (80 lb)
Short	0.79 m (31 in)	21.8 kg (48 lb)



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OVERHEAD BIN

CARGO DOORS

The cargo doors are manually operated from the outside. The initial opening movement (displacement of the door inward) and final closing and latching movement (displacement of the door outward) are achieved by means of a door locking mechanism controlled by an external handle.

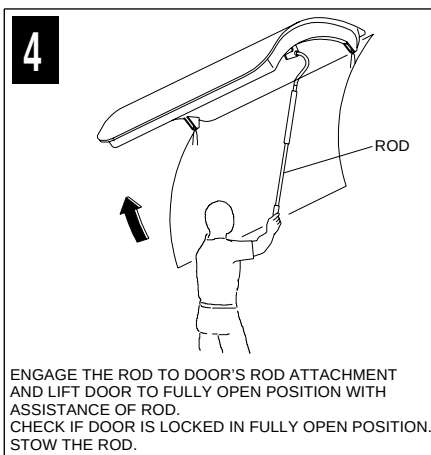
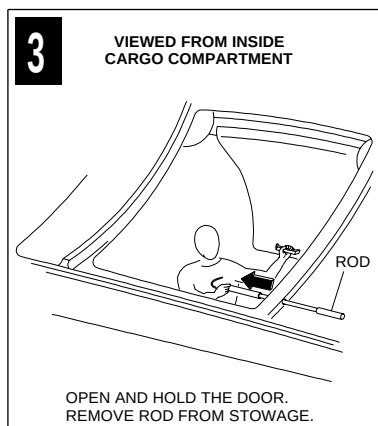
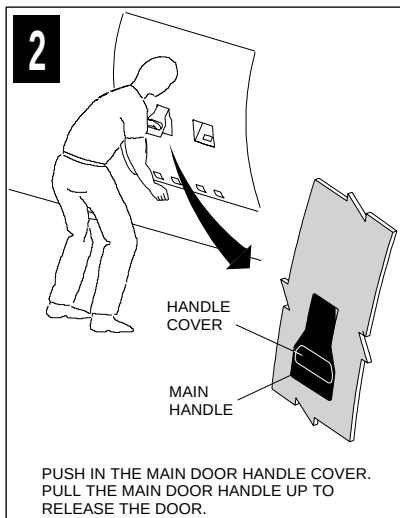
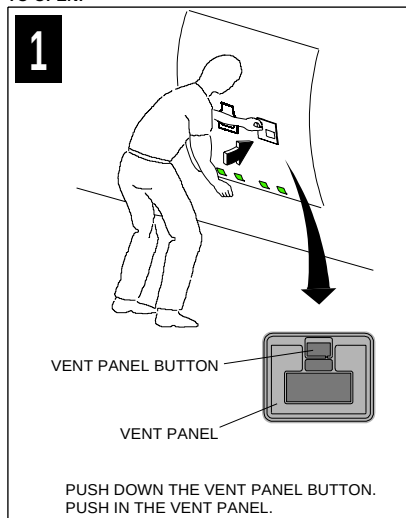
Two actuators are installed in each cargo door to give assistance in door opening and closing movements. So, the door operator must support the door weight by using the rod during all opening and closing movements.

The forward cargo door is 1.10 m (3 ft 7.3 in) wide and 0.90 m (2 ft 11.4 in) high.

The aft cargo door is a trapezoid 0.99 m (3 ft 3 in) wide and with minor high of 0.78 m (2 ft 6.7 in) and major high of 0.87 m (2 ft 10 in).

CARGO DOOR OPENING

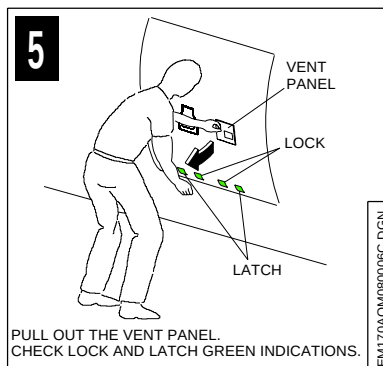
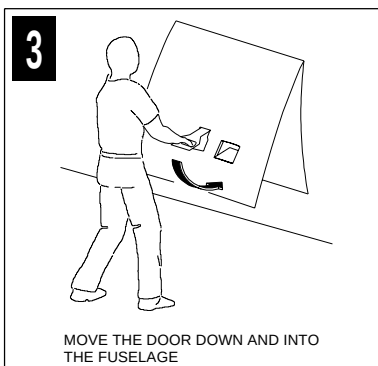
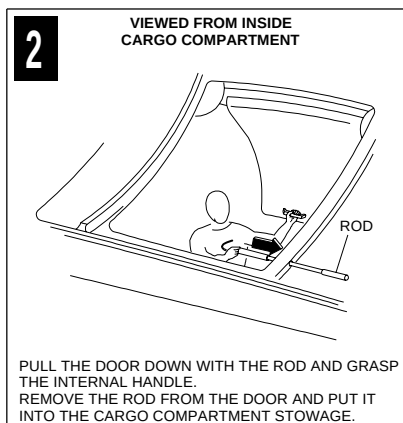
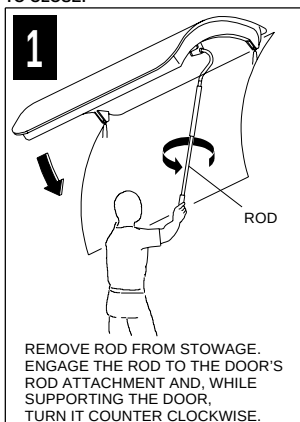
TO OPEN:



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CARGO DOOR CLOSING

TO CLOSE:



EM170AOM08006C.DGN

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CARGO COMPARTMENT

DESCRIPTION

Cargo compartments are located in the forward and rear part of the fuselage.

Both cargo compartments are pressurized. They are “class-C” compartments and have the following systems installed:

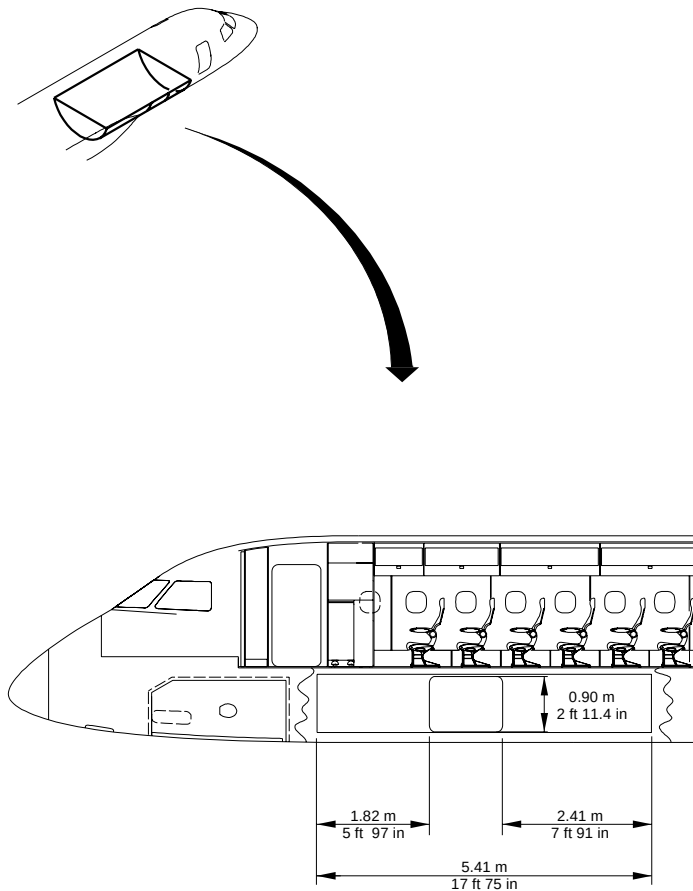
- Smoke Detection System.
- Fire Extinguishing System.
- Ventilation System (FWD).

No dedicated temperature control is available for cargo compartments. The air flowing from passenger cabin heats the FWD cargo compartment, providing proper conditions for live animals carriage.

The following cargo nets may be installed in the cargo compartment:

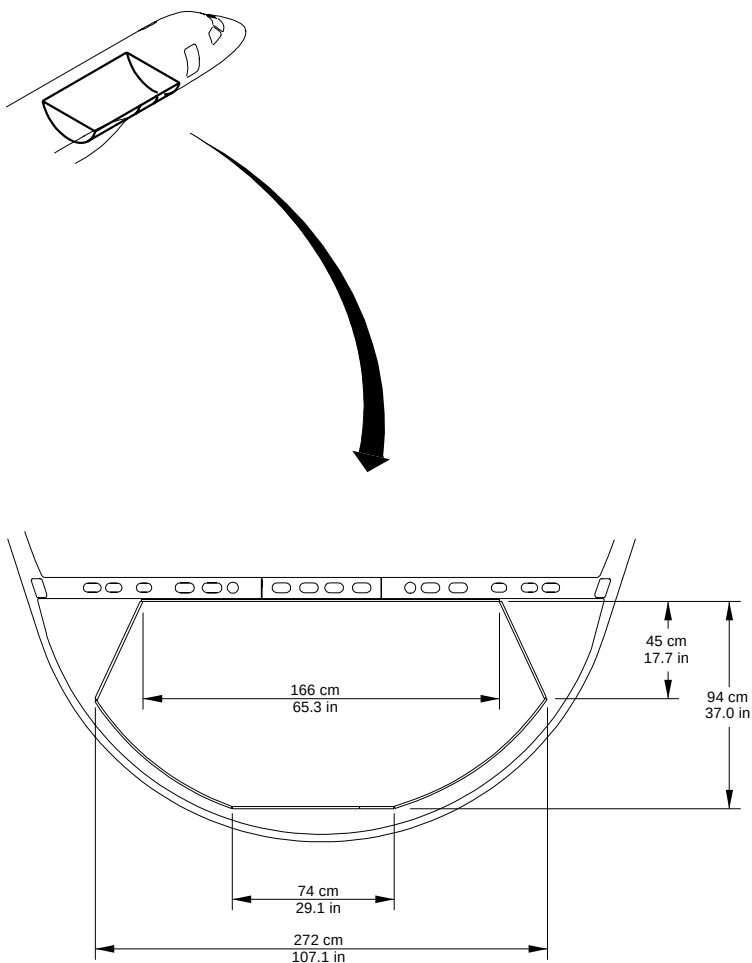
- Doors Safety Nets.
- Cargo Barrier Net (vertical net).

DIMENSIONS AND LIMITS



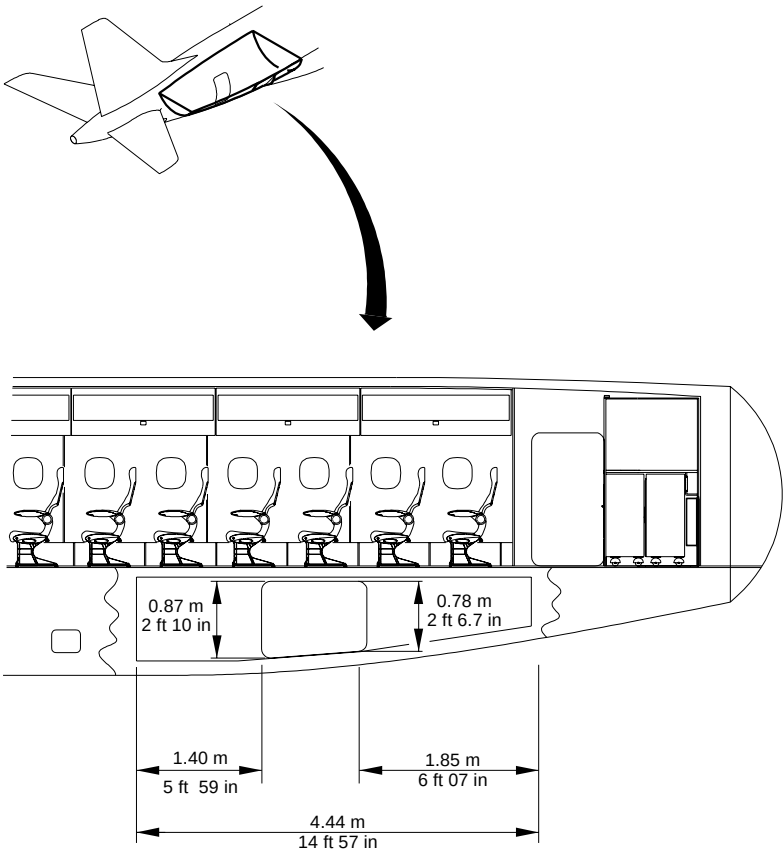
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FORWARD CARGO COMPARTMENT

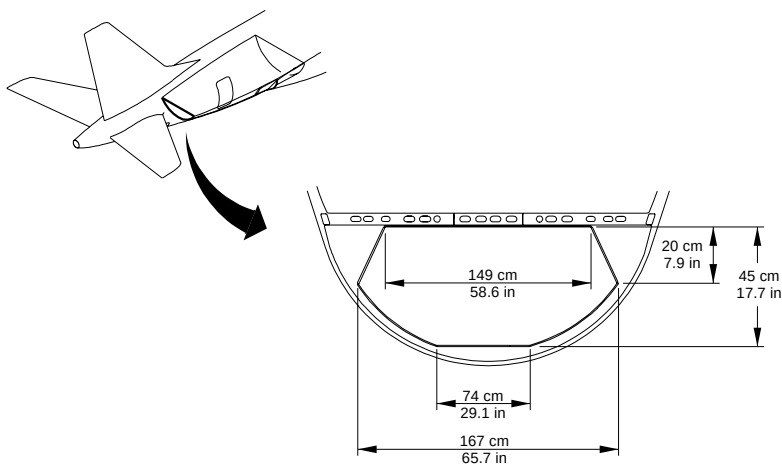
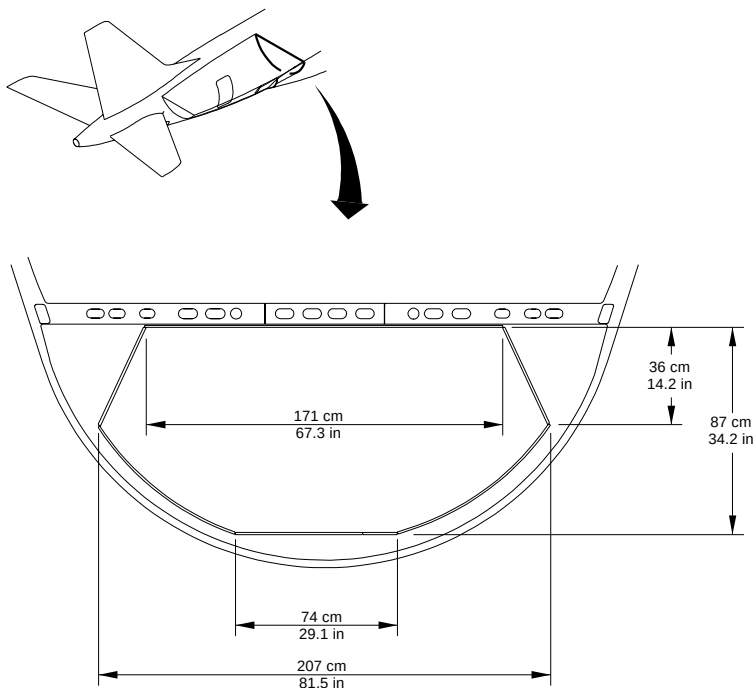


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FORWARD CARGO COMPARTMENT CROSS SECTION



AFT CARGO COMPARTMENT



EM170AOM140432.DGN

AFT CARGO COMPARTMENT CROSS SECTION

ERJ-170	
CARGO COMPARTMENTS (gross weight)	
FWD 1	457 kg (A - 137 kg / B – 320 kg)
FWD 2	913 kg (C-457 kg / D–240 kg / E–216 kg)
AFT 3	686 kg (A - 342 kg / B – 344 kg)
AFT 4	344 kg (C - 172 kg / D – 172 kg)
CARGO COMPT. AVAILABLE VOLUME	
FWD 1 + 2	8.7 m ³
FWD 3 + 4	5.8 m ³
CARGO DOOR DIMENSIONS	
FWD	1.10 m x 0.90 m
AFT	0.99 m x (0.78:0.87) m
MAXIMUM FLOOR LOAD	
MAIN DECK	200 kg/m ²
COMPARTMENTS	488 kg/m ²

BAGGAGE AND CARGO LOADING

Baggage and cargo should be evenly distributed over the cargo compartment to avoid load concentration.

Baggage/Cargo must not become a hazard to the airplane structure or systems as a result of shifting under operational loads. Therefore, sharp edge volumes (like wooden or metal containers) and/or dense cargo (objects significantly more dense than typical passenger baggage) must be arranged with adjacent soft volumes or protections thus preventing airplane damage in case of baggage/cargo shifting due to operational loads.

PACKAGE SIZE TABLES

FORWARD CARGO COMPARTMENT /NO 1 + 2/

Width (cm)	13	25	38	51	64	76	89	102
Height (cm)	Length (cm)							
13	400	400	340	300	270	270	200	180
20	380	360	320	290	280	240	220	200
25	360	340	280	260	230	210	190	170
33	365	355	310	280	260	230	200	170
41	360	350	310	280	230	210	190	160
48	360	350	310	270	240	210	170	150
56	340	320	260	215	180	170	150	130
64	300	240	200	180	170	150	130	130
71	230	210	160	150	140	140	130	120

AFT CARGO COMPARTMENT /NO 3 + 4/

Width (cm)	13	25	38	51	64	76	89	102
Height (cm)	Length (cm)							
13	205	205	205	200	195	185	185	180
20	200	200	200	195	190	180	180	180
25	200	200	200	195	190	180	180	180
33	200	200	200	195	190	180	180	180
41	180	180	175	160	155	150	150	150
48	180	180	175	160	155	150	150	150
56	175	170	165	155	150	145	145	145

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CARGO NETS

Cargo door nets prevent cargo doors from being damaged or jammed.

Attachments in the forward and aft cargo compartments allow the installation of optional vertical cargo nets. The vertical cargo net prevents the luggage shifting and optimizes the loading.

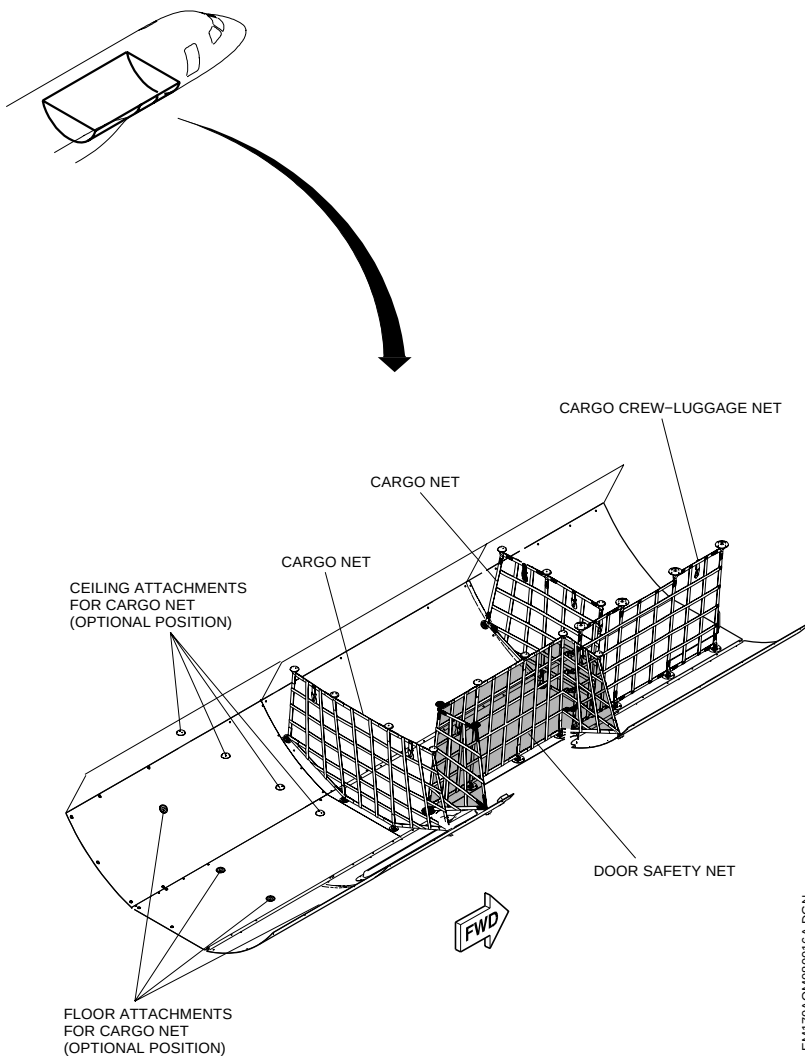
One cargo crew-luggage net is installed in the forward cargo compartment to isolate an area for crewmembers luggage.

The use of vertical cargo nets is not required.

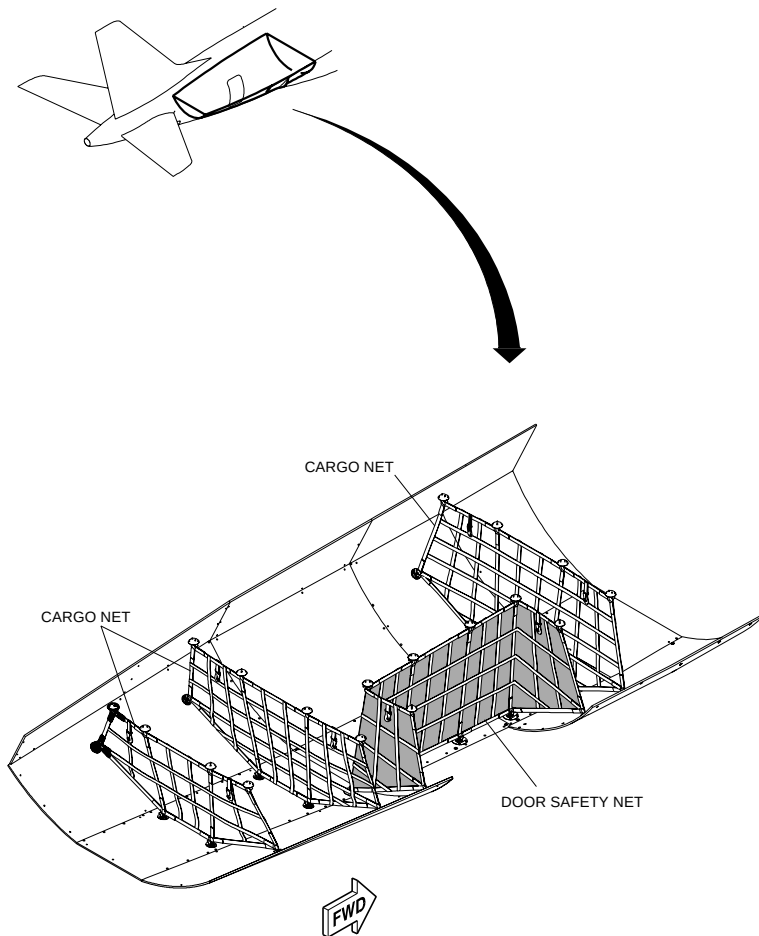
Decals on the net assembly indicate orientation (FWD, AFT, UP, or RIGHT/LEFT).

Positioning of Cargo Compartment Divisions and Vertical Nets Attachments - m (ft) - are shown in the table below.

		FORWARD	AFT
Forward Bulkhead Position		5.00 m (16.40 ft)	16.92 m (55.51 ft)
1 st	Vertical Net Attachment Position	6.36 m (20.87 ft)	17.78 m (58.33 ft)
2 nd	Vertical Net Attachment Position	8.45 m (27.72 ft)	19.86 m (65.16 ft)
3 rd	Vertical Net Attachment Position	9.59 m (31.46 ft)	20.67 m (67.81 ft)
Aft Bulkhead Position		10.41 m (34.15 ft)	21.26 m (69.75 ft)



FORWARD CARGO COMPARTMENT



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AFT CARGO COMPARTMENT

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LIVE ANIMALS' TRANSPORTATION

This section presents the general conditions for live animals' transportation in the EMBRAER 170 forward cargo compartment.

The main reference that regulates and states methods and procedures of handling, appropriate packaging, legal aspects for animal transportation, etc. is the IATA Live Animal Regulations.

GENERAL RECOMMENDATIONS

Generically, animals should be protected from stressing situations, like excessive noise, solar radiation, draft, high or low temperatures.

The containers should be appropriate for the type of animal to be transported, as recommended by IATA Live Animal Regulations.

Animals shall be handled with great care, to minimize the stress associated with handling. While waiting for the shipment, animals should be maintained in a waiting room with controlled temperature and protected from noise and draught. The adverse climatic conditions could cause additional stress to the animals. The ambient should be dark to make the animals calmer and comfortable while waiting for shipment. Animals of different species, specially which are natural enemies, such as cats and dogs, must be kept apart one from another. On the other hand, animals of the same species would be calmer if kept together.

Animals shall be loaded just before departure and unloaded just after arrival, in order to minimize the exposition to high or low temperatures on ground, where the cargo compartment ventilation is not completely effective. Specially in the hot season, it should be preferable to schedule the animal shipment for the night period, when the temperatures are lower than during the day. For the more sensitive animals, such as little birds, which would not resist high temperatures, this is an important requirement. In addition, these animals would be too susceptible to low temperatures present during long cruise flights, so it could be necessary to limit the flight cruise altitude to reduce the temperature drop in the cargo compartment and protect them.

The containers should not be placed near the compartment floor, in order to isolate the animals from low temperatures in that region. The recommendations for animal load limitations should be observed, in order to prevent animals being exposed to adverse environmental conditions.

LOAD LIMITATIONS

The limitations for the load in the compartment are defined mainly by temperature, carbon dioxide concentration and humidity, that are a result of animal metabolism. These items are compensated with the cargo compartment ventilation system, that draws air from passenger cabin to the cargo compartment, as air exchange reduces CO2 concentration and humidity and controls the compartment temperature.

FWD CARGO COMPARTMENT TEMPERATURES

External temperature at departure and the flight level flown determine the temperature achieved in the FWD cargo compartment. The temperatures in the cargo compartment stabilize after a short time and they are listed in the table below.

LIVE ANIMALS' TRANSPORTATION					
FL	Minimum Forward Cargo Compartment °C (°F)				
	ISA Conditions at Airport of Departure				
	ISA-20°C	ISA-10°C	ISA	ISA+10°C	ISA+20°C
200	22.7 (72.8)	24.3 (75.7)	25.9 (78.7)	27.6 (81.6)	29.2 (84.5)
210	22.3 (72.1)	23.9 (75.0)	25.5 (77.9)	27.1 (80.8)	28.7 (83.7)
220	21.9 (71.4)	23.5 (74.3)	25.1 (77.2)	26.7 (80.1)	28.3 (83.0)
230	21.5 (70.8)	23.1 (73.6)	24.7 (76.5)	26.3 (79.3)	27.9 (82.2)
240	21.2 (70.1)	22.7 (72.9)	24.3 (75.7)	25.9 (78.6)	27.4 (81.4)
250	20.8 (69.4)	22.3 (72.2)	23.9 (75.0)	25.4 (77.8)	27.0 (80.6)
260	20.5 (68.8)	21.9 (71.5)	23.4 (74.1)	24.9 (76.7)	26.3 (79.4)
270	20.1 (68.2)	21.5 (70.7)	22.9 (73.2)	24.3 (75.7)	25.6 (78.2)
280	19.8 (67.7)	21.1 (70.0)	22.4 (72.3)	23.7 (74.6)	25.0 (76.9)
290	19.5 (67.1)	20.7 (69.2)	21.9 (71.4)	23.1 (73.6)	24.3 (75.7)
300	19.2 (66.5)	20.3 (68.5)	21.4 (70.5)	22.5 (72.5)	23.6 (74.5)
310	18.8 (65.9)	19.9 (67.8)	20.9 (69.6)	21.9 (71.4)	22.9 (73.3)
320	18.5 (65.3)	19.5 (67.0)	20.4 (68.7)	21.3 (70.4)	22.3 (72.1)
330	18.2 (64.8)	19.0 (66.3)	19.9 (67.8)	20.7 (69.3)	21.6 (70.8)
340	17.9 (64.2)	18.6 (65.5)	19.4 (66.9)	20.1 (68.3)	20.9 (69.6)
350	17.6 (63.6)	18.2 (64.8)	18.9 (66.0)	19.6 (67.2)	20.2 (68.4)
360	17.4 (63.4)	18.1 (64.6)	18.8 (65.8)	19.4 (67.0)	20.1 (68.2)
370	17.3 (63.2)	18.0 (64.4)	18.7 (65.6)	19.3 (66.8)	20.0 (68.0)
380	17.2 (63.0)	17.9 (64.2)	18.6 (65.4)	19.2 (66.6)	19.9 (67.8)
390	17.1 (62.8)	17.8 (64.0)	18.4 (65.2)	19.1 (66.4)	19.8 (67.6)
400	17.0 (62.6)	17.7 (63.8)	18.3 (65.0)	19.0 (66.2)	19.7 (67.4)

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SECTION 8

CONFIGURATION DEVIATION LIST

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ATA Chapter 33 Lights.....	8.1.33		1
ATA Chapter 53 Fuselage.....	8.1.53		1

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INTRODUCTION

This Configuration Deviation List contains additional certificate limitations for operation of the EMBRAER 170 airplane without certain secondary airframe and engine parts as listed herein. When the airplane is operated using the CDL, the limitations specified in the AFM must still be complied with, as amended in this Appendix. All the items that are related to the airworthiness of the airplane and not included on the list are automatically required to be installed.

The associated limitations must be listed on a placard affixed in the cockpit in clear view of the pilots and other appropriate crewmember(s). The pilot in command should be notified of each operation with a missing part(s) by listing the missing part(s) in the flight or dispatch release. The operator should list in the airplane logbook an appropriate notation covering the missing part(s) on each flight.

If an additional part is lost, the airplane may not depart the airport at which it landed following this event, until it complies with the limitation of the CDL. This, of course, does not preclude the issuance of a ferry permit to allow the airplane to be flown to a point where the necessary repairs or replacement can be made.

No more than one part for any one system may be missing, unless specific combinations of parts are included in the CDL. Unless otherwise specified, parts from different systems may be missing. The performance penalties are cumulative, unless specifically designated penalties are indicated for the combination of missing parts.

No more than three parts that have each been determined to cause negligible performance degradation may be missing for takeoff without applying a performance penalty. When more than three such parts are missing, a performance penalty of either 0.5 percent of the maximum takeoff weight or 45 kilograms (100 pounds), whichever is less, must be applied for takeoff, en route, and landing for each missing part.

No more than ten parts that have each been determined to cause no performance penalty may be missing.

Takeoff performance penalties should be applied to the takeoff weights that are limited by performance considerations (i.e., takeoff field length, first, second, or final segment climb, or takeoff flight path).

If the performance-limited takeoff weight is greater than the maximum certified takeoff weight, the takeoff performance penalties should be applied to the maximum certified takeoff weight to ensure compliance with the noise requirements.

Landing performance penalties should be applied to the landing weights that are limited by performance considerations (i.e., landing field length, landing climb, or approach climb). If the performance-limited landing weight is greater than the maximum certified landing weight, the landing performance penalties should be applied to the maximum certified landing weight to ensure compliance with the noise requirements.

En route performance penalties apply only to operations that are limited by the one-engine inoperative en route climb performance.

If the CDL indicates that an item is considered inoperative, regard associated LOT MEL item. In this case, LOT MEL repair intervals must be applied.

COMPONENT LOCATION

The numbering and designation of each system in this Appendix is based on ATA Spec. 2200. The parts within each system are identified by its functional description and, when necessary, by door or panel identification. See associated drawings, for panel identification.

ATA CHAPTER 23 COMMUNICATIONS

System & Sequence ITEM Number	1.	2. Number installed	
		3.	Number required for dispatch
23 COMMUNICATIONS			4. Remarks and/or exceptions
61-00 Static Dischargers	32	25	A maximum of 07 (seven) static discharges may be missing in any combination provided: a) 5 five are installed on each winglet; b) 2 (two) are installed on each aileron; c) 3 (three) are installed on each elevator; d) 3 (three) are installed on rudder; e) 1 (one) is installed on vertical stabilizer, and f) 1 (one) is installed on nose landing gear.

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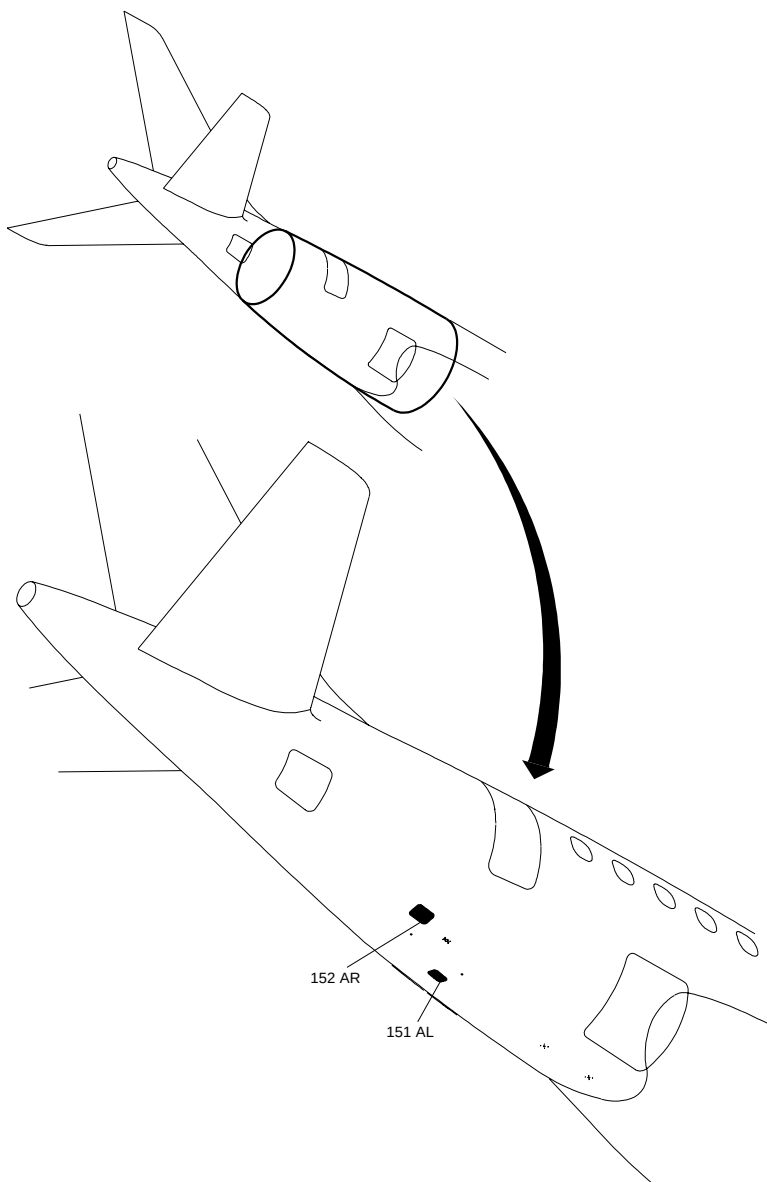
ATA CHAPTER 33 LIGHTS

System & Sequence ITEM Number	1.	2. Number installed	
		3.	4. Remarks and/or exceptions
33 LIGHTS			
44-00 Wing inspection light lens	2	0	May be missing with no penalty provided. a) Cavity is covered with speed tape, and b) Affected light is deactivated and considered inoperative. Refer to LOT MEL 33-44-00.
45-00 Red beacon light covers (Upper and Lower)	2	1	May be missing with no penalty provided affected light is deactivated and considered inoperative. Refer to LOT MEL 33-45-00..
46-00 Logotype light covers	2	0	May be missing with no penalty. Cover the cavity with speed tape.

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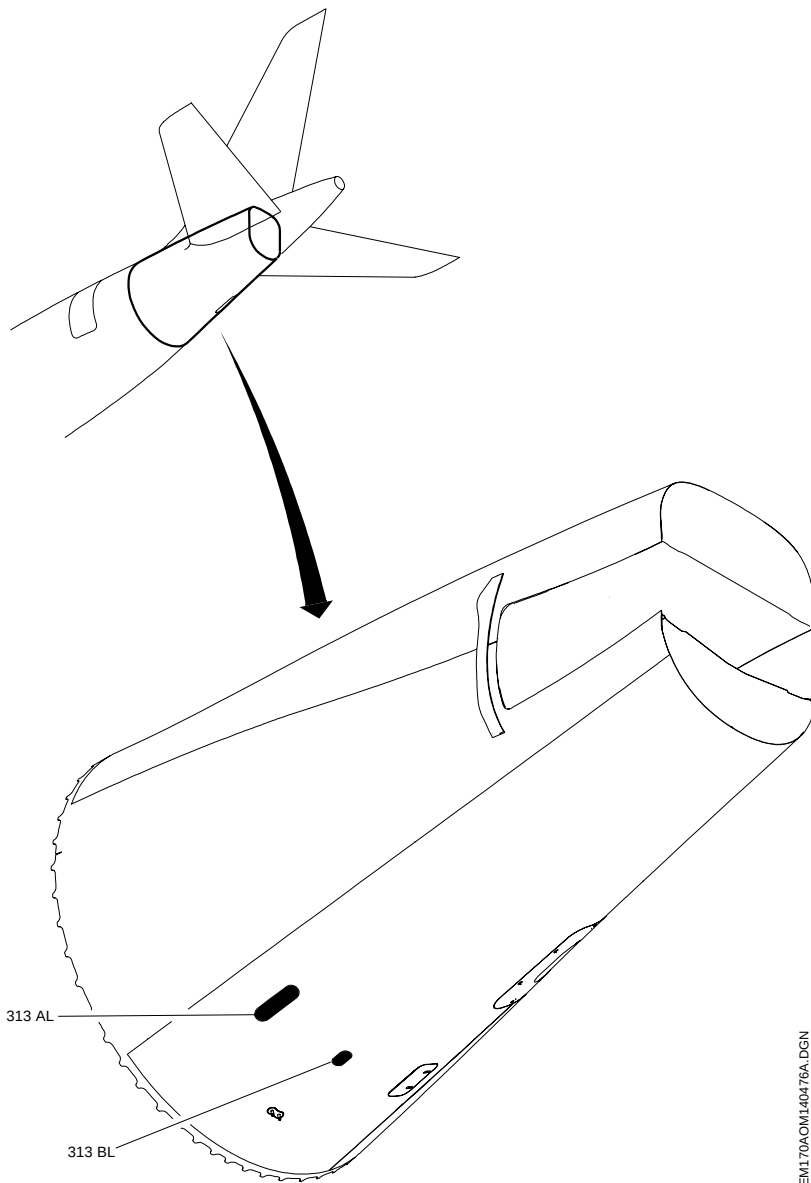
ATA CHAPTER 53 FUSELAGE

System & Sequence ITEM Number	1.	2. Number installed	
		3.	4. Remarks and/or exceptions
53 FUSELAGE			
03-06 Waste service access door (152AR)	1	0	May be missing with no penalty. Cover the cavity with speed tape.
03-07 Water Service access door (151AL)	1	0	May be missing with no penalty. Cover the cavity with speed tape.
03-08 External power supply 28VDC, Aft ramp handset access door (313AL)	1	0	May be missing with no penalty. Cover the cavity with speed tape.
03-10 Jacking point adapter access panel (313BL)	1	0	May be missing with no penalty. Cover the cavity with speed tape.
03-11 Tailcone attachment access panels (351EL, 351FR, 351CL and 351DR)	4	3	One may be missing with no penalty. Cover the cavity with speed tape.



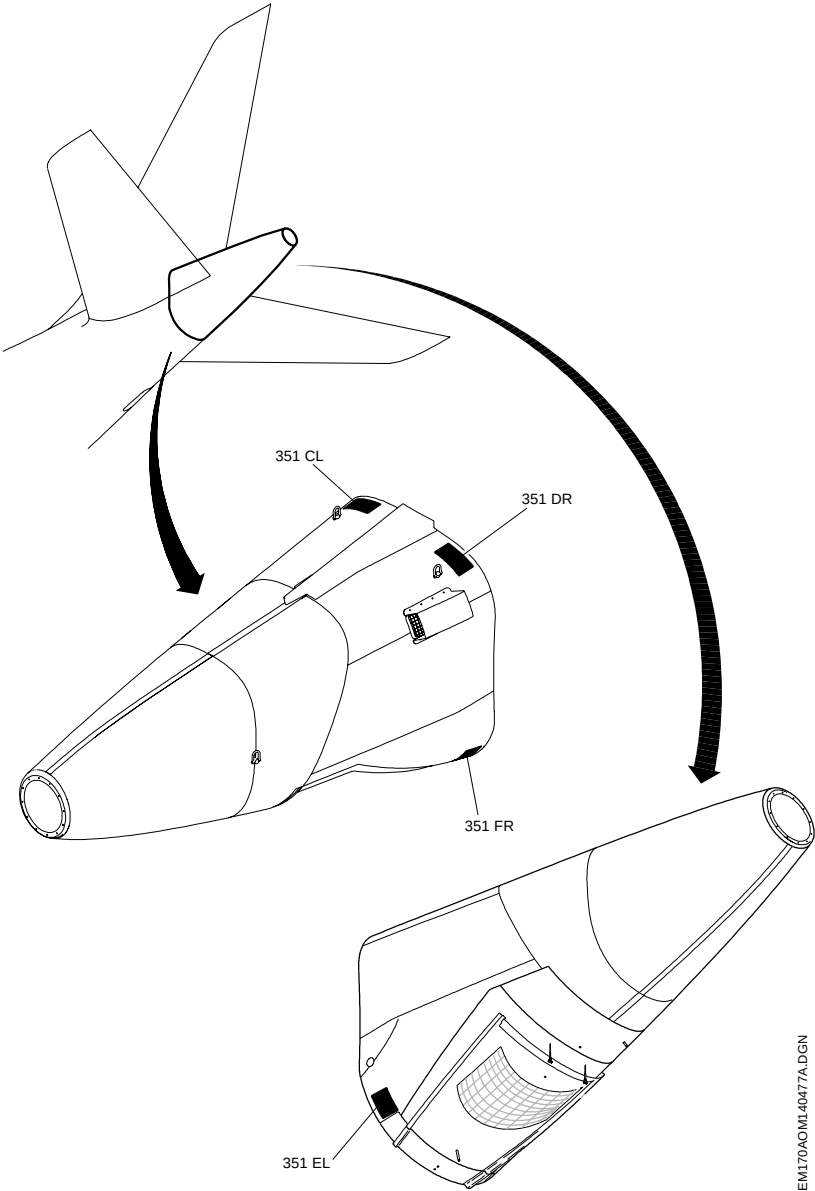
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WASTE (152AR) AND WATER (151AL) SERVICE ACCESS DOORS



EM170AOM140476A.DGN

**EXTERNAL POWER SUPPLY 28 VDC,
AFT RAMP HANDSET ACCESS DOOR (313AL) AND
JACKING POINT ADAPTER ACCESS PANEL (313BL)**



TAILCONE ATTACHMENT ACCESS PANELS (351EL/FR/CL/DR)

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MINIMUM EQUIPMENT LIST

This chapter is covered by LOT Minimum Equipment List ERJ-170 and Dispatch Deviation Procedures Manual ERJ-170.

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EMERGENCY INFORMATION

SECTION 10.1

SURVIVAL AND EMERGENCY EQUIPMENT

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Passenger Floatable Seat and Life Jacket	10.1.c		1
Fire Extinguisher	10.1.d		1
Emergency Locator Transmitter (ELT)	10.1.e		1
Least Risk Location	10.1.f		1
Emergency Equipment Check	10.1.g		1
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SECTION 10.2

OXYGEN

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INTRODUCTION

Section 10.1 presents a list of the survival equipment to be carried for the routes to be flown and the procedures for checking the serviceability of this equipment prior to take-off. This Section also includes instructions regarding the location, accessibility and use of survival and emergency equipment and its associated check list(s) for Cockpit and Cabin Crew.

Emergency equipment includes items used during in-flight emergencies (such as first-aid kits and fire extinguishers), and those used to assist in the airplane evacuation (such as crash hatchet and escape ropes).

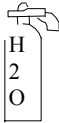
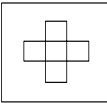
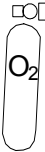
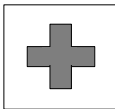
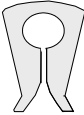
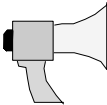
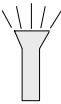
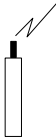
Section 10.2 presents the procedure for determining the amount of oxygen required and the quantity that is available. This Section also includes the flight profile, number of occupants and possible cabin decompression.

The information presented herein is focused on its technical aspects. Being so, it is not mandatory.

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EMERGENCY EQUIPMENT

EMERGENCY EQUIPMENT SYMBOLS

SYMBOL	KIND OF EQUIPMENT	SYMBOL	KIND OF EQUIPMENT
	HALON EXTINGUISHER		HATCHET
	WATER EXTINGUISHER		PROTECTIVE BREATHING EQUIPMENT
	FIRST AID KIT		PORTABLE OXYGEN CYLINDER
	EMERGENCY MEDICAL KIT		GOGGLES
	LIFE VEST		MEGAPHONE
	FLASHLIGHT		OXYGEN BOX DEPLOY TOOL
	GLOVES	D A	DEMO KIT JUMPSEAT C/C
	ELT BEACON	G C LA	GALLEY WARDROBE TOILET

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EQUIPMENT CHECKLIST

COCKPIT AREA

Flashlight.....CHECK LED ON
Life Vest ON BOARD
Hatchet.....ON BOARD
Oxygen Mask/Goggle.....CHECK
Protective Breathing Equipment (PBE) SEALED
Fire Extinguisher CONDITION

FRONT PASSENGER CABIN AREA

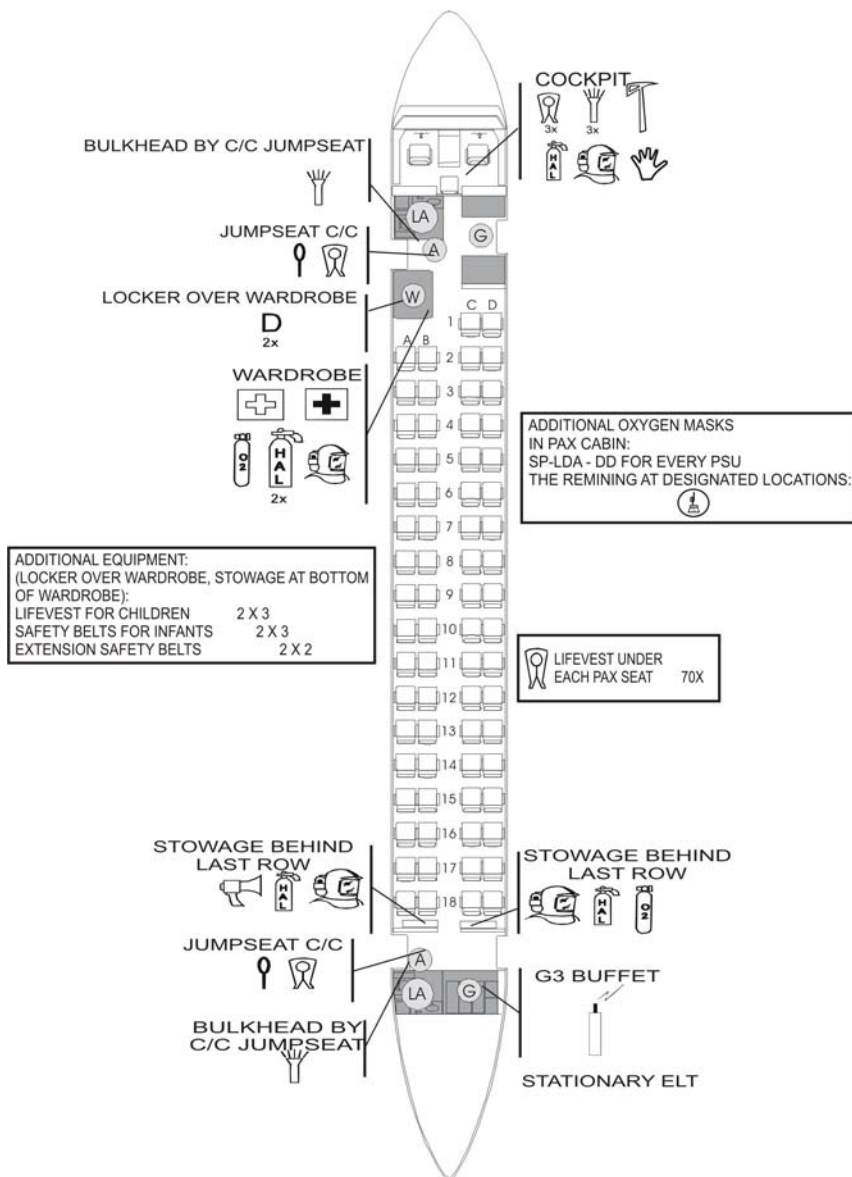
Flashlight.....CHECK LED ON
First-Aid Kit.....SEALED
Life Vest ON BOARD
Medical Kit.....SEALED
Portable Oxygen Cylinder CONDITION
Protective Breathing Equipment (PBE) SEALED
Fire Extinguisher CONDITION
Oxygen Box Deploy Tool.....ON BOARD

REAR PASSENGER CABIN area

Flashlight.....CHECK LED ON
Life Vest ON BOARD
Megaphone ON BOARD
Portable Oxygen Cylinder CONDITION
Protective Breathing Equipment (PBE) SEALED
Fire Extinguisher CONDITION
Oxygen Box Deploy Tool.....ON BOARD

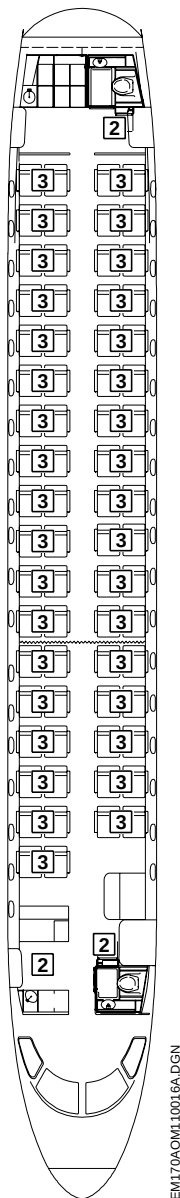
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EMERGENCY EQUIPMENT LAYOUT



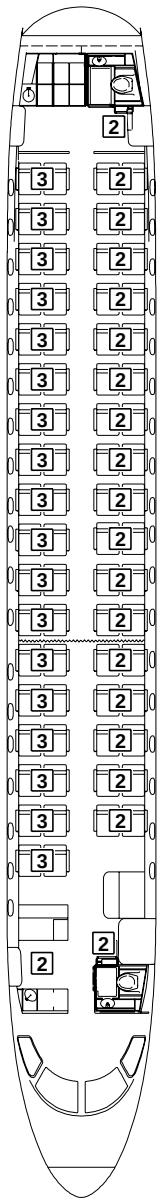
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ERJ-170 PASSENGER OXYGEN MASKS LOCATION (APP. to –DA thru –DD)



70 SEAT INTERIOR ARRANGEMENT

**ERJ-170 PASSENGER OXYGEN MASKS
LOCATION (APP. to –DE and on)**



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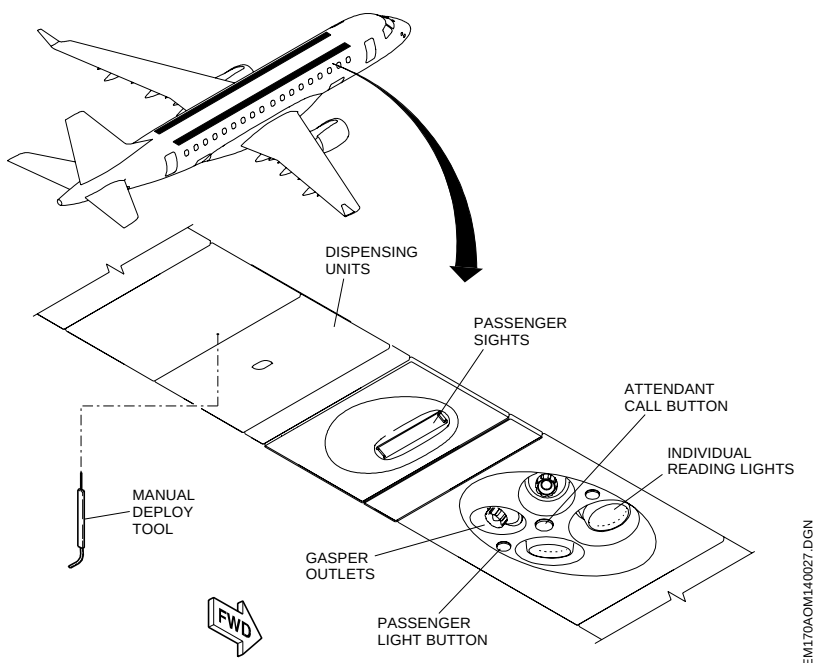
70 SEAT INTERIOR ARRANGEMENT

Two oxygen masks are installed at cabin crew dispensing unit. As primary option, the mask with longer hose must be donned in an emergency.

OXYGEN MASK MANUAL DEPLOYMENT

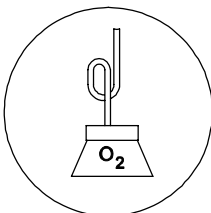
A manual deploy tool is provided near each cabin crew station. Placards indicate their location.

If a dispensing unit door fails to open and the automatic deployment of passenger oxygen masks is not commanded, insert the manual deploy tool in the small hole diameter in the PSU to manually actuate the electrical latch. The masks are deployed and oxygen is available to the occupant.



PASSENGER SERVICE UNIT

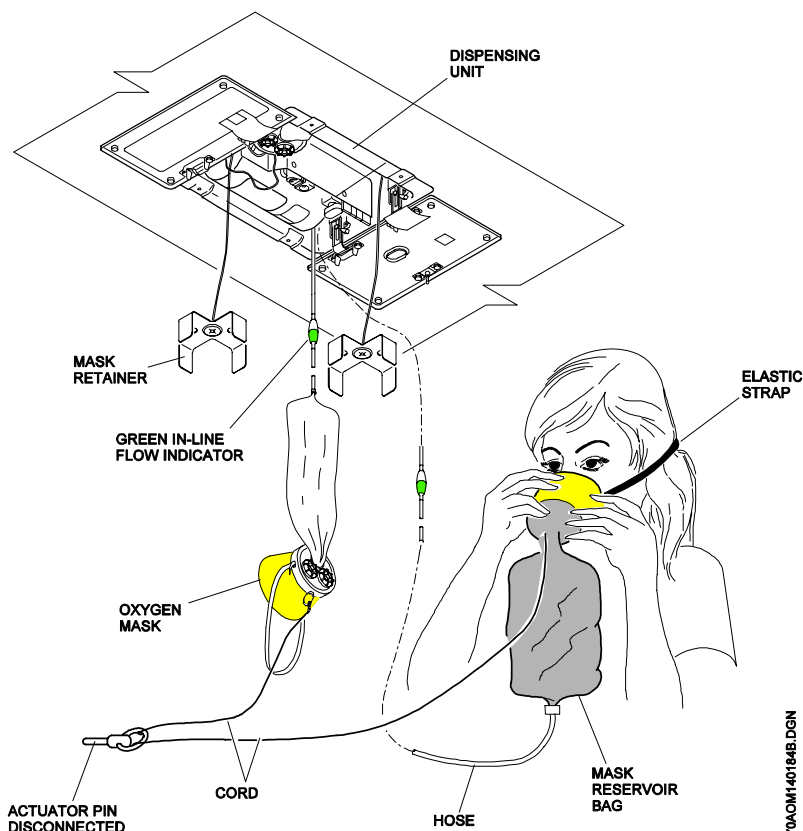
OXYGEN MASKS DEPLOYED



ADDITIONAL OXYGEN
MASK INDICATION

NOTE: · DISPENSING UNITS WITH THIS INDICATION
INCLUDE AN ADDITIONAL OXYGEN MASK.

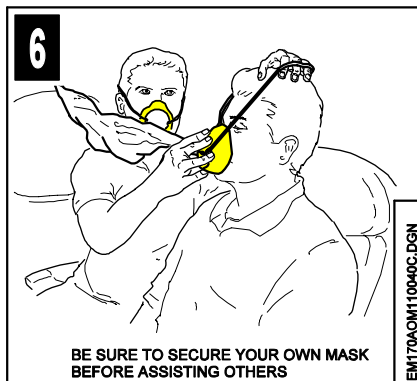
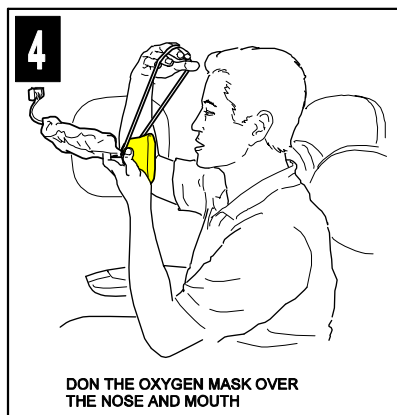
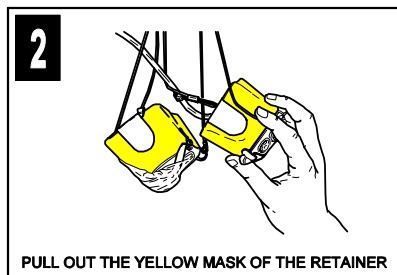
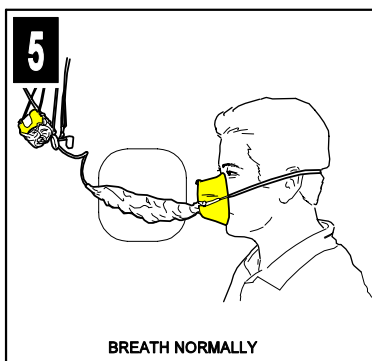
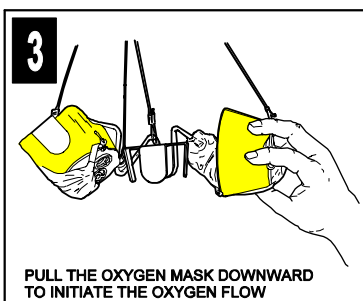
· AIRPLANES EQUIPPED WITH THREE MASKS
IN ALL DISPENSING UNITS LOCATED IN THE
RIGHT OVERHEAD BINS DO NOT HAVE THIS
INDICATION.



EM170QM1401848.DGN

PASSENGER OXYGEN MASKS DEPLOYED AND MASK RETAINERS

OXYGEN MASK USAGE PROCEDURE



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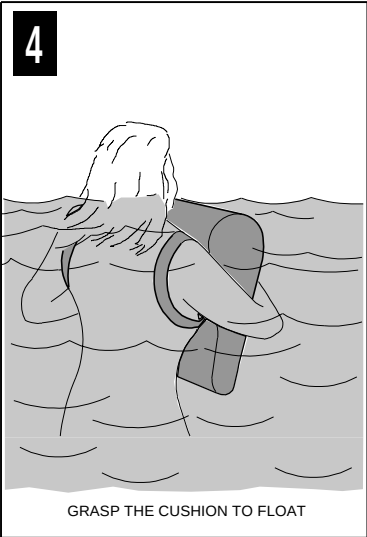
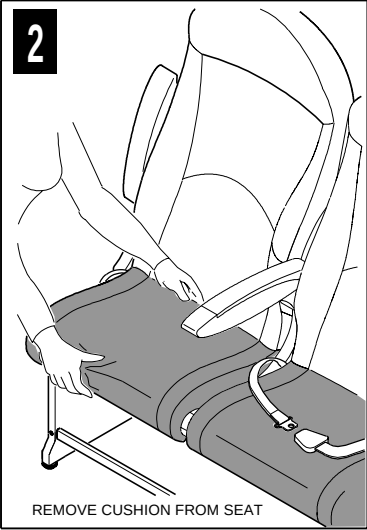
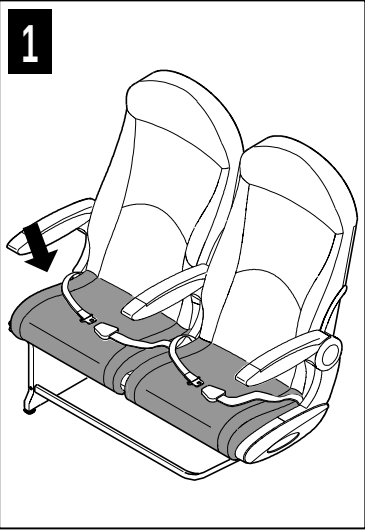
PROCEDURE FOR PASSENGER AND CABIN CREW OXYGEN MASKS

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PASSENGER FLOATABLE SEAT AND LIFE JACKET

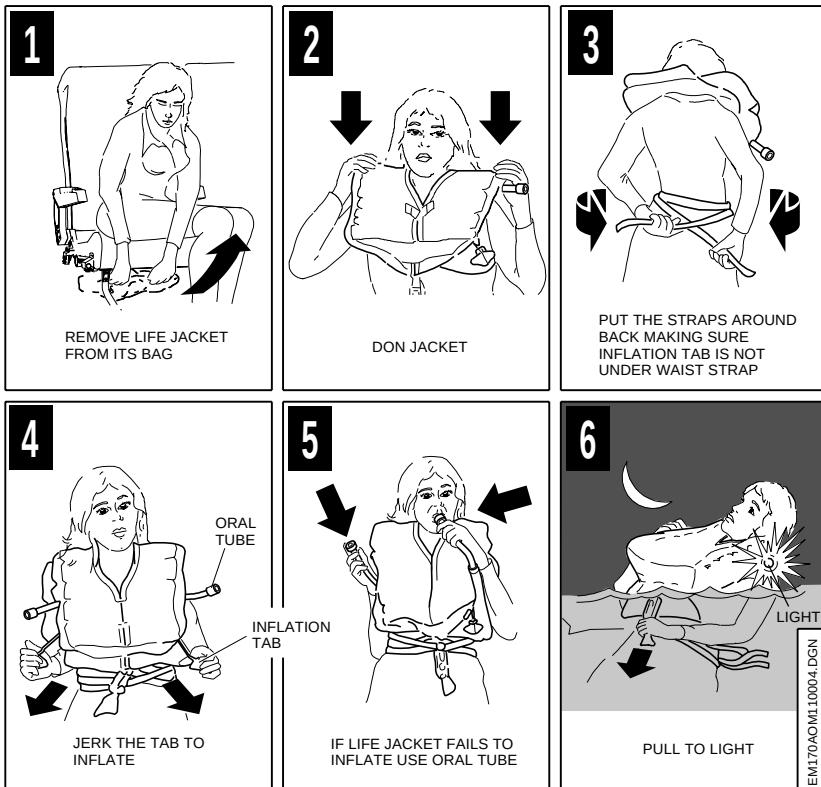
PASSENGER FLOATABLE SEAT OPERATION

NOTE: For information only, because Polish Law not included floating seats to emergency survival equipment.



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LIFE JACKET OPERATION



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FIRE EXTINGUISHER

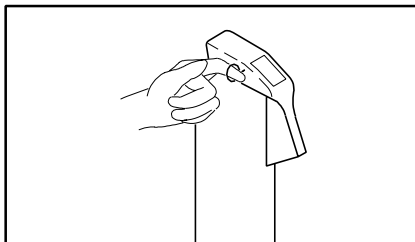
HALON FIRE EXTINGUISHER

The fire extinguisher in the EMBRAER 170 airplane contains a Halon blend composed of two different fire-fighting agents.

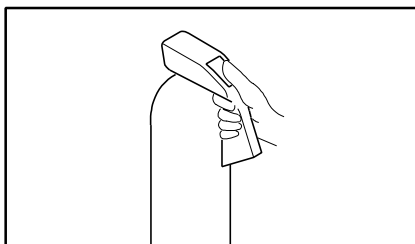
This blend evaporates on contact, leaving no damaging powdery residue. It may be used to extinguish the following classes of fire:

- Class A (paper, wood, fabric, rubber);
- Class B (oils, greases, flammable liquids);
- Class C (electrical or electronic equipment, live electrical).

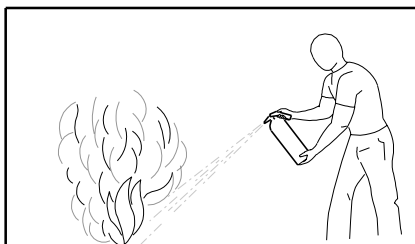
FIRE EXTINGUISHER OPERATION



1. UNSNAP "QUICK RELEASE" MOUNTING STRAP AND REMOVE EXTINGUISHER.



3. PRESS LEVER FOR DISCHARGE OPERATION.



4. STAND APPROXIMATELY 2 m (8 ft) AWAY FROM FIRE BEFORE DISCHARGING. AIM DISCHARGE NOZZLE AT FIRE BASE. SPRAY QUICKLY SIDE TO SIDE ACROSS FIRE WIDTH. MOVE CLOSER AS FIRE IS BEING EXTINGUISHED. DIRECT ALL OF THE DISCHARGING AGENT ONTO THE FIRE AND MAKE SURE THE FIRE IS COMPLETELY EXTINGUISHED.

EM170AOM110003.DGN

Precautions after fire extinguishing:

- Look out for "flashback";
- Ventilate the compartment as promptly as possible.

EMERGENCY LOCATOR TRANSMITTER (ELT)

Transmitting a radio signal on frequencies of 121.5, 243.0 and 406 MHz when activated, the Emergency Locator Transmitter (ELT) assists in the swift location of the aircraft during search and rescue operations.

The system comprises a transmitter with an ON/OFF switch and an impact switch installed in the rear rack, an antenna located on the top rear and a remote panel located in the cockpit.

The ELT may be manually or automatically activated. In both cases, a red light flashes on the cockpit panel to indicate the ELT's activation.

Manual activation may be performed when any switch is set to the ON position.

Automatic activation occurs when the transmitter switch is set to the OFF position, the cockpit switch is set to the ARM position and the airplane suffers a deceleration whose intensity triggers the impact switch.

Using an optional configuration with the ELT/NAV interface unit, the ELT is able to transmit the geographical position of the aircraft when activated.

CONTROLS AND INDICATORS

REMOTE PANEL

1 - ELT ALERT LIGHT (RED)

- Flashes when the ELT is transmitting.

2 - ELT SWITCH (GUARDED)

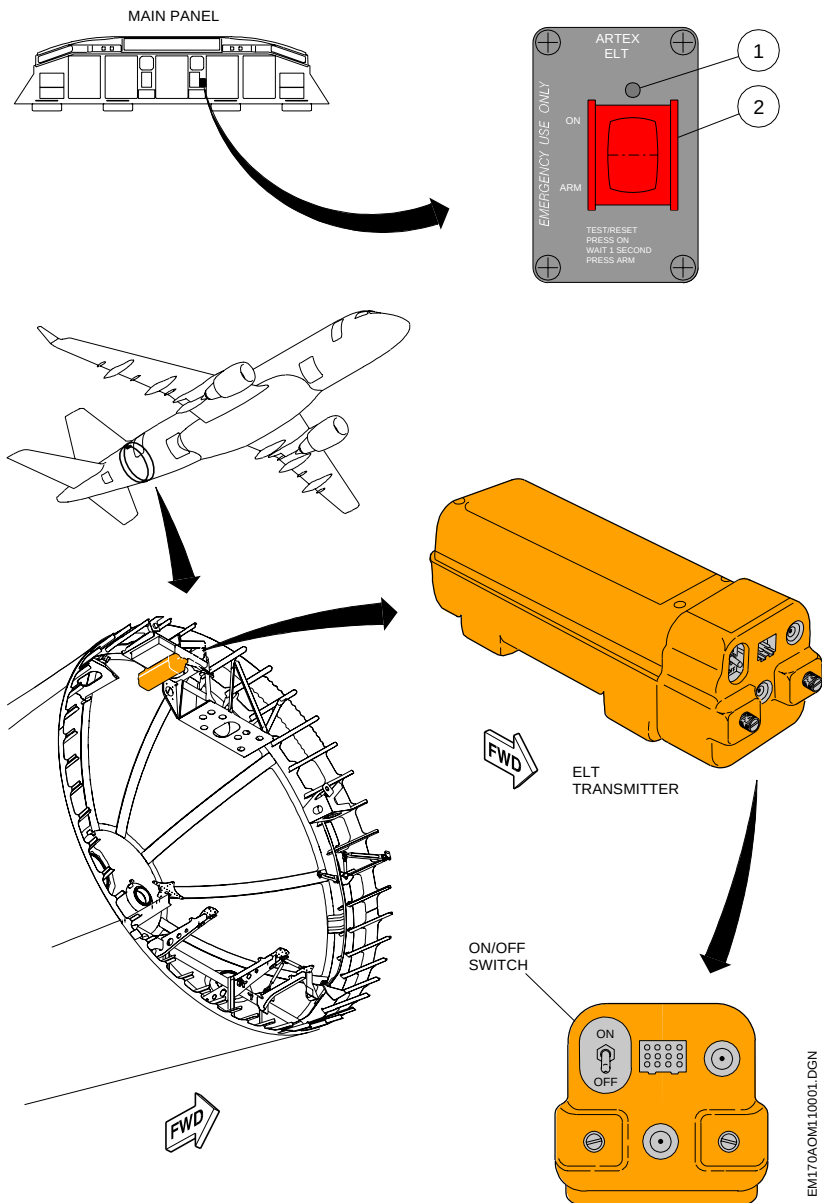
ON - Activates the ELT.

ARM - Allows the ELT to be automatically activated.

NOTE: - The TEST/RESET function is provided by pressing ON, waiting 1 second and then pressing ARM.

- RESET function allows ELT deactivating, after a manual or automatic activation.
- During TEST/RESET function, the ELT alert light flashes to indicate that the system is transmitting.

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EMERGENCY LOCATOR TRANSMITTER

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LEAST RISK LOCATION

The location inside the airplane's cabin where structural or system damages are least likely to jeopardize flight safety. For the EMBRAER 170 the Least Risk Location is sited aft, near the next to last window on the left side.

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EMERGENCY EQUIPMENT CHECK

Prior to each flight from the base and prior to each return flight emergency equipment positioning and readiness for use should be checked in each section of the aircraft. This is done in each section of the aircraft by appointed cabin crew member, who follows “Check list”. All defects or deficiencies should be reported to the appropriate service, or if it is not possible, to the Captain-in-Command or flight officer.

After receiving information from personnel checking the state of emergency equipment, a Senior Cabin Crew Member, prior to passengers’ boarding – is absolutely obligated to make a report: “Emergency equipment checked”(– which means: complete and ready for use) to the Captain-in-Command of the aircraft or to the first officer.

Each defect or fact of using emergency equipment must be registered in the Technical Log.

CABIN SWEEP

Cabin crew always when entering, leaving, returning to the aircraft or after replacement of the crew and leaving, other service personnel shall conduct cabin sweep. It should be done prior to passengers’ boarding. Each cabin crew member visually checks the passenger cabin, toilets and buffets taking into account cleanliness, deficiencies (seatbelts, headrest covers, finding unfamiliar objects, mechanical defects (breakage, fractures or cracks). Check shall be performed from the forward towards the aft. Ending Cabin Sweep should be reported to Senior Cabin Crew Member.

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OXYGEN REQUIREMENTS

See Operational Manual part B Volume II Ata Chapter 35 – OXYGEN.

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GENERAL INFORMATION	0
LIMITATIONS	1
NORMAL PROCEDURES	2
EMERGENCY AND ABNORMAL PROCEDURES	3
PERFORMANCE	4
FLIGHT PLANNING	5
MASS AND BALANCE	6
LOADING	7
CONFIGURATION DEVIATION LIST	8
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SECTION 11

EMERGENCY EVACUATION

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Doors And Exits	11.1.a		1
Emergency Evacuation Procedures	11.2.a		1

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INTRODUCTION

Section 11.1 presents instructions for preparation for emergency evacuation including crew coordination and emergency station assignment.

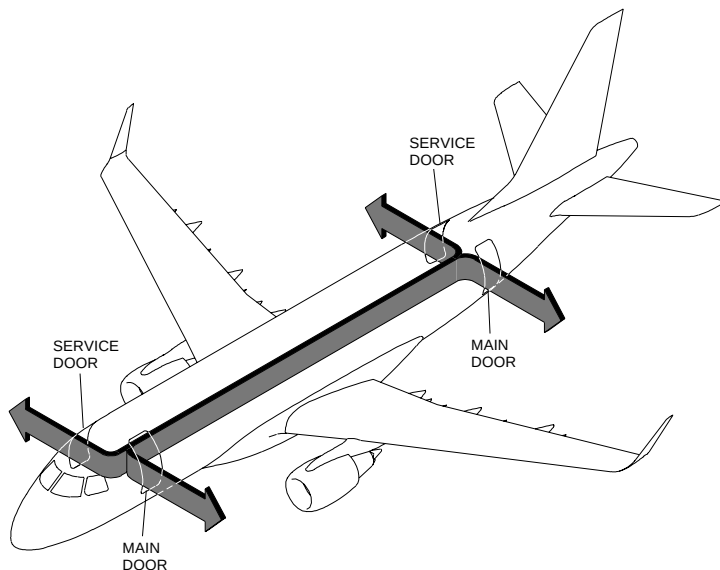
Section 11.2 presents emergency evacuation procedures. A description of the duties of all members of the crew for the rapid evacuation of an airplane and the handling of the passengers in the event of a forced landing, ditching or other emergency.

The Captain of the airplane is solely responsible for coordination of the evacuation process.

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DOORS AND EXITS

This airplane has two jetway passenger doors on the left side (forward and aft location), two jetway service doors on the right side (forward and aft location) and two cockpit windows, on each side, that can be used for emergency evacuation.



DOORS AND EXITS LOCATION

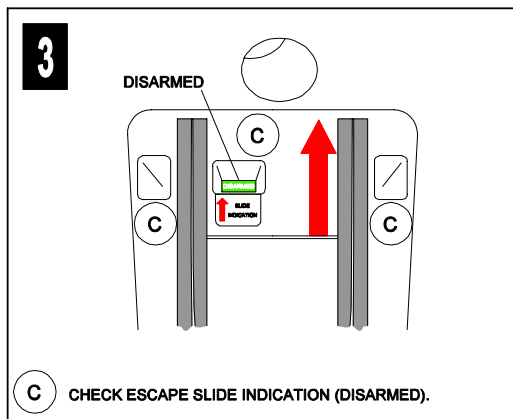
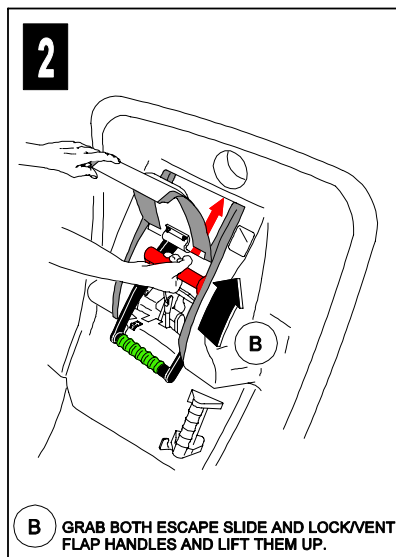
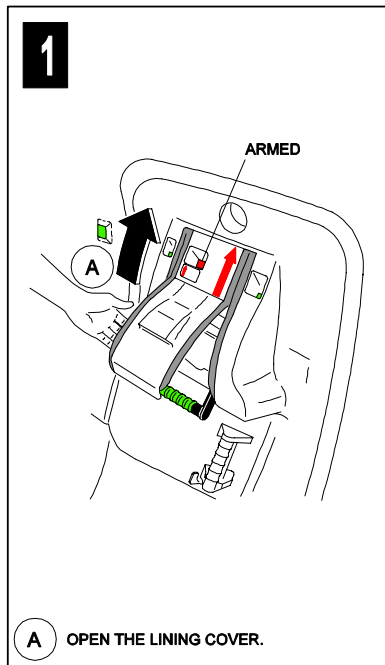
PASSENGER AND SERVICE DOORS

This airplane has one passenger door located at the left forward fuselage section and another located at the aft fuselage section. Passenger door operation is manual and it is identical for both passenger doors. Passenger doors are semi-plug-in type and they are designed as type I doors.

One service door is located at the right forward fuselage section and another located at the aft fuselage section. Service doors are used for galley servicing and cabin cleaning between flights. It may also be used as an emergency exit. The operation of service and passenger doors is similar.

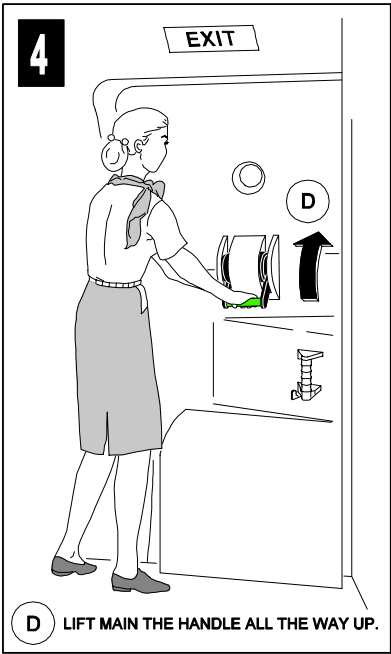
DOOR OPENING

TO OPEN:



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ESCAPE SLIDE DISARM

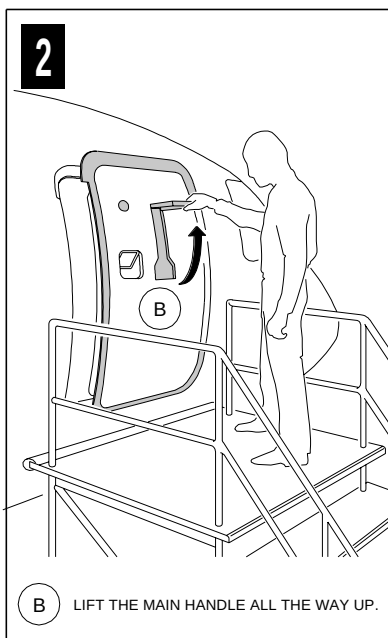
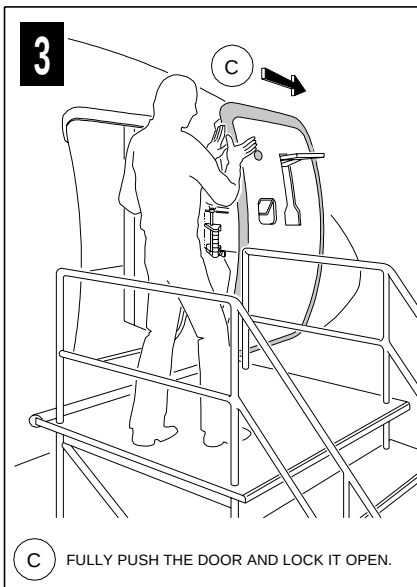
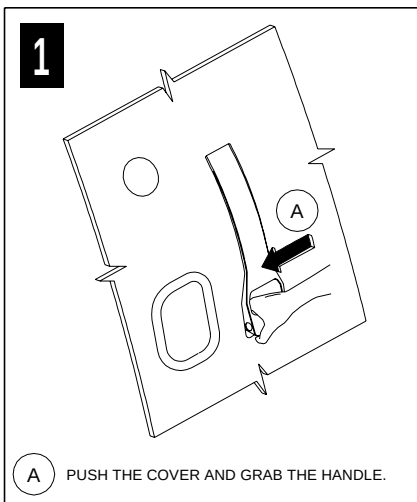


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MAIN HANDLE ACTUATION

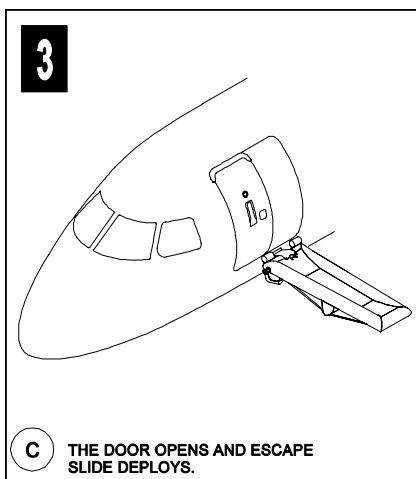
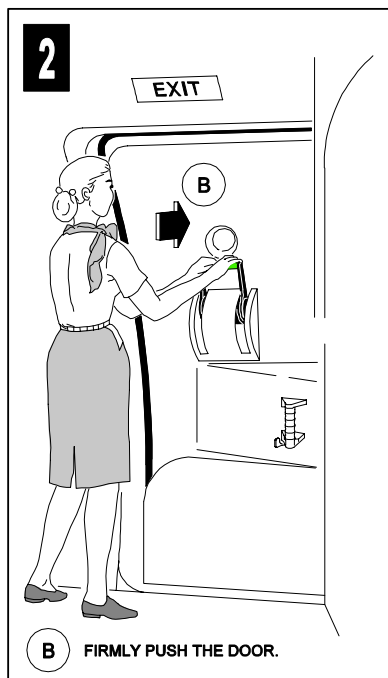
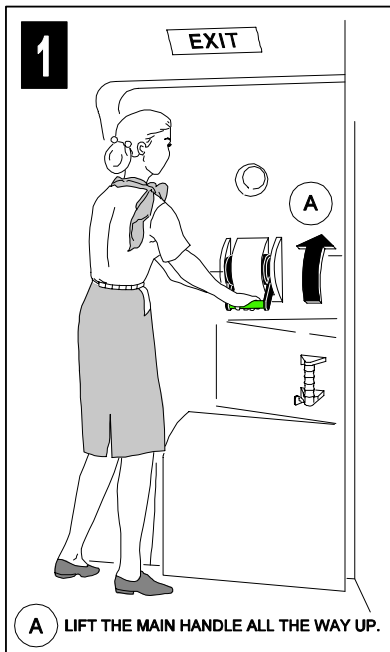
DOOR OUTSIDE OPENING

TO OPEN:



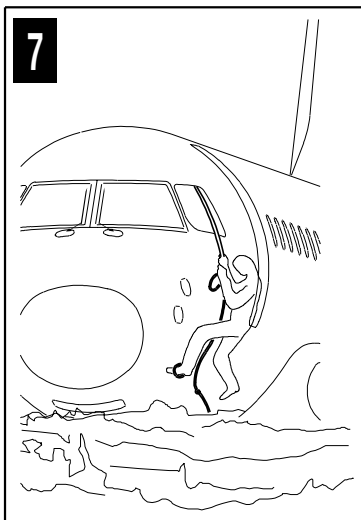
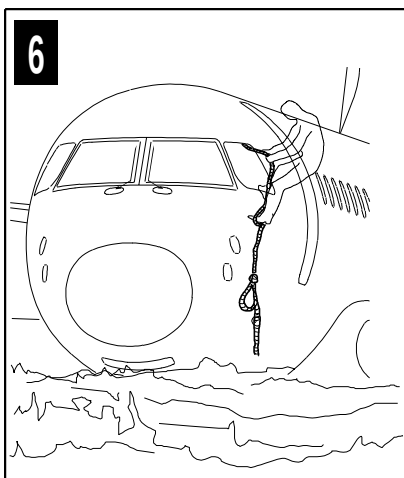
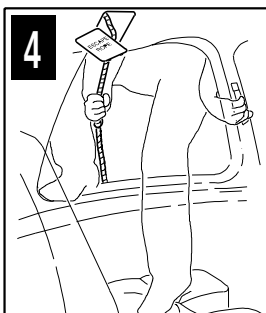
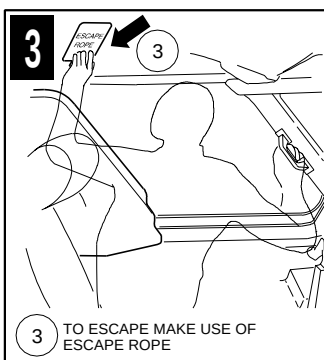
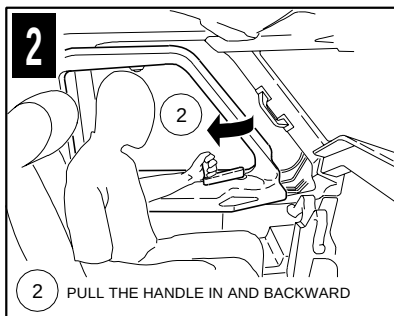
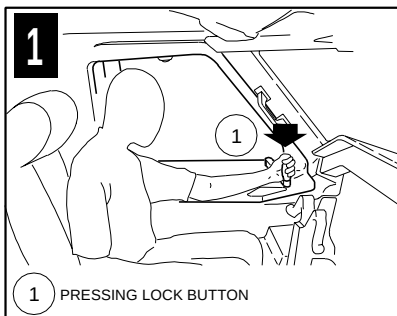
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DOOR EMERGENCY OPENING



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COCKPIT EVACUATION



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COCKPIT WINDOW EMERGENCY EXIT

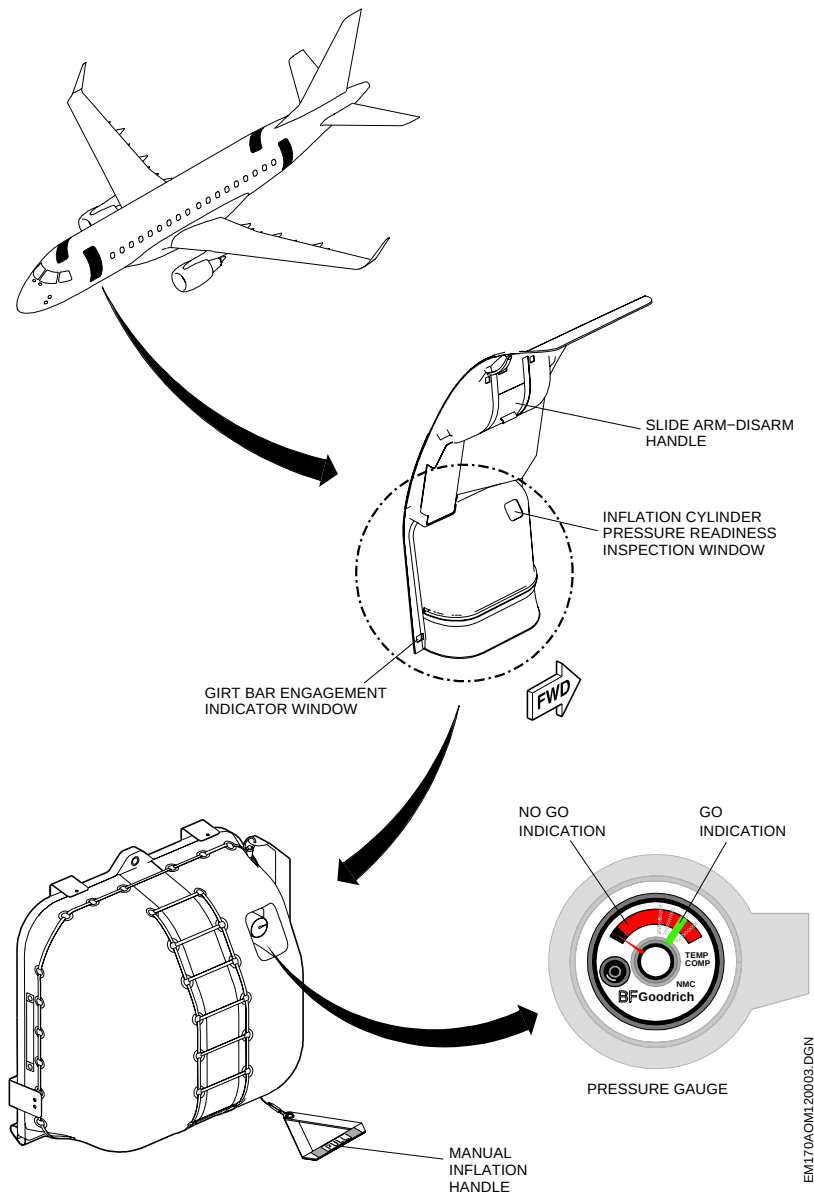
ESCAPE SLIDE

The evacuation slides are designed to provide passengers and crew with a means to safely descend from the aircraft to the ground during an emergency evacuation. In the event of emergency evacuation, the slides deploy automatically when the exit door is opened.

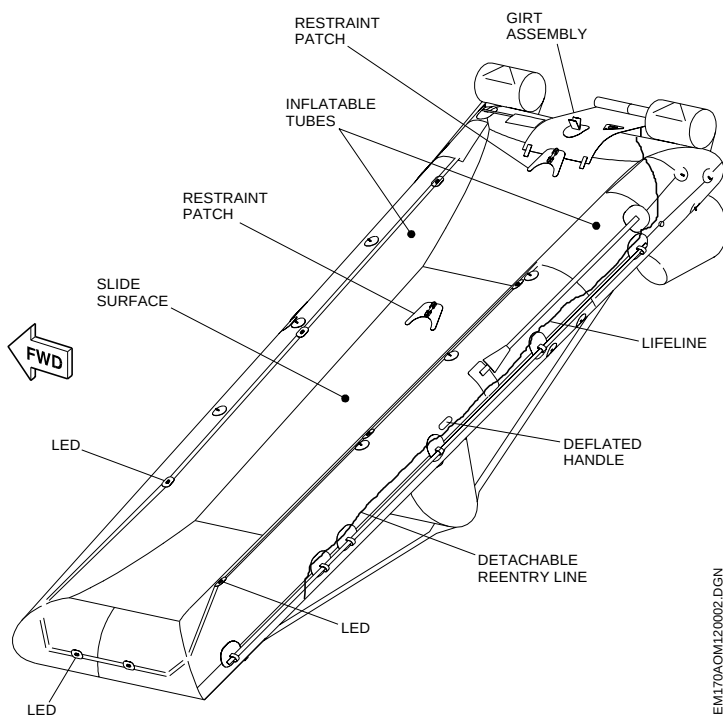
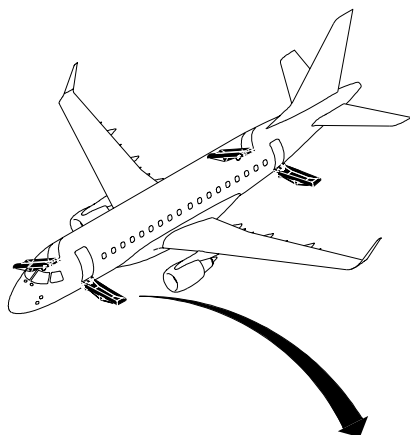
Upon completion of the inflation sequence, the slide is fully inflated and ready to assist passengers and crew in descending to the ground.

The evacuation slides are armed by raising the slide arming lever cover located on the door and moving the slide arming lever to the "armed" position. The lever attaches the girt bar to the cabin floor brackets. The evacuation slide is attached to the girt bar by means of a fabric girt.

Opening the door from the outside automatically disengages the girt bar from the floor fittings, disarming the slide.

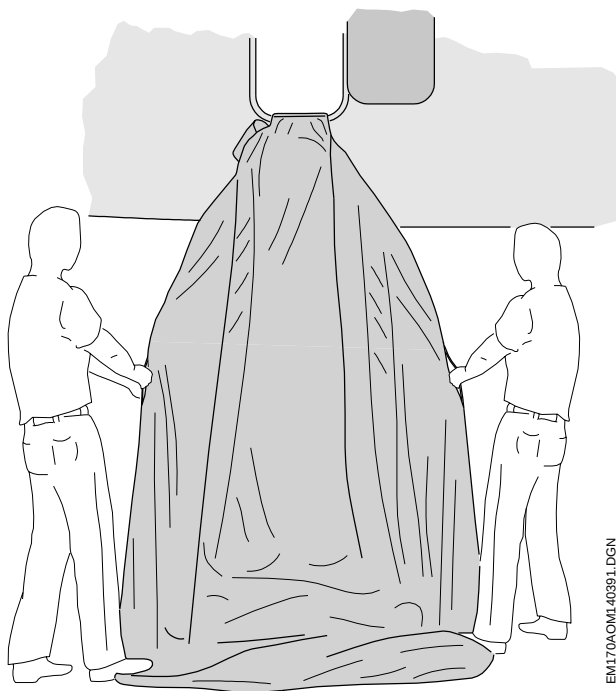


ESCAPE SLIDE – PACKED



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ESCAPE SLIDE – DEPLOYED



EW170AOM140391.DGN

DEFLATED ESCAPE SLIDE

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EMERGENCY EVACUATION PROCEDURES

Emergency/Parking Brake.....	ON
Thrust Levers	IDLE
Start/Stop Selector Knobs	STOP
Fire Extinguishing Handles.....	PULL AND ROTATE (1-L and 2-R)
APU Emergency Stop Button	PUSH IN
APU Fire Extinguishing Button	PUSH
Pressurization Dump Button.....	PUSH
Emergency Evacuation	ANNOUNCE
Batteries	OFF

NOTE: Details evacuation procedures concerning cabin crew activity are defined inside LOT Cabin Crew Manual.

NOTE: When notifying the cabin personnel about emergency landing the captain must give the following information:

- **remaining time** – kind of preparation, full or shortened
- **place** – airport, forced landing on randomly chosen ground or ditching
- **kind of defect** – define dangerous sides of airplane, or emergency exits
- **command, signal** – for taking emergency position
- **command, signal** – for starting or not continuing passengers' evacuation
- **special instructions** – who and in what form informs passengers

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