BRITISH AIRWAYS VIRTUAL
FLIGHT TRAINING

747-436 BAV Flight Crew Quick Reference Handbook

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Quick Action Index

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Non Normal Checklist 0 – Abnormal Situations

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Non Normal Checklist 0.1 – Abnormal Situations - Ditching

Ditching

Condition:

Aircraft ditching and evacuation are needed.

1 Jettison fuel as needed to reduce the VREF speed.
2 Do not arm the Autobrake.
3 Use FLAP 30 and VREF 30.
4 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Recall.....Checked
Autobrake.....OFF
Landing data.....VREF 30, SET___
Approach briefing.....Completed

Approach Checklist

Altimeters....._____

When below 5,000 feet:

GND PROX GEAR OVRD switch.....OVRD
PACK control selectors (all).....OFF
OUTFLOW VALVES MAN switches (both).....ON
OUTFLOW VALVES manual control.....Push to CLOSE

and hold until outflow valve indications show fully closed

Passenger signs.....ON

When on final approach:

Omit the landing checklist.

Landing Gear Lever.....UP
FLAPS.....30

Maintain airspeed at VREF 30.
Rotate to a touchdown attitude of 10 to 12°

After impact:

FUEL CONTROL switches (all).....CUTOFF
Engine fire switches (all).....Pull, rotate to the stop and hold for 1 second

Deploy the slide/rafts and evacuate the aircraft

END

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Non Normal Checklist 0.2 – Abnormal Situations – Emergency Evacuation

Emergency Evacuation

Condition: Emergency evacuation is needed.

1 Parking Brake.....SET

2 OUTFLOW VALVES MAN switches (both).....ON

3 OUTFLOW VALVES manual control.....PUSH to OPEN

and hold until outflow valve indications show fully open

4 FUEL CONTROL switches (all).....CUTOFF

5 Advise the cabin to evacuate.
6 Advise the tower.

7 Engine Fire Switches (all).....PULL

8 APU Fire Switch.....OVERRIDE & PULL

9 If an engine or APU fire warning occurs:

Related fire switch.....ROTATE to the stop and HOLD for 1 second

10 Vacate aircraft by nearest suitable exit

END

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Non Normal Checklist 0.3 – Abnormal Situations - Tailstrike

Tailstrike

Condition: The tail section of the fuselage strikes the runway on takeoff.

Objective: To depressurize the airplane.

Caution! Do not pressurize the airplane.

Pressurizing the airplane may cause further structural damage.

1 OUTFLOW VALVES MAN switches (both).....ON

2 OUTFLOW VALVES manual control.....PUSH to OPEN and HOLD

Hold until both outflow valve indications show fully open.

3 **Do not** accomplish the following checklists:

CABIN ALT AUTO
OUTFLOW VLV

Land at the nearest suitable airport

END

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Non Normal Checklist Section 1 – Air Systems

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Non Normal Checklist Section 1 – Air Systems

NNC 1.1 CABIN ALTITUDE or Rapid Depressurization

Condition: A cabin altitude exceedance occurs.

1 Don the oxygen masks.
2 Establish crew communications.
3 Check the cabin altitude and rate.

Verify packs are ON and outflow valves are CLOSED.

4 If the cabin altitude is uncontrollable:

PASS OXYGEN Switch.....ON

Without delay, descend to the lowest safe altitude or 10,000 feet, whichever is higher.

To descend:

Move the Thrust Levers to idle.
Extend the Speedbrake.

If structural integrity is in doubt, limit airspeed and avoid high manoeuvring loads.

Descend at VMO/MMO.

If OUTFLOW VLV L, OUTFLOW VLV R, and CABIN ALT AUTO messages are shown:

Do not accomplish the following checklists:

CABIN ALT AUTO
OUTFLOW VLV L, R

END

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Non Normal Checklist Section 1 – Air Systems

NNC 1.2 BLEED DUCT LEAK L, C, R

Condition: A bleed air leak occurs in the left, centre, or right duct.

Objective: To isolate the bleed duct leak.

1 Choose one:

BLD DUCT LEAK C message is shown:

Go to step **2**

BLD DUCT LEAK L or R message is shown:

Go to step **11**

2 ISLN valve switches (both) .....OFF

3 PACK 2 control selector.....OFF

4 APU Selector.....OFF

5 AFT CARGO HEAT Switch.....OFF

6 TRIM AIR Switch.....OFF

7 PASS TEMP Selector.....SET

8 Cargo Smoke Detection is no longer available.

9 DO NOT use ground pneumatic air.

10 Do not accomplish the following checklists:

TEMP ZONE
TRIM AIR OFF

11 ISLN valve switch (affected side) .....OFF

Continued on next page

BLD DUCT LEAK L, C, R continued

12 ISLN Valve Switch (unaffected side) .....ON

13 ENGINE BLEED Air Switches (affected side) .....OFF

This isolates the air source and maintains pressure on the unaffected side.

14 PACK Control Selector (affected side) .....OFF

15 Hydraulic DEMAND PUMP 1 or 4 Selector (affected side) .....OFF

16 WING ANTI-ICE Switch.....OFF

DO NOT use wing anti-ice.

17 Choose one:

At or above 10,000 feet:

Sufficient bleed air may not be available for nacelle anti-ice if N1 is less than 70%.

Go to step 18

Less than 10,000 feet:

Sufficient bleed air may not be available for nacelle anti-ice if N1 is less than 55%.

Go to step 18

18 DO NOT accomplish the following checklists:

BLEED OFF
HYD PRESS DEM 1 or 4 (affected side)

19 Checklist Complete Except Deferred Items

Deferred Items

At top of descent:

PACK Control Selectors.....Set a maximum of one pack on

This maintains bleed air extraction within limits.

Continued on next page

BLD DUCT LEAK L, C, R continued

Descent Checklist

Recall.....Checked
Briefing.....Complete
VREF.....SET
Minima.....SET & CROSSCHECKED
Autobrake.....() SET

Flap Extension

LE flaps move in secondary mode. During approach, allow additional time for flap extension.

DO NOT accomplish the following checklist:

FLAPS PRIMARY

Note: A temporary LE flap asymmetry, accompanied by a mild rolling moment, results when the LE flaps are extended or retracted.

Approach Checklist

Altimeters.....QNH SET & CROSSCHECKED
Map Integrity.....VERIFIED

Caution!

DO NOT deploy the thrust reversers until the nose gear contacts the runway.

Landing Checklist

Speedbrake.....ARMED
Landing Gear.....DOWN
Cabin Report.....RECEIVED
Flaps.....() GREEN
Missed Approach Altitude.....SET

After landing

Note:

If the BLD DUCT LEAK L message is shown, do not shut down engine 1 when towed into a gate. Shutting down engine 1 depressurizes hydraulic system 1, and body gear steering is inoperative. Tight turns may cause tire scrubbing.

Continued on next page

BLD DUCT LEAK L, C, R continued

Additional Information

When the thrust reversers are deployed, the inboard and midspan LE flaps retract, resulting in a LE flap asymmetry. If the thrust reversers are deployed before the nose gear contacts the runway, immediate and significant control wheel input, approximately 25° to 65° may be needed to counter the LE flap asymmetry.

END

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Non Normal Checklist Section 1 – Air Systems

NNC 1.3 **BLEED 1, 2, 3, 4 OVHT**

Condition: One or more of these occur:

An engine bleed air overheat
A PRV is failed closed

Nacelle anti-ice is not available for affected engine.

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Non Normal Checklist Section 1 – Air Systems

NNC 1.4 **BLEED 1, 2, 3, 4**

Condition: One of these occurs:

An engine bleed overpressure
A high pressure bleed valve failed open
A PRV failed open

Objective: To turn the engine bleed air switch OFF and then determine whether nacelle anti-ice is available.

1 ENGINE BLEED air switch (affected engine).....OFF

2 NACELLE ANTI-ICE switch (affected engine).....ON

3 Choose one:

NAI VALVE message for the affected engine is shown:

Nacelle anti-ice for the affected engine is not available.

ANTI-ICE message may be shown.

NACELLE ANTI-ICE switch (affected engine) .....OFF

Go to step **6**

NAI VALVE message for the affected engine is not shown:

Go to step **4**
Continued on next page

BLEED 1, 2, 3, 4 continued

4 Use the nacelle anti-ice normally.

5 Choose one:

At or above 10,000 feet:

Sufficient bleed air may not be available for nacelle anti-ice if N1 is less than 70%.

Go to step **6**

Less than 10,000 feet:

Sufficient bleed air may not be available for nacelle anti-ice if N1 is less than 55%.

Go to step **6**

6 Do not accomplish the following checklist:

BLEED OFF

END

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Non Normal Checklist Section 1 – Air Systems

NNC 1.5 **BLEED HP ENG 1, 2, 3, 4**

Condition: The high pressure bleed valve is failed or closed.

Choose one:

At or above 10,000 feet:

Sufficient bleed air may not be available for nacelle anti-ice if N1 is less than 70%.

Go to step **6**

Less than 10,000 feet:

Sufficient bleed air may not be available for nacelle anti-ice if N1 is less than 55%.

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Non Normal Checklist Section 1 – Air Systems

NNC 1.6 **BLEED ISLN L, R**

Condition: The isolation valve is not in the commanded position.

If attempting duct isolation and the isolation valve will not close:

ISLN valve switch (unaffected side) .....OFF

PACK 2 control selector.....OFF

END

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Non Normal Checklist Section 1 – Air Systems

NNC 1.7 **>BLEED ISLN APU**

Condition: The APU bleed isolation valve is not in the commanded position.

END

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Non Normal Checklist Section 1 – Air Systems

NNC 1.8 **>BLEED 1, 2, 3, 4 OFF**

Condition: All of these occur:

Engine bleed air switch is OFF
Engine is running
Engine bleed air valve is closed

END

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Non Normal Checklist Section 1 – Air Systems

NNC 1.9 **>EQPT COOLING CARD**

Condition: A fault occurs in the equipment cooling system. The system does not fully operate.

END

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Non Normal Checklist Section 1 – Air Systems

NNC 1.10 **>EQPT COOLING**

Condition: The ground exhaust valve is not in the commanded position

OR:

With Equipment Cooling selector in NORM or STBY, one or more of these occur:

Airflow is insufficient
An overheat is sensed
Smoke is sensed
With Equipment Cooling selector in OVRD, differential pressure for reverse flow cooling is not sufficient.

1 Avionics/electronic equipment and displays may become unreliable or fail.

2 Choose one:

On the ground:

EQUIP COOLING selector.....STBY

In flight:

Go to step **3**

3 EQUIP COOLING selector.....OVRD

4 Choose one:

EQUIP COOLING message stays shown or shows again:

Plan to land at the nearest suitable airport.

EQUIP COOLING message stays blank:

END

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Non Normal Checklist Section 1 – Air Systems

NNC 1.11 OUTFLOW VLV L, R

Condition: One of these occurs:

Automatic outflow valve control is inoperative
The outflow valve manual switch is on

Objective: To control cabin altitude manually.

1 OUTFLOW VALVES MAN switch (affected valve).....ON

2 PACK control selector.....One pack OFF

3 OUTFLOW VALVES manual control.....Push to CLOSE

and hold until outflow valve indications show fully closed

END

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Non Normal Checklist Section 1 – Air Systems

NNC 1.12 **PACK 1, 2, 3 FAIL**

SYS FAULT

May or may not be illuminated

Condition: One or more of these occur:

A pack controller fault
A pack operation fault
A pack overheat
A pack 2 shutdown and a cabin pressure relief valve is open
All engine bleed air is shutoff

Objective: To attempt to switch to a functioning controller.

1 Choose one:

One or two PACK messages are shown:

Go to step **2**

Three PACK messages are shown:

Go to step **9**

2 TRIM AIR Switch.....ON

3 PACK control selector (affected pack(s).....A

4 PACK RST switch.....PUSH

5 Choose one:

PACK message(s) blanks:

or

PACK message(s) stays shown or shows again:

Go to step 6

Continued on next page

PACK 1, 2, 3 continued

6 PACK control selector (affected pack(s).....B

7 PACK RST switch.....PUSH

8 Choose one:

PACK message(s) blanks:

or

PACK message(s) stays shown or shows again:

PACK control selector (affected pack(s).....OFF

9 Pressurization is lost.

10 If the CABIN ALTITUDE message shows:

Don the oxygen masks.

Establish crew communications.

PASS OXYGEN switch.....ON

Without delay, descend to the lowest safe altitude or 10,000 feet, whichever is higher.

Inoperative Items

Nacelle and wing anti-ice inop

Avoid icing conditions.

11 After level off:

Go to step **12**

12 Choose one:

ENGINE BLEED air OFF lights are not illuminated:

ENGINE BLEED air switches (all).....OFF, then ON

ENGINE BLEED air OFF lights are illuminated:

Go to step **13**

Continued on next page

PACK 1, 2, 3 continued

13 Regularly check the ENGINE BLEED air OFF lights.

14 If the ENGINE BLEED air OFF lights extinguish:

ENGINE BLEED air switches (all).....OFF, then ON

This restores engine bleed air.

15 **If cabin temperature increases and becomes uncomfortable**:

Instruct the cabin attendants to:

Turn off all IFE
Turn off all galleys
Close all window shades
Remove power from any other possible heat sources

OUTFLOW VALVES MAN switches (both).....ON

OUTFLOW VALVES manual control.....Set outflow valves OPEN

Smoke evacuation handle.....Pull
Open the flight deck door.

Plan to land at the nearest suitable airport.

Do not accomplish the following checklists:

CABIN ALT AUTO
HYD PRESS DEM 1, 4
TRIM AIR OFF
OUTFLOW VLV

16 If cabin heat becomes dangerous:

Maintain airspeed 200 KIAS or less.

Direct cabin crew to open door 1L or 1R, and door 5L or 5R.
Position mode selector handle to MANUAL.
Rotate and secure handle in the 12 o'clock position.

Continued on next page

PACK 1, 2, 3 continued

17 Checklist Complete Except Deferred Items:

Deferred Items:

Before Landing

If cabin doors were opened, direct cabin crew to close doors.
The forward door must be closed before closing the aft door.
Position mode selector handle to AUTO.

Descent Checklist

Recall.....Checked
Briefing.....Complete
VREF.....SET
Minima.....SET & CROSSCHECKED
Autobrake.....() SET

Approach Checklist

Altimeters.....QNH SET & CROSSCHECKED
Map Integrity.....VERIFIED

Flap Extension

LE flaps operate in secondary mode.
Allow additional time during approach for flap extension.

Note:
A temporary LE flap asymmetry, accompanied by a mild rolling moment, results when LE flaps are extended or retracted.

Do not accomplish the following checklists:

FLAPS PRIMARY

Landing Checklist

Speedbrake.....ARMED
Landing Gear.....DOWN
Cabin Report.....RECEIVED
Flaps.....() GREEN
Missed Approach Altitude.....SET

END

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Non Normal Checklist Section 1 – Air Systems

NNC 1.13 PACK CONTROL

Condition: Automatic control of the outlet temperature of all packs is inoperative.

1 PACK RST switch.....Push

Note: If the PACK CONTROL message stays shown or shows again, the packs continue to work, but the air outlet temperature is not controlled.

2 Choose one:

PACK CONTROL message blanks:

or

PACK CONTROL message stays shown or shows again:

Go to step **3**

3 TRIM AIR switch.....ON

4 Packs may overheat and shut down at lower altitudes during descent.

5 Choose one:

TEMP ZONE message is shown:

The cabin temperature cannot be controlled.

TEMP ZONE message is not shown:

Go to step 6

6 Pack outlet temperature cannot be reduced to decrease cabin temperature.

Note: Passenger cabin temperatures may be controlled with passenger temperature selector and cabin temperature panel.

END

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Non Normal Checklist Section 1 – Air Systems

NNC 1.14 TEMP CARGO HEAT

Condition: An aft cargo compartment overheat occurs.

1 Choose one:

Aft cargo heat is not needed:

AFT CARGO HEAT switch.....OFF

On extended flights, the aft cargo compartment temperature may decrease to below freezing.

or

Aft cargo heat is needed:

Note: If aft cargo heat stays on, the system cycles at a higher temperature and alternately shows the TEMP CARGO HEAT message.

END

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Non Normal Checklist Section 1 – Air Systems

NNC 1.15 TEMP ZONE

Condition: One or more of these occur:

A zone duct overheat
The master trim air valve fails closed
A zone temperature controller fails

1 ZONE RST switch.....PUSH

2 Choose one:

TEMP ZONE message blanks:

or

TEMP ZONE message stays shown or shows again within five minutes:

Go to step **3**

3 PASS TEMP selector.....SET

If the zone temperature controller is failed:

All cabin zones are maintained at a moderate temperature.

4 Do not accomplish the following checklist:

TRIM AIR OFF

END

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Non Normal Checklist Section 1 – Air Systems

NNC 1.16 **>TRIM AIR OFF**

Condition: The master trim air valve is closed.

The backup mode controls flight deck and passenger cabin temperature.

END

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Non Normal Checklist Section 2 – Ice & Rain Protection

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Non Normal Checklist Section 2 – Ice & Rain Protection

NNC 2.1 **>ANTI-ICE NAC**

Condition: All of these occur:

A nacelle anti-ice system is on
TAT is more than 12°C
Ice is not detected by the ice detector

END

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Non Normal Checklist Section 2 – Ice & Rain Protection

NNC 2.2 **>ANTI-ICE WING**

Condition: All of these occur:

The wing anti-ice system is on
TAT is more than 12°C
Ice is not detected by the ice detector

END

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Non Normal Checklist Section 2 – Ice & Rain Protection

NNC 2.3 **HEAT L, R AOA**

Condition: An AOA probe heat has failed.

Flight in icing conditions may result in erroneous flight instrument indications.

END

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Non Normal Checklist Section 2 – Ice & Rain Protection

NNC 2.4 **HEAT L, R TAT**

Condition: One of these occurs:

TAT probe heat is failed off
Air/ground logic failure, TAT probe is heated on the ground

Flight in icing conditions may result in unreliable performance calculations.

END

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Non Normal Checklist Section 2 – Ice & Rain Protection

NNC 2.5 **HEAT P/S CAPT, F/O**

Condition: A pitot static probe heat is failed.

Objective: To isolate the failed probe to prevent erroneous flight instrument indications.

1 Disengage the autopilot.

2 Choose one:

HEAT P/S CAPT message is shown:

AIR DATA SOURCE selector (Captain).....R

AIR DATA SOURCE (First Officer).....C

Engage the R autopilot, if needed.
L and C autopilots are unreliable.

OR

HEAT P/S F/O message is shown:

Go to step **3**

3 AIR DATA SOURCE selector (Captain).....C

4 AIR DATA SOURCE selector (First Officer).....L

5 Engage the L or C autopilot, if needed.

6 **RIGHT AUTOPILOT IS UNRELIABLE**.

END

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Non Normal Checklist Section 2 – Ice & Rain Protection

NNC 2.6 **HEAT P/S L, R AUX**

Condition: A pitot static probe heat is failed.

Objective: To isolate the failed probe to prevent erroneous flight instrument indications.

1 Disengage the autopilot.

2 Choose one:

HEAT P/S R AUX message is shown:

AIR DATA SOURCE selector (Captain).....R

AIR DATA SOURCE selector (First Officer).....C

Engage the R autopilot, if needed.

L and C autopilots are unreliable.

OR

HEAT P/S L AUX message is shown:

Go to step **3**

3 AIR DATA SOURCE selector (Captain).....C

4 AIR DATA SOURCE selector (First Officer).....L

5 Engage the L or C autopilot, if needed.

6 **R AUTOPILOT IS UNRELIABLE**.

END

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Non Normal Checklist Section 2 – Ice & Rain Protection

NNC 2.7 **HEAT WINDOW L, R**

Condition: Window heat is off.

Objective: To attempt to reset the window heat.

1 WINDOW HEAT switch (affected window).....Off 10 secs, then ON

2 Choose one:

HEAT WINDOW message stays shown:

WINDOW HEAT switch (affected window).....OFF

OR

HEAT WINDOW message blanks:

Continue normal operation.

END

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Non Normal Checklist Section 2 – Ice & Rain Protection

NNC 2.8 **>NAI VALVE 1, 2, 3, 4**

Condition: The nacelle anti-ice valve is not in the commanded position.

1 Choose one:

NACELLE ANTI-ICE switch is ON:

Nacelle anti-ice is not available for the affected engine.

Valve is failed closed.

OR

NACELLE ANTI-ICE switch is OFF:

If TAT is above 10° C:

If conditions allow, avoid high thrust settings.

Valve is failed open.

END

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Non Normal Checklist Section 2 – Ice & Rain Protection

NNC 2.9 **>VALVE WAI VALVE LEFT, RIGHT**

Condition: The wing anti-ice valve is not in the commanded position.

1 Choose one:

WING ANTI-ICE switch is ON:

WING ANTI-ICE switch.....OFF

Do not use wing anti-ice.

Valve is failed closed.

OR

WING ANTI-ICE switch is OFF:

WING ANTI-ICE switch.....ON

Valve is failed open.

Go to step **2**

2 Checklist Complete Except Deferred Items

Descent Checklist

Recall.....Checked
Briefing.....Complete
VREF.....SET
Minima.....SET & CROSSCHECKED
Autobrake.....() SET

Approach Checklist

Altimeters.....QNH SET & CROSSCHECKED
Map Integrity.....VERIFIED

Landing Checklist

Speedbrake.....ARMED
Landing Gear.....DOWN
Cabin Report.....RECEIVED
Flaps.....() GREEN
Missed Approach Altitude.....SET
After Landing:

ENGINE BLEED air switches (affected side).....OFF

ISLN valve switch (affected side).....OFF

Note:

If the WAI VALVE LEFT message is shown, **DO NOT** shut down engine 1 when towed into a gate.

Shutting down engine 1 depressurizes hydraulic system 1, and body gear steering is inoperative.

Tight turns may cause tire scrubbing.

END

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Non Normal Checklist Section 3 – Automatic Flight

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Non Normal Checklist Section 3 – Automatic Flight

NNC 3.1 **>AUTOPILOT**

Condition:

One or more of these occur:

The autopilot operates in a degraded mode

The engaged roll mode fails

The engaged pitch mode fails

END

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Non Normal Checklist Section 3 – Automatic Flight

NNC 3.2 **>AUTOPILOT DISC**

Condition:

All autopilots are disengaged.

END

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Non Normal Checklist Section 3 – Automatic Flight

NNC 3.3 **>AUTOTHROT DISC**

Condition:

The Autothrottle is disconnected.

END

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Non Normal Checklist Section 3 – Automatic Flight

NNC 3.4 **>NO AUTOLAND**

Condition:

The autoland system is not available.

END

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Non Normal Checklist Section 3 – Automatic Flight

NNC 3.4 **>NO LAND 3**

Condition:

The autoland system does not have redundancy for a triple channel autoland.

END

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Non Normal Checklist Section 4 – Electrical Systems

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Non Normal Checklist Section Electrical Systems

NNC 4.1 ELEC AC BUS 1, 2, 3, 4

Condition: The AC bus is not powered.

Objective: To attempt to reset the generator and
then the bus tie. Also, to reset the EEC if the bus is recovered.

Attempt only one reset of the Generator Control Switch.

1 GEN CONT switch (affected generator).....OFF, then ON

2 Choose one:

ELEC AC BUS message stays shown:

Do not attempt to close the bus tie

Go to step **3**

ELEC AC BUS message blanks:

Go to step **6**

3 Choose one:

ELEC AC BUS 2 or 3 message stays shown

END

Continued on next page

ELEC AC BUS 1 or 4 message stays shown

Go to step **4**

4 Choose one:

ELEC AC BUS 1 message is shown:

Avoid icing conditions.

Flight in icing conditions may result in unreliable Captain's and Standby flight instrument indications.

Go to Inoperative Items

ELEC AC BUS 4 message is shown:

Avoid icing conditions.

Flight in icing conditions may result in unreliable First Officer's flight instrument indications.

Go to Inoperative Items

Inoperative Items:

Both pitot probe heaters on one side of the airplane inop - avoid icing conditions.

Autothrottle inop - use manual throttle.

LNAV/VNAV modes inop - use HDG SEL or HDG HOLD

Reference EPR is blank - use manual throttle.

5 Do not accomplish the following checklists:

HEAT P/S CAPT, F/O

HEAT P/S L, R AUX

6 Choose one:

ELEC BUS ISLN message is not shown:

Continued on next page

ELEC BUS ISLN message is shown:

Go to step **7**

Attempt only one reset

7 BUS TIE switch (affected generator).....OFF, then AUTO

8 Choose one:

ELEC BUS ISLN message stays shown:

END

ELEC BUS ISLN message blanks:

Go to step **9**

9 Do these steps for the affected engine:

Thrust lever.....Retard to mid position

ELEC ENG CONTROL switch.....ALTN, then NORM

END

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Non Normal Checklist Section Electrical Systems

NNC 4.2 **ISLN ELEC BUS ISLN 1, 2, 3, 4**

Condition: The bus tie is open.

Objective: To attempt to reset the bus tie.

Attempt only one reset of the Bus Tie Switch.

BUS TIE switch.....OFF, then AUTO

END

Non Normal Checklist Section Electrical Systems

NNC 4.3 **>DRIVE DISC 1, 2, 3, 4**

Condition: The generator drive is disconnected.

END

Non Normal Checklist Section Electrical Systems

NNC 4.3 **ELEC GEN OFF 1, 2, 3, 4**

Condition: The generator control is open.

Objective: To attempt to reset the generator.

Attempt only one reset of the generator control switch.

GEN CONT Switch.....OFF, then ON

END

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Non Normal Checklist Section 5 – Engine Systems

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Non Normal Checklist Section Engine Systems

NNC 5.1 Aborted Engine Start

Condition: During a ground start, an abort start condition occurs.

Objective: To shut down the engine and motor it.

1 FUEL CONTROL Switch.....CUTOFF

2 Choose one:

Engine START light is illuminated:

Motor the engine for 30 seconds.

Engine START Switch.....PUSH

Engine START light is extinguished:

Go to step **3**

3 When N2 decreases below 15%:

AUTOSTART Switch.....OFF

This allows engine motoring.

Engine START Switch.....PULL

Motor the engine for 30 seconds.

Engine START Switch.....PUSH

END

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Non Normal Checklist Section Engine Systems

NNC 5.2 ENG 1, 2, 3, 4 FAIL or Multiple Engine Flameout or Stall

Condition: One of these occurs on two or more engines:

•engine flameout
•engine indications are unusual
•engine indications are more than limits
•unusual engine noises are heard
•there is no response to thrust lever movement

Objective: To attempt a rapid relight.

1 CONT IGNITION switch.....ON

2 FUEL CONTROL Switches (affected engines)..Confirm.....CUTOFF, then RUN

3 If EGT rises rapidly approaching the EGT takeoff limit:

Repeat the above step as needed.

4 Choose one:

Airspeed is less than 200 KIAS:

PACKS Control Selectors.....Set a maximum of one pack ON

Engine START switch (affected engines).....Pull

Go to step **5**

Airspeed is equal or more than 200 KIAS:

Go to step **5**

5 Engines may accelerate to idle very slowly, especially at high altitudes. Slow acceleration may be incorrectly interpreted as a hung start or an engine malfunction.

6 If N2 is steadily increasing, and EGT stays within limits, the start is progressing normally.

Continued on next page

7 Choose one:

AUTOSTART switch for the affected engine is OFF:

Monitor EGT during engine start.

END

AUTOSTART switch for the affected engine is ON:

END

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Non Normal Checklist Section Engine Systems

NNC 5.3 Engine Limit or Surge or Stall

Condition: One or more of these occur:

- **Engine indications are unusual**
- **Engine indications are rapidly approaching or exceeding limits**
- **Unusual engine noises are heard**
- **There is no response to thrust lever movement**

Objective: To attempt to recover normal engine operation, or shut down the engine if recovery is not possible.

1 Thrust lever (affected engine).....Confirm.....Retard

until indications stay within normal limits, or return to normal, or the thrust lever is at idle

2 CONT IGNITION Switch.....ON

This may prevent flameout.

3 Choose one:

EGT is stabilized or decreasing and the other engine indications are normal:

Go to step **4**

EGT continues to increase toward the limit or the abnormal condition continues:

FUEL CONTROL switch (affected engine).....Confirm.....CUTOFF

Transponder mode selector.....TA ONLY

Do not accomplish the following checklist:

ENG SHUTDOWN

END

4 Thrust lever (affected engine).....Advance slowly

check that RPM and EGT follow thrust lever movement and all indications stay within limits

5 Run the engine normally or at a reduced thrust level which is surge and stall free.

END

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Non Normal Checklist Section Engine Systems

NNC 5.4 Engine In-flight Start

Condition: An engine start is needed after a shutdown and there is:

•N1 rotation
•No fire
•No abnormal airframe vibration

1 Monitor EGT during start.

2 Engines may accelerate to idle very slowly, especially at high altitudes. Slow acceleration may be incorrectly interpreted as a hung start or an engine malfunction.

3 If N2 is steadily increasing, and EGT stays within limits, the start is progressing normally.

4 Choose one:

AUTOSTART Switch is ON:

Go to step **5**

AUTOSTART switch is OFF:

AUTO IGNITION Selector.....BOTH

Go to step **6**

5 Choose one:

X-BLD is not shown:

FUEL CONTROL Switch.....RUN

Go to step **7**

X-BLD is shown:

Engine START Switch.....PULL

FUEL CONTROL Switch.....RUN

Go to step **8**

Continued on next page

6 Choose one:

X-BLD is not shown:

CONT IGNITION Switch.....ON

FUEL CONTROL Switch.....RUN

Go to step **7**

X-BLD is shown:

Engine START Switch.....PULL

When N2 exceeds the fuel-on indicator:

FUEL CONTROL Switch.....RUN

Go to step **8**

7 Choose one:

EGT does not increase within 30 seconds or an abort start condition as listed in normal procedures occurs:

FUEL CONTROL Switch.....Confirm.....CUTOFF

END

Start is normal:

Transponder mode selector.....TA/RA

END

8 Choose one:

EGT does not increase within 30 seconds or an abort start condition as listed in normal procedures occurs:

FUEL CONTROL Switch.....Confirm.....CUTOFF

Engine START Switch.....PUSH

END

Continued on next page

Start is normal:

Transponder mode selector.....TA/RA

END

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Non Normal Checklist Section Engine Systems

NNC 5.5 Volcanic Ash

Condition: Volcanic ash is suspected when **one or more** of these occur:

•A static discharge around the windshield
•A bright glow in the engine inlets
•Smoke or dust on the flight deck
•An acrid odour

Objective: To exit the ash cloud and restart engines if needed.

Caution! Exit volcanic ash as quickly as possible. Consider a 180 degree turn.

1 Don oxygen masks and smoke goggles, if needed.

2 Establish crew communications, if needed.

3 Autothrottle Disconnect Switch.....PUSH

This allows the thrust levers to stay where manually positioned.

If conditions allow, run the engines at idle

Thrust levers.....IDLE

This reduces possible engine damage or flameout, or both, by decreasing EGT.

5 CONT IGNITION Switch.....ON

6 PACK control selectors (all).....NORM

7 HI FLOW Switch.....ON

8 NACELLE ANTI–ICE Switches.....ON

This increases bleed air extraction to improve engine stall margins.

9 WING ANTI–ICE Switch.....ON

This increases bleed air extraction to improve engine stall margins.

Continued on next page

10 If any engine is flamed out or stalled, or EGT is rapidly approaching or exceeding limit:

Engines may accelerate to idle very slowly, especially at high altitudes. Slow acceleration may be incorrectly interpreted as a hung start or an engine malfunction.

If N2 is steadily increasing, and EGT stays within limits, the start is progressing normally.

FUEL CONTROL Switch (affected engines).....Confirm.....CUTOFF, then RUN

If airspeed less than 200 KIAS:

PACK Control Selectors.....SET

Set a maximum of one pack on.

ENGINE START SWITCH (affected engines).....PULL

11AUTO IGNITION Selector.....BOTH

12 Volcanic ash can cause abnormal system operation such as:

Engine malfunctions, increasing EGT, unusually high EGT, compressor stall, or flameout

Decreased or complete loss of airspeed indications

Equipment cooling system malfunctions

Cargo fire indications

13 **Plan to land at nearest suitable airport**

END

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Non Normal Checklist Section Engine Systems

NNC 5.5 Two Engines Inoperative

Condition: A two engine landing is needed.

1 The Autothrottle is inoperative.

2 Checklist Complete Except Deferred Items

Deferred Items:

Landing commit point is gear extension

****

Warning! Go-Around after passing the landing commit point is not recommended

****

Performance is not assured

Use Flaps 25 and VREF 25 for landing

PACK Control Selectors.....Two Packs OFF

Descent Checklist

Recall.....Checked
Briefing.....Complete
VREF.....SET
Minima.....SET & CROSSCHECKED
Autobrake.....() SET

Approach Checklist

Altimeters.....QNH SET & CROSSCHECKED
Map Integrity.....VERIFIED

Continued on next page

Go-around procedure review:

If a go-around is absolutely required:

DO NOT use TO/GA

Set flaps 20, at the same time increase thrust as airspeed increases while maintaining directional control

Retract the landing gear without delay

Retract flaps to FLAP 1 on schedule. Descent may be required

Climb at VREF 30+60

Extend the landing gear and select flaps 20 at glideslope intercept, or at final descent point.

Approaching 1,000' AGL select flaps 25 and center Rudder Trim.

Landing Checklist

Speedbrake.....ARMED
Landing Gear.....DOWN
Cabin Report.....RECEIVED
Flaps.....25 GREEN
Missed Approach Altitude.....SET

END

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Non Normal Checklist Section Engine Systems

NNC 5.7 **ENG 1, 2, 3, 4 OIL PRESS**

Condition: The oil pressure is low.

1 Choose one:

Oil pressure is above the red line limit:

END

Oil pressure is at or below the red line limit:

Go to step **2**

2 Thrust Lever (affected engine).....Confirm.....IDLE

3 FUEL CONTROL Switch (affected engine).....Confirm.....CUTOFF

4 Transponder mode selector.....TA ONLY

5 Do not accomplish the following checklist:

ENG SHUTDOWN

END

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Non Normal Checklist Section Engine Systems

NNC 5.8 ENG 1, 2, 3, 4 OIL TEMP

Condition: The oil temperature is high.

1 Thrust Lever (affected engine).....Confirm.....Retard slowly

until the temperature decreases

2 Choose one:

ENG OIL TEMP message blanks:

Run the engine at a thrust level to keep the ENG OIL TEMP message from showing.

END

Oil temperature does not decrease below the red line limit or stays in the amber band for longer than 20 minutes:

Go to step 3

3 Thrust Lever (affected engine).....Confirm.....IDLE

4 FUEL CONTROL Switch (affected engine).....Confirm.....CUTOFF

5 Transponder mode selector.....TA ONLY

6 Do not accomplish the following checklist:

ENG SHUTDOWN

END

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Non Normal Checklist Section Engine Systems

NNC 5.9 **ENG 1, 2, 3, 4 FAIL**

Condition: One of these occurs:

•An engine failure
•An engine flameout

1 **If more than one ENG FAIL message is shown**:

Go to the ENG 1, 2, 3, 4 FAIL or Multiple Engine Flameout or Stall Checklist

2 Thrust lever.....Confirm.....IDLE

3 FUEL CONTROL Switch.....Confirm.....CUTOFF

4 Transponder mode selector.....TA ONLY

5 Do not accomplish the following checklist:

ENG SHUTDOWN

6 A restart may be attempted if there is N1 rotation and no abnormal airframe vibration.

7 Choose one:

Restart is not needed:

END

Restart is needed:

Go to step **8**

8 Monitor EGT during start.

9 Engines may accelerate to idle very slowly, especially at high altitudes. Slow acceleration may be incorrectly interpreted as a hung start or an engine malfunction.

10 If N2 is steadily increasing, and EGT stays within limits, the start is progressing normally.

Continued on next page

1 Choose one:

AUTOSTART switch is ON:

Go to step **12**

AUTOSTART switch is OFF:

AUTO IGNITION Selector.....BOTH

Go to step **13**

12 Choose one:

X-BLD is not shown:

FUEL CONTROL Switch.....RUN

Go to step **14**

X-BLD is shown:

Engine START Switch.....PULL

FUEL CONTROL Switch.....RUN

Go to step **15**

13 Choose one:

X-BLD is not shown:

CONT IGNITION Switch.....ON

FUEL CONTROL Switch.....RUN

Go to step 14

X-BLD is shown:

Engine START Switch.....PULL

When N2 exceeds the fuel-on indicator:

FUEL CONTROL Switch.....RUN

Go to step **15**

Continued on next page

14 Choose one:

EGT does not increase within 30 seconds or an abort start condition as listed in normal procedures occurs:

FUEL CONTROL Switch.....Confirm.....CUTOFF

Start is normal:

Transponder mode selector.....TA/RA

END

15 Choose one:

EGT does not increase within 30 seconds or an abort start condition as listed in normal procedures occurs:

FUEL CONTROL Switch.....Confirm.....CUTOFF

Engine START switch.....PUSH

END

Start is normal:

Transponder mode selector.....TA/RA

END

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Non Normal Checklist Section 6 – Engine Systems

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Non Normal Checklist Section Engine Systems

NNC 6.1 FIRE APU

Condition: Fire is detected in the APU

1 APU Fire Switch.....Confirm.....PULL, rotate to the stop and hold for 1 second

2 Choose one:

FIRE APU message stays shown:

Plan to land at the nearest suitable airport.

Go to step 3

FIRE APU message blanks:

Go to step 3

3 Do not accomplish the following checklist:

APU

END

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Non Normal Checklist Section Engine Systems

NNC 6.2 **>DET FIRE APU**

Condition: APU fire detection is inoperative.

Aircraft **MUST NOT** be dispatched in this condition.

END

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Non Normal Checklist Section Engine Systems

NNC 6.3 FIRE CARGO AFT

Condition: Smoke is detected in the lower aft cargo compartment

1 AFT CARGO FIRE ARM Switch.....Confirm.....ARMED

2 PACK 3 Control Selector.....OFF

3 PACK 1 or 2 Control Selector.....OFF, set a maximum of one pack ON

4 CARGO FIRE DISCH Switch.....PUSH and hold for one second

195 minutes of fire suppression are available

5 Choose one:

Airplane is at or below 8,000 feet:

Go to step **9**

Airplane is above 8,000 feet:

Go to step **6**

6 LDG ALT Switch.....MAN

7 LDG ALT Selector.....SET

Set the landing altitude between 8,000 and 8,500 to command cabin altitude to 8,000 feet

8 Direct SCCM to remove power from all galley chillers. An operating galley chiller may allow smoke to enter the cabin.

9 Plan to land at the nearest suitable airport

10 Do not accomplish the following checklist:

LANDING ALT

11 Checklist Complete Except Deferred Items

Continued on next page

Before Descent

LDG ALT Switch.....AUTO

Descent Checklist

Recall.....Checked
Briefing.....Complete
VREF.....SET
Minima.....SET & CROSSCHECKED
Autobrake.....() SET

Approach Checklist

Altimeters.....QNH SET & CROSSCHECKED
Map Integrity.....VERIFIED

Warning!

Inform ground personnel not to open the cargo door until all passengers and crew have exited the airplane and fire fighting equipment is nearby.

Landing Checklist

Speedbrake.....ARMED
Landing Gear.....DOWN
Cabin Report.....RECEIVED
Flaps.....() GREEN
Missed Approach Altitude.....SET

END

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Non Normal Checklist Section Engine Systems

NNC 6.4 **FIRE CARGO FWD**

Condition: Smoke is detected in the lower forward cargo compartment

1 FWD CARGO FIRE ARM Switch.....Confirm.....ARMED

2 PACK 3 Control Selector.....OFF

3 PACK 1 or 2 control Selector.....OFF

set a maximum of one pack on

4 CARGO FIRE DISCH Switch.....PUSH and hold for one second

195 minutes of fire suppression are available

5 Choose one:

Airplane is at or below 8,000 feet:

Go to step **9**

Airplane is above 8,000 feet:

Go to step **6**

6 LDG ALT Switch.....MAN

7 LDG ALT Selector.....SET

Set the landing altitude between 8,000 and 8,500 to command cabin altitude to 8,000 feet

8 Direct the SCCM to remove power from all galley chillers. An operating galley chiller may allow smoke to enter the cabin.

9 Plan to land at the nearest suitable airport

10 Do not accomplish the following checklist:
LANDING ALT

Continued on next page

11 Checklist Complete Except Deferred Items

Deferred Items

Before descent

LDG ALT Switch.....AUTO

Descent Checklist

Recall.....Checked
Briefing.....Complete
VREF.....SET
Minima.....SET & CROSSCHECKED
Autobrake.....() SET

Approach Checklist

Altimeters.....QNH SET & CROSSCHECKED
Map Integrity.....VERIFIED

Warning!

Inform ground personnel not to open the cargo door until all passengers and crew have exited the airplane and fire fighting equipment is nearby.

Landing Checklist

Speedbrake.....ARMED
Landing Gear.....DOWN
Cabin Report.....RECEIVED
Flaps.....() GREEN
Missed Approach Altitude.....SET

END

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NNC 6.5 **>CARGO DET AIR**

Condition: Cargo smoke detection airflow is not sufficient.

END

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Non Normal Checklist Section Engine Systems

NNC 6.6 **>DET FIRE/OHT 1, 2, 3, 4**

Condition: Engine fire and overheat detection is inoperative.

2 Fire Detection Loops are fitted to each engine.

Aircraft may be dispatched with 1 Fire Detection Loop INOP following ground engineer inspection.

END

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Non Normal Checklist Section Engine Systems

NNC 6.7 **FIRE ENG 1, 2, 3, 4**

Or

Engine Severe Damage or Separation

Condition: One or more of these occur:

•Engine fire warning
•Airframe vibrations with unusual engine indications
•Engine separation

1 Thrust Lever (affected engine)....Confirm.....IDLE

2 FUEL CONTROL Switch (affected engine).....Confirm.....CUTOFF

3 Engine Fire Switch (affected engine) . . . . Confirm. . . . . PULL

4 If the FIRE ENG message is shown:

Engine fire switch.....Rotate to the stop and hold for 1 second

If after 30 seconds the FIRE ENG message stays shown:

Engine Fire Switch.....Rotate to the other stop and hold for 1 second

5 If high vibration occurs and continues after engine shutdown:

Without delay, reduce airspeed and descend to a safe altitude which results in an acceptable vibration level. If high vibration returns and further airspeed reduction and descent are not practical, increasing airspeed may reduce the vibration.

Go to step **6**

6 Transponder mode selector.....TA ONLY

7 For severe engine damage, separation, or an engine fire that does not extinguish:

Plan to land at the nearest suitable airport.

8 Do not accomplish the following checklist:

ENG SHUTDOWN
END

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Non Normal Checklist Section Engine Systems

NNC 6.8 FIRE WHEEL WELL

Condition: Fire is detected in a main wheel well.

1 When extending or retracting the landing gear, do not exceed the gear EXTEND limit speed (270K/.82M).

2 Landing Gear Lever.....DOWN

This attempts to remove and extinguish the fire source.

3 Do not use FMC fuel predictions with gear extended.

4 Choose one:

Gear must be retracted for airplane performance:

Go to step **5**

Gear does not need to be retracted for airplane performance:

Go to step **6**

5 When the FIRE WHEEL WELL message blanks:

Wait 20 minutes.

This attempts to ensure the wheel well fire is extinguished.

Landing gear lever .....UP, then OFF

6 **Plan to land at the nearest suitable airport**.

END

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Non Normal Checklist Section 7 – Fuel

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Non Normal Checklist Section Engine Systems

NNC 7.1 FUEL IMBAL 1-4

Condition: There is a fuel imbalance of 1,360 kgs between main tanks 1 and 4.

Objective: To check for indications of an engine fuel leak before balancing fuel.

1 The FUEL IMBAL message may be caused by an engine fuel leak.

2 For indications of an engine fuel leak, check:

Total fuel remaining on EICAS compared to planned fuel remaining

Fuel flow indications, for an engine with excessive fuel flow

Individual tank quantities

Totalizer compared to calculated quantities (PROGRESS page 2). The TOTALIZER value is the sum of the individual tank quantities. The CALCULATED value is the totalizer value at engine start minus fuel used (calculated using fuel flow rates and time)

3 Choose one:

There is an indication of an engine fuel leak:

Go to the Fuel Leak Engine checklist

There is no indication of an engine fuel leak:

Go to step **4**

4 Configure the fuel pumps and crossfeed valves as needed to balance fuel.

5 When fuel balancing is complete:

Resume normal fuel management.

END

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Non Normal Checklist Section Engine Systems

NNC 7.2 **FUEL IMBAL 2-3**

Condition: There is a fuel imbalance of 2,720 kgs between main tanks 2 and 3.

Objective: To check for indications of an engine fuel leak before balancing fuel.

1 The FUEL IMBAL message may be caused by an engine fuel leak.

2 For indications of an engine fuel leak, check:

Total fuel remaining on EICAS compared to planned fuel remaining

Fuel flow indications, for an engine with excessive fuel flow

Individual tank quantities

Totalizer compared to calculated quantities (PROGRESS page 2). The TOTALIZER value is the sum of the individual tank quantities. The CALCULATED value is the totalizer value at engine start minus fuel used (calculated using fuel flow rates and time)

3 Choose one:

There is an indication of an engine fuel leak:

Go to the Fuel Leak Engine checklist

There is no indication of an engine fuel leak:

Go to step **4**

4 Configure the fuel pumps and crossfeed valves as needed to balance fuel.

5 When fuel balancing is complete:

Resume normal fuel management.

END

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Non Normal Checklist Section Engine Systems

NNC 7.3 FUEL IMBALANCE

Condition: There is a fuel imbalance of 2,720 kgs between the inboard and outboard main tanks after the >FUEL TANK/ENG message shows.

Objective: To check for indications of an engine fuel leak before balancing fuel.

1 The FUEL IMBAL message may be caused by an engine fuel leak.

2 For indications of an engine fuel leak, check:

Total fuel remaining on EICAS compared to planned fuel remaining

Fuel flow indications, for an engine with excessive fuel flow

Individual tank quantities

Totalizer compared to calculated quantities (PROGRESS page 2). The TOTALIZER value is the sum of the individual tank quantities. The CALCULATED value is the totalizer value at engine start minus fuel used (calculated using fuel flow rates and time)

3 Choose one:

There is an indication of an engine fuel leak:

Go to the Fuel Leak Engine checklist

There is no indication of an engine fuel leak:

Go to step **4**

4 Configure the fuel pumps and crossfeed valves as needed to balance fuel.

5 When fuel balancing is complete:

Resume normal fuel management.

END

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Non Normal Checklist Section Engine Systems

NNC 7.4 FUEL JETT SYS

Condition: Fuel jettison is needed.

1FUEL JETTISON Selector.....SEL A or SEL B

2 If SEL position used:

FUEL TO REMAIN.....SET

3 FUEL JETTISON NOZZLE Valve Switches (both).....ON

4 Fuel Pump Switches (all tanks that have fuel).....ON

This turns on Centre Wing Tank Pump Switches which may be off. This ensures override pumps 2 and 3 are ON.

5 Do not extend or retract flaps between FLAP 1 and 5 during fuel jettison.

6 Do not accomplish the following checklist during jettison:

FUEL OVRD 2, 3

This precludes turning the FUEL OVRD 2, 3 pumps off if low back pressure and high flow rates trigger a low pressure indication.

7 When the FUEL PRESS CTR message shows:

CTR pump switches (both).....OFF

8 When jettison is complete:

FUEL JETTISON NOZZLE Valve Switches (both).....OFF

FUEL JETTISON Selector.....OFF

END

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NNC 7.5 FUEL JETTISON

Condition: Fuel jettison is needed.

1FUEL JETTISON Selector.....SEL A or SEL B

2 If SEL position used:

FUEL TO REMAIN.....SET

3 FUEL JETTISON NOZZLE Valve Switches (both).....ON

4 Fuel pump switches (all tanks that have fuel).....ON

This turns on centre wing tank pump switches which may be off. This ensures override pumps 2 and 3 are on.

5 Do not extend or retract flaps between FLAP 1 and 5 during fuel jettison.

6 Do not accomplish the following checklist during jettison:

FUEL OVRD 2, 3

This precludes turning the FUEL OVRD 2, 3 pumps off if low back pressure and high flow rates trigger a low pressure indication.

7 When the FUEL PRESS CTR message shows:

CTR pump switches (both).....OFF

8 When jettison is complete:

FUEL JETTISON NOZZLE valve switches (both).....OFF

FUEL JETTISON selector.....OFF

END

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NNC 7.5 FUEL LEAK ENGINE

Condition: An in-flight engine fuel leak is suspected or confirmed. (Items which may indicate an engine fuel leak are listed in the Additional Information section.)

Objective: To verify that there is an engine fuel leak. To identify the leaking engine, and shut down the engine.

1 CTR pump switches (both).....OFF

2 FUEL X FEED valve switches (all).....OFF

3 OVRD 2 pump switches (both).....OFF

4 OVRD 3 pump switches (both).....OFF

5 Identify an engine fuel leak by observing one main tank fuel quantity decreasing faster than other main tank fuel quantities.

6 An increase in fuel imbalance of approximately 500 kg or more in 30 minutes should be considered an engine fuel leak.

7 If conditions allow:

Visually check for an engine fuel leak.

8 Do not accomplish the following checklists:

FUEL IMBAL 1-4
FUEL IMBAL 2-3
FUEL IMBALANCE
X FEED CONFIG

9 Choose one:

All main tank quantities decrease at same rate (an engine fuel leak is not confirmed):

Resume normal fuel management.

END

If the FUEL DISAGREE - PROG 2 message is shown on the CDU scratchpad:

Continued on next page

Select PROGRESS PAGE 2.

TOTALIZER or CALCULATED.....Select USE for the most accurate indication

Go to step **17**

Any main tank quantity decreases at a different rate (an engine fuel leak is confirmed):

Go to step **10**

10 Thrust Lever (affected engine).....Confirm.....CLOSE

11 If conditions allow:

Run at idle for two minutes to allow the engine to cool and stabilize.

12 FUEL CONTROL Switch (affected engine).....Confirm.....CUTOFF

13 Transponder mode selector.....TA ONLY

14 Do not accomplish the following checklist:

ENGINE SHUTDOWN

15 Choose one:

FUEL DISAGREE - PROG 2 message is shown on the CDU scratchpad:

Select PROGRESS PAGE 2.

TOTALIZER.....Select USE TOTALIZER to determine fuel remaining.

Go to step **16**

FUEL DISAGREE - PROG 2 message is not shown on the CDU scratchpad:

Go to step **16**

16 After engine shutdown, all remaining fuel can be used for the operating engines. Resume normal fuel management.

Continued on next page

17 Choose one:

FUEL QTY LOW message is not shown:

END

FUEL QTY LOW message is shown:

Go to step 18

18 FUEL X FEED valve switches (all).....ON

19 Fuel pump switches (all tanks that have fuel).....ON

20 Plan to land at nearest suitable airport.

21 Avoid high nose up attitude and excessive acceleration and deceleration.

22 Do not accomplish the following checklist:

FUEL QTY LOW

END

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NNC 7.7 **>FUEL OVD CTR L, R**

Condition: One of these occurs:

•On the ground, the center wing tank quantity is 900 kgs or more with the pump switch off
•In cruise, the center wing tank quantity is 900 kgs or more with the pump switch off

Turn OFF centre wing pumps

END

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NNC 7.8 **PRESS FUEL PUMP 1, 4 AFT, FWD**

Condition: The pump pressure is low.

1 MAIN pump switch (affected pump(s))…….OFF

2 Choose one:

At least one main pump in tank 1 and at least one main pump in tank 4 are operative:

END

Both main pumps in tank 1 or both main pumps in tank 4 are inoperative:

Go to step **3**

3 The last 3,200 kgs of fuel in the affected tank are available only by suction feed.

4 When the >FUEL TANK/ENG message shows:

Do not accomplish the fuel tank to engine procedure.

5 When the FUEL OVRD 2 and 3, AFT and FWD messages show:

OVRD 2 pump switches (both)…….OFF

OVRD 3 pump switches (both)…….OFF

FUEL X FEED 1 and 4 valve switches…….OFF

Fuel in the affected tank (1 or 4) is available only by suction feed. The unaffected tank pumps operate normally.

END

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Non Normal Checklist Section Engine Systems

NNC 7.9 **PRESS FUEL PUMP 2, 3 AFT, FWD**

Condition: The pump pressure is low.

1 MAIN pump switch (affected pump(s))…….OFF

2 Choose one:

At least one main pump in tank 2 and at least one main pump in tank 3 are operative:

END

Both main pumps in tank 2 or both main pumps in tank 3 are inoperative:

Go to step 3

3 OVRD 2 pump switches (both)……ON

4 OVRD 3 pump switches (both)……ON

5 The last 3,200 kgs of fuel in the affected tank are available only by suction feed.

6 When the >FUEL TANK/ENG message shows:

Do not accomplish the fuel tank to engine procedure.

FUEL X FEED 1 and 4 valve switches……OFF

7 When the FUEL OVRD 2 and 3, AFT and FWD messages show:

OVRD 2 pump switches (both)……OFF

OVRD 3 pump switches (both)……OFF

FUEL X FEED valve switch (affected tank)……OFF

This prevents fuel imbalance and fuel starvation.

Fuel in main tanks 2 and 3 is at standpipe level, 3,200 kgs.

END

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NNC 7.10 FUEL QTY LOW

Condition: Fuel quantity 900 kgs or less in one or more main tanks.

Objective: To check for indications of an engine fuel leak before configuring the fuel system.

1 The FUEL QTY LOW message may be caused by an engine fuel leak.

2 For indications of an engine fuel leak, check:

Total fuel remaining on EICAS compared to planned fuel remaining

Fuel flow indications, for an engine with excessive fuel flow

Individual tank quantities

Totalizer compared to calculated quantities (PROGRESS page 2). The TOTALIZER value is the sum of the individual tank quantities. The CALCULATED value is the totalizer value at engine start minus fuel used (calculated using fuel flow rates and time)

3 Choose one:

There is an indication of an engine fuel leak:

Go to the Fuel Leak Engine checklist

END

There is no indication of an engine fuel leak:

Go to step 4

4 FUEL X FEED valve switches (all).....ON

5 Fuel pump switches (all tanks that have fuel).....ON

6 Plan to land at the nearest suitable airport.

7 Avoid high nose up attitude and excessive acceleration and deceleration.

END

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NNC 7.11 **>FUEL TANK/ENG**

Condition: One of these occurs with crossfeed valve 1 or 4 open:

•Main tank 2 quantity is equal to or less than main tank 1 quantity or main tank 3 quantity is equal to or less than main tank 4 quantity.

•On the ground after refuelling, after initial electrical power established, main tank 2 quantity less than or equal to main tank 1 quantity plus 500 kgs and main tank 3 quantity less than or equal to main tank 4 quantity plus 500 kgs.

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NNC 7.12 **FUEL TEMP LOW**

Condition: Fuel temperature is near the minimum.

1 Choose one:

Fuel temperature is not approaching the fuel temperature limit (3°C above the fuel freeze point):

Check the fuel temperature regularly. Do this checklist if the fuel temperature approaches the fuel temperature limit (3°C above the fuel freeze point).

END

Fuel temperature is approaching the fuel temperature limit (3°C above the fuel freeze point):

Go to step 2

2 Increase airspeed, or change altitude, or deviate to a warmer air mass, or all three, to achieve a TAT equal to or higher than the fuel temperature limit.

3 TAT will increase approximately 0.5 to 0.7 degrees C for each .01 Mach increase in speed.

4 In extreme conditions, it may be necessary to descend to as low as FL250.

END

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NNC 7.13 **>JETT NOZ ON**

Condition: A jettison nozzle valve is open.

END

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NNC 7.14 **VALVE >JETT NOZ ON L, R**

Condition: Fuel jettison nozzle valve position disagrees with commanded position.

END

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NNC 7.15 **>X FEED CONFIG**

Condition: A fuel crossfeed valve is not in the correct position.

END

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Non Normal Checklist Section 8 Engine Systems

NNC 8.1 FAULT HYD OVHT SYS 1, 2, 3, 4

Condition: The system temperature is high.

Objective: To cool the system and, if the overheat persists, to configure for landing.

1 Choose one:

HYD OVHT SYS 1 message is shown:

Use the L or R autopilot.

Go to step **2**

HYD OVHT SYS 2 message is shown:

Use the C or L autopilot.

Go to step **2**

HYD OVHT SYS 3 message is shown:

Use the R or C autopilot.

Go to step **2**

HYD OVHT SYS 4 message is shown:

Go to step **2**

Cool down the system

2 ENGINE PUMP switch (affected system).....OFF

3 DEMAND PUMP selector (affected system).....OFF

4 When the HYD OVHT SYS message blanks:

DEMAND PUMP Selector (affected system).....AUTO

Do not accomplish the following checklist:

HYD PRESS ENG

Continued on next page

5 Choose one:

HYD OVHT SYS message shows again:

Go to step **6**

HYD OVHT SYS message stays blank:

Continue normal operation.

END

Depressurize the system

6 DEMAND PUMP Selector (affected system).....OFF

7 Do not accomplish the following checklist:

HYD PRESS SYS

8 Note degraded or inoperative system items below.

System 1

Inoperative Items

Left outboard elevator inop. Pitch control is reduced.

Inboard trailing edge flap hydraulic operation inop. Trailing edge flaps move in secondary mode.

Secondary extension from flaps 1 to 5 requires approximately 4 minutes. During approach, allow extra time for flap extension.

Nose and body gear hydraulic extension and retraction inop. Alternate gear extension is needed.

Nose and body gear steering inop. A tow will be needed after landing.

System 1 alternate brake source inop. System 4 primary and system 2 alternate brake sources are available.

Thrust reverser engine 1. Use symmetrical thrust unless stopping distance is critical.

Continued on next page

System 2

Inoperative Items

Two outboard spoiler panels on each wing inop. Roll rate and spoiler capability are reduced.

System 2 hydraulic power to stabilizer trim inop. System 3 powers the trim at half rate.

System 2 alternate brake source inop. System 4 normal and system 1 alternate brake sources are available.

Thrust reverser engine 2. Use symmetrical thrust unless stopping distance is critical.

System 3

Inoperative Items

System 3 hydraulic power to stabilizer trims inop. System 2 powers the trim at half rate.

Two outboard spoiler panels on each wing inop. Roll rate and spoiler capability are reduced.

Thrust reverser engine 3. Use symmetrical thrust unless stopping distance is critical.

Continued on next page

System 4

Inoperative Items

Right outboard elevator inop. Pitch control is reduced.

Outboard trailing edge flap hydraulic operation inop. Trailing edge flaps move in secondary mode.

Secondary extension from flaps 1 to 5 requires approximately 4 minutes. During approach, allow extra time for flap extension.

Two inboard spoiler panels on each wing inop. Roll rate and spoiler capability are reduced.

Wing gear hydraulic extension and retraction inop. Alternate gear extension is needed.

System 4 primary brake source inop. System 1 and system 2 alternate brake sources are available.

Autobrake inop. Manual braking is needed.

Thrust reverser engine 4

Use symmetrical thrust unless stopping distance is critical.

9 Recall switch . . . . . Push

Continued on next page

10 Choose one:

Only one HYD PRESS SYS message is shown:

Go to step **14**

More than one HYD PRESS SYS message is shown:

Go to step **11**

11 **Plan to land at the nearest suitable airport**.

12 Use flaps 25 and VREF 30+20 for landing.

13 Cross wind limit is 20 knots.

Continued on next page

14 Checklist Complete Except Deferred Items

Deferred Items

Descent Checklist

Recall.....Checked
Briefing.....Complete
VREF.....SET or VREF 30+20 with more than one system inop
Minima.....SET & CROSSCHECKED
Autobrake.....() or OFF with system 4 inop

Approach Checklist

Altimeters.....QNH SET & CROSSCHECKED
Map Integrity.....VERIFIED

Choose one:

Both Systems 1 and 4 are inoperative:

Go to A - Both Systems 1 and 4 are inoperative

Both Systems 2 and 3 are inoperative:

Go to B - Both Systems 2 and 3 are inoperative

Only System 2 is inoperative:

Go to Landing Checklist

Only System 3 is inoperative:

Go to Landing Checklist

All other system failure conditions:

Go to C - All other system failure conditions

Continued on next page

A - Both Systems 1 and 4 are inoperative

Trailing edge flaps move in secondary mode. Secondary extension from flaps 1 to 5 requires approximately 4 minutes. During approach, allow extra time for flap extension.

Do not accomplish the following checklist:

FLAPS PRIMARY

Alternate Gear Extension

Landing Gear Lever.....OFF

Do not exceed the gear EXTEND limit speed (270K/.82M).

ALTN NOSE/BODY and WING GEAR EXTEND Switches.....ALTN

Action is not reversible

When all gear are down:

Landing Gear Lever.....DOWN

AUTOBRAKES Selector.....OFF

The speedbrake lever does not extend past the flight detent until the nose gear is on the runway.

Extend the ground spoilers manually and slowly. Automatic extension of the outboard ground spoilers, without automatic extension of the inboard ground spoilers, causes the nose to pitch up.

Thrust reversers are only available after the nose gear is on the runway.

Go to Landing Checklist

B - Both Systems 2 and 3 are inoperative

Stabilizer trim and elevator feel are inoperative. Avoid abrupt elevator movement.

All autopilots are inoperative.

Go to Landing Checklist

Continued on next page

C - All other system failure conditions

Trailing edge flaps move in secondary mode. Secondary extension from flaps 1 to 5 requires approximately 4 minutes. During approach, allow extra time for flap extension.

Do not accomplish the following checklist:

FLAPS PRIMARY

Alternate Gear Extension

Landing Gear Lever.....OFF

Do not exceed the gear EXTEND limit speed (270K/.82M).

ALTN NOSE/BODY and WING GEAR EXTEND Switches.....ALTN

Action is not reversible

When all gear are down:

Landing Gear Lever.....DOWN

AUTOBRAKES Selector.....OFF

If system 4 is inoperative:

AUTOBRAKES Selector.....OFF

The speedbrake lever does not extend past the flight detent until the nose gear is on the runway.

Extend the ground spoilers manually and slowly. Automatic extension of the outboard ground spoilers, without automatic extension of the inboard ground spoilers, causes the nose to pitch up.

Go to Landing Checklist

Landing Checklist

Speedbrake.....ARMED or DOWN with system 4 inop
Landing Gear.....DOWN
Cabin Report.....RECEIVED
Flaps..... ... () SET or 25 with more than one system inop
Missed Approach Altitude.....SET

END

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NNC 8.2 **HYD PRESS DEM 1, 2, 3, 4**

Condition: The pump pressure is low.

Objective: To avoid system contamination or pump damage.

1 DEMAND PUMP selector (affected system).....ON

2 Choose one:

HYD PRESS DEM message blanks:

Continue normal operation.

END

HYD PRESS DEM message stays shown:

Go to step **3**

3 DEMAND PUMP selector (affected system).....OFF

END

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Non Normal Checklist Section 8 Engine Systems

NNC 8.3 **HYD PRESS ENG 1, 2, 3, 4**

Condition: The pump pressure is low.

Objective: To avoid system contamination or pump damage.

1 ENGINE PUMP Switch (affected system).....OFF
END

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Non Normal Checklist Section 8 Engine Systems

NNC 8.4 **HYD PRESS SYS 1, 2, 3, 4**

Condition: The hydraulic system pressure is low.

Objective: To attempt to restore system pressure, avoid further system damage, and configure for landing using alternate systems.

1 DEMAND PUMP Selector (affected system).....ON

2 ENGINE PUMP switch (affected system).....OFF

3 Do not accomplish the following checklist:

HYD PRESS ENG

4 Choose one:

HYD PRESS SYS message blanks:

Continue normal operation.

END

HYD PRESS SYS message stays shown:

Go to step **5**

5 DEMAND PUMP Selector (affected system).....OFF

6 Note degraded or inoperative system items below.

Continued on next page

System 1

Inoperative Items

Centre autopilot inop. Left and right autopilots are available.

Left outboard elevator inop. Pitch control is reduced.

Inboard trailing edge flap hydraulic operation inop. Trailing edge flaps move in secondary mode. Secondary extension from flaps 1 to 5 requires approximately 4 minutes. During approach, allow extra time for flap extension.

Nose and body gear hydraulic extension and retraction inop. Alternate gear extension is needed.

Nose and body gear steering inop. A tow will be needed after landing.

System 1 alternate brake source inop. System 4 primary and system 2 alternate brake sources are available.

Thrust reverser engine 1. Use symmetrical thrust unless stopping distance is critical.

System 2

Inoperative Items

Right autopilot inop. Left and centre autopilots are available.

Two outboard spoiler panels on each wing inop. Roll rate and spoiler capability are reduced.

System 2 hydraulic power to stabilizer trim inop. System 3 powers the trim at half rate.

System 2 alternate brake source inop. System 4 normal and system 1 alternate brake sources are available.

Thrust reverser engine 2. Use symmetrical thrust unless stopping distance is critical.

Continued on next page

System 3

Inoperative Items

Left autopilot inop. Centre and right autopilots are available.

System 3 hydraulic power to stabilizer trim inop. System 2 powers the trim at half rate.

Two outboard spoiler panels on each wing inop. Roll rate and spoiler capability are reduced.

Thrust reverser engine 3. Use symmetrical thrust unless stopping distance is critical.

System 4

Inoperative Items

Right outboard elevator inop. Pitch control is reduced.

Outboard trailing edge flap hydraulic operation inop. Trailing edge flaps move in secondary mode. Secondary extension from flaps 1 to 5 requires approximately 4 minutes. During approach, allow extra time for flap extension.

Two inboard spoiler panels on each wing inop. Roll rate and spoiler capability are reduced.

Wing gear hydraulic extension and retraction inop. Alternate gear extension is needed.

System 4 primary brake source inop. System 1 and system 2 alternate brake sources are available.

Autobrake inop. Manual braking is needed.

Thrust reverser engine 4. Use symmetrical thrust unless stopping distance is critical.

7 Recall switch.....PUSH

8 Choose one:

Only one HYD PRESS SYS message is shown:

Go to step **12**

More than one HYD PRESS SYS message is shown:

Go to step **9**

Continued on next page

9 Plan to land at the nearest suitable airport.

10 Use flaps 25 and VREF 30+20 for landing.

11 Cross wind limit is 20 knots.

12 Checklist Complete Except Deferred Items

Deferred Items

Descent Checklist

Recall.....Checked
Briefing.....Complete
VREF.....SET or VREF 30+20 with more than one system inop
Minima.....SET & CROSSCHECKED
Autobrake.....() or OFF with system 4 inop

Approach Checklist

Altimeters.....QNH SET & CROSSCHECKED
Map Integrity.....VERIFIED

Choose one:

Both Systems 1 and 4 are inoperative:

Go to A - Both Systems 1 and 4 are inoperative

Both Systems 2 and 3 are inoperative:

Go to B - Both Systems 2 and 3 are inoperative

Only System 2 is inoperative:

Go to Landing Checklist

Only System 3 is inoperative:

Go to Landing Checklist

All other system failure conditions:

Go to C - All other system failure conditions

Continued on next page

A - Both Systems 1 and 4 are inoperative

Trailing edge flaps move in secondary mode. Secondary extension from flaps 1 to 5 requires approximately 4 minutes. During approach, allow extra time for flap extension.

Do not accomplish the following checklist:

FLAPS PRIMARY

Alternate Gear Extension

Landing Gear Lever.....OFF

Do not exceed the gear EXTEND limit speed (270K/.82M).

ALTN NOSE/BODY and WING GEAR EXTEND Switches.....ALTN

Action is not reversible

When all gear are down:

Landing Gear Lever.....DOWN

AUTOBRAKES Selector.....OFF

The speedbrake lever does not extend past the flight detent until the nose gear is on the runway.

Extend the ground spoilers manually and slowly. Automatic extension of the outboard ground spoilers, without automatic extension of the inboard ground spoilers, causes the nose to pitch up.

Thrust reversers are only available after the nose gear is on the runway.

Go to Landing Checklist

B - Both Systems 2 and 3 are inoperative

Stabilizer trim and elevator feel are inoperative. Avoid abrupt elevator movement.

All autopilots are inoperative.

Go to Landing Checklist

Continued on next page

C - All other system failure conditions

Trailing edge flaps move in secondary mode. Secondary extension from flaps 1 to 5 requires approximately 4 minutes. During approach, allow extra time for flap extension.

Do not accomplish the following checklist:

FLAPS PRIMARY

Alternate Gear Extension

Landing Gear Lever.....OFF

Do not exceed the gear EXTEND limit speed (270K/.82M).

ALTN NOSE/BODY and WING GEAR EXTEND Switches.....ALTN

Action is not reversible

When all gear are down:

Landing Gear Lever.....DOWN

AUTOBRAKES Selector.....OFF

If system 4 is inoperative:

AUTOBRAKES Selector.....OFF

The speedbrake lever does not extend past the flight detent until the nose gear is on the runway.

Extend the ground spoilers manually and slowly. Automatic extension of the outboard ground spoilers, without automatic extension of the inboard ground spoilers, causes the nose to pitch up.

Go to Landing Checklist

Landing Checklist

Speedbrake.....ARMED or DOWN with system 4 inop
Landing Gear.....DOWN
Cabin Report.....RECEIVED
Flaps..... ... () SET or 25 with more than one system inop
Missed Approach Altitude.....SET

END

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Non Normal Checklist Section 8 Engine Systems

NNC 8.5 **>HYD QTY LOW 1**

Condition: The hydraulic quantity is low.

Objective: If needed, to reconfigure to preclude a progressive loss of systems.

1 Choose one:

HYD PRESS SYS 4 is not shown:

Continue normal operation.

END

HYD PRESS SYS 4 is shown:

Go to step **2**

2 If C autopilot is engaged:

Autopilot Disengage Switch.....PUSH

L and R Autopilots are available.

3 ENGINE PUMP 1 switch.....OFF

4 DEMAND PUMP 1 selector.....OFF

5 **Plan to land at the nearest suitable airport**.

6 **Do not** accomplish the following checklists:

HYD PRESS ENG 1
HYD PRESS SYS 1

Inoperative Items

Left outboard elevator inop. Pitch control is reduced until hydraulic system 1 is repressurized before extending flaps and landing gear.

7 Checklist Complete Except Deferred Items

Continued on next page

Deferred Items

Descent Checklist

Recall.....Checked
Briefing.....Complete
VREF.....SET
Minima.....SET & CROSSCHECKED
Autobrake.....OFF

Approach Checklist

Altimeters.....QNH SET & CROSSCHECKED
Map Integrity.....VERIFIED

Just before extending the flaps and landing gear for approach:

ENGINE PUMP 1 switch.....ON

DEMAND PUMP 1 selector.....AUTO

Loss of hydraulic fluid from system 4 followed by loss of hydraulic fluid from system 1 is likely caused by leakage through the brake system.

Subsequent fluid loss from system 2 may occur.

Landing Checklist

Speedbrake.....DOWN
Landing Gear.....DOWN
Cabin Report.....RECEIVED
Flaps.....() SET
Missed Approach Altitude.....SET

END

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NNC 8.6 **>HYD QTY LOW 2, 3**

Condition: The hydraulic quantity is low.

END

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NNC 8.7 **>HYD QTY LOW 4**

Condition: The hydraulic quantity is low.

Objective: If needed, reconfigure to preclude a progressive loss of systems.

1 Choose one:

HYD PRESS SYS 4 message is shown:

Go to the HYD PRESS SYS 1, 2, 3, 4

END

HYD PRESS SYS 4 message is not shown and less than one hour from landing:

Continue normal operation.

END

HYD PRESS SYS 4 message is not shown and one hour or more from landing:

Go to step **2**

2 ENGINE PUMP 4 switch.....OFF

3 DEMAND PUMP 4 selector.....OFF

4 Do not accomplish the following checklists:

HYD PRESS ENG 4
HYD PRESS SYS 4

Inoperative Items

Two inboard spoiler panels on each wing inop. Roll rate and spoiler capability are reduced.

Right outboard elevator inop. Pitch control is reduced until hydraulic system 4 is repressurized before extending flaps and landing gear.

5 Checklist Complete Except Deferred Items

Continued on next page

Deferred Items

Descent Checklist

Recall.....Checked
Briefing.....Complete
VREF.....SET
Minima.....SET & CROSSCHECKED
Autobrake.....OFF

Approach Checklist

Altimeters.....QNH SET & CROSSCHECKED
Map Integrity.....VERIFIED

Just before extending the flaps and landing gear for approach:

ENGINE PUMP 4 switch.....ON
DEMAND PUMP 4 selector.....AUTO

Landing Checklist

Speedbrake.....ARMED
Landing Gear.....DOWN
Cabin Report.....RECEIVED
Flaps.....() SET
Missed Approach Altitude.....SET

END

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Non Normal Checklist Section 9 – Warning Systems

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Non Normal Checklist Section 9 Warning Systems

NNC 9.1 **>AIRSPEED LOW**

Condition: Airspeed is less than minimum manoeuvring speed.

END

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NNC 9.2 **>ALT CALLOUTS**

Condition: Altitude voice annunciations during approach are not supplied.

END

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NNC 9.3 **>ALTITUDE ALERT**

Condition: A deviation from the MCP set altitude occurs.

END

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Non Normal Checklist Section 9 Warning Systems

NNC 9.4 **>CONFIG FLAPS**

Condition: The flaps are not in a takeoff position (i.e. not set at 10 or 20) during takeoff.

END

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Non Normal Checklist Section 9 Warning Systems

NNC 9.5 **>CONFIG GEAR**

Condition: A landing gear is not down and locked and one of these occurs:

•A thrust lever is at idle below 800ft RA
•The flaps are in a landing position

END

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NNC 9.6 **>CONFIG GEAR CTR**

Condition: Body gear steering is not centred during takeoff.

END

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NNC 9.7 **>CONFIG PARK BRK**

Condition: The parking brake is set during takeoff.

END

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NNC 9.8 **>CONFIG SPOILERS**

Condition: The speedbrake lever is not down during takeoff.

END

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NNC 9.9 **>CONFIG STAB**

Condition: The stabilizer is not in the green band during takeoff.

END

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Non Normal Checklist Section 9 Warning Systems

NNC 9.10 **GND PROX SYS**

Condition: A ground proximity warning system fault occurs.

Note: Some or all ground proximity alerts are not available. Ground proximity alerts that occur are valid.

END

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Non Normal Checklist Section 9 Warning Systems

NNC 9.11 **>OVERSPEED**

Condition: Airspeed is more than Vmo/Mmo.

END

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Non Normal Checklist Section 9 Warning Systems

NNC 9.12 **>TCAS RA CAPT, F/O**

Condition: TCAS cannot show RA guidance on the PFD.

END

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NNC 9.13 **>TERR OVRD**

Condition: The ground proximity terrain override switch is in OVRD.

END

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Non Normal Checklist Section 10 – Non-Normal Flying Manoeuvres

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Non-Normal Manoeuvres

Flight crews are expected to do non-normal manoeuvres from memory

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Non Normal Checklist Section 10 – Non-Normal Flying Manoeuvres

NNC 10.1 Approach to Stall Recovery

Immediately accomplish the following at first indication of stall buffet or stick shaker.

<table>
<tr><th>P1</th><th>P2</th></tr>
<tr><td>• Advance the thrust levers to maximum thrust
• Smoothly adjust the pitch attitude
* to avoid ground contact or obstacles
• Level the wings (do not change flaps or landing gear configuration)
• Retract the Speedbrake.</td><td rowspan="2">• Verify maximum thrust.
• Monitor altitude and airspeed.
• Call out any trend toward terrain contact.
• Verify all required actions have been completed and call out any omissions.</td></tr>
<tr><td>When ground contact is no longer a factor:

• Adjust the pitch attitude to accelerate while minimizing altitude loss.
• Return to a speed appropriate for the configuration.</td></tr>
</table>

Note: *At high altitudes, it may be necessary to decrease pitch attitude below the horizon to achieve acceleration.

END

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Non Normal Checklist Section 10 – Non-Normal Flying Manoeuvres

NNC 10.2 Rejected Takeoff

The Commander has the sole responsibility for the decision to reject the takeoff. The decision must be made in time to start the rejected takeoff manoeuvre by V1.

If the decision is to reject the takeoff, the captain must clearly announce “REJECT,” immediately start the rejected takeoff manoeuvre, and assume control of the airplane.

If the first officer is making the takeoff, the first officer must maintain control of the airplane until the captain makes a positive input to the controls.

Prior to 80 knots, the takeoff should be rejected for any of the following:

- Activation of the master caution system
- System failure
- Unusual noise or vibration
- tire failure
- Abnormally slow acceleration
- Takeoff configuration warning
- Fire or fire warning
- Engine failure
- If the airplane is unsafe or unable to fly

The RTO function of the Autobrake becomes active at 80kts. Prior to this speed maximum manual braking MUST BE USED

Above 80 knots and prior to V1, the takeoff should be rejected for any of the following:

- Fire or fire warning
- Engine failure
- Windshear encounter
- If the airplane is unsafe or unable to fly

During takeoff, the crew member observing the non-normal situation will immediately call it out as clearly as possible.

Commander	Other Crew Member
Without delay: Simultaneously close Thrust levers & disconnect Autothrottle. <u>Below 80kts</u>: Apply maximum manual wheel brakes <u>Above 80kts</u>: Verify RTO function of the Autobrake. If RTO Autobrake selected, monitor system performance and apply manual wheel brakes if AUTOBRAKES message displayed or deceleration not sufficient Raise Speedbrake lever. Apply the maximum amount of reverse thrust on symmetric engines consistent with conditions. Continue maximum braking until certain the airplane will stop on the runway.	Verify actions as follows: Thrust levers closed. Autothrottle disconnected. Maximum brakes applied. Verify Speedbrake lever UP and call “SPEEDBRAKES UP.” If Speedbrake lever not UP, call “SPEEDBRAKES NOT UP.” Reverse thrust applied symmetrically. Call out any omitted action items.
Field length permitting: Initiate movement of Reverse Thrust Levers to reach reverse idle detent by taxi speed.	Call out 60 knots. Communicate reject decision to control tower and cabin as soon as practical.
When the airplane is stopped, perform procedures as required. Review Brake Cooling Schedule for brake cooling time and precautions (refer to Performance In-flight chapter). Consider the following: • the possibility of wheel fuse plugs melting • the need to clear the runway • the requirement for remote parking • wind direction in case of fire • alerting fire equipment • not setting parking brake unless passenger evacuation is necessary • advising the ground crew of the hot brake hazard • advising the passengers of the need to remain seated or evacuate • completion of the Non-Normal checklist (if appropriate) for conditions which caused the RTO	

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Non Normal Checklist Section 10 – Non-Normal Flying Manoeuvres

NNC 10.3 Terrain Avoidance Ground Proximity Caution

Accomplish the following manoeuvre for any of these aural alerts*:

• CAUTION OBSTACLE
• CAUTION TERRAIN
• SINK RATE
• TERRAIN
• DON'T SINK
• TOO LOW FLAPS
• TOO LOW GEAR
• TOO LOW TERRAIN
• GLIDESLOPE
• BANK ANGLE

P1	P2
Correct flight path or airplane configuration.	

The below glideslope deviation alert may be cancelled or inhibited for:

• Localizer or backcourse approach
• Circling approach from an ILS
• When conditions require a deliberate approach below glideslope
• Unreliable glideslope signal.

Note: If a terrain caution occurs when flying under daylight VMC, and positive visual verification is made that no obstacle or terrain hazard exists, the alert may be regarded as cautionary and the approach may be continued.

END

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Non Normal Checklist Section 10 – Non-Normal Flying Manoeuvres

NNC 10.4 Ground Proximity Warning

Accomplish the following manoeuver for any of these conditions**:

• Activation of “PULL UP” or "OBSTACLE OBSTACLE PULLUP" or “TERRAIN TERRAIN PULL UP” warning

• Other situations resulting in unacceptable flight toward terrain.

P1	P2
Disengage autopilot. Disconnect autothrottle Aggressively apply maximum thrust. Simultaneously roll wings level and rotate to an initial pitch attitude of 20°. Retract Speedbrake. If terrain remains a threat, continue rotation up to the pitch limit indicator or stick shaker or initial buffet.	Assure maximum thrust * Verify all required actions have been completed and call out any omissions.
Do not change gear or flap configuration until terrain separation is assured. Monitor radio altimeter for sustained or increasing terrain separation. When clear of terrain, slowly decrease pitch attitude and accelerate.	Monitor vertical speed and altitude (radio altitude for terrain clearance and barometric altitude for a minimum safe altitude). Call out any trend toward terrain contact.

Note: Aft control column force increases as airspeed decreases. In all cases, the pitch attitude that results in intermittent stick shaker or initial buffet is the upper pitch attitude limit. Flight at intermittent stick shaker may be required to obtain positive terrain separation.
Smooth, steady control will avoid a pitch attitude overshoot and stall.

Note: **Do not use** flight director commands.

Note: * Maximum thrust can be obtained by advancing the Thrust levers full forward when the EECs are in the normal mode. If terrain contact is imminent, advance Thrust levers full forward.

Note: If positive visual verification is made that no obstacle or terrain hazard exists when flying under daylight VMC conditions prior to a terrain or obstacle** warning, the alert may be regarded as cautionary and the approach may be continued.

END

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Non Normal Checklist Section 10 – Non-Normal Flying Manoeuvres

NNC 10.5 Traffic Avoidance

Immediately accomplish the following by recall whenever a TCAS traffic advisory (TA) or resolution advisory (RA) occurs.

WARNING: Comply with the RA if there is a direct conflict between the RA and air traffic control.

Note: If stick shaker or initial buffet occurs during the manoeuvre, immediately accomplish the APPROACH TO STALL RECOVERY procedure.

Note: If high speed buffet occurs during the manoeuvre, relax pitch force as necessary to reduce buffet, but continue the manoeuvre.

Note: Do not use Flight Director pitch commands until clear of conflict.

For TA:

P1	P2
Look for traffic using traffic display as a guide. Call out any conflicting traffic.	
If traffic is sighted, manoeuvre if needed.	

Note: Manoeuvres based solely on a TA may result in reduced separation and are not recommended.

For RA, except a climb in landing configuration:

WARNING: A DESCEND (fly down) RA issued below 1000ft AGL should not be followed

P1	P2
If manoeuvring is required, disengage autopilot and disconnect autothrottle. Smoothly adjust pitch and thrust to satisfy the RA command. Follow the planned lateral flight path unless visual contact with the conflicting traffic requires other action.	
Attempt to establish visual contact. Call out any conflicting traffic.	

For a climb RA in landing configuration:

P1	**P2**
Disengage autopilot and disconnect autothrottle. Advance Thrust levers forward to ensure maximum thrust is attained and call for FLAP 20. Smoothly adjust pitch to satisfy the RA command. Follow the planned lateral flight path unless visual contact with the conflicting traffic requires other action.	Verify maximum thrust set. Position Flap Lever to the FLAP 20 detent.
Verify a positive rate of climb on the altimeter and call "GEAR UP".	Verify a positive rate of climb on the altimeter and call "POSITIVE RATE". Set the Landing Gear Lever to UP.
Attempt to establish visual contact. Call out any conflicting traffic.	

END

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Unusual Attitude Recovery

An unusual attitude can generally be defined as unintentionally exceeding the following conditions:

• Pitch attitude greater than 25 degrees nose up, or
• Pitch attitude greater than 10 degrees nose down, or
• Bank angle greater than 45 degrees, or
• Within above parameters but flying at airspeeds inappropriate for the conditions

The following techniques represent a logical progression for recovering the airplane. The sequence of actions is for guidance only and represents a series of options to be considered and used depending on the situation. Not all the actions may be necessary once recovery is underway. If needed, use pitch trim sparingly. Careful use of rudder to aid roll control should be considered only if roll control is ineffective and the airplane is not stalled.

These techniques assume the airplane is not stalled. A stalled condition can exist at any altitude and may be recognized by continuous stick shaker activation accompanied by one or more of the following:

• Buffeting, which could be heavy at times
• Lack of pitch authority and/or roll control
• Inability to arrest descent rate

If the airplane is stalled, recovery from the stall must be accomplished first by applying and maintaining nose down elevator until stall recovery is complete and stick shaker activation ceases.

END

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NNC 10.6 Nose High Recovery

P1	**P2**
Recognize and confirm the situation	
Disengage autopilot and disconnect the autothrottle Apply as much as full nose-down elevator *Apply appropriate nose-down stabilizer trim Reduce thrust *Roll (adjust bank angle) to obtain a nose down pitch rate Complete the recovery: When approaching the horizon, roll to wings level Check airspeed and adjust thrust Establish pitch attitude	Call out attitude, airspeed and altitude throughout the recovery Verify all required actions have been completed and call out any omissions

END

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NNC 10.7 Nose Low Recovery

P1	P2
Recognize and confirm the situation	
Disengage autopilot and disconnect the autothrottle Recover from stall, if required *Roll in the shortest direction to wings level (unload and roll if bank angle is more than 90 degrees) Recover to level flight: Apply nose up elevator *Apply nose-up trim, if required Adjust thrust and drag as required	Call out attitude, airspeed and altitude throughout the recovery Verify all required actions have been completed and call out any omissions
WARNING: ***EXCESSIVE USE OF PITCH TRIM OR RUDDER MAY AGGRAVATE AN UPSET SITUATION OR MAY RESULT IN LOSS OF CONTROL AND/ORHIGH STRUCTURAL LOADS**	

END

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NNC 10.8 Windshear

Takeoff

Prior to V1, reject takeoff

After V1, perform a Windshear Go-Around.

If windshear encountered prior to V1, there may not be sufficient runway remaining to stop if an RTO is initiated at V1.

At VR, rotate at a normal rate toward a 15° pitch attitude.

Once in flight perform a Windshear Go-Around.

If windshear encountered near normal rotation speed and airspeed suddenly decreases, there may not be sufficient runway left to accelerate back to normal takeoff speed. If there is insufficient runway left to stop, initiate a normal rotation at least 2,000 feet before the end of the runway even if airspeed is low.

Higher than normal attitudes may be required to lift off in the remaining runway.

Ensure maximum thrust is set.

In Flight

Perform Windshear Go-Around.

Landing

Perform Windshear Go-Around, or at pilot's discretion, perform a normal go-around.

Note: The following are indications the airplane is in windshear:

Unacceptable flight path deviations are recognized as uncontrolled changes from normal steady state flight conditions below 1,000 feet AGL, in excess of any of the following:

- 15 knots indicated airspeed
- 500 FPM vertical speed
- 5 degrees pitch attitude
- 1 dot displacement from the glideslope
- Unusual thrust lever position for a significant period of time.

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Windshear Go-Around

P1	P2
MANUAL FLIGHT: Disengage autopilot Push either TO/GA Switch Aggressively apply maximum* thrust Disconnect autothrottle Simultaneously roll wings level and rotate toward an initial pitch attitude of 15° Retract Speedbrake Follow flight director TO/GA guidance (if available) AUTOMATIC FLIGHT: Press either TO/GA switch** Verify TO/GA mode annunciation Verify thrust advances to GA power Retract Speedbrake Monitor system performance***	Assure maximum* thrust. Verify all required actions have been completed and call out any omissions.

P1	P2
Do not change gear or flap configuration until windshear is no longer a factor. Monitor vertical speed and altitude. Do not attempt to regain lost airspeed until windshear is no longer a factor.	Monitor vertical speed and altitude. Call out any trend toward terrain contact, descending flight path, or significant airspeed changes.

Note: Aft control column force increases as the airspeed decreases. In all cases, the pitch attitude that results in intermittent stick shaker or initial buffet is the upper pitch attitude limit. Flight at intermittent stick shaker may be required to obtain positive terrain separation. Smooth, steady control will avoid a pitch attitude overshoot and stall.

Note: * Maximum thrust can be obtained by advancing the Thrust levers full forward when the EECs are in the normal mode. If terrain contact is imminent, advance Thrust levers full forward.

Note: ** If TO/GA is not available, disengage autopilot and disconnect autothrottle and fly manually.

WARNING: * Severe windshear may exceed the performance capability of the AFDS**

The pilot flying must be prepared to disengage the autopilot and disconnect the autothrottle and fly manually

END
