ABNORMAL / EMERGENCY CHECKLIST

BOEING 737-700/800/900

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ABORTED ENGINE START

One or more of the following conditions:

- **g** No N_1 rotation before the engine start lever is raised to IDLE.
- **g** No oil pressure indication by the time the engine is stabilized at idle.
- **g** No increase in EGT, within 10 seconds on the ground or 30 seconds in flight, after the engine start lever is raised to IDLE.
- **g** No increase in, or a very slow increase in N_1 or N_2 after EGT indication.
- **g** EGT rapidly approaching or exceeding the start limit.

Before engine start lever raised to IDLE:

ENGINE START SWITCH . . . . . OFF

After engine start lever raised to IDLE:

Before starter cutout:

ENGINE STARTER LEVER . . . . . CUTOFF

Continue to motor the engine for 60 sec.

[Clears fuel and cools engine components.]

ENGINE START SWITCH . . . . . OFF

After starter cutout:

ENGINE START LEVER . . . . . CUTOFF

After N2 decreases to below 20%:

ENGINE START SWITCH . . . . . GRD

Motor the engine for 60 sec.

[Clears fuel and cools engine components.]

ENGINE START SWITCH . . . . . OFF

ENGINE TAILPIPE FIRE

Condition: Tailpipe fire is reported with no engine fire warning.

ENGINE START LEVER . . . . . CUTOFF

If bleed air is available:

PACKS . . . . . OFF

[Allows maximum bleed air for engine motoring.]

ISOLATION VALVE . . . . . AUTO

ENGINE NO. 1 AND NO. 2 BLEED AIR . . . . . VERIFY ON

If APU is operating:

APU BLEED AIR . . . . . ON

If engine start switch is OFF/CONT:

Allow N_2 to decrease below 20%

ENGINE START SWITCH . . . . . GRD

Motor engine until tailpipe fire is reported extinguished.

ENGINE START SWITCH . . . . . OFF

TOWER AND FLIGHT ATTENDANTS . . . . . NOTIFY

LOSS OF THRUST ON BOTH ENGINES

Condition: Loss of all thust on both engines or loss of thrust lever response from both engines.

ENGINE START SWITCHES . . . . . FLT

ENGINE START LEVERS . . . . . CUTOFF

EGT decreasing:

ENGINE START LEVERS . . . . . IDLE DETENT

If EGT reaches 930EC, repeat the above steps.

Note: In moderate to heavy rain it may take up to 3 minutes to accelerate to IDLE.

APU (if available) . . . . . START & ON BUS

Do not wait for successful engine start(s) prior to starting APU.

[The APU has demonstrated the capability to provide electrical and pneumatic power up to 20.000 ft.]

If neither restarts is successful and N_2 is below 15%:

WING ANTI-ICE . . . . . OFF

PACKS . . . . . OFF

APU BLEED AIR . . . . . ON

IGNITION SELECT . . . . . BOTH

EITHER ENGINE START SWITCH . . . . . GRD

When engine parameters have stabilized:

APU BLEED AIR . . . . . OFF

ENGINE START SWITCH . . . . . FLT

THRUST LEVER . . . . . ADVANCE

ENGINE GENERATOR . . . . . ON

PACK . . . . . AUTO

Accomplish the INFLIGHT ENGINE START checklist to start the other engine.

If neither IRS attitude display recovers after a generator bus is restored:

IRS MODE SELECTORS . . . . . ATT

Maintain straight and level, constant airspeed flight untill attitude displays recover (approximately 30 seconds).

MAGNETIC HEADING . . . . . ENTER

APU . . . . . AS REQUIRED

IN-FLIGHT ENGINE START

Condition: Engine start is desired after a shutdown with no fire or apparent damage.

Complete the ENGINE FAILURE AND SHUTDOWN checklist before attempting an inflight engine start.

INFLIGHT START ENVELOPE . . . . . CHECK

CAUTION: Starter assist should be used if N_2 is below 15%.

THRUST LEVER . . . . . CLOSE

ENGINE START LEVER . . . . . CUTOFF

If starter assist is required:

PACKS . . . . . OFF

DUCT PRESSURE . . . . . MINIMUM 30 PSI

If required, advance the thrust lever to increase duct pressure.

IGNITION SELECT . . . . . BOTH

ENGINE START SWITCH . . . . . GRD/FLT

ENGINE START LEVER . . . . . IDLE DETENT

Position engine start lever to IDLE detent for a minimum of 15% N_2.

If no increase in EGT is observed within 30 seconds:

ENGINE START LEVER . . . . . CUTOFF

ENGINE START SWITCH . . . . . OFF

After engine start:

ELECTRICAL . . . . . GENERATOR ON

PACK . . . . . AUTO

ENGINE START SWITCH . . . . . AS REQUIRED

APU . . . . . AS REQUIRED

TRANSPONDER MODE SELECTOR . . . . . TA/RA

ENGINE FAILURE / SHUTDOWN

Condition: Loss of all thrust on an engine accompanied by illumination of the ENG FAIL alert or abnormal engine indications.

Accomplish an engine shutdown only when flight conditions permit.

AUTO-THROTTLE . . . . . DISENGAGE

THRUST LEVER (affected engine) . . . . . IDLE

ENGINE START LEVER (affected engine) . . . . . CUTOFF

APU . . . . . START & ON BUS

PACK (affected side) . . . . . OFF

FUEL . . . . . BALANCE

If wing anti-ice is required:

ISOLATION VALVE . . . . . AUTO

ENGINE FIRE, SEVERE DAMAGE OR SEPARATION

Condition: Fire is detected in the engine or severe damage vibration is associated with the engine or abnormal indications which occur as a result of engine separation from airplane.

AUTO-THROTTLE . . . . . DISENGAGE

THRUST LEVER . . . . . CLOSE

FUEL CONTROL LEVER . . . . . CUTOFF

ENGINE FIRE HANDLE . . . . . PULL & ROTATE

TIMER . . . . . TIME FOR 30 SECONDS

If after 30 seconds the engine fire warning remains on or the ENG OVERHEAT light remains illuminated:

ENGINE FIRE HANDLE . . . . . ROTATE TO REMAINING BOTTLE

If fire indication is not extinguished within 30 seconds of discharging second bottle, assume fire is NOT CONTAINED, even if VISUAL INDICATIONS of fire DO NOT EXIST:

LAND AS SOON AS POSSIBLE

ISOLATION VALVE . . . . . CLOSE

PACK . . . . . OFF

APU BLEED AIR . . . . . OFF

APU (if available) . . . . . START

APU GENERATOR . . . . . ON

FUEL . . . . . BALANCE

TRANSPONDER . . . . . TA

[Prevents climb commands from TCAS that may exceed single engine climb performance.]

If wing anti-ice is required:

ISOLATION VALVE . . . . . AUTO

Accomplish the ONE ENGINE INOPERATIVE LANDING checklist.

ENGINE OIL FILTER BYPASS

Condition: An engine OIL FILTER BYPASS alert illuminated indicates an impending bypass of the scavenge oil filter.

AUTO-THROTTLE	DISENGAGE
THRUST LEVER	RETARD
[Retard until the OIL FILTER BYPASS alert extinguished.]	

If OIL FILTER BYPASS alert extiguishes:

Operate the engine at reduced thrust to keep alert extinguished.

If OIL FILTER BYPASS alert remains illuminated:

Accomplish ENGINE FAIURE / SHUTDOWN checklist.

ENGINE OVERHEAT

Condition: An ENG OVERHEAT light illuminated indicates an overheat on the related engine.

THRUST LEVER	IDLE

If the ENGINE OVERHEAT light remains illuminated:

Accomplish ENGINE FAIURE / SHUTDOWN checklist.

APU FIRE

Condition: A fire has been detected in the APU.

APU FIRE HANDLE	PULL & ROTATE
APU START SWITCH	OFF

Do not restart APU as risk of uncontained fire exists.

ONE ENGINE INOPERATIVE LANDING

Condition: Landing must be accomplished with one engine inoperative.

- **g** Plan a flap 15 landing.
- **g** Set $V_{ref\ 15}$. If any of the following conditions apply, set $V_{ref\ 15}$ + 10.
  - **þ** Engine anti-ice will be used during landing
  - **þ** Wing anti-ice has been used any time during the flight.
  - **þ** Icing conditions were encountered during the flight / before landing.
- **g** When $V_{ref\ 15}$ + 10 is required, the wind additive should not exceed 10.

The following descent and approach checklist must be used:

ANTI-ICE . . . . . AS REQUIRED

AIR CONDITIONING . . . . . SET

PRESSURIZATION . . . . . SET

ALTIMETERS . . . . . SET

INSTRUMENTS . . . . . CROSS CHECK

N_1 & BUGS . . . . . CHECKED & SET ($V_{ref\ 15}$)

The following landing checklist must be used:

ENGINE START SWITCH . . . . . ON

RECALL . . . . . CHECKED

SPEED BRAKE . . . . . ARMED

LANDING GEAR . . . . . DOWN, 3 GREEN

FLAPS . . . . . 15 (FINAL SETTING)

GO-AROUND PROCEDURE:

Accomplish normal go-around procedure except:

- **þ** Use flaps 1.
- **þ** Maintain $_{Vref\ 15}$ + 5 to flap retraction altitude.
- **þ** Limit bank angle to 15 degrees until reaching $_{Vref\ 15}$ + 15.
- **þ** Accelerate to flap 1 speed prior to flap retraction.

ELECTRICAL FIRE / SMOKE / FUMES

Condition: Electrical fire / smoke / fumes is identified.

OXYGEN MASKS AND REGULATORS . . . . . ON, 100%

[Prevents the inhalation of smoke or fumes].

SMOKE GOGGLES . . . . . ON

If smoke / fumes affect vision, use the EMERGENCY position on the oxygen regulator to clear the goggles.

CREW COMMUNICATION . . . . . ESTABLISH

If source can be determined:

ELECTRICAL POWER (affected equipment) . . . . . OFF

Complete the SMOKE / FUMES REMOVAL checklist if required.

If source cannot be determined OR fire / smoke / fumes persist:

BUS TRANSFER . . . . . OFF

[Prevents unwanted transfer of power.]

CAB / UTIL POWER . . . . . OFF

IFE / PASS SEAT POWER . . . . . OFF

EQUIPMENT COOLING SUPPLY / EXHAUST . . . . . ALTERNATE

CABIN READING & GALLEY WORK LIGHTS . . . . . ON

[Flight attendants to turn ON cabin reading lights and galley lights.]

CABIN EQUIPMENT . . . . . OFF

[Flight attendants to turn OFF galley power, cabin fluorescent light and IFE.]

LAND AT THE NEAREST SUITABLE AIRPORT

AIR CONDITIONING SMOKE / FUMES

Condition: Smoke or fumes are coming from the air conditioning system.

OXYGEN MASKS AND REGULATORS . . . . . ON, 100%

[Prevents the inhalation of smoke or fumes].

SMOKE GOGGLES (if required) . . . . . ON

If smoke / fumes affect vision, use the EMERGENCY position on the oxygen regulator to clear the goggles.

CREW COMMUNICATION . . . . . ESTABLISH

RECIRCULATION FAN . . . . . OFF

If smoke / fumes stop:

Continue flight with recirculation fan OFF.

If smoke / fumes continue:

ISOLATION VALLVE . . . . . CLOSE

R PACK . . . . . OFF

If smoke / fumes stop:

Continue flight with R Pack OFF and Isolation Valve CLOSED.

If smoke / fumes continue:

R PACK . . . . . AUTO

L PACK . . . . . OFF

If smoke / fumes stops:

Continues flight with L Pack OFF and Isolation Valve Closed.

If smoke / fumes continue:

L PACK . . . . . AUTO

LAND AT THE NEAREST SUITABLE AIRPORT

Accomplish the SMOKE / FUMES REMOVAL checklist if required.

SMOKE / FUMES REMOVAL

Condition: Smoke / fumes removal is required.

OXYGEN MASKS AND REGULATORS . . . . . ON, 100%

[Prevents the inhalation of smoke or fumes].

SMOKE GOGGLES (if required) . . . . . ON

If smoke / fumes affect vision, use the EMERGENCY position on the oxygen regulator to clear the goggles.

CABON DOOR . . . . . CLOSE

[Prevents smoke / fumes contamination to / from other compartments.]

CREW COMMUNICATION . . . . . ESTABLISH

If pack(s) are ON and smoke / fumes source is confirmed to be on the flight deck or main cabin:

PRESSURIZATION MODE SELECTOR . . . . . STBY

CABIN ALTITUDE (max. 10.000 ft) . . . . . INCREASE

CABIN RATE SELECTOR . . . . . MAX. INCREASE

L AND R PACKS . . . . . HIGH

RECIRCULATION FAN . . . . . OFF

ENGINE NO. 1 & NO. 2 BLEED AIR . . . . . VERIFY ON

ENGINE THRUST (min. 45%) . . . . . MAX. PRACTICAL

[Provides maximum cabin ventilation.]

FLIGHT DECK AIR CONDITIONING . . . . . OPEN

GASPER OUTLETS . . . . . OPEN

CAUTION: Do not open any flight deck window. Keep cabin door closed

If smoke / fumes are uncontrollable:

AIRPLANE ALTITUDE . . . . . LOWEST SAFE ALTITUDE OR 10.000 FT WHICHEVER IS HIGHER

At 14.000 ft or below:

PRESSRIZATION MODE SELECTOR . . . . . MAN

OUTFLOW VALVE . . . . . OPEN

If pack(s) are OFF and smoke / fumes source is confirmed to be on the flight deck:

CAUTION: Window should not be opened unless the source is confirmed to be originating from the flight deck.

NORMAL HOLDING SPEED . . . . . ESTABLISH

[Higher airspeed may prevent opening the window.]

FIRST OFFICER'S SLIDING WINDOW . . . . . OPEN

LOSS OF BOTH ENGINE DRIVEN GENERATORS

Condition: All TRANSFER BUS OFF, SOURCE OFF and GEN OFF BUS lights illuminated indicate loss of both engine driven generators.

NOTE: With main tank fuel pumps inoperative above 30.000 ft, thrust deterioration or engine flameout may occur.

ENGINE GENERATORS . . . . . ON

If only one SOURCE OFF light extinguishes:

APU (if available) . . . . . START & ON BUS

If both SOURCE OFF lights remain illuminated:

If APU is available:

BUS TRANSFER . . . . . OFF

ELECTRICAL HYDRAULIC PUMPS . . . . . OFF

APU . . . . . START & ON BUS

Note: APU start attempts above 25.000 ft are not recommended.

BUS TRANSFER . . . . . AUTO

ELECTRICAL HYDRAULIC PUMPS . . . . . ON (one at a time)

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

Plan to land at nearest suitable airport.

BATTERY DISCHARGE

Condition: The BAT DISCHARGE light illuminated indicates excessive battery discharge is detected with the battery switch ON.

Correct battery drain problem if possible by bringing an engine generator or APU generator online.

NOTE: A fully charged battery provides approximately 30 minutes of standby power.

DRIVE

Condition: A generator DRIVE light illuminated indicates a malfunction in the related generator drive.

GENERATOR DRIVE . . . . . DISCONNECT

APU (if available) . . . . . START & ON BUS

ELEC

Condition: The ELEC light illuminated indicates a fault excists in the DC or standby power system.

NOTE: The ELEC light only illuminates on the ground.

SOURCE OFF

Condition: A SOURCE OFF light illuminated indicates the related transfer bus is not powered by the last selected source.

ENGINE GENERATORS . . . . . ON

If SOURCE OFF light remains illuminated:

APU (if available) . . . . . START & ON BUS

TR UNIT

Condition: The TR UNIT light illuminated indicates one or more TR's have failed.

Do not use the AFDS approach mode as it will be unreliable.

TRANSFER BUS OFF

Condition: A TRANSFER BUS OFF light illuminated indicates the related transfer bus is not powered.

ENGINE GENERATORS . . . . . ON

If TRANSFER BUS OFF light remains illuminated:

APU (if available) . . . . . START & ON BUS

STANDBY POWER OFF

Condition: The STANDBY PWR OFF light illuminated indicates one or more of the following busses are unpowered:

AC STANDBY BUS

DC STANDBY BUS

BATTERY BUS

STANDBY POWER . . . . . ON

ENGINE COWL ANTI-ICE

Condition: An ENGINE ANTI-ICE light illuminated indicates an overpressure condition in the cowl anti-ice duct.

Flight conditions permitting:

AUTO-THROTTLE . . . . . DISENGAGE

THRUST LEVER (affected engine) . . . . . RETARD

Reduce thrust untill the COWL ANTI-ICE light extinguishes.

PROBE HEAT

Condition: PROBE HEAT light illuminated indicates related probe is not heated.

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

WINDOW HEAT OFF

Condition: A WINDOW HEAT OFF light illuminated indicates a system failure has occured.

WINDOW HEAT . . . . . OFF

Limit airspeed to 250 knots maximum below 10.000 ft due to brittle window and possibility of bird strikes at lower altitudes.

WINDOWS OVERHEAT

Condition: A WINDOW OVERHEAT light illuminated indicates an overheat condition has been detected.

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

After 2-5 minutes:

WINDOW HEAT . . . . . ON

If the WINDOW OVERHEAT light re-illuminates:

WINDOW HEAT . . . . . OFF

Limit airspeed to 250 knots maximum below 10.000 ft due to brittle window and possibility of bird strikes at lower altitudes.

PACK

Condition: A PACK light illuminated indicates both primary and stanby pack controls have failed or the related valve is closed due to temperature exceeding limits.

ALL TEMPERATURE SELECTORS . . . . . WARMER TEMPERATURE

TRIP RESET SWITCH . . . . . PUSH

If one PACK light remains illuminated:

ISOLATION VALVE . . . . . CLOSE

PACK (affected side) . . . . . OFF

If cabin altitude increases:

DESCENT . . . . . ACCOMPLISH

Monitor cabin altitude and rate. Descent to lowest safe altitude or 10.000 ft.

At level off:

AIRSPEED . . . . . 290 KNOTS MINIMUM

PRESSURIZATION MODE SELECTOR . . . . . MAN

OUTFLOW VALVE . . . . . FULL OPEN

RIGHT RECIRCULATION FAN . . . . . AUTO

LEFT RECIRCULATION FAN . . . . . OFF

If flight deck and cabin temperature are excessive warm:

FLIGHT DECK DOOR . . . . . OPEN

CABIN LIGHTING . . . . . DIM

IFE / PAX SEAT POWER . . . . . OFF

GALLEY POWER . . . . . OFF

FLIGHT DECK / CABIN SHADES . . . . . CLOSED

PACK TRIP OFF

Condition: A PACK TRIP OFF light illuminated indicates the related valve is closed due to temperature exceeding limits.

ALL TEMPERATURE SELECTORS . . . . . WARMER TEMPERATURE

TRIP RESET SWITCH . . . . . PUSH

If both PACK TRIP OFF lights remains illuminated:

If cabin altitude increases:

DESCENT . . . . . ACCOMPLISH

Monitor cabin altitude and rate. Descent to lowest safe altitude or 10.000 ft.

At level off:

AIRSPEED . . . . . 290 KNOTS MINIMUM

PRESSURIZATION MODE SELECTOR . . . . . MAN

OUTFLOW VALVE . . . . . FULL OPEN

If flight deck and cabin temperature are excessive warm:

FLIGHT DECK DOOR . . . . . OPEN

CABIN LIGHTING . . . . . DIM

IFE / PAX SEAT POWER . . . . . OFF

GALLEY POWER . . . . . OFF

BLEED TRIP OFF

Condition: A BLEED TRIP OFF light illuminated indicates the related engine bleed air temperature or pressure is excessive.

WING ANTI-ICE . . . . . OFF

TRIP RESET SWITCH . . . . . PUSH

If BLEED TRIP OFF light remains illuminated:

PACK (affected side) . . . . . OFF

Avoid icing conditions.

If the BLEED TRIP OFF light extinguishes:

WING ANTI-ICE . . . . . AS REQUIRED

DUAL BLEED

Condition: The DUAL BLEED light illuminated indicates the APU bleed air valve open and the Engine No. 1 bleed air switch ON, or the Engine No. 2 bleed air switch ON with APU bleed air valve and isolation valve OPEN.

Limit engine thrust to idle while the light is illuminated to prevent damage to APU.

APU BLEED AIR . . . . . OFF

DUCT OVERHEAT

Condition: A DUCT OVERHEAT light illuminated indicates air temperature in the related duct exceeds limits.

CABIN TEMPERATURE SELECTOR . . . . . COOLER TEMPERATURE

TRIP RESET SWITCH . . . . . PUSH

If duct temeperature increases rapidly or the air mix valve indicator moves toward full hot:

TEMPERATURE SELECTOR . . . . . MAN

Adjust the air mix valve position as required.

EQUIPMENT COOLING OFF

Condition: The EQUIPMENT COOLING SUPPLY or EXHAUST OFF light illuminated indicates a loss of airflow from the selected cooling fan.

EQUIPMENT COOLING SUPPLY / EXHAUST . . . . . ALTERNATE

No further action is necessary in flight if the light does not extinguish.

RAPID DEPRESSURIZATION

Condition: A rapid loss of cabin pressure with airplane altitude above 14.000 ft.

OXYGEN MASKS AND REGULATORS . . . . . ON, 100%

CREW COMMUNICATION . . . . . ESTABLISH

PRESSURIZATION MODE SELECTOR . . . . . MAN

OUTFLOW VALVE . . . . . CLOSE

If pressurization is restored, continue manual operation to maintain proper cabin altitude.

PASSENGER SIGNS . . . . . ON

PASSENGER OXYGEN (if required) . . . . . ON

Activate passenger oxygen if cabin altitude exceeds or is expected to exceed 14.000 ft.

EMERGENCY DESCENT (if required) . . . . . INITIATE

Accomplish the EMERGENCY DESCENT checklist if the airplane is above 14.000 ft and control of cabin pressure is not possible or cabin pressure is lost.

AUTO FAIL / UNSCHEDULED PRESSURIZATION CHANGE

Condition: Automatic pressurization mode has failed, cabin altitude warning is ON or the cabin altitude is not under control.

ENGINE BLEED AIR . . . . . ON (one at a time)

PACKS . . . . . ON (one at a time)

Allow cabin rate to stabilize before placing second switch ON.

If AUT FAIL light is illuminated or pressurization is not under control:

PRESSURIZATION MODE SELECTOR . . . . . ALTN

Verify the AUTO FAIL light extinguishes.

If the AUTO FAIL light remains on or the ALTN mode cannot maintain cabin pressurization:

PRESSURIZATION MODE SELECTOR . . . . . MAN

OUTFLOW VALVE . . . . . AS REQUIRED

OFF SCHEDULE DESCENT

Condition: The OFF SCHEDULE DESCENT light illuminated indicates the airplane descended before reaching the planned cruise altitude set in the FLT ALT indicator.

No action is necessary if the airplane is returned for landing at airport of departure.

If not landing at airport of deparute:

FLIGHT ALTITUDE INDICATOR . . . . . RESET

EMERGENCY DESCENT

Condition: Unable to control cabin pressure with airplane above 14.000 ft or conditions require a rapid descent.

EMERGENCY DESCENT . . . . . ANNOUNCE

The Captain will advise the cabin crew (on the PA system) of impending rapid descent. First Officer will advise ATC and obtain the area altimeter setting.

ENGINE START SWITCHES . . . . . ON

THRUST LEVERS . . . . . CLOSE

Reduce thrust to minimum or as required for anti-ice.

SPEED BRAKE . . . . . FLIGHT DETENT

DESCENT . . . . . INITIATE

TARGET SPEED . . . . . M_{MO} / V_{MO}

If stuctural integrity is in doubt, limit speed as much as possible and avoid high maneuvering loads.

LEVEL-OFF ALTITUDE . . . . . LOWEST SAFE ALTITUDE OR 10.000 FT WHICHEVER IS HIGHER

SPEED BRAKE . . . . . DOWN DETENT

Smoothly lower the SPEED BRAKE lever and level off. Add thrust and stabilize on altitude at desired airspeed.

CREW OXYGEN REGULATORS . . . . . NORMAL

Flight crew must use oxygen when cabin altitude is above 10.000 ft. To conserve oxygen, position the selector to NORMAL.

ENGINE START SWITCHES . . . . . AS REQUIRED

The new course of action is based on weather, oxygen, fuel remaining and available airports. Use of long range cruise may be appropriate.

UNCOMMANDED RUDDER

Condition: Uncommanded rudder pedal displacement or pedal kicks.

AUTO-PILOT (if engaged) . . . . . DISENGAGE

Maintain control of the airplane with all available flight controls. If roll is uncontrollable, immediately reduce pitch / angle of attack and increase airspeed. Do not attempt to maintain altitude until control is recovered.

AUTO-THROTTLE (if engaged) . . . . . DISENGAGE

Verify thrust is symmetrical.

YAW DAMPER . . . . . OFF

RUDDER TRIM . . . . . CENTER

RUDDER PEDALS . . . . . FREE & CENTER

Use maximum force including a combined effort of both pilots, if required, to free and center the rudder pedals.

If rudder pedal position or movement is not normal and the condition is not the result of rudder trim:

SYSTEM B FLIGHT CONTROL SWITCH . . . . . STBY HYD

A slight rudder deflection may remain, but continued rudder pedal pressure may help maintain in-trim condition.

Sufficient directional control is available on landing using differential braking and nose wheel steering.

Crosswind capability may be reduced.

Do not use auto brake.

Consider checking rudder freedom of movement at a safe altitude using slow rudder inputs while in the landing configuration and at approach speed.

If conditions was a result of rudder trim or environmental factors:

YAW DAMPER . . . . . ON

UNCOMMANDED YAW OR ROLL

Condition: Uncommanded yaw or roll occurs in flight.

Maintain control of the airplane with all available flight controls. If roll is uncontrollable, immediately reduce pitch attitude / angle of attack and increase airspeed. Do not attempt to maintain altitude until control is recovered.

AUTO-PILOT (if engaged) . . . . . DISENGAGE

The pilot should be prepared to make control wheel corrections to return to wings level upon disengagement. The auto-pilot may be putting in an appropriate correction for an uncommanded way or roll. Allowing the control wheel to go to neutral after disengagement may allow the airplane to roll even more.

AUTO-THROTTLE (if engaged) . . . . . DISENGAGE

Verify thrust is symmetrical.

If yaw or roll forces continue:

YAW DAMPER . . . . . OFF

The YAW DAMPER light illuminates when yaw damper is disengaged.

If it is confirmed that the auto-pilot or auto-throttle is not the cause of the uncommanded yaw or roll, the auto-pilot and auto-throttle may be re-engaged at the pilot's discretion.

JAMMED STABILIZER

Condition: The stabilizer fails to respond to electric trim inputs.

Attempt to use manual trim.

[Force applied to the trim wheel causes a disconnect clutch to disengage. Steady pressure on the manual trim handles is required until the desired trim is attained. A maximum effort on the trim wheels will not cause a cable or system failure.]

NOTE: Handle should be folded inside stabilizer trim wheel when not in use.

If the trim wheel moves when released:

STABILIZER TRIM AUTO-PILOT . . . . . CUT-OUT

[Auto-pilot is not available.]

Maintain in-trim airspeed until start of approach.

Plan a Flap 15 landing.

Set Vref 15.

Establish landing configuration early.

NOTE: Anticipate higher than normal elevator forces during approach and landing.

<<<<<<<<<<<<<<<<< DESCENT & APPROACH >>>>>>>>>>>>>>>>>

ANTI-ICE . . . . . AS REQUIRED

AIR CONDITIONING & PRESSURIZATION . . . . . SET

ALTIMETERS & INSTRUMENTS . . . . . SET & X-CHECK

N_1 & IAS BUGS . . . . . CHECKED & SET (V_{REF15})

GROUND PROXIMITY - FLAP / GEAR . . . . . INHIBIT

GROUND PROXIMITY - GEAR . . . . . INHIBIT

<<<<<<<<<<<<<<<<<<<<<<< LANDING >>>>>>>>>>>>>>>>>>>>>>>

ENGINE START SWITCHES . . . . . ON

RECALL . . . . . CHECKED

SPEED BRAKE . . . . . ARMED, GREEN LIGHT

LANDING GEAR . . . . . DOWN, 3 GREEN

FLAPS . . . . . 15, GREEN LIGHT

JAMMED OR RESTICTED ELEVATOR OR AILERONS

Condition: Restricted movement of the elevator or ailerons / spoiler is experienced.

AUTO-PILOT (if engaged) . . . . . OFF

AUTO-THROTTLE (if engaged) . . . . . OFF

Verify thrust is symmetrical.

JAMMED OR RESTICTED SYSTEM . . . . . OVERPOWER

Use maximum force, including a combined effort of both pilots, is required. A miximum two-pilot effort on the controls will not cause a cable or system failure.

Do not turn off any flight control switches.

If controls are normal:

Accomplish the normal DESCENT, APPROACH and LANDING CHECKLIST.

If controls are not normal:

Do not make abrupt thrust changes. Extend or retract speedbrakes slowly and smoothly.

Limit bank angle to 15 degrees.

Plan to land at the nearest suitable airport.

Plan a Flaps 15 landing.

Set $V_{ref\ 15}$ + 5

<<<<<<<<<<<<<<<<< DESCENT & APPROACH >>>>>>>>>>>>>>>>>

ANTI-ICE . . . . . AS REQUIRED

AIR CONDITIONING & PRESSURIZATION . . . . . SET

ALTIMETERS & INSTRUMENTS . . . . . SET & X-CHECK

N_1 & IAS BUGS . . . . . CHECKED & SET (V_{REF15} + 5)

GROUND PROXIMITY - FLAP / GEAR . . . . . INHIBIT

GROUND PROXIMITY - GEAR . . . . . INHIBIT

GO-AROUND PROCEDURE . . . . . REVIEW

Accomplish normal go-around procedure. Advance thrust smoothly and slowly to avoid excessive pitch-up.

<<<<<<<<<<<<<<<<<<<<<<< LANDING >>>>>>>>>>>>>>>>>>>>>>>

ENGINE START SWITCHES . . . . . .

RECALL . . . . . CHECKED

SPEED BRAKE . . . . . ARMED, GREEN LIGHT

LANDING GEAR . . . . . DOWN, 3 GREEN

FLAPS . . . . . 15, GREEN LIGHT

DAMAGED OR CRACKED WINDOW

Condition: Arcing, substantial delamination, shattering or cracking of any flight deck window.

WINDOW HEAT (effected window . . . . . OFF

Limit maximum airspeed to 250 knots below 10.000 ft.

Use crew and passenger oxygen if required.

If window 1, 2, 4 or 5 is affected:

CABIN ALTITUDE INDICATOR . . . . . 10.000 ft

PRESSURIZATION MODE SELECTOR . . . . . STBY

Reduce pressure differential by limiting flight altitude as indicated in the following tables.

NOTE: For MEA between 15.000 ft and 20.000 ft select a higher cabin altitude to maintain 2 psi differential.

Above 20.000 ft, select MAN and maintain2 psi differential.

Window 1, 2 or 5:

CRACKED PANE	MAX DIFF PRESS	APPROX FLT ALT
Outer	- No resriction -	
Inner	5 psi	26.000 ft
Both	2 psi	15.000 ft

Window 4:

A failed middle pane usually appears shattered and transparency is virtually lost.

CRACKED PANE	MAX DIFF PRESS	APPROX FLT ALT
Outer	- No resriction -	
Middle	5 psi	26.000 ft
Both	2 psi	15.000 ft

If window 3 is affected:

CABIN ALTITUDE INDICATOR . . . . . 13.000 ft

PRESSURIZATION MODE SELECTOR . . . . . STBY

Reduce pressure differential by limiting altitude as indicated in the following table:

CRACKED PANE	MAX DIFF PRESS	APPROX FLT ALT
Outer	- No resriction -	
Inner	- No restriction -	
Both	0 psi	14.000 ft

AIRSPEED UNRELIABLE

Condition: Pitch attitude not consistent with existing phase of flight, altitude, thrust and weight or noise and / or low frequency buffeting.

Crosscheck ground speed and winds provided by the IRS and FMC to determine airspeed acuracy if indicated airspeed is questionable.

NOTE: Erroneous or unreliable airspeed indications may be caused by blocked or frozen pitot-static system(s), or a severely damaged or missing radome.

AIRPLANE ATTITTUDE / THRUST . . . . . ADJUST

Maintain airplane control. Attitude and thust information is provided in the Performance Inflight section.

PITOT-STATIC HEAT . . . . . CHECK ON

MACH / AIRSPEED INDICATORS . . . . . CROSS CHECK

WING BODY OVERHEAT

Condition: A WING BODY OVERHEAT light illuminated indicates a bleed air duct leak.

ISOLATION VALVE . . . . . CLOSE

PACK (affected side) . . . . . OFF

ENGINE BLEED AIR (affected side) . . . . . OFF

WING ANTI-ICE . . . . . OFF

Avoid icing conditions.

If the left WING BODY OVERHEAT light remains illuminated:

APU BLEED AIR (if APU running) . . . . . OFF

If the light remains illuminated:

APU . . . . . OFF

If the light extinhuishes:

ISOLATION VALVE . . . . . AUTO

ENGINE NO. 1 BLEED AIR . . . . . ON

LEFT PACK . . . . . AUTO

WING ANTI-ICE . . . . . AS REQUIRED

TAIL STRIKE ON TAKE-OFF

Condition: Airplane tail has contracted the ground during take-off.

CAUTION: Do not pressurize airplane due to possible structural damage.

PRESSURIZATION MODE SELECTOR . . . . . MAN

OUTFLOW VALVE . . . . . OPEN

Hold outflow valve switch in the OPEN position untill outflow VALVE position indicator shows valve full open.

CONFIGURATION WARNING

Condition: An intermittent warning horn sounds when advancing thrust levers to take-off, or a steady warning horn sounds in-flight.

ASSURE PROPER AIRPLANE CONFIGURATION

VOLCANIC ASH

Condition: Static discharge around the windshields, bright glow in the enigne inlets, smoke or dust on the flight deck or an accid odor indicates the airplane is in volcanic ash.

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

OXYGEN MASKS AND REGULATORS . . . . . ON, 100%

SMOKE GOOGLES (if required) . . . . . ON

If smoke / fumes affect vision, use the EMERGENCY position on the oxygen regulator to clear the goggles.

CREW COMMUNICATION . . . . . ESTABLISH

THRUST LEVERS . . . . . CLOSE

Conditions permitting, operate idle thrust.

[Reduces possible engine damage and / or flame out by decreasing EGT.]

AUTO-THROTTLE . . . . . DISENGAGE

[Prevents undesired autothrottle activity.]

ENGINE START SWITCHES . . . . . FLT

PACKS . . . . . HIGH

WING ANTI-ICE . . . . . ON

[Increases bleed air extraction to improve engine stall margin.]

ENGINE ANTI-ICE . . . . . ON

[Increases bleed air extraction to improve engine stall margin.]

APU (if available) . . . . . START

[Provides backup electrical and penumatic source, if required.]

NOTE: Encountering volcanic ash can lead to abnormal system reactions such as:

- Engine malfunctions, increasing EGT, engine stall or flameout.
- Decrease or loss of airspeed indications.
- Equipment cooling OFF light.

If engine have flamed out or stalled, or EGT rapidly approaches or exceeds limit:

Accomplish the LOSS OF THRUST ON BOTH ENGINES checklist.

NOTE: Engines are very slow to accelerate to idle at high altitude, which may be interpreted as a hung start or an engine malfunction.

Plan to land at the nearest suitable airport.

DITCHING

Condition: Airplane ditching and evacuation are required.

Send distress signals.

Determine position, course, speed, altitude, situation, intention, time and position of intended touchdown and transmit MAYDAY.

Report type of aircraft and request intercept.

Alert cabin crew to prepare for ditching and seat passengers as far forward as possible.

Burn off fuel to reduce touchdown speed and increase buoyancy.

Plan to touch down on the windward side and parallel to waves and swells.

Plan a flaps 40 landing unless other configuration is required.

<<<<<<<<<<<<<<<<<< DEFERRED ITEMS >>>>>>>>>>>>>>>>>>

Below 5.000 ft:

AURAL WARN C/B (P6) . . . . . PULL

[Prevents warning horn with gear retracted and landing flaps selected.]

PASSENGER SIGNS . . . . . ON

ENGINE BLEED AIR . . . . . OFF

[Permits depressurizing the airplane with outflow valve closed.]

PRESSURIZATION MODE SELECTOR . . . . . MAN DC

OUTFLOW VALVE . . . . . CLOSE

[Prevents water from entering the airplane.]

APU . . . . . SHUT-DOWN

GROUND PROXIMITY - FLAP / GEAR . . . . . INHIBIT

GROUND PROXIMITY - GEAR . . . . . INHIBIT

LIFE VESTS . . . . . ON

SEAT BELTS AND SHOULDER HARNESSES . . . . . ON

PASSENGER CABIN PREPARATION . . . . . COMPLETE

Confirm that passenger cabin preparations are complete.

FINAL POSITION . . . . . TRANSMIT

Transmit all pertinent information regarding final ditching position.

<<<<< CONTINUED NEXT PAGE >>>>>

DITCHING

(CONTINUED FROM PREVIOUS PAGE...)

Review "After Impact Procedures":

U Engine start levers to CUT-OFF.

U Close fuel shut-off valves to prevent discharge of fuel from ruptured fuel lines.

U Initiate evacuation.

U Proceed to assigned ditching stations, launch rafts and evacuate airplane as soon as practicable.

U The airplane may remain afloat indefinitely if fuel load is minimal and no serious damage was sustained during landing.

<<<<<<<<<<<<<<<<<<< DEFERRED ITEMS >>>>>>>>>>>>>>>>>>>

Omit normal LANDING checklist.

LANDING GEAR . . . . . UP & OFF

FLAPS . . . . . ____, GREEN LIGHT

At 500 ft: Advise cabin crew that ditching is imminent.

At 50 ft: "Brace for Impact".

Maintain airspeed at V_{ref}. Flare airplane to achive minimum rate of descent at touchdown. Maintain 200-300 fpm rate of descent untill start of flare.

At flare, rotate smoothly to touchdown attitude of 10-12 degrees, maintain desired airspeed and rate of descent with thust.

At touchdown, reduce thrust to idle.

EMERGENCY EVACUATION

Condition: Evacuation of passengers and crew is required.

On the Captain's command, simultaneously accomplish individual checklist items.

CAPTAIN

PARKING BRAKE . . . . . SET

SPEED BRAKE LEVER . . . . . DOWN DETENT

[Prevents possible interfacing or injury to passengers evacuating through the overwing escape hatches.]

START LEVERS (both) . . . . . CUT-OFF

If time permits, verify flaps are full down before placing the start levers to CUT-OFF.

[Shuts down the engines to reduce the possibility of slide damage or injury.]

EVACUATION . . . . . INITIATE

Notify cabin flight attendants.

ENGINE AND APU FIRE WARNING . . . . . .

Rotate engine fire handles in opposite directions. Rotate all handles to the stop and hold for 1 second.

[Reduces the risk of fire and injury.]

FIRST OFFICER

FLAP LEVER 40

[Aids in evacuating passengers over the wing.]

STANDBY POWER . . . . . BAT

PRESSURIZATION MODE SELECTOR . . . . . MAN DC

OUTFLOW VALVE . . . . . OPEN

[Ensures the airplane is depressurized for opening exits.]

TOWER . . . . . NOTIFY