DOCKET NO. SA-510

EXHIBIT NO. 2G

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

B-737-300/400
ABNORMAL OPERATIONS

INDEX

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FOREWORD

Abnormal procedures set up in this manual were included only after repeated testing and investigation. They represent the best known available facts about the subject. Pilots should follow these procedures as long as they fit the abnormal condition; however, if at any time they are not adequate or do not apply, the Captain's best judgment should prevail. Only the flight crew operating the airplane at the time the abnormal situation occurs can evaluate the situation sufficiently to make the proper decision.

The procedures are essentially the same as those contained in the FAA Approved Flight Manual. Certain changes to the manufacturer's recommendations in operating technique have been made. These differences have been found by USAir as a result of experience to be in consonance with and in the best interest of safety and good operating practice; full responsibility is assumed for this determination.

All crewmembers should be thoroughly familiar with abnormal procedures and should be equipped to handle the emergency duties of any other crewmember.

Obviously, all abnormal procedures which could occur could not be included in this manual.

Abnormal checklists are used in the same CHALLENGE and RESPONSE method as the Normal checklists but with this additional step: The pilot reading the checklist (normally the pilot not flying) should read aloud ***both*** the CHALLENGE and the RESPONSE. There should be no doubt in any flight crewmember's mind as to the correct course of action. The pilot responding has the same responsibility for checking and/or accomplishing the item and responding to the Challenge as if it were not being read aloud.

Only the **BOLD-FACE** items in the abnormal section are required to be read aloud. Additional text or notes are for informational purposes only. →

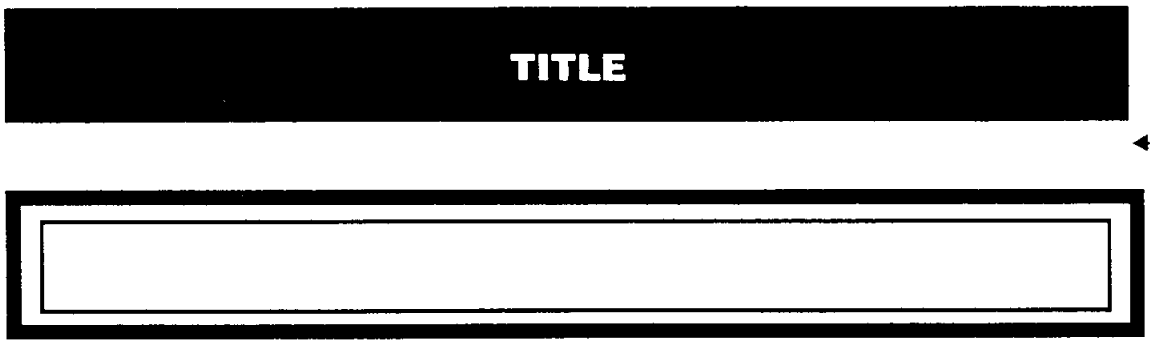
CHECKLIST AMPLIFICATION

Procedures contained herein assume certain actions by the crew:

- System controls are in the normal configuration for the phase of flight prior to the initiation of abnormal procedures.
- Warning aurals are silenced by the flight crew as soon as the cause of such warning(s) is recognized.
- Testing lights may be accomplished at the discretion of the flight crew to verify suspected indication faults.
- While resetting circuit breakers is not generally a requirement in flight, a tripped circuit breaker may be reset, at the Captain's discretion, after a short cooling period (approximately 2 minutes). If the circuit breaker trips again, no further attempt should be made to reset that circuit breaker.
- Oxygen masks and goggles are donned and communications are established when their use is required. This includes, but is not limited to: loss of cabin pressure, use of fire extinguishing agents, contamination (such as smoke), or concentration of fumes or odors, either present or anticipated on the flight deck or in the passenger cabin.
- Emergency oxygen should be utilized when necessary to provide positive pressure in the masks and goggles to prevent the entry of or evacuate contaminants. When positive pressure is not required, but contamination of cockpit air exists, 100% oxygen must be used. If prolonged use is required and the situation permits, oxygen availability should be extended by selecting normal flow. These actions will be accomplished when required, therefore, no specific mention is made concerning oxygen usage in procedures and checklists.
- Obvious corrective action (if any) is taken for Crew Awareness items.
- Landing at nearest suitable airport is accomplished in the event of:
  - Engine failure or fire.
  - Wheel well fire.
  - Cabin smoke or fire which cannot be immediately and positively determined to be eliminated or extinguished.
  - One hydraulic system remaining.
  - One main AC power source remaining (i.e., engine or APU generator).
  - Any other situation determined by the crew to present significant adverse effect on safety if flight continued.

CHECKLIST AMPLIFICATION (cont'd.)

Checklist Abnormal titles are contained in either of the following type boxes:



Abnormal checklist items are printed in **BOLD-FACE TYPE**. The CHALLENGE is separated from the RESPONSE by a series of dots.

Example:

L PACK SWITCH . . . . . **OFF**

BOLD-FACE TYPE is also used to indicate information that must be read as part of the checklist process, but is not in a CHALLENGE and RESPONSE format.

Example:

If smoke stops:

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INDEX

FLIGHT CONTROLS

LEFT BLANK INTENTIONALLY

FLT CONTROL LOW PRESSURE

FLIGHT CONTROL SWITCH . . . . . STDBY RUD

Placing a flight control switch to STDBY RUD starts the standby hydraulic pump and arms the STANDBY LOW PRESSURE light. The FLT CONTROL LOW PRESSURE light extinguishes, indicating the standby rudder shutoff valve has opened.

CAUTION: If flight control malfunctions are indicated, do not deactivate systems until the cause is established. If any flight control caution lights illuminate during flight, check position of corresponding switches, and monitor hydraulic system indications.

CAUSE: The light indicates low hydraulic system pressure to ailerons, elevators, and rudder.

FEEL DIFF PRESS

No crew action required in flight.

CAUSE: The light illuminated indicates that the computed pressure for hydraulic system "A" and "B" differ by an abnormal amount.

YAW DAMPER

YAW DAMPER SWITCH . . . . . OFF, THEN ON

If light remains illuminated:

YAW DAMPER SWITCH . . . . . OFF

NOTE: Flying in turbulence with the yaw damper inoperative can be difficult, and uncomfortable for the passengers. Before commencing a flight with yaw damper inoperative, insure that turbulence (especially continuous turbulence of moderate or greater intensity) can be avoided.

MACH TRIM FAIL

AIRSPEED . . . . . LIMIT TO 0.74 MACH

SPEEDBRAKE DO NOT ARM

SPEEDBRAKE LEVER . . . . . DOWN (DETENT)

Manually deploy speedbrakes immediately upon touchdown.

CAUSE: The SPEEDBRAKE DO NOT ARM light indicates a fault in the automatic speedbrake system. The system monitors wheel rotation, speedbrake lever, landing gear lever, and speedbrake and anti-skid systems.

STAB OUT-OF-TRIM

If the stabilizer is not trimming:

CONTROL COLUMN . . . . . HOLD FIRMLY

The control column should be held steady to prevent undesirable airplane pitching.

AUTOPILOT . . . . . DISENGAGE

The autopilot should be disengaged as soon as practical.

STABILIZER TRIM . . . . . AS REQUIRED

Return to an in-trim condition by using electrical or manual trim, as required.

CAUSE: The STAB OUT OF TRIM light functions only with the autopilot engaged. With the autopilot engaged, the stabilizer will trim if the elevator position exceeds a certain value based on stabilizer position.

The STAB OUT OF TRIM light may illuminate briefly with the autopilot engaged during large trim changes of the airplane.

RUNAWAY STABILIZER

This condition is recognized by continuing rotation of the stabilizer trim wheel in a manner not appropriate for flight conditions.

CONTROL COLUMN . . . . . HOLD FIRMLY

AUTOPILOT (If engaged) . . . . . DISENGAGE

Do not re-engage the autopilot.

Control column movement opposite to the direction of a runaway electric trim will stop the stabilizer.

Control airplane pitch attitude manually with control column and main electric trim as required.

— **If runaway continues:**

STABILIZER TRIM CUTOUT SWITCHES . . . . . CUTOUT

Continued trimming opposite to an electric trim runaway may result in overheating and/or stalling of the stabilizer trim motor.

— **If runaway continues:**

STABILIZER TRIM WHEEL . . . . . GRASP & HOLD

If positioning the stabilizer trim cutout switches to CUTOUT does not stop the runaway, the stabilizer is coasting due to mechanical brake failure. Stabilizer travel can be stopped by grabbing and holding the stabilizer trim wheel.

STABILIZER . . . . . TRIM MANUALLY

— **Anticipate trim requirements.**

— **Complete the PRELIMINARY LANDING and LANDING checklists.**

— **Establish proper airspeed and in-trim condition early on final approach.**

JAMMED OR RESTRICTED FLIGHT CONTROLS

This procedure is accomplished when jammed or restricted movement of flight controls in roll, pitch, or yaw control is experienced.

JAMMED OR RESTRICTED SYSTEM . . . . . OVERPOWER

Use maximum force, including a combined effort of both pilots, if necessary.

NOTE: A maximum two-pilot effort on the control will not cause a cable or system failure.

Do NOT turn off any flight control switches unless the faulty control is positively identified.

If the aileron or spoiler is jammed, force applied to the Captain's and the First Officer's control wheels identifies which lateral control system (aileron or spoiler) is usable, and which control wheel (Captain's or First Officer's) provides roll control.

If the aileron control system is jammed, force applied to the First Officer's control wheel provides roll control from the spoilers. The ailerons and the Captain's control wheel are inoperative.

If the spoiler system is jammed, force applied to the Captain's control wheel provides roll control from the ailerons. The spoilers and the First Officer's control wheel are inoperative.

With a jammed elevator, manual or electric trim may be used to trim in either direction to offload control column forces. If electric trim is desired, the column actuated stabilizer trim override switch must be positioned to OVERRIDE.

Should the rudder control cable system fail, inputs to the rudder can be accomplished through the rudder trim control mechanism. If the rudder pedals are jammed, rudder control, rudder trim, and nose wheel pedal steering are inoperative.

If freezing water is the suspected cause, consider descent to warmer air if conditions persist and re-attempt to override the jammed or restricted controls.

If the faulty system cannot be overpowered, use operative flight controls, trim and thrust, as required for airplane control.

Use normal PRELIMINARY LANDING and LANDING checklists.

JAMMED STABILIZER

This condition is recognized by failure of the stabilizer to respond to electric trim inputs.

Attempt to use manual trim.

There is no limit on the amount of effort which the pilots may exert on the manual trim wheels when attempting to free a jammed stabilizer. Force applied to the trim wheels causes a disconnect clutch to disengage. Approximately ½ turn of the stabilizer wheel is necessary to disengage the clutch before trimming can take place. Steady pressure on the manual trim handles is required to prevent engagement before the desired trim is attained.

— **Maintain in-trim airspeed until start of approach.**

— **Plan a flaps 15 landing.**

— **Set V_{REF} 15.**

— **Establish landing configuration early.**

— **Anticipate higher than normal elevator force during approach and landing.**

— *PRELIMINARY LANDING:*

ALTIMETERS/FLT INSTS . . . . . ____.____/CHECKED

LANDING DATA (V_{REF} 15) . . . . . CHECKED & SET

GPWS . . . . . FLAP INHIBIT

SHOULDER HARNESS . . . . . ON

APPROACH BRIEFING . . . . . COMPLETE

(cont'd.)

JAMMED STABILIZER (cont'd.)

— *LANDING:*

START SWITCHES . . . . . CONT

RECALL . . . . . CHECKED

SPEEDBRAKE . . . . . ARMED, GREEN LIGHT

GEAR . . . . . DOWN, 3 GREEN

AUTOBRAKE . . . . . AS DESIRED

Select desired autobrake level consistent with runway length, condition, and desired stopping distance.

►

FLAPS . . . . . 15, GREEN LT, DETENT

←

LEADING EDGE FLAPS TRANSIT

Accomplish this procedure if the LE FLAPS TRANSIT light is illuminated with the flaps UP.

AIRSPEED (MAX) . . . . . 230 KTS

— With roll encountered:

Accomplish the ASYMMETRICAL OR NO LEADING EDGE DEVICES CHECKLIST.

— With no roll encountered:

Following flap retraction:

If the LE FLAPS TRANSIT light remains illuminated, the flaps/slats may be recycled.

If the LE FLAPS TRANSIT light extinguishes, proceed normally.

If the LE FLAPS TRANSIT light does not extinguish:

LED ANNUNCIATOR PANEL . . . . . CHECK

If only one LE DEVICES TRANSIT light is illuminated, limit maximum airspeed to 300 knots (280 knots for turbulent air penetration) or .65 Mach, whichever is lower.

If more than one LE DEVICES TRANSIT light is illuminated, limit airspeed to 230 knots.

During flap extension:

ASYMMETRICAL OR NO LEADING EDGE DEVICES CHECKLIST . . . . . ACCOMPLISH

ASYMMETRICAL OR NO LEADING EDGE DEVICES

— **Plan a flaps 15 landing.**

— **Set V_{REF} 15 + 5 knots.**

— **Limit bank angle to 15° below 210 knots.**

— *PRELIMINARY LANDING:*

ALTIMETERS, FLT INSTS . . . . . ___.___/CHECKED

LANDING DATA (V_{REF} 15 + 5 KNOTS) . . . CHECKED & SET

GPWS . . . . . FLAP INHIBIT

SHOULDER HARNESS . . . . . ON

APPROACH BRIEFING . . . . . COMPLETE

— *LANDING:*

START SWITCHES . . . . . CONT

RECALL . . . . . CHECKED

SPEEDBRAKE . . . . . ARMED, GREEN LIGHT

GEAR . . . . . DOWN, 3 GREEN

AUTOBRAKE . . . . . AS DESIRED

Select desired autobrake level consistent with runway length, condition, and desired stopping distance.

►

FLAPS . . . . . 15, AMBER LT, DETENT

With asymmetrical or no leading edge devices extended, the amber LE FLAP TRANSIT light is illuminated.

NOTE: The LE FLAP TRANSIT amber light illuminated indicates an asymmetrical or no leading edge device condition. The LE DEVICES annunciator on the aft overhead panel confirms status of leading edge devices.

ASYMMETRICAL TRAILING EDGE FLAPS

FLAPS . . . . . SET

Move flap lever to the detent nearest the SMALLEST actual flap position. ←

CAUTION: Do not attempt to move the TRAILING EDGE FLAPS with the alternate flaps switch as there is no asymmetry protection.

— **FLAPS 15 OR MORE: Set V_{REF} for smallest flap position.**

— **FLAPS BETWEEN 1 AND 15: Set V_{REF} 40 + 30 knots.**

— **FLAPS LESS THAN 1: Use TRAILING EDGE FLAPS-UP LANDING Checklist.**

— *PRELIMINARY LANDING:*

ALTIMETERS, FLT INSTS . . . . . ____/CHECKED

LANDING DATA (V_{REF} AS REQ'D) . . . . . CHECKED & SET

GPWS . . . . . FLAP INHIBIT

SHOULDER HARNESS . . . . . ON

APPROACH BRIEFING . . . . . COMPLETE

ASYMMETRICAL TRAILING EDGE FLAPS (cont'd.)

— *LANDING:*

START SWITCHES . . . . . CONT

RECALL . . . . . CHECKED

SPEEDBRAKE . . . . . ARMED, GREEN LIGHT

GEAR . . . . . DOWN, 3 GREEN

AUTOBRAKE . . . . . AS DESIRED

Select desired autobrake level consistent with runway length, condition, and desired stopping distance.

FLAPS . . . . . _____, GREEN LT, DETENT

NOTE: *This condition is recognized by uncommanded roll when a new flap selection is made and a difference in the left and right flap indication.*

Hydraulic flap drive shutoff occurs with a significant trailing edge flap asymmetry. there is adequate lateral control to counteract the maximum amount of flap asymmetry that can occur before shutoff.

AUTO SLAT FAIL

No crew action is required in flight.

The illumination of the AUTO SLAT FAIL light indicates the failure of both auto slat channels.

SPEED TRIM FAIL

No crew action is required in flight.

The illumination of the SPEED TRIM FAIL light indicates the failure of the speed trim system.

TRAILING EDGE FLAPS UP LANDING

— **If situation permits, burn off fuel to reduce touchdown speed.**

— **Set V_{REF} 40 + 40 knots.**

NOTE: With trailing edge flaps up, a nuisance stickshaker may occur when slowing to V_{REF} 40 + 40 at high gross weight and/or bank angles greater than 15°.

— **Maintain 0 Flap Maneuver Speed until on final.**

— **Limit bank angle to 15° below 0 Flap Maneuver Speed.**

— *PRELIMINARY LANDING:*

ALTIMETERS, FLT INSTS . . . . . ___, ___/CHECKED

LANDING DATA (V_{REF} 40 + 40 KTS) . . . . CHECKED & SET

GPWS . . . . . FLAP INHIBIT

SHOULDER HARNESS . . . . . ON

APPROACH BRIEFING . . . . . COMPLETE

GO-AROUND PROCEDURES . . . . . REVIEW

— **Limit bank angle to 15° below 0 Flap Maneuver Speed.**

— **Accelerate to 230 knots maximum with leading edge devices extended.**

ALTERNATE FLAPS MASTER SWITCH . . . . . ARM

This arms the alternate flaps position switch and starts the standby hydraulic pump for leading edge device extension.

ALTERNATE FLAPS POSITION SWITCH
(230 KTS MAX) . . . . . (MOMENTARY) DOWN

Verify LE DEVICES annunciator indicates FULL EXT.

NOTE: If leading edges are fully extended, 0 chart maneuver speed may be reduced by 20 knots.

TRAILING EDGE FLAPS UP LANDING (cont'd.)

— *LANDING:*

START SWITCHES . . . . . CONT

RECALL . . . . . CHECKED

SPEEDBRAKE . . . . . ARMED, GREEN LIGHT

GEAR . . . . . DOWN, 3 GREEN

AUTOBRAKE . . . . . AS DESIRED

Select desired autobrake level consistent with runway length, condition, and desired stopping distance.

►

FLAPS . . . . . UP, AMBER LT, DETENT

CAUSE: A trailing edge flaps up landing is required when the flap position indicator remains in the UP position, or less than 1, when flaps 1 is selected.

NOTE: It is necessary to distinguish a TRAILING EDGE FLAPS UP condition from an ASYMMETRICAL TRAILING EDGE FLAPS condition. An asymmetrical trailing edge flaps condition would be recognized by an uncommanded roll when a new flap selection is made, and by observing a difference in the left and right flap indicators. For an asymmetrical trailing edge flaps condition, refer to the ASYMMETRICAL TRAILING EDGE FLAPS procedure elsewhere in this section.

After ascertaining that an asymmetrical trailing edge flap condition does not exist, attempt to extend flaps using the ALTERNATE FLAP OPERATION procedure elsewhere in this section. Observe the NOTE above.

ALL FLAPS UP LANDING

NOTE: Utilize this procedure provided no asymmetrical condition exists, and an attempt to extend flaps with the ALTERNATE FLAP OPERATION checklist has not been successful.

— **If the situation permits, burn off fuel to reduce touchdown speed.**

— **Set V_{REF} 0.**

— **Consider runway length. A landing with flaps UP, 121,000 lbs. landing weight, sea level, standard day, anti-skid ON, reverse thrust, manual braking and auto-spoilers on a dry runway would require 5,000 feet of runway. A landing in the same circumstances on a wet runway would require 7,000 feet of runway.**

— **Maintain 0 Flap Maneuver Speed until on final.**

— **Limit bank angle to 15° below 0 Flap Maneuver Speed.**

— *PRELIMINARY LANDING:*

ALTIMETERS, FLT INSTS . . . . . ___, ___/CHECKED

LANDING DATA (V_{REF} 0) . . . . . CHECKED & SET

GPWS . . . . . FLAP INHIBIT

SHOULDER HARNESS . . . . . ON

APPROACH BRIEFING . . . . . COMPLETE

GO-AROUND PROCEDURE . . . . . REVIEW

Accomplish normal go-around, except limit bank angle to 15° until reaching 0 Flap Maneuver Speed.

ALL FLAPS UP LANDING (cont'd.)

— *LANDING:*

START SWITCHES . . . . . CONT

RECALL . . . . . CHECKED

SPEEDBRAKE . . . . . ARMED, GREEN LIGHT

GEAR . . . . . DOWN, 3 GREEN

AUTOBRAKE . . . . . AS DESIRED

Select desired autobrake level consistent with runway length, condition, and desired stopping distance.

►

FLAPS . . . . . UP, NO LTS, DETENT

CAUSE: An ALL FLAPS UP LANDING is required when unable to extend any leading edge device or trailing edge flap.

ALTERNATE FLAP OPERATION

This procedure is accomplished if flaps fail to EXTEND or RETRACT in response to flap lever selection and no asymmetry is indicated.

When the leading edge devices have been extended by the alternate system, they cannot be retracted, unless hydraulic system "B" is operating and normal flap operation is restored.

The drag penalty with the leading edge devices extended may make it impossible to reach an alternate field.

Plan a flaps 15 landing.

A flaps 15 landing is recommended because of the time required to retract from flaps 30/40 to 15 in the event of a go-around.

Set V_{REF} 15.

NOTE: Asymmetry protection is not provided when the alternate extension system is used.

— *PRELIMINARY LANDING (in lieu of normal Preliminary Landing Checklist):*

ALTIMETERS, FLT INSTS . . . . . ___, ___/CHECKED

LANDING DATA (V_{REF} 15) . . . . . CHECKED & SET

GPWS . . . . . FLAP INHIBIT

To avoid a nuisance warning with less than normal landing flaps.

SHOULDER HARNESS . . . . . ON

APPROACH BRIEFING . . . . . COMPLETE

AUTOBRAKES . . . . . ___SET

(cont'd.)

ALTERNATE FLAP OPERATION (cont'd.)

— *PRELIMINARY LANDING (in lieu of normal Preliminary Landing Checklist): (cont'd.)*

► **At appropriate time on approach:**

ALTERNATE FLAPS MASTER SWITCH . . . . . ARM

Arms alternate flap system for alternate flap extension.

FLAP LEVER 15

Flap lever positioned for landing flaps.

AIRSPEED . . . . . MAX. 230 KNOTS

EXTEND FLAPS 10 USING ALTERNATE SYSTEM.

As flaps extend, adjust airspeed according to flap position. 1½ to 2 minutes will be required to extend flaps 10. The landing gear warning horn sounds if flaps are extended beyond 10 until all landing gear are down and locked.

All leading edge devices go to the FULL EXT position and cannot be retracted unless hydraulic system "B" is operating and normal flap operation is restored.

LANDING GEAR LEVER . . . . . DOWN

EXTEND FLAPS 15 USING ALTERNATE SYSTEM.

— *LANDING (in lieu of normal Landing Checklist):*

START SWITCHES . . . . . CONT

RECALL . . . . . CHECKED

SPEEDBRAKE . . . . . ARMED, GREEN LIGHT

GEAR . . . . . DOWN, 3 GREEN

►

FLAPS . . . . . 15, GREEN LT, DETENT

INDEX

HYDRAULICS

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HYD PUMP LOW PRESSURE OR OVERHEAT

PUMP SWITCH . . . . . OFF

The illumination of a hydraulic pump LOW PRESSURE light indicates low pump output pressure. The illumination of the hydraulic pump OVERHEAT light indicates fluid or pump overheat. On some airplanes, if the pump overheats, the electric motor will be switched off and the OVERHEAT light and LOW PRESSURE light will illuminate simultaneously.

If the action was in response to an OVERHEAT light, positioning the switch OFF will cause a LOW PRESSURE light to illuminate.

One pump provides adequate pressure for normal system operation.

LOSS OF SYSTEM "A"

Loss of system "A" pressure is indicated by the system "A" pressure at zero and illumination of:

- MASTER CAUTION lights.
- FLT CONT and HYD annunciator lights.
- System "A" LOW PRESSURE lights.
- System "A" flt control LOW PRESSURE light.
- FEEL DIFF PRESS light (Flaps up).

SYSTEM "A" FLT CONTROL SWITCH . . . . . STBY RUD

This activates the standby pump, supplies pressure to the rudder power control unit, arms the standby hyd LOW PRESSURE light, and deactivates the flt control LOW PRESSURE light.

SYSTEM "A" HYD PUMP SWITCHES . . . . . OFF

Ground spoilers, inboard flight spoilers, autopilot "A," nosewheel steering, and alternate brakes are inoperative. The engine No. 1 thrust reverser has standby pressure.

Plan for MANUAL GEAR EXTENSION.

When the gear has been lowered manually, it cannot be retracted. The drag penalty with gear extended may make it impossible to reach an alternate field.

— *PRELIMINARY LANDING:*

The following checklist is accomplished in lieu of the normal PRELIMINARY LANDING checklist.

ALTIMETERS, FLT INSTS . . . . . ____/____/CHECKED

LANDING DATA (V_{REF} 30 or 40) . . . . . CHECKED & SET

SHOULDER HARNESS . . . . . ON

APPROACH BRIEFING . . . . . COMPLETE

(cont'd.)

LOSS OF SYSTEM "A" (cont'd.)

— ***LANDING:***

The following checklist is accomplished in lieu of the normal LANDING checklist.

LANDING GEAR LEVER . . . . . OFF

MANUAL GEAR EXTENSION HANDLES . . . . . PULL

The uplock is released when the handle is pulled to its limit, approximately 18 inches for the main gear and 8 inches for the nose gear. The respective red landing gear indicator light illuminates, indicating uplock release. The gear free-falls to the locked position and the green landing gear indicator light illuminates as each gear is locked down.

Wait 15 seconds after the last MANUAL GEAR EXTENSION HANDLE is pulled:

LANDING GEAR LEVER . . . . . DOWN

The red landing gear indicator lights extinguish after the green landing gear indicator lights illuminate and the landing gear lever is down.

START SWITCHES . . . . . CONT

RECALL . . . . . CHECKED

SPEEDBRAKE . . . . . ARMED, GREEN LIGHT

GEAR . . . . . DOWN, 3 GREEN

AUTOBRAKE . . . . . AS DESIRED

Select desired autobrake level consistent with runway length, condition, and desired stopping distance.

►

FLAPS . . . . . _____, GREEN LT, DETENT

LOSS OF SYSTEM "B"

Loss of system "B" pressure is indicated by the system "B" pressure at zero and illumination of:

— MASTER CAUTION lights.
— FLT CONT and HYD annunciator lights.
— System "B" LOW PRESSURE lights.
— System "B" flt control LOW PRESSURE light.
— FEEL DIFF PRESS light (Flaps up).

SYSTEM "B" FLT CONTROL SWITCH . . . . . STBY RUD

This activates the standby pump, supplies pressure to the rudder power control unit, arms the standby hyd LOW PRESSURE light, and deactivates the flt control LOW PRESSURE light.

SYSTEM "B" HYD PUMP SWITCHES . . . . . OFF

— Outboard flight spoilers, autobrake, yaw damper, and autopilot "B" are inoperative. Normal brakes are inoperative. Alternate brakes are available. The engine No. 2 thrust reverser and leading edge flaps and slats have standby pressure. Trailing edge flaps have alternate electric power.

— Plan for a flaps 15 landing.

A flaps 15 landing is recommended because of the time required to retract from flaps 30/40 in the event of a go-around.

— Set V_{REF} 15.

NOTE: Asymmetry protection is not provided when the alternate extension system is used.

— Plan for ALTERNATE FLAP EXTENSION.

When the leading edge devices have been extended by the alternate system, they cannot be retracted. The drag penalty with the leading edge devices extended may make it impossible to reach an alternate field.

(cont'd.)

LOSS OF SYSTEM "B" (cont'd.)

— *PRELIMINARY LANDING (in lieu of normal Preliminary Landing Checklist):*

ALTIMETERS, FLT INSTS . . . . . /CHECKED

LANDING DATA (V_{REF} 15) . . . . . CHECKED & SET

GPWS . . . . . FLAP INHIBIT

To avoid a nuisance warning with less than normal landing flap.

SHOULDER HARNESS . . . . . ON

APPROACH BRIEFING . . . . . COMPLETE

AUTOBRAKES . . . . . OFF

► **At appropriate time on approach:**

ALTERNATE FLAPS MASTER SWITCH . . . . . ARM

Arms alternate flap system for alternate flap extension.

FLAP LEVER 15

Flap lever positioned for landing flaps.

AIRSPEED . . . . . MAX. 230 KNOTS

EXTEND FLAPS 10 USING ALTERNATE SYSTEM.

As flaps extend, adjust airspeed according to flap position. 1½ to 2 minutes will be required to extend flaps 10. The landing gear warning horn sounds if flaps are extended beyond 10 until all landing gear are down and locked.

LANDING GEAR LEVER . . . . . DOWN

EXTEND FLAPS 15 USING ALTERNATE SYSTEM.

(cont'd.)

LOSS OF SYSTEM "B" (cont'd.)

→ — *LANDING (in lieu of normal Landing Checklist):*

START SWITCHES . . . . . CONT

RECALL . . . . . CHECKED

SPEEDBRAKE . . . . . ARMED, GREEN LIGHT

GEAR . . . . . DOWN, 3 GREEN

←

►

FLAPS . . . . . 15, GREEN LT, DETENT

MANUAL REVERSION (Loss of Both Hydraulic Systems "A" and "B")

Loss of System "A" and "B" pressure is indicated by the system "A" and "B" pressure at zero and illumination of:

— MASTER CAUTION lights
— FLT CONT and HYD annunciator lights.
— System "A" & "B" LOW PRESSURE lights.
— System "A" & "B" flight control LOW PRESSURE lights.

SYS "A" & "B" FLT CONTROL SWITCHES . . . . . STBY RUD

This actuates the standby pump, supplies pressure to the rudder power control unit, arms the standby LOW PRESSURE light, and deactivates the flight control LOW PRESSURE lights.

SYS "A" & "B" HYD PUMP SWITCHES . . . . . OFF

Ground spoilers, inboard and outboard flight spoilers, nosewheel steering, autopilots, and yaw damper are inoperative. Thrust reversers have standby pressure. Inboard and outboard brakes have accumulator pressure only.

— Plan for a flaps 15 landing.

— Set V_{REF} 15.

— Plan for MANUAL GEAR and ALTERNATE FLAP EXTENSION.

When the gear has been lowered manually, it cannot be retracted. When the leading edge devices are extended by the alternate system, they cannot be retracted. Maximum airspeed is limited to 230 knots. The drag penalty with gear and/or leading edge devices extended may make it impossible to reach an alternate field.

(cont'd.)

MANUAL REVERSION (cont'd.)

— *PRELIMINARY LANDING:*

ALTIMETERS, FLT INSTS . . . . . ___.___/CHECKED

LANDING DATA (V_{REF} 15) . . . . . CHECKED & SET

GPWS . . . . . FLAP INHIBIT

To avoid a nuisance warning with less than normal landing flaps.

SHOULDER HARNESS . . . . . ON

APPROACH BRIEFING . . . . . COMPLETE

GO-AROUND PROCEDURE . . . . . REVIEW

Accomplish normal go-around procedure, except:

— **Advance thrust to go-around smoothly and slowly to avoid excessive pitch-up.**

— **Prepare to trim.**

— **Limit bank angle to 15° if below maneuver speed.**

ALTERNATE FLAPS MASTER SWITCH . . . . . ARM

FLAP LEVER 15

Flap lever positioned for landing flaps.

AIRSPEED . . . . . MAX 230 KNOTS

EXTEND FLAPS 10 USING ALTERNATE SYSTEM.

As flaps extend, adjust airspeed according to flap position. 1½ to 2 minutes will be required to extend flaps 10.

LANDING GEAR LEVER . . . . . OFF

(cont'd.)

MANUAL REVERSION (cont'd.)

— *PRELIMINARY LANDING: (cont'd.)*

MANUAL GEAR EXTENSION HANDLES . . . . . PULL

The uplock is released when the handle is pulled to its limit, approximately 18 inches for the main gear and 8 inches for nose gear. The respective red landing gear indicator light illuminates, indicating uplock release. The gear free-falls to the locked position and the green landing gear indicator light illuminates as each gear is locked down.

Wait 15 seconds after the last MANUAL GEAR EXTENSION HANDLE is pulled:

LANDING GEAR LEVER . . . . . DOWN

The red landing gear indicator lights extinguish after the green landing gear indicator lights illuminate and the landing gear lever is down.

EXTEND FLAPS 15 USING ALTERNATE SYSTEM.

— *LANDING:*

START SWITCHES . . . . . CONT

RECALL . . . . . CHECKED

SPEEDBRAKE . . . . . DOWN (DETENT)

GEAR . . . . . DOWN, 3 GREEN

AUTOBRAKES . . . . . OFF

►

FLAPS . . . . . 15, GREEN LT, DETENT

(cont'd.)

MANUAL REVERSION (cont'd.)

MANUAL REVERSION LANDING TECHNIQUES

With the loss of both hydraulic systems "A" and "B," the ailerons are controlled manually. High control forces are required for turns and the control wheel must be forceably returned to the aileron neutral position. Bank angle should be limited to 20° maximum. Because the rudder is powered by the standby hydraulic system, it is still very effective, and care must be used to prevent overcontrol. The elevator is controlled manually; a noticeable dead band exists. To minimize the effect of the dead band, the airplane may be trimmed slightly nose-up and a light forward pressure held on the control column.

Fly large landing patterns, with a long straight-in final approach. Keep thrust changes small or slow to allow for pitch trim changes. Landing configuration and approach airspeed should be established in-trim, on a level flight path, and on the runway centerline so that only a slight reduction in thrust is required to establish the landing profile. Fly a normal landing profile. Do not make a flat approach.

For go-around, apply thrust smoothly and in coordination with stabilizer trim. Rapid thrust application results in maximum nose-up pitch forces. Keep thrust and flight control movements smooth and moderate.

On touchdown, thrust reverser operation will be slow; apply steady brake pressure, do not modulate the brakes. Because of the inoperative nosewheel steering and limited capacity of the brake accumulators, do not attempt to taxi the airplane after stopping.