

PART 4
EMERGENCY PROCEDURES

PART 4

CHAPTER 1—EMERGENCIES

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Crash Landing

1. The following considerations are recommended if a crash landing becomes necessary:

a. *Before Landing*

- (1) Reduce weight as much as is practicable.
- (2) Have the nav/radar make the ejection seats safe. The pip pin for the canopy jettison gun must *not* be removed.
- (3) If crash landing on an airfield, request foam on the runway as early as possible.
- (4) If, in the opinion of the captain, there may be a danger of the navigators and AEO being trapped in the aircraft after the landing, they should be ordered to abandon the aircraft. Ensure that the undercarriage is in the up position.
- (5) A check should be made for obstructions, bearing in mind the direction of expected swing, ie one mainwheel up condition.
- (6) If crash vehicles are available check their positions.
- (7) If possible, check that a long ladder is available to expedite the crew's escape.
- (8) Ensure that all unnecessary navigational and electrical equipment is switched off.
- (9) Uncover the rear cabin windows prior to crash landing.

b. *Approach*

- (1) Make a normal approach with the undercarriage up or down according to circumstances. The advantages of reducing impact load with the undercarriage down, however, should be carefully considered.
- (2) Jettison the canopy and close the HP cocks just before touchdown.

2. The recommended **Crash Landing Drill** is given in the Flight Reference Cards.

Landing with Undercarriage in Abnormal Positions3. *General*

a. If, after using the emergency system, only one leg is lowered, it is recommended that the aircraft is abandoned. In other cases, if a landing is considered feasible, then the general principle is that all crew stay with the aircraft. Techniques for landing are given in para 4.

b. ~~Where practicable, make the landing at an airfield equipped with foam-laying apparatus. When landing with one main unit unlocked, the foam strip should be laid along the side of the runway that the wing tip is expected to strike. The foam acts as a lubricant and so delays the start of the ground loop, which imposes a heavy strain upon the undercarriage.~~ *ANA!*

c. The possibility of major damage is also reduced if, after touchdown, the unsupported wing or nose is lowered at a controlled rate while the flying controls are still effective, rather than be allowed to drop on to the runway.

4. *Landing Techniques*

a. *Belly Landing.* If, after the use of the emergency system, all units of the undercarriage remain retracted, it is recommended that the aircraft be belly-landed, as follows:

- (1) Reduce weight as much as practicable and switch off all unnecessary equipment.
- (2) Have the nav/radar make the ejection seats safe. The pip-pin for the canopy jettison gun must not be removed.
- (3) Ensure that the bomb doors and entrance door are closed.
- (4) Ensure all loose objects are stowed, that all crew have their harnesses tight and locked, protective helmets on, with 100% and emergency oxygen selected and flowing correctly.

- (5) Make a normal approach.
- (6) Jettison the canopy while still on the approach.
- (7) Make a normal landing, keeping the wings level and the rate of descent to a minimum.
- (8) Close the HP cocks. As soon as possible, operate the fire extinguishers and switch off all electrics.

b. Nosewheel Up, Both Mainwheels Down

- (1) Move the CG as far aft as possible, within permitted limits of the available fuel.
- (2) Carry out a low overshoot, to check wind conditions.
- (3) Ensure all loose objects are stowed, that all crew have their harnesses tight and locked, protective helmets on, with 100% and emergency oxygen selected and flowing correctly.
- (4) Carry out a normal circuit. Open the entrance door. Jettison the canopy on completion of final turn. Switch on the landing lamps at night.
- (5) Touch down normally at the correct speed.
- (6) When firmly on the main wheels, stream the tail parachute (crosswind permitting) and cut the outboard engines.
- (7) AEO to switch off Nos 1 and 4 alternators.
- (8) Hold the nose up until speed drops to 80 knots, runway length permitting.
- (9) While elevator control is still available, lower the nose on to the ground.
- (10) As soon as the nose touches, cut the remaining engines; the co-pilot switches off all ▶◀ LP cocks; the AEO switches OFF all alternators and operates the battery isolating switch.
- (11) When the nose is firmly on the ground, apply the brakes gently and evenly.
- (12) When the aircraft stops, the co-pilot leaves first, followed by the nav/radar, AEO, nav/plotter and 1st pilot in that order. If 6th and 7th seat members are carried they should leave the aircraft after the co-pilot in the order 6th, then 7th.

c. Nosewheel Down, One Mainwheel Down

- (1) Move the CG as far aft and as far away from the failed mainwheel as possible.
- (2) Carry out at least one low overshoot, to check wind conditions.
- (3) Ensure all loose objects are stowed, that all crew have their harnesses tight and locked, protective helmets on, with 100% and emergency oxygen selected and flowing correctly.
- (4) Carry out a normal circuit and jettison the canopy on completion of the final turn. Switch on the landing lamps at night.

- (5) Touch down normally at the correct speed.
- (6) On touchdown, cut the outer engines and lower the nosewheel onto the ground.
- (7) AEO switches off Nos 1 and 4 alternators.
- (8) Hold the wing up, using aileron, rudder and nosewheel steering.
- (9) Before control effectiveness is lost, lower the wing and cut the remaining engines; hold the aircraft straight for as long as possible. The co-pilot switches off the ▶◀ LP cocks; the AEO switches off all the alternators and operates the battery isolating switch.
- (10) When the aircraft stops, the co-pilot leaves first followed by the nav/radar, AEO, nav/plotter, and 1st pilot in that order. If 6th and 7th seat members are carried they should leave the aircraft after the co-pilot in the order 6th, then 7th.

d. Nosewheel Down, Both Mainwheels Up. In these circumstances, it is recommended that the aircraft be abandoned, as it is considered that the hazards for the rear crew escaping past the nosewheel are less than the danger to the whole crew of the nose section breaking off and the main fuselage overrunning the cabin. If, for any reason, a landing is imperative, the following technique is recommended:

- (1) Reduce weight to the minimum practicable.
- (2) Insert the pins in the ejection seats but not in the canopy jettison gun. Switch off all unnecessary equipment. Ensure all loose objects are stowed, that all crew have their harnesses tight and locked, protective helmets on, with 100% and emergency oxygen selected and flowing correctly.
- (3) Make a normal approach. Jettison the canopy at the end of the final turn. Switch on the landing lamps at night.
- (4) Make a normal landing, keeping the wings level; avoid a high nose-up attitude and land with minimum drift. Do not stream the brake parachute.
- (5) As soon as the nosewheel drops to the ground, cut all engines and switch off all services.

Abandoning the Aircraft

5. General

- a. Ejections may be initiated in straight and level flight, at any height from ground level upwards. However, runway ejections should only be made when the speed of the aircraft is above 90 knots. At low altitude the aircraft should be straight and level or climbing; any significant rate of descent or nose-up attitude at the instant of ejection reduces the seat performance.
- b. Rear crew members can leave the aircraft down to a minimum height of 250 feet at a maximum speed of 250 knots. Whenever possible, speed

should be reduced to 200 knots and the aircraft be in a shallow climb with undercarriage raised, prior to escape.

6. To minimise the possibility of injury by air blast or by loss of equipment, it is recommended that, if circumstances permit, speed is reduced as much as possible before attempting to escape. Escape is made easier if no personal survival pack is worn.

7. The following amplifies the drills in the Flight Reference Cards:

a. *Escape for Rear Crew Members—General*

(1) Whenever possible, altitude should be reduced to below 40,000 feet. Above 40,000 feet the aircraft should only be abandoned in an extreme emergency. Crew members should initiate the demand emergency oxygen set and then disconnect from the aircraft system. Post-Mod 2393 a combined static line, oxygen hose and mic/tel release coupling is fitted for rear crew members. Speed should be reduced as much as possible. It is most important that the exit is made by sliding cleanly down the door, in a bunched-up attitude. Ground tests also show that, by using the technique described in para 7 c, rear crew members can clear an extended nose-wheel on escape at speeds up to 180 knots.

(2) Move the abandon aircraft switch rearwards to the EMERGENCY position and confirm on the intercom. Post-SEM 027, operation of the abandon aircraft switch automatically illuminates the cabin light.

(3) Nav/plotter and AEO operate the door opening switches. Above 20,000 feet, the normal door opening lever should only be operated in addition to and simultaneously with the switches when escape in the minimum time is essential. Below 20,000 feet, the switches and door opening lever may both be used. Whichever method has been used to open the door, the first rear crew member to reach the door should ensure the door opening lever is in the gated EMERGENCY position. Ensure that static lines are connected.

(4) When giving the order to abandon the aircraft, the pilot should normally indicate to the rear crew members that the static lines are to be used. However, below 1000 feet and 200 knots he should order the manual overrides to be used.

(5) The nav/radar's last action before sliding down the door must be to ensure that his oxygen hose passes behind his PSP.

(6) Navigators and AEO leave the aircraft in the order, nav/radar, AEO and nav/plotter. If an experienced 6th seat crew member is carried he will be first to leave the aircraft. In the case of an inexperienced 6th member he will leave after

the nav/radar. When an inexperienced 7th member is carried, the 6th member must be an experienced aircrew member or a crew chief. The 7th member is not to be given any task other than leave the aircraft when instructed. The order of abandoning will be 6th, 7th, nav/radar, AEO and nav/plotter. The co-pilot, if possible, should watch the rear crew members leave the aircraft and inform the 1st pilot when the nav/plotter has left. The crew gone lights indicate to the pilot that the rear crew members have left the aircraft.

b. *Escape for Rear Crew Members—Undercarriage Raised*

(1) Sit on the floor at the front end of the door aperture facing aft.

(2) Grasping the handle at the bottom of the centre seat, swing forward onto the door and slide down it. At speeds above 200 knots it is advisable to adopt and hold a bunched-up attitude to minimise the possibility of injury from limb flailing. Below 200 knots an extended attitude with the legs straight out and rigid probably gives an easier exit. An upward pull with the arms is necessary to ensure that the PSP is lifted clear of the door edge.

c. *Escape for Rear Crew Members—Undercarriage Lowered.* If the undercarriage cannot be raised, the following technique is recommended:

(1) Grasping the handle at the bottom of the centre seat, swing the legs onto the door facing aft. Slide down the door with the legs apart until the feet can be braced against the door-operating jacks. An upward pull with the arms is necessary to ensure that the PSP is lifted clear of the door edge.

(2) Releasing the grip, lean forward with bent knees and grasp the right-hand (port) jack with both hands, as low as possible, thumbs uppermost, right hand on top.

(3) Withdrawing both feet inwards from the jacks, keeping the knees bent and the body close to the port jack, swing down and round the port jack and over the port side at the bottom of the door. Release the hold on the jack as the body swings completely clear. Try to maintain a compact position with the arms close to the body after letting go. Keeping close to the port jack decreases the risk of the PSP fouling the starboard jack.

d. *Escape for Rear Crew Members at Low Altitudes*

Note: Whenever possible, convert speed to height.

If it is necessary to abandon the aircraft at very low altitude (below 1000 feet), reduction of the time interval between the moment at which the order to

abandon aircraft is given and the moment at which the parachute deploys can be of overriding importance and the following points should be borne in mind:

- (1) The time taken to open the door can be reduced to a minimum by operating either rear crew switch immediately then, if necessary, operating the manual door control.
 - (2) The static line arms a barostat, which then withdraws the parachute pack pins after a delay of 2 seconds. Therefore, whether a static line is connected or not, the parachute release handle should be pulled as soon as possible after clearing the door.
8. The pilots should escape, using their ejection seats, after the rear crew members have escaped.
 9. If the ejection seat automatic system fails after ejection, proceed as follows:
 - a. When forward speed is sufficiently low, discard the face screen.
 - b. Pull the manual separation lever outwards and then up.
 - c. Fall clear of the seat and pull the rip-cord handle.

Ditching

10. Model tests indicate that the ditching qualities of the aircraft are good there being no tendency to nose under after impact.

- a. The following considerations and actions amplify the drill given in the FRC:
 - (1) *Assessment of Sea State.* Whenever possible, fly low over the water and study its surface before ditching. It is important to establish correctly the direction of the swell and of the surface wind.
 - (2) *Direction of Approach.* The aircraft should always be ditched into wind if the surface of the water is smooth or there is a very long swell. However, ditching into the swell or large waves should be avoided because of the danger of nosing under. In practice a direction of approach which is a compromise between swell, wave and wind direction, may be the best choice.
 - (3) *Judgment of Height.* As judgment of height over water can be difficult, the Alt 7 or Alt 6 should be used if possible. The landing lamps should also be used at night.
 - (4) *Fuel Weight.* Fuel weight should be reduced as much as practicable prior to ditching. Excess fuel may be used to position the aircraft in a more favourable location, eg closer to ships or land, but it is essential that the ditching is carried out while engine power is still available.
- b. *Ditching Drill*
 - (1) Ensure all loose objects are stowed, that all crew have their harnesses locked and tight, pro-

tective helmets on, 100% and emergency oxygen selected and flowing correctly. Uncover the rear cabin windows.

- (2) Have ejection seat pins replaced.
 - (3) Disconnect PSP and lanyards, leg restraint, emergency oxygen and parachute harnesses as appropriate to crew position.
 - (4) On the approach, stow the fuel console and jettison the canopy.
- c. *Touchdown*
 - (1) Touchdown should be made in a tail-down attitude at the lowest practicable speed commensurate with the minimum rate of descent. Touching down at high speed and low angle of attack should be avoided due to the likelihood of the aircraft bouncing and the probable collapse of the bombardier's blister with subsequent flooding of the cabin. In any event the control column should be held hard back after impact.
11. The recommended **Ditching Drill** is given in the Flight Reference Cards.

Aborted Take-Off Procedures

12. a. If an emergency occurs before decision speed, take-off is to be aborted in accordance with the FRC drill. The following emergencies constitute mandatory reasons for abandoning take-off, unless otherwise authorised.
 - (1) Engine failure.
 - (2) Any fire warning light coming on.
 - (3) Double alternator failure.
 - (4) PFC failure (main warning not accompanied by a white reminder MI).
- b. The Captain is to warn the crew "Aborting".
- c. The pilot flying the aircraft is to:
 - (1) Close the throttles.
 - (2) Select HIGH DRAG airbrake.
 - (3) Apply maximum continuous braking at NMBS or below.
- d. The non-flying pilot is to:
 - (1) Stream the tail braking parachute (75 knots to 145 knots).
 - (2) Carry out engine failure/fire drills as ordered.
- e. The AEO calls "Aborting, Aborting" on the frequency in use.
- f. The nav/plotter calls airspeeds down to 50 knots.

Emergency Evacuation on the Ground

13. The following considerations for evacuating the aircraft in an emergency on the ground amplify the drills given in the Flight Reference Cards:

a. *Undercarriage Position.* The direction of exit depends on the emergency and whether the undercarriage is raised or has collapsed during the emergency. If the nosewheel has collapsed, it may be possible to leave the aircraft through the door; if, however, all the undercarriage legs are retracted, exit will have to be via the canopy aperture. The route from the canopy to leave the aircraft will depend upon the condition of the aircraft and whether a fire exists.

b. *Canopy Jettison.* It will be necessary to leave via the canopy aperture if exit through the door is not possible. When the canopy is jettisoned, if the aircraft is stationary, the possibility exists that the canopy will fall back on to the cockpit and may injure one or other of the pilots.

c. *Ejection Seat Pins.* If exit through the entrance door is feasible, the pilots should replace the seat pan firing handle safety pin prior to leaving their seats. If the exit has to be made via the canopy aperture, and time permits, the main gun seat pins are to be inserted to make the ejection seats safe.

d. *Crew Ladder.* If speed of exit is essential and exit through the door is feasible the crew should slide down the door and clear the vicinity of the aircraft as quickly as possible. Only replace the door ladder when the degree of emergency allows.

e. *Battery.* If conditions permit the AEO should switch off the aircraft battery prior to evacuating the aircraft. It should be borne in mind that with the battery off all cabin lighting is lost. However, if the battery was left on, when it is safe and if it is feasible, the AEO should return to the aircraft to switch off the battery in order to make the aircraft electrically safe.

Engine Failure Above Decision Speed

14. a. If engine failure or other serious emergency

occurs above decision speed, the take-off is normally to be continued and the drill recommended in Part 3, Chapter 5 para 1 and 2 followed.

b. When the aircraft is safely airborne, the pilot flying the aircraft is to close the HP cock(s) of the affected engine(s), simultaneously ordering the non-flying pilot to select undercarriage up. The flying pilot is then to order the non-flying pilot to carry out the drill required, eg "Engine Failure Drill, No 3 Engine".

c. The non-flying pilot is to complete, from memory, the engine fire/failure drill as ordered: the immediate actions listed in the FRC as far as 'Fuel Pumps' are to be completed.

d. The AEO declares an emergency on the frequency in use.

e. Once the aircraft is fully under control (pattern speed attained) the FRC checks for engine failure/fire are to be completed.

f. A turn on to the downwind leg is not to be initiated below 1000 feet above ground level, and until pattern speed is attained. Bank is to be restricted to a maximum of 25° in the turn. It is recommended that an instrument pattern is flown following double engine failure.

g. When the aircraft is established on the downwind leg, the 'Resetting' checks are to be carried out (if required) followed by the 'Pre-landing' checks. The undercarriage is not to be lowered until approaching the glide path.

Index of Emergency Drills and Malfunctioning Procedures

15. In addition to the emergency drills and malfunctioning procedures contained in the Flight Reference Cards, Table 1 shows where, in the Aircrew Manual, the subject is covered.

Table 1. Index of Emergency Drills and Malfunctioning Procedures

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