

PART 4

Chapter 3 — ABANDONING AND EMERGENCY LANDING PROCEDURES

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1 Ejecting from the aircraft

NOTE 1: Emergency oxygen is not available once separated from the seats.

NOTE 2: The canopy is jettisoned immediately either handle of either ejection seat is pulled, ejection following 0.5 second later.

- (a) The recommended minimum height and speed for safe ejection in straight and level flight is ground level/90 knots. If the aircraft is descending or in a nose-down attitude, additional altitude is required.
- (b) Warn the other occupant to prepare for ejection.
- (c) Reduce speed to 250 knots or below if possible.
- (d) Grasp the face-screen firing handle. The elbows must be drawn in close to the body and both hands must grasp the handle firmly, the backs of the hands facing forward. The feet should not be withdrawn from the rudder pedals.
- (e) (i) Draw the handle and face-screen firmly over the face, keeping the head pressed hard against the headrest. It is not necessary to jerk the handle and in no circumstances should the screen be pulled outwards away from the face, as it may not then be possible to fire the cartridge.

(ii) If conditions of positive G prohibit the use of the face-screen firing handle, ejection should be initiated by pulling the seat-pan handle upwards. In this event no protection is given to the face. It is essential, therefore, that the visor is lowered and the head is pressed firmly against the headrest to minimise the risk of spinal injury on ejection. The seat-pan firing handle may provide a more rapid means of initiating the ejection sequence; its use is recommended if the canopy has been previously jettisoned.

(iii) If the seat fails to eject, ensure that the handle has been pulled to its fullest possible extent before using the alternative handle. If the face-screen firing handle has been used unsuccessfully it is unlikely that the seat-pan firing handle will effect an ejection; should the attempt be made, a one-hand grip on the face-screen handle must be retained to avoid the possibility of the drogue gun bullet fouling the face-screen.

(f) During ejection, the drogue gun fires automatically.

(g) If ejection takes place above 10000 feet automatic separation will not occur until that height is reached. If ejection takes place at or below 10000 feet automatic separation occurs after $1\frac{1}{4}$ seconds if the G-stop has not operated.

(h) If the parachute fails to open after separation, pull the rip-cord D-ring.

(i) When the parachute is fully developed and the occupant is comfortably settled in the harness, check that the PSP lowering line is attached to the life preserver, detach the PSP from the harness *side couplings* and allow it to lower. This reduces oscillation and lessens the risk of injury on landing.

2 Manual separation from the seat

If the automatic system fails after ejection:

(a) When forward speed is sufficiently low, discard the face-screen.

(b) Operate the manual separation handle.

(c) Push clear of the seat. It may be necessary to exert pressure on the sides of the seat to disengage the sticker straps.

(d) With the right hand, pull the rip-cord D-ring.

3 Manual bale-out

(a) If the seat fails to eject after carrying out the actions detailed in para 1 (e) (iii) a manual escape may be attempted.

(b) Since emergency oxygen is not available during the descent it is recommended that, if the aircraft is controllable, a descent is made to below 15000 feet and the bale-out delayed until 10000 feet.

(c) *Manual escape hazards*

(i) The following information is provided to assist the pilot in assessing the relative hazards of other courses of action.

(ii) A manual escape cannot be made until the parachute pack is freed from its housing. Due to the confined cockpit, this is a difficult, if not impossible task. Impact with the airframe may occur after escape.

(d) *Manual escape sequence*

The following sequence of actions may prove successful:

(i) Disconnect oxygen, anti-G, PSP and mic/tel connections.

(ii) Operate the manual separation handle.

(iii) Jettison canopy (if still in place).

(iv) Grasp parachute lift webs at pack level and lean forward attempting to tug the parachute pack from the seat housing and fire the guillotine; a firm pull is necessary.

(v) Keeping the pack firmly on the shoulders, transfer the lift webs to the outboard hand. Do not lean back again.

(vi) With assistance from the free hand, twist the body and leave the aircraft head first over the nearest coaming.

(vii) Pull rip-cord D-ring when clear of the aircraft.

WARNING: Do not deliberately invert the aircraft. The parachute pack is likely to jam in its housing; further control of the body position is then lost. Do not operate the QRB to free the seat harness; this action also releases the parachute harness.

4 Controlled ejection

(a) If a situation arises which ultimately necessitates ejection, the following procedure should be adopted to ensure safe ejection of the crew and impact of the aircraft in the clear area selected.

(b) Establish the following configuration:

| | |
|-------------------------------|--|
| Flaps, landing gear, airbrake | Retracted |
| Height | 9000 feet |
| Speed | 250 knots |
| Power | Flight idling |
| Elevator trim | Set for level flight |
| Aileron trim | POWER—spring bias to 9 o'clock position MANUAL—trim indicator to 20° left |

NOTE: When appreciable lateral asymmetry has previously been corrected with aileron trim, application of the recommended amounts of aileron trim should be towards centralisation. This reduces the danger of the stick fouling the knees during ejection.

(c) Position the aircraft over the selected area.

(d) Release the control column and carry out a normal ejection.

(e) The aircraft will now spiral down into the selected area and crash within a circle radius approximately 2 nm of the ejection point.

(f) Considerable scatter of impact must be expected but the procedure above eliminates the possibility of the aircraft continuing unpredictable flight after the crew have ejected.

5 Forced landing procedure

(a) *Immediate actions*

| | | |
|-------------------------|--------|---|
| Glide | | 210 knots |
| Airbrake | | IN |
| HP and LP cocks | | OFF |
| Booster pumps | | OFF |
| Tailplane | | Interconnection OFF, trim load-free |
| UHF | | As required, if practical set: Selector to STBY EMERG BATT Main set OFF |
| Turn and slip | | EMERGY |
| Non-essential electrics | | Off |
| Aileron trim | | Unlocked, check zero set |
| Power controls | | Select manual: 1 If auto-reversion occurs 2 Before electrics fail 3 Before joining circuit |
| External stores | | Jettison before batteries exhausted |

(b) Considerations

All the circumstances prevailing at the time of engine, hydraulic and electrical failure cannot be predicted. Each system must be thoroughly understood. The following information is intended to help the pilot reach the best decision:

(i) The recommended gliding speed for maximum range is 210 knots. In still air, a distance of approximately 2 nm per 1000 feet can be achieved with an average rate of descent of 2300 feet per minute.

(ii) Experience shows that at 200 knots, windmilling RPM provides sufficient hydraulic pressure for limited use of the power controls, but coarse or frequent use of the controls or selection of any of the hydraulic services, may cause Manual reversion.

(iii) When gliding at 210 knots, windmilling RPM are insufficient to maintain the generators on line; to achieve this at 40000 feet a speed of approximately 250 knots is required, increasing to 450 knots at 10000 feet. As the power controls can only be selected off whilst electrical power is available, to prevent inadvertent Manual reversion at an inconvenient stage of the approach, select power off before electrical failure occurs.

(iv) If range is not important and a descent in Manual is being made, control is more comfortable at 175 knots.

(v) If a deceleration is required to obtain the correct gliding speed, climb rather than use the airbrake which requires considerable hydraulic power and constitutes a hazard on landing should it remain out.

(c) Practice forced landing procedure

For practice purposes, a flap setting of 23° and 5500 RPM gives a rate of descent comparable with an engine-off glide.

(d) Circuit procedure and landing on an airfield

(i) If a forced landing on an airfield is being made, attempt to arrive overhead at approximately 7000 feet AGL.

(ii) Plan a Manual approach and aim to be downwind opposite the touchdown point at about 210 knots (but not less than 180 knots) at 4000 feet AGL depending on prevailing wind conditions. When the landing gear is lowered, the rate of descent is high and increases rapidly as speed is reduced below 180 knots.

(iii) Turn across wind at 180-210 knots and when it is certain that the touchdown can be reached select full flap. Once flaps are lowered there is a marked increase in the rate of descent.

(iv) Maintain at least 180 knots on the final approach and aim for a threshold speed of 160 knots. In Manual the pull force to roundout from a glide approach is large and requires considerable anticipation.

(e) *Landing away from an airfield*

Experience suggests that it is preferable to lower the landing gear. In the down position it absorbs much if not all the initial impact, assists in retarding the aircraft and, provided that electrical power is available and that the emergency lowering system has not been operated, it may be retracted after touchdown if necessary. With the landing gear up, the aircraft must be lowered gently on to the ground *at the normal* speed; if the speed is too low a wing drop is likely to occur and the tail may strike the ground causing the aircraft to porpoise. If the speed is too high the aircraft is prone to bounce, the initial impact having a damaging effect on the cockpit.

6 Landing with the landing gear in abnormal positions

NOTE: Experience has shown that these techniques cause minimum damage to the aircraft and none to the pilot. Retain empty drop tanks if carried. Unless circumstances dictate otherwise, always land on a runway when any of the legs are not locked down. Ensure that the harnesses are locked and tight. The arrester hook should not be used when landing with the landing gear in an abnormal position.

(a) *Both main wheels only locked down*

(i) Use up as much fuel as is safe, in order to move the CG as far aft as possible.

(ii) Make a powered approach at the normal speed. On touchdown, close the HP cock, maintain a moderate nose-up attitude and stream the brake parachute.

(iii) Trim the tailplane to give full nose-up trim and, as the speed falls below 100 knots, maintain a high nose-up attitude without touching the tail cone on the ground.

(iv) Lower the nose on to the runway at 80-90 knots and use the brakes gently to keep straight.

(b) *Nosewheel and one main wheel locked down*

(i) Make a normal approach and land gently. The unsupported wing immediately tends to drop but can be held level with aileron. Close the HP cock after touchdown.

(ii) Lower the nosewheel as soon as possible and stream the brake parachute, crosswind permitting. Hold the wings level for as long as possible by use of aileron; moving the control column fully forward assists in keeping the wings level.

(iii) Only one wheelbrake is effective and this, if used to decelerate the aircraft induces a swing and aggravates the wing drop.

(iv) When the wing finally drops, the aircraft swings in the direction of the faulty landing gear unit. The swing should be counteracted as much as possible by use of opposite brake.

(v) Experience has shown that the lateral distance from the landing path to the point of rest averages approximately 60 yards but may be as much as 400 yards. If possible choose a runway which has a clear area about 400 yards wide in the direction of the anticipated swing and land on the edge of the runway away from the unlocked leg.

(c) *Wheels-up landing*

(i) Land on foam carpet if possible.

(ii) Make a normal approach and fly the aircraft on to the runway at normal speed.

(iii) Close the HP cock at touchdown.

7 Landing with a burst tyre

No special difficulty is encountered when landing with a burst tyre(s), directional control and braking being adequate.

8 Use of arrester hook

(a) If it is necessary to engage the arresting gear to avoid going off the end of the runway, select hook DOWN approximately 100 yards before reaching the arrester wire. Aim for the centre of the wire. Cease braking before engaging the wire. Do not re-apply the brakes. As the hook cannot be raised from the cockpit, assistance will be required to clear the runway.

(b) If the hook is lowered in the air, it will probably bounce up on touchdown and strike the fuselage and possibly render the damper system inoperative.

(c) Engagement speeds and weights for various types of arresting gear are given in Part 2, Chapter 2, para 19.

(d) The arrester hook should not be used when landing with the landing gear in an abnormal position.

9 Engagement with arrester barrier

(a) The aircraft is cleared for engagement with Safeland arrester barriers Mks 5 and 6. Engagement should always be made if the aircraft would otherwise enter the overshoot area.

(b) A clean, straight engagement should be made aiming to enter between the centre verticals at minimum speed. The following technique is recommended.

(c) *Clean aircraft or aircraft with empty drop tanks*

(i) Stream the brake parachute. In strong crosswinds, however, and if wheel braking is not available, the parachute should not be streamed if it would result in the aircraft missing the barrier.

(ii) Call on RT for 'Barrier'.

(iii) Lower full flap.

(iv) Close the HP cock, commence steady braking to reduce speed to a minimum before engagement and aim for the centre panel. If brake failure has occurred it may be advisable not to close the HP cock and to use power to maintain sufficient speed for rudder control.

(v) Keep the canopy closed.

(vi) Duck head forward before engagement.

(vii) Immediately before the engagement, momentarily release the brakes to enable the wheels to roll smoothly over the lower cable.

(viii) Resume full braking after the engagement and apply the parking brake when the aircraft comes to rest to prevent further damage due to roll back.

(ix) If circumstances permit, close the LP cock, switch off the battery master switch and make the aircraft 'safe for parking'.

(d) *Aircraft with drop tanks containing fuel*

(i) Because of the fire risk if the drop tanks are ruptured on engagement, it is recommended that the tanks are jettisoned or the fuel burned off if it is known that barrier engagement is probable on landing.

(ii) The frangible 100 gallon drop tanks may be jettisoned on the runway; because of the danger of the tanks following the aircraft into the barrier the tanks must not be jettisoned within 1000 feet of the barrier. If take-off is abandoned when in formation or stream, the tanks should not be jettisoned until it is certain that other aircraft are not endangered.

(iii) Jettisoning should be carried out before streaming the brake parachute or application of wheelbrakes.

(iv) If within 1000 feet of the barrier, retain the tanks and endeavour to enter the barrier at 50-60 knots if speed control is possible. This speed facilitates a clear over-run of the bottom cable thus reducing the risk of rupturing the tanks.

10 Ditching

(a) Model tests of a clean aircraft indicate that a ditching in any but ideal conditions would be very hazardous, therefore abandon the aircraft rather than attempt to ditch.

(b) *If ditching is inevitable:*

(i) Select 100% oxygen and deflect the emergency toggle sideways. Disconnect the emergency oxygen tube.

(ii) Check the PSP lowering line for security of attachment to the life preserver. Disconnect the PSP side quick release couplings from the parachute harness.

(iii) Disconnect the anti-G hose from the suit.

(iv) Lock the safety harness in the rear position and tighten the straps.

(v) Disconnect leg restraint garters and jettison the canopy.

(vi) Ditch along the swell or, if the swell is not steep, into wind. *The airbrake must be retracted.*

(vii) When the aircraft has stopped, unlock the harness quick release and free the straps. Disconnect the main oxygen tube, remove the oxygen mask from the face and leave the aircraft as quickly as possible.

NOTE: If time permits, the PSP should be manhandled from the cockpit. If the aircraft sinks before this has been achieved, disconnect the PSP lowering line.

(viii) Inflate the life preserver when clear of the aircraft.

(ix) If the PSP has been salvaged, inflate and board the life raft.

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