

82. Single engine landing

Maintain a speed of at least 150 knots while positioning the aircraft with the flaps up. Lower the undercarriage in the normal position on the circuit. Maintain speed A given on the approach speed chart until the final decision to land is made at 600 feet A.G.L. or above, then lower the flaps and reduce speed to cross the airfield boundary at the speed recommended for a normal landing.

83. Going round again on one engine

- (a) This can be done comfortably provided that the speed is at least that given in line A on the approach speed chart.
- (b) Raise the undercarriage and carefully increase the power to 7,000 r.p.m. on the live engine, taking care to maintain directional control and allowing the speed to build up to 140 knots. The aircraft should be climbed away at this speed. Unless power is increased carefully, control will be lost.

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84. Engine failure on take-off

- (a) The safety speed is 140 knots.
- (b) At weights below about 33,000 lb. if corrective action is taken quickly, control may be maintained at speeds as low as 125 knots and the aircraft will accelerate and climb away comfortably from this speed. It may be necessary to throttle back the live engine sufficiently to maintain directional control.
- (c) Raise the undercarriage, trim as necessary and build up speed to 150 knots.
- (d) Close the H.P. cock and throttle of the failed engine.
- (e) Switch off the L.P. cocks and pumps of the failed engine.

85. Engine failure in flight

In the event of engine failure in flight the immediate action should be to close the throttle and H.P. cock. If failure is due to an obvious mechanical defect put off the relevant L.P. pumps and cocks and stop No. 5 inverter. Do not attempt to relight. If failure is due to a flame-out put off the L.P. pumps but leave one L.P. cock open. Shed all non-essential electrical load, and in any case No. 5 inverter, until the engine has been relit.

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86. Double flame-out

- (a) The most important factor to the achievement of re-lighting after a double flame-out has occurred, is the condition of the aircraft batteries. Should a double flame-out occur, immediately reduce the electrical consumption to the emergency minimum by:—
- (i) Switching off all the radar inverters.
 - (ii) Switching off all booster-pumps.
 - (iii) Stopping the standby instrument inverter, if running, by tripping its circuit-breaker. This should only be done if the instrument supply is on the normal supply.
 - (iv) Checking that the generators cut out when the idling r.p.m. fall below the cut-out r.p.m. If they do not, switch off the generator switches.
 - (v) Switching off other non-vital equipment such as de-mister motor, radio compass, A.M.U., A.P.I., external lights, etc.
 - (vi) Switching off the standby V.H.F. set.
- (b) Transmit a distress call and obtain a course to steer. After initial contact, inform that the V.H.F. will be switched OFF for a period whilst the aircraft descends.
- (c) Commence a maximum rate descent to 15,000 feet. Avoid using the trimming controls, particularly the tail-plane control. If over the sea or uninhabited territory, the captain may elect to glide for range (160 to 180 knots), but in these circumstances greater attention must be paid to electrical consumption during the descent. The aircraft batteries should last for 20 minutes with the above services OFF, but the chances of a successful relight are far greater if the time factor between the flame-out and the attempted relight is at a minimum.
- (d) Reduce speed to approximately 160 to 180 knots, check the windmilling r.p.m. are between 1,000 and 1,200 r.p.m. and, on *each engine in turn* carry out the re-lighting drill given in para. 81.

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87. Action in the event of fire

(a) Engine fire

When an engine fire warning light comes on, or a fire is suspected, the L.P. and H.P. cocks must be closed immediately. The cabin air switch (if fitted) should be turned OFF to prevent toxic fumes entering the cabin. Speed should be reduced as much as possible and the fire-extinguisher pushbutton pressed. The warning light should go out when the fire is extinguished. The engine must not be restarted owing to the risk of fire restarting after the fire-extinguishers are exhausted.

(b) Fuel tank fire

The fuel tank bay fire warning light will come on if fire breaks out in the bay, or may come on due to an electrical fault. In the event of fire, the fire-extinguishers will be automatically discharged into the bay and the light will remain on even if the fire has been put out. If the light comes on due to an electrical fault the fire-extinguisher bottles will not discharge. If the warning light comes on, an attempt should be made to discover whether there is a fire. If signs of fire are apparent the aircraft should be abandoned immediately. If there are no signs of fire the aircraft must be landed at the nearest airfield as soon as possible. While the warning light is on, the crew should be ready for immediate escape in the event of trouble developing.

(c) Cabin fire

Should an electrical fire occur in the cabin, the following drill is recommended:—

Oxygen	Set masks to HIGH, regulators to emergency.
Electrical	All non-essential services—OFF.
Fire-extinguisher	Use if source of fire can be identified and fire is persistent.
Cabin pressurization	Maintain pressure.

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If the fumes persist descend to below 13,000 feet, reduce speed to 150 knots and jettison the navigator's hatch to improve ventilation, keeping the engine air switches (if fitted) on. If the fire spreads or the fumes become dangerously over-powering the aircraft should be abandoned.

NOTE.—If a fire develops which cannot be quickly controlled, there is a risk that damage may occur to the ejection seat, parachute and jettison circuits, rendering subsequent escape impossible.

88. Flapless landing

Turn on to the final approach at 140 knots. The approach, which should be longer than that for a normal landing, will be very flat.

- (i) Throttle back early, aiming to cross the boundary at a speed of 115 to 125 knots, depending on the weight.
- (ii) Lower the nosewheel immediately after touchdown and apply the brakes as much as possible without locking the wheels.
- (iii) On a 2,000-yard runway a flapless landing may be carried out comfortably following a correctly executed approach, at weights up to 40,000 lb. If the runway is wet, at weights above 35,000 lb., a 3,000-yard runway should be used if possible.

89. Emergency operation of the undercarriage

- (a) Failure of the undercarriage to lower normally may be caused through a hydraulic, electrical or mechanical fault.
- (b) If the pressure indicated on the main pressure gauge is 1,500 lb./sq. in. or below, a hydraulic fault can be assumed, and the handpump may have to be used to lower the undercarriage. In this event it will be impossible to lower the flaps or extend the airbrakes. To conserve fluid for braking, the bomb doors should not be opened.

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- (c) If the hydraulic pressure is normal and shows no sign of falling:—

- (i) Check the changeover lights on the undercarriage position indicator.

- (ii) Check the fuses for

Undercarriage indicator circuit No. 68
Undercarriage control circuit No. 67

- (iii) Reselect undercarriage up and down several times to try to overcome any slight sticking of sequence valves, doors or latches.

- (iv) If there is no evidence of selection, an electrical fault may be assumed; selection of another service will confirm this, and the hydraulic selector valve should be operated by pulling the red toggle handle fitted above the selector pushbuttons.

WARNING.—After the emergency toggle handle has been pulled it is not possible to retract or unlock the undercarriage.

- (v) If either a main wheel or the nosewheel fails to lower, the fault is probably mechanical within the unit itself. Experience has shown that by using the handpump, because of its greater pressure it is sometimes possible to overcome the fault and achieve a successful lowering. Considerable time and effort will be needed.

- (d) To raise the undercarriage on the ground in an emergency, rotate clockwise and press the normal UP selector button. It must not be used in this way to retract the undercarriage in the air as there is a risk of the oleo leg being retracted when not fully extended. If the UP button cannot be pressed in normally after take-off, the wheels must be left down and the aircraft landed.

90. Landing with an undercarriage unit not locked down

- (a) *Both main wheels only locked down*

- (i) Reduce weight and fuel as much as possible so that the landing is carried out at an aft C.G.

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Unless circumstances dictate otherwise land on a runway.

- (ii) Check harness tight and locked.
 - (iii) Make a normal approach and landing and maintain a moderate nose-up attitude after touch-down.
 - (iv) Close the throttles and shut the H.P. cocks.
 - (v) Use the tail trimmer to assist in holding the nose-wheel off as long as possible.
 - (vi) When the nose drops on to the runway use the brakes gently to keep straight.
- (b) *Nosewheel and one main wheel locked down*

The aircraft can be successfully landed as follows:—

- (i) Reduce weight as much as possible and have fuel only in No. 2 tank.
- (ii) Make a normal landing and hold the wings level for as long as possible after touch-down.
- (iii) When the wing finally drops the aircraft will swing in that direction.
- (iv) Such a landing should be made on grass and will need an area of about 500 yards in width at the side of the landing path in the direction of the expected swing.

NOTE.—If wing tip tanks are fitted and have been fuelled with AVTAG they should be jettisoned before landing.

91. Landing with a defective hydraulic system or wheel brakes

- (a) If the handpump has had to be used to lower the under-carriage for landing, it may be found that the wheel brake hydraulic pressure is low and shows no signs of building up. Should this occur, or at any other time

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that the brake pressure remains low, an attempt must be made to raise it by means of the handpump. If it remains low the brakes must not be applied until after touch-down (i.e., delete the downwind check of brake function).

- (b) If little or no pressure is available reduce weight as much as practicable. It is an advantage to empty the No. 1 tank as far as possible so that the landing is carried out at an aft C. of G.
 - (i) Touch-down at as low a speed as possible.
 - (ii) Close the H.P. cocks immediately.
 - (iii) Hold the nose-wheel off for as long as possible, using the assistance from the tail trimmer.
- (c) If some pressure is available it should not be used until the maximum aerodynamic braking has been obtained from the aircraft and the nosewheel can no longer be held off. If possible the navigator should operate the handpump while the brakes are in use.

92. Cabin pressurization failure at altitude

In the event of cabin pressurization failure occurring, due to damage to the canopy or cabin, at heights above 44,000 feet, the following emergency drill should be used:—

- (a) Captain warns navigators "Immediate Descent" and orders "Mask HIGH emergency oxygen". Navigators acknowledge.
- (b) Throttle right back.
- (c) Airbrakes OUT (MID if three-position).
- (d) Bomb doors open.
- (e) Descend at 0.80M.
- (f) Below 40,000 feet, set the engine air switches (if fitted) off. Depending on the degree of damage the aircraft

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should be brought back to base or landed at the nearest airfield. Altitude should be restricted to 37,000 feet and speed to 300 knots or 0.7M.

93. Abandoning the aircraft in flight

- (a) The navigators should occupy their ejection seats at all times unless engaged at the forward station, as they may find it difficult or even impossible to regain the ejection seats if the aircraft goes out of control.
- (b) The recommended method of escape for the pilot is by ejection through the canopy after operating the control column snatch unit. The canopy should not be jettisoned. It is advisable to set the seat in the lowest position. The navigators *must* jettison the hatch before ejection. If it fails to come off they may eject through it although serious injury may result. The navigators' hatch should, when possible, be jettisoned at a speed above 150 knots.
- (c) The following escape drill is recommended:—
 - (i) Pilot and navigators check jettison master switches ON.
 - (ii) Navigators jettison hatch and eject.

- (iii) Pilot lowers his seat fully, operates snatch unit and then ejects through the canopy by pulling the seat blind as follows:—

Place the feet in the footrests and grasp the firing handle firmly with both hands, keeping the elbows well tucked in. Draw the handle and face screen firmly over the face, keeping the head pressed hard back. It is not necessary to jerk the handle, and in no circumstances must the blind be pulled outwards away from the face as it may not then be possible to fire the cartridge.

After ejection the drogue gun will fire automatically.

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94. Forced landing

- (a) If a forced landing has to be made, the navigators' roof hatch should be jettisoned at a speed above 150 knots and while electrical power is still available.
- (b) *With engine power available*
 - (i) Reduce weight as much as is practicable aiming to land if possible with fuel in No. 2 tank only.
 - (ii) Jettison the wing tip tanks if using AVTAG.
 - (iii) Check harness tight and locked.
 - (iv) Make a normal approach and landing, having the undercarriage up or down according to circumstances.
 - (v) Switch off the battery isolating switch and close the H.P. cocks before touch-down.
 - (vi) After touch-down the pilot and navigators leave through the navigators' hatch.
- (c) *With no engine power available*
 - (i) Glide at 165 knots.
 - (ii) Jettison the wing tip tanks if using AVTAG.
 - (iii) Close the H.P. and L.P. cocks and switch off all L.P. pumps. Check harness tight and locked.
 - (iv) While positioning for the landing reduce speed to 130 knots and maintain this speed until the final approach is commenced.
 - (v) Use the flaps if possible and reduce speed to 95 to 105 knots.
 - (vi) Before touch-down switch off the battery isolating switch.

95. Ditching

- (a) The ditching qualities are expected to be poor and it is recommended that the aircraft be abandoned in flight rather than ditched.
- (b) Should ditching be unavoidable, the bomb doors must be closed and the entrance door must not be jettisoned. The navigators' hatch should be jettisoned at 150 knots. The flaps should be lowered and the final descent made in a nose-up attitude at the lowest practical forward speed and rate of descent. The pilot and navigators should lose no time in escaping through the hatch aperture.