

PART IV

EMERGENCY HANDLING

84. Action in the event of engine failure in flight

(a) Mechanical defect

If the engine fails due to an obvious mechanical defect set:—

Throttle	SHUT
H.P. and L.P. cocks	Closed
Booster pump	Off
Non-essential electrical services	Off

Do not attempt to relight

(b) Sudden drop in engine r.p.m.

If an inexplicable drop in r.p.m. occurs in flight, close the throttle and set the H.P. pump isolating switch ON (i.e. pump isolated). Since, in these circumstances, the rate of fuel flow to the burners may not be under automatic control, reopen the throttle with care, to prevent overfuelling and a consequently high j.p.t. or even flame extinction. When the isolating switch is ON and Mod. 1129 is not incorporated, the maximum r.p.m. are liable to hunt between 9,900 and 10,400; this, though unpleasant, is not dangerous and can be eliminated by throttling back to 10,000 r.p.m. Large changes in r.p.m. (increasing with altitude) may be experienced for relatively small throttle movements and, during the descent, the throttle will have to be opened progressively to maintain constant r.p.m. Leave the switch ON until after landing and, because the idling thrust will be higher than normal, close the H.P. cock after touch-down if it is necessary to ensure the shortest possible landing run. If, following the use of the isolating switch, there is a flame-out, carry out the relighting procedure in paragraph 85 *but with the isolating switch ON and the throttle CLOSED.*

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(c) If failure of the engine fuel system is suspected, set the H.P. pump isolating switch ON. If failure occurs following aerobatics or rapid acceleration of the engine, a flame-out is indicated, as distinct from a fuel system failure.

(d) Flame-out

(i) If a flame-out occurs, a relight may be attempted immediately, while r.p.m. are decreasing, by closing the throttle and pressing the relight button with the H.P. cock open. A successful relight will be indicated by the r.p.m. stabilising and then commencing to rise.

(ii) If no relight occurs within 10 seconds, release the relight button and proceed as follows:

Throttle	$\frac{1}{4}$ open (shut if isolating switch ON)
H.P. cock	Closed
All non-essential electrics	Off (to conserve electric power)
Booster pump	ON if an immediate relight is to be made, otherwise OFF

85. Relighting

(a) Relighting may be accomplished at altitudes of up to 40,000 feet but is more certain at 30,000 feet and below. If the H.P. pump isolating switch is ON, no attempt must be made to relight above 30,000 feet.

(b) Check and/or set:—

Maximum altitude	See (a) above
Airspeed	180–250 knots
Windmilling speed	Not more than 1,800 r.p.m.
All non-essential electrics	Off (to conserve electric power)
Throttle	$\frac{1}{4}$ open (shut if isolating switch ON)
Ground/flight switch	FLIGHT
H.P. pump isolating switch	As required (see 84 (c))
Booster pump	ON

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- (c) Press the relight button and, at the same time, move the H.P. cock *quickly* to the fully open position, keeping the relight button pressed for 15–20 seconds. Immediately a rise in r.p.m. or j.p.t. is observed, or after 5–6 seconds (see NOTE), close the throttle if it is open. The engine should then accelerate to the normal idling speed for the altitude.

NOTE.—It is possible that the two igniter combustion chambers may relight satisfactorily but combustion may not spread to the other chambers if the throttle is open. If, therefore, the engine has not relit normally within 5–6 seconds of reopening the H.P. cock, the throttle should be closed to encourage combustion to spread.

- (d) When r.p.m. increase to idling speed, open the throttle *carefully* to the desired power setting. This is essential if the H.P. pump isolating switch is ON.
- (e) If the engine has not relit within 30 seconds of opening the H.P. cock, close the cock again and wait about one minute before repeating the cycle of operations.

86. **Action in the event of the throttle jamming open**

In aircraft fitted with Ghost Mod. 470, the H.P. cock is tapered; this allows a measure of engine control in extreme emergency, the cock being used as a coarse throttle. Very small movements of the lever result in large r.p.m. changes and great care is needed to avoid stopping the engine.

87. **Action in the event of engine fire**

WARNING.—Fire in the engine bay may render the flying controls and pressure instruments useless, necessitating immediate abandoning of the aircraft.

- (a) Should the fire warning light come on, close the throttle immediately. If the light goes out within 5 seconds of closing the throttle, a hot gas leakage, as distinct from fire, is indicated. It is safe to use the engine in this condition but a landing should be made as soon as practicable. Reduced power should be used but, unless the power used is low, the light will probably come on again. It is therefore advisable frequently to throttle back fully, to ensure that a fire has not started.

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- (b) If the light does not go out after closing the throttle, proceed as follows:—

- (i) Close the L.P. and H.P. cocks
- (ii) Switch off the booster pump,
- (iii) Turn emergency oxygen ON and turn cockpit pressurisation OFF.
- (iv) Reduce speed as much as possible and press the fire-extinguisher button. If the fire is extinguished the fire-warning light should go out.

88. **Action in the event of hydraulic failure**

If the engine-driven hydraulic pump fails and the accumulator is exhausted, use the handpump between the seats to operate the undercarriage and flaps; it will not operate the airbrakes. To avoid possible dumping of hydraulic fluid, set the flap lever to neutral immediately hydraulic failure is suspected. Do not attempt to lower the flaps by the handpump until the undercarriage is down and locked. Up to 115 strokes of the handpump may be necessary to lock the undercarriage down.

89. **Undercarriage emergency retraction**

To retract the undercarriage in an emergency when the aircraft is on the ground, first operate the emergency retraction switch (19) and then raise the normal selector lever. This will not be possible if complete electrical failure has occurred.

90. **Action in the event of electrical failure**

If the generator fails, switch off all non-essential electrical services and set the turn and slip switch to EMERGENCY. The endurance of the main battery is approximately as follows:—

All services on	20 mins.
Radar off immediately, all other services on	40 mins.
V.H.F. and flight instruments only ..	1 hour

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- NOTE.—1. When the voltmeter reading falls to 21, all electrical services become inoperative.
2. With the booster pump inoperative, maximum r.p.m. will not be obtainable above 20,000 feet. This may cause engine surging and rough running.

91. **Action in the event of cockpit pressure failure**

- (a) Cockpit pressure failure will be indicated by the red warning light (52) and the cockpit altimeter (53).

NOTE.—Should cracks, or other signs of failure appear in the perspex of the hood or windscreen, reduce cockpit pressure and speed to a safe minimum.

- (b) If a type J mask is fitted, proceed as follows:—
(i) Set the emergency lever on the oxygen regulator to ON.
(ii) Turn the valve on the type J mask to the position marked H to inflate the pressure breathing waistcoat.
(iii) Descend as rapidly as possible to 30,000 feet or below, when the emergency lever may be switched OFF, the valve on the type J mask turned back to the normal position and high flow selected.
- (c) If a type H mask is fitted, proceed as follows:—
(i) Set the emergency lever on the oxygen regulator to ON.
(ii) Descend as rapidly as possible to 30,000 feet or below.
(iii) Set emergency lever to OFF and check supply on HIGH flow.

92. **Action in the event of oxygen failure**

If the main oxygen supply fails, use the emergency bottle on the parachute and make an immediate descent to below 10,000 feet. The endurance of the emergency supply is about 10 minutes.

93. **Landing with a full tip tank on one side**

The minimum speed at which a straight approach can be made with a full tip tank on one side and an empty one on the other, is 130 knots. At speeds below this, there may not be sufficient aileron control to raise a wing.

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94. **Hood jettisoning**

- (a) If possible, reduce speed to below 240 knots, lower the seat fully and pull the jettison handle. If the hood is jettisoned below 150 knots, there is a danger of it striking the tail plane. Both occupants should lower their heads before the jettison handle is pulled.
- (b) If operation of the explosive hood jettisoning has no effect, pull the ring handle behind the observer, to release the hood rear hinges *and after this* operate the opening handle to release the hood. Care must be taken to keep the hand unclenched to avoid a snatch on the wrist when the hood suddenly lifts. Attempts to jettison the hood by *first* operating the normal hood opening handle must never be made.

95. **Forced landing**

NOTE.—Experience suggests that it is preferable to lower the undercarriage when making a forced landing on an aerodrome or in open country. In the down position, it absorbs most if not all of the initial impact, assists in retarding the aircraft and, provided that electrical power is available, it may be retracted after touchdown if necessary. With the undercarriage 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 if the speed is too high, the aircraft is prone to bounce, the initial impact having a damaging effect on the cockpit.

- (a) In all cases of engine failure, when a relight is not possible, the following actions should be carried out:—
- | | |
|-----------------------------|-----|
| L.P. and H.P. cocks | OFF |
| Booster pump | OFF |
| All non-essential electrics | Off |
| Glide at 160 knots | |
- (b) Transmit distress call.
- (c) If circumstances permit, jettison the hood and external stores and fuel.
- (d) Release the emergency oxygen supply tube, the parachute harness and the dinghy pack and lanyard attachments to the life jackets.

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- (e) Turn off cockpit pressurisation if the hood has not been jettisoned.
- (f) When manoeuvring to land, maintain 140 knots until the selected area is within reach. Lower the flaps as required, aiming to cross the threshold of the landing area at 120 knots.

96. Abandoning the aircraft

Reduce speed, if possible, to between 150 and 200 knots and trim the aircraft as nose-heavy as stick forces permit. Invert the aircraft, release harnesses and fall out.

97. Ditching

- (a) Ditching characteristics are believed to be poor, because of the probability of the tail booms hitting the water and causing a nose-down pitch and subsequent dive in. The tail booms may in some cases break off. It is therefore recommended that the aircraft be abandoned rather than ditched.
- (b) Successful ditching in ideal conditions may be possible using the following technique:—
 - (i) The water must appear calm (but not glassy) and free from swell.
 - (ii) Jettison the hood, tip-tank fuel and all external stores.
 - (iii) Make a normal approach, using 10° to 15° of flap *only*, using engine assistance where possible.
 - (iv) The speed at touchdown must be 10 knots above the *normal* speed and any nose-up attitude likely to cause the tail booms to hit the water first must be avoided.
 - (v) Provided that the tail booms do not hit the water first at touchdown and if the sea is calm, the aircraft should plane well on its fuselage with the radome clear. To reduce any tendency to porpoise, the rate of descent at touchdown must be at a minimum.

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