PART IV
EMERGENCY HANDLING

69. **Action in the event of an inexplicable drop in r.p.m.**

(i) *During flight*

If an inexplicable drop in r.p.m. occurs in flight the throttle should be closed and the H.P. pump switch put to ON. Since in these circumstances the rate of flow of fuel may not be under the control of the B.P.C. or A.C.U., the throttle should be opened again with care to avoid overfuelling and a consequently high j.p.t. Large changes in r.p.m. may be experienced for relatively small movements of the throttle and during a descent the throttle may have to be opened progressively to maintain a constant r.p.m. The switch should be left on until after the landing, which should be made as soon as practicable. Because the idling r.p.m. may be high with the switch on, the landing should be made with caution and if necessary the H.P. cock should be shut after touchdown to ensure the shortest possible landing run.

If combustion has ceased, the relighting procedure recommended in para. 70 should be carried out leaving the H.P. pump isolating switch on.

(ii) *During take-off*

If the r.p.m. should drop suddenly during take-off the H.P. pump isolating switch must be put to ON immediately. Any delay will probably result in flame extinction. For the reasons stated in sub-para. (i) all subsequent movements of the throttle should be made with care. An emergency landing should be made as soon as possible, caution being taken because of the possibility of high idling r.p.m.

(iii) *After take-off with the H.P. pump isolating switch on*

If the H.P. pump isolating switch is put to on as a safeguard during take-off, failure of either H.P. pump, the B.P.C. or A.C.U. or the associated servo system will not be apparent until the switch is put to OFF. Should a failure have occurred, putting the switch to OFF will result in a sharp drop in r.p.m. In these circumstances, as a drop in r.p.m. while at full throttle should not occur, the switch should be returned to ON immediately in an endeavour to prevent flame extinction.

NOTE.—If the switch is not put to OFF until considerable height has been gained it will be necessary to throttle back to prevent overfuelling. Under these circumstances when the switch *is* put to OFF a sharp r.p.m. drop will in any case be experienced, and if the switch is put to ON again without first closing the throttle completely, flame extinction is likely.

70. Engine failure and relighting in flight

(i) Should flame extinction occur during flight, reduce speed below 250 knots and carry out the drill detailed below.

(a) Close the H.P. cock immediately.

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

(c) Set the throttle closed. If difficulty is experienced in relighting, the throttle may be moved to the one-quarter open position.

(d) Turn on the ignition time switch (if fitted), *or*, press the relight button on the H.P. cock while proceeding as in (e).

(e) Return the H.P. cock to the fully open position, keeping the relight button pressed for 15-20 seconds.

(ii) Immediately a rise in r.p.m. or j.p.t. is observed, close the throttle if it is open; the engine should then accelerate to the normal idling speed for the altitude.

(iii) It is possible that the two igniter combustion chambers may relight satisfactorily, but the combustion may not spread to the other combustion chambers if the throttle is open. If, therefore, the engine has not relit normally within five to six seconds of re-opening the H.P. cock, the throttle should be closed to encourage the combustion to spread.

(iv) If the engine has not relit within 15-20 seconds of having opened the H.P. cock, close the cock again and wait about one minute before repeating the cycle of operations.

(v) To avoid the possibility of excessively high jet pipe temperatures it is recommended that relighting be carried out at airspeeds of not less than 180 knots.

(vi) If the H.P. pump isolating switch is ON (see (i) (b) above) careful throttle movement is essential.

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

NOTE.—If practicable, all electrical services, except those which are immediately essential, should be switched off in order to obtain the maximum output from the batteries.

71. Action in the event of engine fire

(i) Should fire break out in the engine bay, indicated by the fire warning light coming on, proceed as follows:—

(a) Close the throttle fully.

(b) Close the L.P. cock.

(c) Close the H.P. cock.

(d) Switch off the booster pump.

(ii) Reduce the airspeed low as practicable and turn off the cockpit pressure control wheel before operating the fire-extinguisher. To obtain maximum benefit from the fire-extinguishing equipment the aircraft should be in level flight when the button is pressed.

(iii) These operations should be carried out as quickly as possible.

(iv) If the fire has been extinguished the fire warning light will go out.

(v) Any attempt to relight the engine may result in a further outbreak of fire which will be uncontrollable since the extinguisher cannot be used again.

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

72. Flying in manual control

NOTE.—1. Intentional manual reversion must be carried out at speeds below 0.82M.

2. If automatic reversion occurs above 0.82M, aileron buffet will be encountered, the severity of which will depend on the amount of G being applied. Use of the trim switch should be avoided as response above 0.82M is slow and when it does take effect with decrease in speed the amount of trim may be in excess of that required for the lower speed, causing the aircraft to roll rapidly.

(i) If hydraulic pressure fails, the aileron control will revert to manual automatically. For practice purposes manual control can be selected by means of the selector valve on the lower left side of the instrument panel. It must be pushed down and turned clockwise to lock in the MANUAL position.

(ii) When manual reversion takes place a very slight longitudinal trim change may occur caused by the ailerons up-floating.

(iii) The aileron forces in manual are very heavy. There will be slight backlash at the control column due to the dead travel of the servodyne selector valve.

(iv) The use of the aileron trimmer for manoeuvring the aircraft is not recommended as it will be found that the action of the trimmer is so much in advance of the response of the aircraft that it is impossible to check the aircraft laterally when required. In case of malfunctioning of the trim tab actuator it can be cut out by means of the circuit-breaker (4).

(v) Landing in manual control is straightforward, but because of the considerable force required and the slow response of the ailerons a slightly larger circuit will have to be made.

73. Hydraulic pump failure

(i) If the hydraulic pump fails, indicated by the audio warning and subsequently by the warning light (11), pressure is available in two accumulators for emergency use.

(a) *No. 1 accumulator.* The main accumulator is connected to all the services, but its capacity provides for only one one-way operation of the undercarriage and flaps or airbrakes provided that manual control has been selected as soon as the failure has occurred. If manual control has not been selected immediately the failure has occurred the accumulator may have been partially exhausted with use of the ailerons.

(b) *No. 2 accumulator.* This accumulator provides a reserve for the powered ailerons. Three full aileron reversals will normally exhaust the accumulator.

(c) When the accumulators are exhausted, the handpump can be used to pump down the undercarriage and flaps. It will not operate the ailerons or airbrakes. When operating the handpump for lowering the undercarriage, ensure that the flap selector lever is in the neutral position.

(ii) (a) To conserve pressure in No. 1 accumulator for lowering undercarriage and flap, manual aileron control should be selected. If a descent or deceleration is required the *airbrakes must not be used*. This is because the airbrakes cannot be operated by the handpump in flight and the capacity of No. 1 accumulator is insufficient to effect full retraction following extension.

(b) If a descent from high altitude is required the following procedure is recommended:—

Reduce speed to below 220 knots.

Lower the undercarriage. (If the main accumulator is exhausted it will have to be pumped down.)

Descend at not more than 220 knots.

(c) If a G.C.A. is being made, aim to have full flap lowered before the glide path is reached.

74. **Emergency operation of undercarriage**

(i) If the hydraulic pump has failed and no pressure is available in No. 1 accumulator, the undercarriage can be lowered by means of the handpump after normal selection. Up to 115 strokes will be required to lock it down.

(ii) The undercarriage can be retracted in emergency when the aircraft is on the ground by first operating the override switch and then raising the normal selector lever. This will not be possible if complete electrical failure has occurred.

75. **Emergency operation of flaps**

If the hydraulic pump has failed and accumulator pressure is not available, the flaps may be lowered by the handpump, after normal selection.

76. **Hood jettisoning**

The hood may be jettisoned safely in flight at speeds between 110 and 300 knots by pulling inwards the lever on the cockpit starboard wall. The pilot's head should

be lowered below the level of the cockpit coaming before operating the lever. The hood will not jettison at low speeds with the hood seal inflated.

77. **Loss of cockpit pressure at high altitudes**

In the event of loss of cockpit pressure at high altitudes, or if cracks appear in the hood or windscreen, making necessary the use of pressure-breathing equipment, carry out the following drill:—

(a) Set the emergency lever on the oxygen regulator to ON.

(b) Turn the valve on the type J mask to the position marked H., to inflate the pressure-breathing waistcoat.

(c) Descend as rapidly as possible to 35,000 ft. 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.

78. **Landing with one full tip tank**

Landing with a full tip tank on one side and an empty one on the other presents no difficulty. The runway threshold speed should be increased by 5 knots above the normal.

79. **Drop tank and bomb jettisoning**

(i) *Wing tip tanks*

The tanks can be jettisoned at any speed in straight and level flight in the following range:—

Tanks empty	180 - 260 knots
Tanks full	130 - 260 knots

Jettison the wing-tip tanks by pressing the pushbutton on the inboard face of the throttle box. If the electrical jettison system fails, the tanks may be jettisoned mechanically by pulling up the lever on the right-hand side of the seat.

(ii) *Pylon tanks*

The pylon tanks can be jettisoned by pressing the appropriate button on the inboard face of the throttle box. If the electrical system fails, the tanks may be jettisoned mechanically by pulling up the lever on the left-hand side of the seat.

Before jettisoning reduce speed to between 180 and 260 knots and check the airbrakes are in. Because of the possibility of damage to the airbrakes when the tanks are jettisoned at high Mach numbers reduce height to below 35,000 ft.

(iii) *Bomb jettisoning*

There is no electrical bomb jettisoning switch. Bombs may be jettisoned unfused by the normal selector or by the mechanical jettison lever.

80. Forced landing

(i) In all cases of engine failure when a relight is not possible, the following immediate action should be carried out:—

L.P. and H.P. cocks	OFF
Booster-pump	OFF
All non-essential electrics	OFF
Glide at 160 knots	

(ii) Even if the engine is windmilling it is unlikely that sufficient hydraulic pressure will be generated to keep the accumulators charged and the ailerons in power so the following procedure is recommended:—

(a) Select manual control (see para. 72)

(b) If circumstances permit, jettison all stores and external tanks.

(c) Jettison the hood (lower the head below the level of the cockpit coaming before doing so). If it is decided not to jettison the hood, the hood seal cock should be at OFF, and the lanyard disconnected from the winding handle.

(d) Release the emergency oxygen supply tube, the parachute harness, and the dinghy pack and lanyard attachment to the life-jacket.

(e) When manoeuvring to land maintain 140 knots until the selected landing area is within reach.

(f) Lower the flaps aiming to cross the threshold of the landing area at 110 knots.

NOTE.—1. Do not use the airbrakes (see para. 73 (ii) (a)).

2. The ejection seat is a source of danger to unskilled persons. After a crash landing the pilot should if possible make the seat safe by inserting the safety pin in the firing handle. An appropriate warning should be given to the authority on the spot.

3. If the battery isolating switch is put OFF before landing, it must be put ON again after landing if it is required to operate the fire-extinguisher.

81. Flapless landing

(i) The turn onto the final approach should be done at 140 knots. A long, flat approach requiring little power should be made and the runway threshold crossed at 120 knots.

(ii) Owing to the difficulty of losing excess speed, it is recommended that speed be reduced to 120 knots early in the approach to avoid the possibility of crossing the threshold at too high a speed.

(iii) The landing run is not excessive if moderate braking is used.

82. Ditching

(i) It is believed that the ditching qualities of this aircraft are poor, and the aircraft should preferably be abandoned.

(ii) *If ditching is inevitable*

(a) Jettison the hood and drop tanks.

(b) Release the emergency oxygen supply tube and the parachute harness.

(c) Lower the flaps 30°. If power is available it should be used to make the touchdown speed as low as possible.

(iii) When contact with the water is made, the tail booms will probably break off, the aircraft may bounce and then bury its nose.

NOTE.—If the water is calm there may be a greater chance of a successful ditching if the flaps are only lowered 10° and the approach is made at normal landing speed, aiming to prevent the booms touching the water first.

83. **Abandoning the aircraft**

(i) (a) Reduce speed as far as is practicable.

(b) Lower the head below the level of the cockpit coaming and jettison the hood.

(c) Pull the firing blind sharply over the face, being careful to keep the elbows out of the slipstream.

(ii) *Action should the Mk. 2F seat fail to eject*

(a) Pull the first "D" ring on parachute harness.

(b) Trim nose-heavy and invert the aircraft to enable the pilot after releasing the safety harness to fall out.

(c) In these circumstances the parachute will not be opened automatically, so when clear of the aircraft pull the second "D" ring to develop the parachute canopy.

(iii) *Action should the automatic mechanism of the Mk. 2F seat fail*

If, after ejection, the pilot for any reason doubts the serviceability of the automatic parachute releasing mechanism he should operate the parachute manually as follows:—

(a) Pull the first "D" ring on the parachute harness.

(b) Release the restraining straps from the seat.

(c) Release the safety harness.

(d) After falling clear of the seat pull the second "D" ring to develop the parachute canopy.