PART 4

EMERGENCY PROCEDURES

LIST OF CHAPTERS

PART 4

Chapter 1 — ENGINE EMERGENCY PROCEDURES

Contents

1 Loss of oil pressure

Should oil pressure failure occur, the aircraft should be landed as soon as practicable, restricting RPM to the minimum required to reach a suitable airfield. Throttle handling should be smooth and progressive to avoid high transient bearing loads and where engine acceleration is unavoidable, the extent of RPM increase and the duration at the higher power setting should be limited. If severe vibration occurs, a bearing failure is indicated which may lead to engine seizure.

2 Engine seizure

(*a*) Engine seizure involves both hydraulic and electric supply failure. If the engine has failed due to obvious mechanical causes do not attempt to relight.

(*b*) Proceed as follows:

(i) Turn off the HP and LP cocks and switch off booster-pumps.

(ii) Carry out flame-out landing or eject.

3 Sudden drop in engine speed

If a sudden inexplicable drop in engine speed occurs, possibly accompanied by an AC malfunction, which cannot be identified as engine surge, switch OFF the top temperature control and maintain the JPT within limitations manually by throttle movement. If the RPM are not restored proceed as follows:

Above 20,000 *ft.* Close the throttle fully and descend; check engine response to throttle movement during the descent.

Below 20,000 *ft.* If the engine fails to respond to normal throttle movements close the throttle fully and set the HP pump isolating switch to ISOLATE. If the engine still fails to respond to throttle movement, leave the switch at ISOLATE and carry out relight action. Once the switch has been set to ISOLATE it must be left there for the remainder of the flight; with it thus set the BPC and ACU are ineffective and all throttle movements must be made with care. Exercise caution when landing because of high idling RPM.

4 Engine flame-out

(*a*) *Immediate actions*

(i) If a flame-out occurs, a relight may be attempted *immediately,* while RPM are decreasing, by pressing and holding the relight button with the throttle at its set position. A successful relight is indicated by the RPM stabilising and then starting to rise; the likelihood of a successful relight is increased if the height and airspeed are below the recommended maxima for relighting.

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

HP cock	OFF.
Throttle	Closed.
LP cock	Leave on.
All non-essential services	Off.
If below 35,000 feet ...	Carry out the relight drill.
If above 35,000 feet ...	Switch off the booster-pumps, descend to 35,000 feet and carry out the relight drill.

(b) Considerations

If above 35,000 feet the decision either to descend quickly or to glide at 210 knots will depend on the prevailing circumstances, i.e. weather conditions, distance to travel, etc. The following should be borne in mind.

(i) The likelihood of obtaining a relight increases with decrease in altitude.
(ii) At best gliding speed the aircraft covers approximately 2 NM per 1,000 feet.

(iii) With normal services running, the batteries cannot be relied on for more than approximately 10 minutes. All non-essential services including booster-pumps should therefore be switched off to conserve battery power.

(iv) Manual should be selected before attempting to relight in case relighting is unsuccessful and the batteries are weakened to the extent that it is not possible to select Manual. For the same reason, consideration should be given to jettisoning the drop tanks and wing stores at this time.

(v) Descending rapidly at a speed above 210 knots increases the windmilling RPM. Consequently hydraulic pressure is higher and the generators may supply power.

(vi) If a glide is to be made at 210 knots the tailplane should be set to 0° ($\frac{1}{2}$° nose-up post Mod. 1357).

(vii) If it is necessary to descend more rapidly than at normal gliding speed 15° flap may be used to increase the rate of descent, but the speed must not exceed 0·9M and the tailplane incidence must be left at 0°. Intermediate degrees of flap can only be selected while electric and hydraulic power is available. The pull force needed to reduce speed to 210 knots is considerable if in Manual.

5 Relighting

NOTE 1: Every precaution should be taken to ensure success at the first attempt due to the loads on the batteries. If the engine and its fuel system are serviceable and the drill is followed correctly a relight should occur at the first attempt.

NOTE 2: If below 20,000 ft. set the HP pump isolation switch to ISOLATE and leave it at ISOLATE after relighting has been accomplished. Allow for possible high idling RPM when landing; close the HP cock after touch down if neccessary.

(*a*) (i) Check and/or set:

Maximum altitude ...	35,000 feet.
Maximum airspeed ...	0·80M below 25,000 ft., 200 knots above 25,000 ft.

All non-essential electrics	Off.
Throttle	Closed.
LP cock	ON.
Battery master switch	ON.
Engine master switch	ON.
Ignition switch ...	ON.
Booster-pumps ...	ON.

(ii) Press the relight button and at the same time open the HP cock keeping the button pressed until the engine lights up and RPM rise by about 200. When the RPM rise to idling, increase power carefully.

(iii) If no relight occurs within 30 seconds, release the relight button, close the HP cock and switch off the booster-pumps. Allow, if possible, 30 seconds for the engine to dry out before the next attempt.

(*b*) *Failure to relight*

(i) If the engine fails to relight turn off the HP and LP cocks and switch off the booster-pumps.

(ii) Carry out flame-out landing or abandon.

6 Emergency relighting

(*a*) In circumstances where the engine cannot be relit by use of the above drill, provided that the pilot is reasonably certain that the fault lies in the relight button circuit, it may be possible to obtain a light-up using the starter push-button in the following way:

(*b*) To ensure that a live cartridge is not fired, the spent cartridge with which the engine was ground-started should first be mechanically re-indexed. To do this set the engine master switch OFF and then press the starter pushbutton fully in twice, pausing for an instant between each operation to allow the button to spring fully out.

(*c*) Check and/or set:

Maximum altitude	...	15,000 ft.
Maximum airspeed	...	0·8M.
All non-essential electrics		OFF.
Throttle	...	Closed.
Battery master switch	...	ON.
Booster-pumps ...	...	ON.
Engine master switch	...	ON.
Ignition switch ...	...	ON.

(*d*) Press the starter pushbutton again and then open the HP cock fully. The igniters then function but if the re-indexing drill has been correctly carried out a cartridge is not fired. If no relight occurs within 30 seconds, set the HP cock OFF when the starter button comes out. The spent cartridge must be re-indexed as in (*b*) above before any further attempt is made.

WARNING: If for any reason the re-indexing drill has not been correctly carried out and a live cartridge is indexed when the starter button is finally pressed, it is probable that damage will be caused to the starter and to the aircraft. This probability may be lessened to some extent if the engine windmilling speed is low and positive G is not applied at the time of operating the pushbutton.

7 Action in the event of fire

If the engine fire warning light comes on in flight, the following actions are recommended:

(*a*) *Immediate actions*

Close the throttle. If this is impracticable eject within the seat limitations (see WARNING below).

Reduce speed to the minimum practicable. Check for confirmatory signs of fire, such as smoking jet wake, heat, fumes, system malfunctions. Have an external inspection made, if possible.

WARNING: In some flight conditions, e.g. take-off or instrument approach, fire warning requires immediate ejection because a reduction in power may cause the aircraft to stall or assume a flight path outside the minimum safe limits of the ejection seat.

(*b*) *Subsequent actions*

(i) *If the warning light goes out within 5 seconds and there are no other signs of fire (hot gas leak symptoms)*:

Prepare to land as soon as possible at the nearest suitable airfield, using minimum necessary power.
If the warning light comes on again, throttle back at frequent intervals to check that it goes out at lower power.

(ii) *If the warning light stays on but there is no sign of fire*:
Decide whether to treat the warning as real or spurious, then:

1. *Decision real*
Continue with the full fire drill.

2. *Decision spurious*
Land as soon as possible using minimum power. Be prepared to resume fire drill or eject if there are further signs of fire.

(*c*) *If there are definite signs of fire*:

HP cock	...	...	Off.
LP cock	...	...	Off.
Booster-pumps	...	...	Off.
Fire extinguisher button			Press.

If the fire goes out, the warning goes out within 30 seconds approximately.

If fire persists, abandon the aircraft.

NOTE 1: Do not test the FFFD system in flight.

NOTE 2: After extinguishing a fire, carry out the drill for noxious fumes.

PART 4

Chapter 2 — AIRFRAME EMERGENCY PROCEDURES

Contents

1 Action in the event of hydraulic failure

(*a*) *Indications*

Complete failure is indicated by a loss of pressure on the gauge followed by the red light coming on and the audio warning sounding when the pressure falls below 600 PSI.

(*b*) *Immediate actions*

(i) Reduce speed to below Manual limitations.

(ii) Release the aileron trim safety lock and check that the trim indicator shows zero.

(*c*) *Subsequent actions*

(i) If lateral control difficulties are encountered due to turbulence or unequal fuel feeding, jettison the drop tanks if the fuel state permits.

(ii) The controls may be left in Power, but when Manual reversion occurs, and in any case at a safe height before joining the circuit, switch off elevator and aileron

Power. Normally the controls revert to Manual quite quickly.

(iii) Lower landing gear and flaps on the emergency systems.

(iv) Do not exercise the brakes downwind. Use brake parachute on landing, unless the crosswind exceeds the limitations. Make one continuous application of the brakes and avoid maxaretting. Close HP cock at touchdown.

(*d*) *Considerations*

(i) Subject to satisfactory turbulence and crosswind conditions, full flap may be used for landing in the following configurations:

No external stores.

Any symmetrical drop tank configuration.

One asymmetric empty drop tank on an inboard pylon.

(ii) For any other configuration, a low speed handling check must be carried out (see Part 3, Chap. 4, para. 3 (*d*)).

(iii) When flap is not used on the approach, it should be lowered immediately after touchdown.

2 Action in the event of complete electrical failure

(*a*) *Indications*

Impending failure is indicated by the generator warning lights both coming on. Subsequent complete failure is indicated by the unserviceability of the booster pumps and all electrically-operated instruments.

(*b*) *Immediate actions*

(i) Switch off all non-essential electrical services to conserve the battery. If booster pumps are switched off reduce to flight idling RPM and descend as for booster-pump failure, thereafter restricting RPM to a maximum of 7,200.

(ii) Set the tailplane angle to 1° nose-down (½° nose-down post Mod. 1357) and switch the TAILPLANE interconnection OFF.

(*c*) *Subsequent actions*

(i) Provided that the engine is running correctly and hydraulic pressure is normal, leave the flying controls

in Power. The magnetic indicators show white when the batteries are discharged although the controls remain in Power.

NOTE: If any doubt as to the serviceability of the hydraulic system exists, select Power OFF before the batteries are discharged.

(ii) The decision to remain on main UHF or to switch to STBY EMERGY BATT will depend on the weather conditions, the expected flying time before landing and the facilities available locally on the guard frequency. If STBY EMERGY BATT is selected, switch OFF main UHF to conserve the batteries.

(iii) The turn-and-slip supply should be switched to EMERGY.

(iv) Lower the landing gear and flaps on the emergency systems.

(v) If battery power is still available in the circuit, trim as required when flap is used.

3 Inverter failure

Indication

Indicator shows STBY (amber)

If No. 2 inverter has failed the STANDBY INVERTER magnetic indicator shows white.

NOTE: If either main inverter fails the standby inverter automatically takes over.

Action

Select the NORMAL/STANDBY switch to STANDBY and then return it to NORMAL. If the indicator remains STBY (or magnetic indicator remains white) resetting has not been accomplished and no further action by the pilot is possible.

4 Combined electrical and hydraulic failure

(*a*) *Indications*

The most likely cause of the failure is the auxiliary gearbox. The hydraulic pressure gauge shows a fall in pressure followed by the warning light and the audio warning coming on. Both generator lights come on.

(*b*) *Immediate actions*

(i) Reduce speed to below the Manual limitations.

(ii) Set tailplane to 1° nose-down ($\frac{1}{2}$° nose-down post Mod. 1357), TAILPLANE interconnection OFF.

(iii) Switch off all non-essential electrics, including booster-pumps, reduce to flight idling RPM and descend as for booster-pump failure, thereafter restricting RPM to a maximum of 7,200.

(iv) Release the aileron trim safety lock and check that the trim indicator is central.

(v) Select power controls to Manual.

(*c*) *Subsequent actions*

(i) If required select UHF selector to STBY EMERGY BATT and select UHF main switch to OFF. (See para. 2 (*c*) (ii) above).

(ii) Land as soon as possible.

(iii) If lateral control difficulties are encountered or are likely to be encountered on landing, jettison external stores, including the drop tanks if fuel state permits.

(iv) Select turn and slip supply NORMAL/EMERGY switch to EMERGY.

(v) Lower landing gear and flaps on the emergency system. Do not exercise the brakes downwind.

(vi) If battery power is still available in the circuit, trim as required when flap is used.

(vii) Select brake parachute to STREAM on landing, unless the crosswind exceeds the limitations. Make one continuous application of the brakes without maxaretting. Do not taxy.

(*d*) *Considerations*

See para. 1 (*d*) of this chapter for considerations applicable to hydraulic failure.

5 Emergency operation of the tailplane

(*a*) If the normal tailplane motor fails or "runs away" lift the cover of the standby switch *fully* and use that control. Rate of operation is about one third that of the normal control. If this fails to stop the runaway, operate the instructor's cut-out switch.

(*b*) If the tailplane runs away to the fully nose-down position, recovery to level flight can be achieved below about 0·86M. Above this speed recovery action may be reduced by elevator jack stalling. If this occurs, after raising the cover of the standby switch, throttle back and extend the airbrake to reduce speed.

(*c*) If complete electrical failure occurs, control of the tailplane is impossible. It is important, therefore, to set the tailplane to 0° ($\frac{1}{2}$° nose-up post Mod. 1357) before the batteries are fully discharged.

(*d*) *Failure of both normal and standby trim control*

(i) In Power control, with full nose-down trim, the aircraft can be controlled below approximately 450 knots, and with full nose-up trim below about 420 knots, depending upon the configuration.

(ii) In Manual control full nose-down trim can be held below 350 knots down to 150 knots; there is insufficient elevator control to prevent the nose falling if more than 30° flap is lowered for landing. Full nose-up trim can be controlled below 250 knots and full flap may be lowered for landing.

6 Aileron trim malfunction in Manual

(*a*) When flying in Manual, if the aileron trim actuator malfunctions, resulting in full trim being applied with subsequent inability to rectify, reselect Power ON immediately and remain in Power for the remainder of the flight.

(*b*) If it is not possible to reselect Power, the additional aileron force in the circuit is moderate if the speed is kept below 175 knots. Above 250 knots, control may be lost.

(*c*) It is recommended that rudder trim is used to oppose the roll. Full rudder trim counteracts the aileron load up to 200-220 knots, and may be used for landing.

7 Canopy jettisoning

(*a*) Jettison the canopy by pulling the handle between the seats firmly and sharply. The speed should be between 130 and 280 knots.

(*b*) The canopy is also jettisoned when either ejection seat face-screen or seat-pan handle is pulled.

(*c*) The cockpit altitude will exceed the aircraft altitude by up to 8,000 feet when the canopy is jettisoned. The maximum safe operating altitude then is 42,000 feet, aircraft altitude. Because of decompression sickness, descend below 25,000 feet, cockpit altitude.

(*d*) If it is desired to remove the canopy on the ground without using the explosive jettison system, remove the pip-pin from the operating rod connected to the canopy jettison firing unit and then pull the red handle on the canopy release unit. The canopy can then be pushed off manually.

8 Fuel transfer pressure failure

(*a*) *Indications*

Transfer indicator(s) show white. Subsequently fuel gauge(s) should show front tank contents only.

(*b*) *Immediate action*

(i) Accept that fuel remaining in the centre, wing and drop tanks is unavailable; rely only on the fuel in the front tanks (800 lb. maximum per tank).

(ii) If one side only has failed, switch the booster pump OFF on this side until the front tanks contents are equal; then switch the booster pump ON.

(iii) Avoid steep dives due to the possibility of collapsing the tanks.

9 Fuel gauge failure

Total or partial gauge failure does not affect fuel flow. Check that neither booster pump nor transfer failure has occurred; leave both pumps ON and return to base.

10 Booster pump failure

(*a*) *Indications*

(i) The booster pump amber warning light comes on.

(ii) The associated contents gauge commences to read high by comparison with the other gauge if drop tanks are empty.

(iii) The red fuel pressure warning light comes on if the fuel pressure drops below 3-3½ PSI. Depending upon altitude and power setting the fuel low pressure warning light may come on in the event of one booster pump failure.

(*b*) *Immediate actions*

(i) Check booster pump circuit breaker(s).

(ii) If one or both pumps have failed, reduce to flight idling RPM and switch OFF the failed pump(s).

(iii) Descend to a maximum height of:
25,000 feet ... Clean aircraft or with empty drop tanks.
20,000 feet ... 2 or 4 drop tanks containing fuel.

NOTE: If maximum range is vital, the above heights may be increased by 10,000 ft. but this may incur damage to the HP fuel system.

(iv) If a single booster pump failure has occurred, switch OFF the serviceable booster pump and as in the case of a double pump failure, accept the fuel flow provided by gravity and tank pressurisation.

(*c*) *Subsequent actions*

(i) Keep throttle movements to a minimum and restrict RPM to a maximum of 7,200.

(ii) Avoid negative G manoeuvres.

(iii) Land as soon as practicable. If a single failure has occurred, the serviceable pump may be switched ON before landing, if the fuel state on that side of the system permits.

(*d*) *Considerations*

If double pump failure has occurred, it is vital to land whilst both sides of the system contain fuel. The fuel flow proportioner maintains any out-of-balance level in the tanks at the time of failure and the engine will not run with one side empty unless the booster pump on the side containing fuel is serviceable and switched ON.

11 Drop tank jettisoning

Drop tank jettisoning must be carried out with flaps and landing gear up and in straight flight, without yaw or side slip, in the speed range 200-450 knots.

NOTE: A better separation is achieved at speeds above 250 knots.

12 Asymmetric fuel loads

In the event of a fuel transfer failure when carrying drop tanks:

(*a*) Investigate the low-speed handling characteristics at

a safe height. If these are not satisfactory or landing conditions are not favourable, jettison the tanks.

(*b*) In Manual control, the aircraft must not be landed with any asymmetric load other than an empty inboard drop tank or practice bombs, unless a low speed handling check has been made.

13 Cockpit pressure failure

(*a*) *Indications*

Pressurisation failure is indicated by the warning light and/or the cockpit altimeter reading corresponding to the aircraft altimeter reading.

(*b*) *Immediate action*

(i) Depress the oxygen mask toggle downwards.

(ii) If the aircraft is above 30,000 feet descend as rapidly as possible to below 25,000 feet cockpit altitude. Return to base at the lowest altitude that the fuel state will safely permit.

NOTE: Flood flow will automatically be supplied at a cockpit altitude greater than 38,000 ft.

14 Noxious fumes in the cockpit

(*a*) *Immediate action*

Set the air inlet NORMAL/100% OXYGEN switch to 100% OXYGEN.

(*b*) Deflect the EMERGENCY three-position switch on the regulator to prevent inward leaks to the mask. If a leak is suspected depress the OXYGEN mask toggle downwards. Depressurise the cockpit at a maximum height of 35,000 feet as soon as possible.

15 Oxygen failure

(*a*) *Magnetic indicator remains black*

(i) *Immediate actions*

Check connections, contents and pressure.
Set air inlet switch to 100% OXYGEN.
Deflect the regulator EMERGENCY switch.

(ii) *Subsequent actions*

If breathing is restricted after carrying out the above actions, operate the emergency oxygen bottle, disconnect

the main supply and descend below 10,000 feet cockpit altitude.

If breathing is unrestricted after carrying out the actions in (*a*) (i), the magnetic indicator is unserviceable and the flight may be continued on 100% OXYGEN.

(*b*) *Magnetic indicator remains white*

Immediate actions

Check mask for tight fit and connection for full engagement. If the magnetic indicator remains white and excessive pressure is felt at the mask, operate the emergency oxygen bottle, disconnect the main supply and descend below 10,000 feet cockpit altitude.

16 Landing gear emergency operation

NOTE 1: Both landing gear and flap emergency systems operate independently of their normal selectors.

NOTE 2: When operating either the flaps or the landing gear emergency selector, it must be pulled out to the full extent of the operating wire.

(*a*) *Landing gear failure to unlock or lock down*

(*Electrical and hydraulic systems normal*)

(i) If the landing gear or any unit of the landing gear fails to unlock after a normal down selection, a mechanical or hydraulic lock is likely to have occurred. If the landing gear fails to lock down, some other type of failure is likely. In any event, the following sequence of actions is recommended:

◀ Make repeated selections at 170-190 knots, with flap both up and down, allowing 10 seconds between selections. If unsuccessful, apply prolonged negative G (by inverting the aircraft if height permits) during down selections, and positive G, followed by sideslip, after down selections. ▶

Operate the landing gear emergency lowering control if the above attempts are unsuccessful.

(ii) *Considerations*

If a main wheel red light remains on after an UP selection, and persists after a subsequent DOWN selection, a sequence valve malfunction may be suspected. If this is confirmed by an external visual check showing the main wheel to be retracted outside the fairing door, the emergency lowering control should be used.

(*b*) *Landing gear fails to raise* (*electrical and hydraulic systems normal*)

(i) Have an external visual check made before re-selection. If clean, select down normally to obtain 3 greens. Wait 30 seconds to ensure nosewheel locked down. Re-select up whilst applying negative G.

(ii) If on the visual check the nosewheel is outside the fairing door, select down normally to obtain 3 greens.

(iii) If the mainwheel is outside the fairing door, select down by using the emergency lowering control.

(*c*) *Landing gear raising on the ground*

To raise the landing gear on the ground in an emergency (after a normal down selection) twist the normal UP selector button clockwise and press in.

(*d*) *Landing gear failure to retract in the air*

If the UP button cannot be pressed in normally after take-off the wheels must be left down. The landing gear over-ride must not be used in the air to retract the landing gear as there is a risk of damage to the leg fairings.

(*e*) *Inadvertent down selection*

If the landing gear is inadvertently selected down above 250 knots it should be left down, if possible, and speed reduced to below 250 knots.

17 Flaps emergency operation

Following the failure of a normal down selection, or an hydraulic or electrical failure, the flaps may be lowered, fully down only, by operating the emergency lowering control (press in knob and pull handle). If a partial hydraulic failure has occurred, it may be possible to select intermediate flaps before using the emergency system.

18 Wheel brakes emergency operation

(*a*) Should the hydraulic system fail, the wheel brake accumulators provide sufficient pressure for brake operation during landing, down to a gauge reading of 750 PSI approximately. To conserve pressure when landing without main hydraulic pressure do not operate the lever during the downwind checks. Call for barrier.

(*b*) Apply brake pressure in such a way that maxaretting does not occur (little pressure at high speed but increasing with decrease in speed), and avoid differential braking as much as possible. The brake lever should not be released after brakes have once been applied as this will result in a large loss of pressure.

(*c*) Set the HP cock OFF on touch-down and stream the brake parachute.

PART 4

Chapter 3 — ABANDONING AND EMERGENCY LANDING PROCEDURES

Contents

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 one second later (post-mod. ESA26 — 0·5 seconds).

(*a*) The recommended minimum height and speed for safe ejection in straight and level flight are as follows:

Ground level/90 knots.

(*b*) Warn the other occupant to prepare for ejection.

(*c*) Reduce speed to 250 knots 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. Leave the feet on the rudder pedals.

(*e*) (i) Draw 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 that the

head is pressed firmly against the headrest to avoid spinal injury on ejection.

(*f*) After ejection, the drogue gun fires automatically.

(*g*) If ejection takes place above 10,000 feet automatic separation will not occur until that height is reached. If ejection takes place at or below 10,000 feet automatic separation occurs after $1\frac{1}{4}$ seconds if the G-stop has not operated.

(*h*) 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 saving jacket, detach the PSP from the harness *side couplings* and allow it to lower. This reduces oscillation and lessens the risk of injury on landing.

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

2 Manual separation from the seat

If the automatic system fails after ejection:

(*a*) When forward speed is sufficiently low, discard the face screen, and operate manual separation handle.

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

(*c*) Grasp the rip-cord D-ring with the right hand.

(*d*) Pull the rip-cord D-ring.

3 Manual bale-out

(*a*) If the seat fails to eject, pull the firing handle again; if it still fails to eject, pull the other firing handle, retaining grasp on face-screen handle.

If still unsuccessful, a manual bale-out 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 15,000 feet and the bale-out delayed until at 10,000 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 long lift webs and confined cockpit this is a difficult if not impossible task. Snagging of the harness and airframe impact are possible during the escape.

(*d*) *Manual escape sequence*

The following sequence of actions may prove successful:

(i) Disconnect leg restraint, oxygen, anti-G, radio and PSP connections.

(ii) Operate manual separation.

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

(iv) Grasp parachute lift webs at pack level and lean forward attempting to tug parachute pack from seat housing and fire guillotine.

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

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

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

WARNING: Do not deliberately invert the aircraft and try to fall out. The parachute pack is likely to jam in the 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 Flame-out landing procedure

(*a*) After engine flame-out, ensure that the following actions have been completed:

HP and LP cocks	...	OFF.
Booster pumps ...	...	OFF.
Tailplane incidence	...	0° ($\frac{1}{2}$° nose-up post Mod. 1357) — TAILPLANE interconnection OFF.
All non-essential electrics		OFF.
Turn and slip supply	...	EMERGY

Aileron trim ...	...	Neutral — Guard disengaged.
UHF	...	As required. If practical set selector to STBY EMERGY BATT and main set OFF.
External stores ...	...	Jettison when convenient.

(*b*) *Considerations*

All the circumstances prevailing at the time of engine, hydraulic and electrical failure cannot be predicted. Each system and the effects of failure of 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 approx. 2 n.m. per 1,000 feet can be achieved with an average rate of descent of 2,300 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 is insufficient to maintain the generators on line; to achieve this at 40,000 feet a speed of approx. 250 knots would be required, increasing to 450 knots at 10,000 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 flame-out landing procedure*

For practice purposes, a flap setting of 23° and 5,500 RPM gives a rate of descent comparable with an engine-off glide.

(*d*) *Circuit procedure and landing on an airfield*

(i) If a flame-out landing on an airfield is being made, attempt to arrive overhead at approximately 7,000 feet AGL.

(ii) Plan a Manual approach and aim to be downwind opposite the touch-down point at 180-210 knots at 4,000 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 180-200 knots.

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

(iv) Maintain 180-200 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 touch-down 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, and if the speed is too high the aircraft is prone to bounce, the initial impact having a damaging effect on the cockpit.

5 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. Unless circumstances dictate otherwise, always land on a runway when any of the legs are not locked down. Retain empty 100 gallon drop tanks if fitted. Ensure that the harness is locked and tight.

(*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 set HP cock OFF, 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 onto 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. Set the HP cock off after touchdown and stream the brake parachute, crosswind permitting.

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

(iii) Only one wheel brake 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 approx. 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*) *Belly landing*

(i) Land on foam carpet if possible.

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

(iii) Set HP cock to OFF on touchdown.

6 Landing with a burst tyre

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

7 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 steer for the centre panel. If brake failure has occurred however, 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 gall. 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 1,000 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 wheel braking.

(iv) If within 1,000 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.

8 Ditching

(*a*) Model tests of a clean aircraft indicate that a ditching in any but ideal conditions would be very hazardous.

(*b*) Except in calm sea and air conditions combined with good visibility, abandon the aircraft rather than attempt to ditch.

(*c*) If ditching is inevitable:

(i) Jettison the canopy.

(ii) Disconnect the leg restraint garters.

(iii) Select 100% OXYGEN and deflect the emergency toggle sideways. Disconnect the emergency oxygen supply.

(iv) Check the PSP lowering line for security of attachment to the life saving waistcoat. Disconnect the PSP from the parachute harness.

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

(vi) Tighten the safety harness.

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

(viii) When the aircraft has stopped, unlock the harness quick release and free the straps. Throw out the PSP and leave the aircraft as quickly as possible.

(ix) Inflate the life saving waistcoat when clear of the aircraft.