

Part V

Chapter 1—Engine Emergency Procedures

List of Contents

	<i>Para.</i>		<i>Para.</i>
Engine fire	1	Engine failure during take-off	4
Engine mechanical failure	2	Two-engine failure in flight	5
Flame extinction	3	Four-engine flame-out	6

1 Engine fire

NOTE: If a fire occurs in one engine it is recommended that the adjacent engine is also closed down. Depending upon the stage of flight this may not always be practicable and aircraft captains must base their decision upon the circumstances at the time of the incident.

(a) Indication

Fire in an engine is indicated by the illumination of the appropriate red ENGINE FIRE WARNING light.

(b) Immediate actions

- (i) Warn crew.
- (ii) Press ENGINE FIRE WARNING button. (This action should automatically close the appropriate HP COCK, LP cock and alternator cooling close shutter).
- (iii) Close both HP and LP cocks on the affected side.
- (iv) Select ECM alternator to main bus-bar.
- (v) Check that the ALTERNATOR COOL CLOSE light has illuminated.

(c) Subsequent actions

- (i) Reduce speed.
- (ii) CLOSE appropriate cabin air isolation cock

- (iii) Switch ON unaffected wing and fuselage pumps.
- (iv) Select unaffected wing and fuselage proportioners to BY-PASS.
- (v) CLOSE both crossfeed cocks.
- (vi) Switch OFF affected wing fuel pumps.
- (vii) Select affected proportioner to NORMAL.
- (viii) CLOSE affected WING ISOLATION COCK.
- (ix) If the fire is in the port side CLOSE the LONG RANGE ISOLATION cock and switch OFF bomb-bay tank pumps.
- (x) Switch OFF affected alternators.
- (xi) Complete load shedding drill.
- (xii) Parallel bus-bars at captain's direction.
- (xiii) Check externally by use of the periscope.

(d) If the fire fails to go out, prepare to abandon the aircraft.

- ◀ (e) If a fire occurs on or soon after take-off, and a heavy weight circuit and landing is carried out, it may be sufficient to switch off the MV battery and monitor the LV supply rather than to carry out the full load-shedding procedure. If the port engines are flamed-out, Tacan must be switched off. ▶

2 Engine mechanical failure

If an engine fails under conditions which indicate a mechanical failure, immediately stop the engine by closing the HP cock and LP cock. Keep close observation for warning of engine fire. Switch OFF the alternator.

3 Flame extinction

If an engine fails under circumstances in which it is unlikely to have suffered mechanical damage, and is not showing signs of mechanical damage but is windmilling at a reasonable speed for the flight conditions prevailing, an attempt may be made to relight it. During the relight attempt a careful watch must be kept on the engine fire warning indications and the JPT, oil pressure and RPM gauges. At the slightest sign of malfunction, close the HP cock and LP cock and make no further attempt to relight the engine.

4 Engine failure during take-off

(a) If a single engine fails during take-off while below the "stop" speed, the take-off must be abandoned. Throttle back all engines, stream the brake-parachute and use wheelbrakes as required.

(b) If an engine fails above the "stop" and "go" speeds, continue with the take-off. The safety speed will always be below the unstick speed. As soon as possible, depending on the circumstances of the failure, attempt to relight the failed engine, or stop it by closing the HP cocks and LP cock.

(c) If two engines fail during take-off, it may be necessary to throttle back the two remaining engines to assist in maintaining directional control.

5 Two engine failure in flight

(a) If two adjacent engines fail in flight, pilot's actions must be in accordance with the indications of the failure.

(b) *No indication of mechanical failure*

- (i) Throttle back.
- (ii) Select alternative fuel supply.
- (iii) Attempt immediate relight on each engine in turn.
- (iv) Descend, continuing to attempt relights

Recheck fuel selections.

(c) *Indications of mechanical failure*

- (i) Close HP and LP cocks.
- (ii) Monitor the engine fire warning lights but do not press unless fire is indicated.
- (iii) CLOSE cross-feed cock and wing isolation cock. Switch off booster pumps in affected wing and select proportioner to NORMAL. Ensure fuel supply to other engines by switching on fuselage booster pumps and selecting fuselage and unaffected wing proportioners to BYPASS.

(d) In both cases the AEO should take the appropriate action for double alternator failure. Bus-bar paralleling action may be taken at the captain's discretion.

6 Four engine flame-out

(a) *Indications of failure.* Indications should be obvious, engine instruments and loss of thrust.

(b) *Actions*

- (i) Attempt hot relights immediately.
- (ii) Captain orders "load shedding".
- (iii) Crew carry out actions as detailed in Table 1.
- (iv) If above 25,000 feet, maintain speed at 0.9M or 300 knots.

This is an attempt to maintain generation by high windmilling RPM.

(v) At 25,000 feet put any additional fuel pumps ON (minimum 3 pumps in any one group) reduce to optimum relighting conditions and attempt relights.

(vi) Continue attempts to relight and if unsuccessful abandon aircraft.

NOTE: During this drill the AEO must monitor the TRU/LV ammeter and, if the readings fall to within 5 amps of the zero point the field circuit breaker of the associated alternator must be tripped. This is to prevent discharge to the alternator field at low windmill RPM.

If the MV bus-bar voltage falls to 75 volts at any time during the drill the aircraft must be abandoned immediately.

Table 1
FOUR ENGINE FLAME-OUT DRILLS

	1 <i>Captain</i>	2 <i>Co-pilot</i>	3 <i>A.E.O.</i>	4 <i>Navs. P & B</i>
Immediate Actions	<ol style="list-style-type: none"> Warn crew "Load shed" Descend, attempting hot relight 	<ol style="list-style-type: none"> Proportioners to BYPASS Load shed 	<ol style="list-style-type: none"> Parallel bus-bars if safe Load shed 	<ol style="list-style-type: none"> Load shed
Subsequent Actions	<ol style="list-style-type: none"> Attempt further relight Adjust speed and attitude for rear crew escape If no relight order "Prepare to abandon aircraft" 	<ol style="list-style-type: none"> Inform A.E.O. when each engine falls below 25% RPM Reduce booster pumps to absolute minimum Transmit distress call 	<ol style="list-style-type: none"> Switch off alternators when associated engine falls below 25% RPM 	<ol style="list-style-type: none"> Take up abandon aircraft positions Pass position to co-pilot

NOTE 1: It is assumed that the alternators will not come off line immediately, and, therefore, the immediate actions will take place with alternators ON.

NOTE 2: This drill assumes the emergency happens when the aircraft is at height. At low level the actions would be modified for immediate rear crew escape.

NOTE 3: "Load shed" implies *all* loads OFF except:—

- Booster pumps as required
- Minimum PFCU's
- Flight instrument 153 inverter
- Standby yaw damper if required
- VHF/UHF set when in use

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