Section 3
EMERGENCY PROCEDURES

CONTENTS

1. AUTOROTATIVE LANDING

In autorotative flight, engine speed should never be decreased by action on the fuel flow control lever. This procedure, however, is permissible when, for pilot training purposes, an autorotative landing is desired, but it is not recommended above 2000 m (6500 ft).

Rotor speed should be maintained as high as the low pitch stop will permit without, however, exceeding 420 r.p.m.

Pilots who fail to avoid overspeeding of the rotor, must enter in the record sheets of the blades and of the rotor hub, the duration of the overspeeding condition and the maximum r.p.m. attained.

In view of the severe stresses liable to be set up by overspeeding, main rotor speeds in excess of 420 r.p.m. shall in every case entail general overhaul or inspection as detailed in chapter 5 of the Maintenance Manual.

A - AUTOROTATIVE LANDING WITH POWER OFF (SHUT DOWN OR ENGINE FAILURE)

(Also refer to paragraph 4)

1) Apply full low collective-pitch ; do not apply forward cyclic stick unless the airspeed, when engine failure occurs, in less than 90 km/h (50 knots). If rotor speed tends to approach 420 r.p.m. slightly increase collective-pitch.

2) Manoeuver so that the helicopter will be approximately facing into wind for the final approach.

3) Establish an approach speed 90 km/h (50 knots) minimum (100 to 110 km/h - 55 to 60 knots if aircraft gross weight is close to maximum) and maintain this airspeed up to the flare-out.

4) At approximately 20 m (60 ft) accomplish a partial flare so as to bring the canopy horizontal former substantially in line with the horizon for a pilot of medium height.

5) Maintain this attitude until the aircraft is 2 to 3 m (6 to 10 feet) from the ground, but start increasing collective-pitch slightly when the aircraft is at 6 to 8 m (20 to 25 feet) in order to reduce the rate of descent.

6) At 2 to 3 m, place the aircraft in an attitude such that the skids are parallel to the ground, by pushing on the cyclic stick while pulling on the collective-pitch lever so that the path becomes tangential to the ground.

7) On touch down, take care not to pull the cyclic-stick back.

B. AUTOROTATIVE LANDINGS FOR TRAINING PURPOSES

It is recommended that grassland be selected for autorotative landing training.

1. Apply full low collective-pitch.

2. Fully close the fuel flow control lever.

3.)
4.)
5.) Proceed as in para. 1A
6.)

7. Two to three seconds after touch down and, in any event, not later than when freewheel re-engagement is perceived, decrease the collective-pitch steadily - (in one or two seconds) - and at the same time, push the cyclic stick forward.

8. Once the aircraft has come to a complete stop, the fuel flow control lever may be opened slowly to engage the clutch and increase engine speed to nominal governed r.p.m. in order to take off again if necessary.

2 - ENGINE FAILURES

A. SYMPTOMS AND REMEDIES

Engine failure is evidenced by :

1. A tendency of the aircraft to swing to the right.
2. A drop in rotor r.p.m.

Take the following steps immediately :

1) If aircraft is not near the ground (above 50 m - 150 ft).

a) Apply full low collective-pitch as quickly as possible. If rotor speed tends to approach 420 r.p.m., slightly increase collective-pitch.

b) Close the fuel flow control lever and move engine selector switch to the OFF position to discontinue delivery from the fuel pump.

c) Close the fuel shut-off cock.

d) Switch the fuel booster pump OFF.

e) Select a landing area and maintain a suitable approach speed (airspeed corresponding to best gliding angle : 120 km/h (65 knots).

f) If the landing area is not flat, or if it is very confined, ground contact must be effected with zero forward speed. The flare should be initiated very high and should be such that zero forward speed is obtained when close to the ground.

2) If aircraft is near the ground.

a) If the aircraft is near the ground when the engine fails (below 3 m (10 ft), at zero or low airspeed (less than 27 knots) do not reduce collective-pitch as this would result in a hard landing; on the contrary, increase collective-pitch steadily to cushion the landing.

b) If the aircraft is at a height between 3 and 50 m (10 and 150 ft), first reduce collective-pitch to the minimum consistent with the drop in altitude, and then increase it to cushion the landing. At the same time a flare should be accomplished. The greater the airspeed, and the closer the aircraft is to the ground, the sharper must be the flare in order to :

- round off the glide-path
- maintain high rotor r.p.m.
- reduce the landing speed.

NOTE : To increase rotor r.p.m., always reduce collective-pitch : do not push cyclic stick forwards.

B. RE-LIGHTING THE ENGINE IN FLIGHT

Apart from fuel supply failure, engine flame out in flight can only result from mishandling of the controls by the pilot : closing of fuel shutt-off cock, actuation of engine selector switch when fuel flow control lever is in closed position.

In the event of engine flame out due to mishandling, the engine may be relighted provided the aircraft is at a sufficient height.

Check :

1. Fuel shut-off cock lever OPEN

2. Fuel flow control lever against "IDLING" stop

3. Engine selector switch OFF

   - With the starting relay warning light OUT, ventilate the engine up to 4.000 r.p.m. (in order to clear the combustion chamber of any residual fuel), and then carry out normal starting operations (see 2-1.5).

3. ENGINE FIRE

A. ENGINE FIRE ON STARTING

- Fire may occur on engine starting if a start is attempted without "ventilating" the engine to clear the residual fuel following several failures to start. The accumulated kerosene ignites, a long flame is emitted from the tail pipe and burning kerosene is likely to spread under the aircraft.

- The fire should be fought by the ground crew attending starting operations.
- The pilot should close the fuel shut-off cock and ventilate the engine.

B. ENGINE FIRE IN FLIGHT

- Proceed as described in para. 2A

4. BALING OUT

For certain duties, the occupants of the aircraft are equipped with parachutes.

Owing to the nature of the mission to be accomplished, the crew and the occupants of the aircraft may have to bale out. The following procedure should be adhered to :

1. Reduce airspeed as much as possible.
2. Jettison the cabin doors.
3. Order the occupants of the rear seat to bale out, from the L.H. side if possible; they should bale out head first.

FOR THE PILOT : Lock the flying controls (especially the cyclic-pitch stick).

4. If altitude permits, do not open the parachute until 3 seconds have elapsed.

5 - TAIL ROTOR FAILURE

Tail rotor failure is indicated by a sudden and uncontrollable turn to the feft. The rate of turn will be dependent on the amount of power that was applied, and the weight of the aircraft, at the time of the failure.

A. OVER TERRAIN FAVOURABLE TO AUTOROTATIVE LANDING

Establish autorotative flight immediately by calmly applying full low collective-pitch (down to the low pitch stop).

- If de-synchronization of the main rotor occurs (heavily loaded aircraft) the helicopter will cease rotating to the left, and will even start to rotate to the right. Determine the appropriate speed which, by weathervane effect on the fuselage, will stop this rotation. If necessary, apply left hand cyclic.

- If de-synchronization of the main rotor does not occur (lightly loaded aircraft) the helicopter may :

  . either cease rotating. In this case, maintain the flight control trim unchanged.
  . or continue to rotate to the left : slowly decrease the engine speed by adjusting the fuel control lever until rotation ceases.

B. OVER TERRAIN UNFAVOURABLE TO IMMEDIATE AUTOROTATIVE LANDING

Reduce collective-pitch just sufficiently to achieve the best compromise between the rate of rotation to the left, the flight path speed and the rate of descent.

In all cases, at the end of the landing approach, with full low collective-pitch, it is imperative to shut down the engine by closing the fuel shut-off cock, and accomplish the flare-out, maintaining a constant height above the ground until forward airspeed is zero.

Apply collective pitch as necessary upon touching the ground.

NOTE : If tail rotor failure occurs close to the ground (e.i. blades damaged by hitting an obstacle) full low collective-pitch must be applied, even if this is to cause a very hard landing, and shut down the engine by closing the fuel shut-off cock, and if possible before touching the ground.

6. SERVO UNIT FAILURE

In the event of servo unit failure, move the servo control cock to the CLOSED position and tighten the collective-pitch lever friction knob. The flight may be continued, control forces being alleviated by reducing airspeed to approximately 120 km/h - 65 knots. There will also be a dead travel of approximately 5 mm (0.2 in.) at the cyclic stick due to servo-unit piston-valve end-play, and collective pitch has a great tendency to decrease.

7. DITCHING WITHOUT FLOATS OR EMERGENCY FLOATATION GEAR

If ditching becomes necessary due to engine failure, proceed as prescribed in paragraphs 1A and 2A.

If the cause is tail rotor failure, proceed in accordance with paragraph 5.

In all cases, the water should be contacted with as little forward speed as possible and, in addition to the afore-mentioned requirements, the following instructions are to be complied with :

1. Warn the passengers as soon as possible.
2. Jettison the cabin doors.
3. Check that safety belts are buckled.
4. Order passengers to assume following attitudes :

   - front passenger : fore-arms braced on knees
   - rear passengers : fore-arms on top of back-rest of front seat, with forehead resting on fore-arms.

5. Begin flare-out high enough to reduce forward speed to zero on touch-down. Hold the helicopter in level attitude on touch-down. Dampen force of impact by applying collective-pitch as for autorotative landing.
6. After touch-down, do not reduce collective-pitch ; use cyclic control to hold the helicopter in level attitude as long as possible.
7. Close the fuel shut off cock.
8. Apply rotor brake as soon as the helicopter begins to sink.
9. Release safety belts. Give the order to abandon the aircraft. Passengers and crew must swim away from the helicopter, remaining under water for about ten seconds before breaking surface.

NOTE : A helicopter should not be flown over water if its rotor brake is unserviceable.

8 - ABNORMAL MGB OIL TEMPERATURE AND PRESSURE

If the main gear box oil pressure warning light comes on, land as soon as possible and check the main gear box oil system.

If the main gear box oil temperature warning light comes on, following sustained hovering, land the aircraft, or establish forward flight. This should cause the light to go out fairly quicky ; however if it is still on three minutes after forward flight has been established land as soon as possible.

In case of low oil pressure and abnormal elevation of oil temperature in the main gear box as shown by the pressure and temperature warning lights which come on land as soon as possible, limiting the transmitted power to a minimum and monitoring the rotor speed.

On approaching the ground :
- maintain the airspeed recommended in autorotative flight, i.e. 90 to 110 km/h (50 to 60 knots) according to load conditions.
- carry out the final approach as for power-on autorotation.

9 - ABNORMAL OPERATION OF ENGINE

A. ABNORMAL ENGINE OIL TEMPERATURE AND PRESSURE

In case of low pressure and abnormal elevation of oil temperature in the engine as shown by the oil pressure warning light coming on and the oil temperature indicator, apply instructions given in paragraph 8.

B. LOW FUEL PRESSURE WARNING LIGHT ON

1) If TRO or TR4 fuel is being used

Flight may be continued and mission carried through at altitudes up to 5000 m (16500 ft).
If operation altitude is above 5000 m (16400 ft) descend to a lower altitude.

2) If any other fuel is used

Same instructions as above (1) but with operating altitude of 3000 metres (9800 ft) instead of 5000 metres (16400 ft).

10 - ALARM LIGHT ON

If the "ALARM" light comes on, ensure that the fuel flow control lever is at forward travel limit.

If the light remains on, give instructions for repair or replacement of the faulty micro switch after the flight.

11 - FILTER CLOGGING WARNING LIGHT ON

If this light comes on, land as soon as possible, reducing power to minimum, to prevent operation of the by-pass valve.

If the fuel filter by-pass operates, return the engine to an approved workshop for flushing of the fuel system.

If the filter by-pass does not operate, replace the filter element.

12 - LOW FUEL LEVEL WARNING

- Before Mod. A.M.S. 2063, one indicator light gave warning that only 60 litres (15.85 U.S. gal) of fuel remain.

- After Mod. A.M.S. 2063 in addition to the low fuel level indicator light, a "push-to-test" type Fuel "TANK EMPTY" warning light, situated below the gauge, flashes when available fuel for only two or three minutes' flight remains.

A. ILLUMINATION OF THE LOW FUEL LEVEL LIGHT

If this light comes on :

- Avoid steep nose-up or nose-down attitudes.

- Limit the duration of flight to approximately 10 minutes.

B. FLASHING OF THE "TANK EMPTY" WARNING LIGHT

If the "TANK EMPTY" warning light flashes :
LAND IMMEDIATELY.

13 - VIBRATION IN FLIGHT AND ON THE GROUND

A. MAIN ROTOR BLADE STALL

Rotor stall is evidenced by an increase in the overall vibration level. To overcome blade stall, reduce collective-pitch immediately, then airspeed without increasing the load factor. In order to avoid premature ageing of the aircraft, avoid flight in the area of incipient blade stall.

B. VIBRATION

Vibration in the helicopter can have many causes.
Types of vibration, however, may be classified according to the respective frequencies.

1) Very low frequency vibration of the aircraft

- Frequency considerably lower than rotor r.p.m. frequency.

This type of vibration is usually evidenced by oscillations about the yaw axis combined with fluctuating engine r.p.m. There are two possible causes :

- faulty adjustment of the drag hinge dampers.
- faulty engine governor. If such is the case, the governor should be replaced.

2) Vibration of the whole aircraft at rotor r.p.m. frequency.

Possible causes :

- Faulty balancing of main rotor blades resulting in rotor unbalance (circular vibration in the horizontal plane).

  Remedy : Replace or re-balance the blades (the blades are balanced at the Manufacturer's works and subsequent unbalance is unlikely).

- Uneven lift of the three blades. Cabin vibration mainly in the vertical plane.

  Remedy : Track the rotor blades (see Maintenance Manual).

- Faulty adjustment of drag hinge dampers. The effect of uneven adjustment of the drag hinge dampers is small.

  Remedy : change the dampers.

3) Vibration in cabin (3/rev.)

Vibration is experienced at the airspeed known as the "Transitional speed" (16 - 22 knots) (30 - 40 km/h) when assuming forward light and also at the conclusion of the landing flare-out. This vibration, which results from a change in the aero-dynamic flow through the rotor, cannot be avoided, as is the case with any helicopter.

4) High-frequency vibration

High frequency vibration, which originates in the rear section of the helicopter, is generally felt through the rudder pedals. It may be due to one of several causes :
- Tail rotor guard of HF antenna attachment points ; check that these components are installed without stress.
- Tail rotor gear box attachment.
- Tail rotor drive : lubrication and free movement of floating bearings; lubrication and condition of coupling shaft.
- Tail rotor head : free movement of links ; condition of blade pitch-change and flapping hinges.
- Tail rotor blades ; unbalance : distortion of blade profile due to skin separation : air-leak (other than through designed vent hole) ; difference in incidence angle of blades.

C. OSCILLATIONS ON GROUND

Under certain conditions, oscillations may be observed when the aircraft is on ground with the main rotor turning at operating r.p.m.
There is no danger as long as these oscillations are of small amplitude. In view, however, of the risk that might exist in the event of an excessive increase in amplitude, pilots must be familiar with the conditions that are liable to bring on such oscillations.

The major factor is the collective-pitch value applied by the pilot while the aircraft is in contact with the ground. In general, the onset of oscillations occurs with collective-pitch settings in excess of 0.40.

Strong oscillations should not be experienced as long as full low collective is applied. These are, however, a number of secondary factors which may affect the pitch setting at which the onset of oscillations is liable to occur. Adverse factors are :

- The hardness of the ground : oscillations are more likely to occur on cement-covered surfaces than on grass-covered surfaces.
- Forward c.g. location.
- Partial touch down, or landing on very rough ground.
- Strong wind, more particularly crosswind.

If the oscillations amplitude on ground becomes difficult to manage or the amplitude tends to increase, the pilot must take off or, where the ground permits, fully reduce collective pitch.

The power available on SA 315 B is such that take-off is practically always possible. Also, the pilot may look for a more convenient place to land.

14 - FAILURE TO START

Ventilate engine after each failure to start

○ = light ON ● = light OUT

SYMPTOMS	Warning light: Starter	Warning light: Micropump	Warning light: Stop	CAUSES	REMEDIES
Engine selector switch ON, starter does not operate	●	●	○	Engine has been shut down for less than 10 seconds	- Move selector switch to OFF.
ditto	●	●	○	Fuel flow control lever is not in the closed position.	- Close fuel flow control lever - Attempt to start.
ditto	●	○	●	The P2 bleed air pressure-switch, which cuts out the starter, is jammed in open position	- Check pressure switch
Engine selector switch ON. Starter operates Engine fails to light up.	○	●	●	a. Faulty micropump b. Micropump relay incorrectly set	- Check micropump unit - Adjust relay in starting box.
ditto	○	○	●	a. Faulty torch igniter or coil operation. b. Air leak at micropump. c. Motor-operated cock fails to open.	- Check torch igniters (ignition and atomizing). - Check ignition coil - Check micropump fuel system and make certain that fuel is expelled through the micropump drain tube. - Check motor-operated cock.
Engine selector switch ON. Starter operates. Engine lights up then stops.	○	○	○	Fuel flow control lever has been advanced before starter green warning has gone out.	- Cause extinction of max. fuel flow warning light by closing fuel flow control lever. - Move selector switch to OFF

SYMPTOMS	Warning light: Starter	Micropump	Stop		CAUSES	REMEDIES
Engine selector switch ON. Starter operates. Engine lights up then stops.	○	○	○			- Ventilate - Attempt to start
ditto	○	○ ↓ ●	○		Starting cycle too long ; starting relay T.30 cuts out too soon.	- Move selector switch to OFF. - Ventilate - Attempt to start - Check operating time of relay T.30
ditto	○	○ ↓ ●	●		Air leak on suction side of fuel pump	- Move selector switch to OFF. - Check fuel system for air leaks.
ditto	○	○ ↓ ●	●		a. Micropump and torch igniters did not operate long enough. b. Insufficient fuel delivery through idling jet	- Move selector switch to OFF. - Ventilate to lower tail pipe temperature (T4) to less than 150°C. - Attempt to start - If engine stops, check idling jet.
Micropump warning light flashes	○	✳	○		Air leak at micropump.	- Check fuel system (air leak).

SYMPTOMS	Warning light: Starter	Warning light: Micropump	Warning light: Stop	CAUSES	REMEDIES
Ignition lag, irregular rise of r.p.m. and tail pipe temperature which attains upper limit for starting	○	○ ↓ ●	●	Faulty torch igniter operation.	- Check torch igniters (ignition and atomizing). - Change torch igniters if necessary.
Micropump operates immediately selector switch is moved to ON. Tail pipe temp. attains upper limit.	○	○	●	Faulty micropump microswitch operates the motor-operated cock.	- Check the micropump.
Abnormal slow acceleration with normal battery.	○	○ ↓ ●	●	a. Faulty starter connection.	- Check connection.
				b. Faulty starter.	- Check starter commutator and brushes.
Fast engine acceleration. Tail pipe temperature rises to upper limit.	○	○ ↓ ●	●	Clogged by pass jet in fuel pump.	- Clear by pass jet.

IMPORTANT NOTE: No attempt to start should be made in the minute following extinction of the "STOP" warning light.

Ventilation may be accomplished during this lapse of time.

After three consecutive starter operating periods, allow the starter to cool for 20 minutes before any further attempt.

15 ILLUMINATION OF THE RED "CHIP" WARNING LIGHT
(After AMS 07.2230)

Illumination of the "CHIP" warning light indicates that metal particles are detected on the engine magnetic plug.
Should the warning light illuminate, place the aircraft in flying conditions permitting landing with engine shut down, if required (fly out of the danger zone)

LAND AS SOON AS POSSIBLE

After landing

- Remove the magnetic plug. Check that electric contact is positively established by one or more metal particles. Retain particles for subsequent analysis.
- Clean the magnetic plug and put it back in place.
- Carry out 5 minutes ground run, monitoring all engine parameters.
- Upon completion of the ground run :
  . If the "CHIP" warning light illuminates again, due to one or more particules :

INTERRUPT THE MISSION

  . If the "CHIP" warning light does not illuminate, resume flight and place the aircraft in flying conditions permitting landing with engine shut down, if required (fly out of the danger zone).
  In this case, fly to the nearest base, while monitoring the engine oil temperature.
  - If the "CHIP" warning light illuminates in the meantime, land as soon as the terrain configuration permits.

INTERRUPT THE MISSION

16 ILLUMINATION OF THE RED "GENERATOR" WARNING LIGHT

- In flight, the red "Generator" warning light should remain off.
- Should the warning light illuminate, the battery is no longer charging, check the "GENERATOR" switch setting, the failure is confirmed, switch the generator off.
- Switch off all consumers which are not indispensable.
- Continue the flight according to the current circumstances.