SECTION 3

EMERGENCY PROCEDURES

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3.1 INTRODUCTION

Section 3 details the emergency checklist procedures for the airplane. Thorough pre flight planning and preparation and adherence to the normal checklist and operating procedures in conjunction with the appropriate airplane maintenance will assist the pilot to minimise exposure to airplane emergencies. The nature of emergencies may vary depending on the flight conditions and phase of flight. However, the basic checklist procedures should be considered in the event of an emergency or malfunction.

3.2 AIRSPEEDS FOR EMERGENCY OPERATIONS

ENGINE FAILURE AFTER TAKEOFF

Flaps Up:	95 KIAS
Flaps 20^0:	80 KIAS

(these speeds are based on an airplane weight of 7500 lbs but may be used at lesser weights)

MAXIMUM GLIDE SPEEDS

Maximum glide speed is the speed which will result in the greatest horizontal distance covered for a given height loss.

7500 lbs:	100 KIAS
6500 lbs:	93 KIAS
5500 lbs:	86 KIAS
4500 lbs:	78 KIAS

MANEUVERING SPEEDS

Maneuvering speed is the maximum speed at which application of full available aerodynamic control will not overstress the airplane.

7500 lbs	131 KIAS
6500 lbs	122 KIAS
5500 lbs	112 KIAS
4500 lbs	101 KIAS

3.3 ENGINE FAILURE

ENGINE FAILURE DURING TAKEOFF

Power Lever	IDLE
Brakes	MAXIMUM BRAKING (or as appropriate to runway remaining)

If unable to stop on the remaining runway

Flaps	UP
Propeller Lever	FEATHER
Fuel Condition Lever	CUT OFF
Fuel Shut Off Valve	OFF (disengage safety lock, pull lever fully out)
Radio	DISTRESS CALL
Master Switch	OFF

ENGINE FAILURE IMMEDIATELY AFTER TAKEOFF

Airspeed	95 KIAS (with flaps up) 80 KIAS (with 20^0 flaps lowered)
Flaps	AS REQUIRED (40^0 flap recommended)
Power Lever	IDLE
Propeller Lever	FEATHER
Fuel Condition Lever	CUT OFF
Fuel Shut Off Valve	OFF (disengage safety lock, pull lever fully out)
Master Switch	OFF (when electrical services no longer required)

NOTE

If the propeller is not feathered following engine failure the rate of descent is significantly higher and 10 KIAS should be added to the normal approach speed to ensure adequate flare capability.

ENGINE FAILURE DURING FLIGHT

Airspeed	100 KIAS
Power Lever	IDLE
Propeller Lever	FEATHER
Fuel Condition Lever	CUT OFF
Flaps	UP
Fuel Shut Off Valve	OFF (disengage safety lock, pull lever fully out)
Fuel Switch	OFF
Ignition Switch	AUTO
Forced Landing	Refer to Forced Landing Without Power checklist

3.4 AIRSTART

RESTART - if Ng is above 50% proceed as follows

Fuel Shut Off Valve	ON (push fully in, engage safety lock)
Fuel Condition Lever	FLIGHT IDLE (fully forward)
Power Lever	IDLE
Ignition Switch	CONTINUOUS, MONITOR - ITT and Ng for stabilized indications within normal flight limits
Power Lever	AS REQUIRED after satisfactory relight
Ignition Switch	AUTO (if the cause of the flameout has been corrected)

RESTART – if Ng is below 50% proceed as follows

AIR START STARTER ASSISTED

CAUTION

An engine restart should not be attempted if the engine failure was considered to be caused by mechanical failure.

Power Lever	IDLE
Propeller Lever	MINIMUM RPM (within normal operating range)

CAUTION

A minimum of 15 psi oil pressure should be registered if the propeller is left unfeathered.

NOTE

If the propeller is not feathered following an engine failure the rate of descent is significantly higher and gliding range will be considerably reduced.

NOTE

Propeller feathering is not required if an immediate engine restart is considered appropriate. Propeller feathering is dependant on circumstances and at the discretion of the pilot.

Fuel Condition Lever	CUT OFF
Cabin Heater	OFF
Cockpit Heater	OFF
Oil Cooler Heater	NORMAL
Inertial Separator	
Pitot Heat	ON
External Lighting	OFF
Cabin Lighting	OFF
Avionics Master	OFF

Ignition Switch	CONTINUOUS
Fuel Switch	MANUAL
Fuel Pressure	5 PSI MINIMUM
Generator Switch	OFF
Master Switch	ON
Fuel Shut Off Valve	ON (pushed fully in and safety lock engaged)
Start Switch	START and OBSERVE: - STARTER ENERGISED annunciator light illuminated - IGNITION ON annunciator light illuminated - Oil pressure indicating above zero
Fuel Condition Lever	GROUND IDLE (when Ng above 12%) and MONITOR: - ITT (1090ºC maximum, 2 second limit above 850ºC) - Ng 52%
Start Switch	INTERRUPT - at 52% Ng (if auto starter cut out fails to disengage starter)
Fuel Condition Lever	FLIGHT IDLE
Propeller Lever	AS REQUIRED
Power Lever	AS REQUIRED
Generator Switch	ON
Fuel Switch	AUTO
Ignition Switch	AUTO
Avionics Master	ON
External Lighting	ON
Cabin Lighting	ON
Oil Cooler Heater	AS REQUIRED
Cockpit Heater	AS REQUIRED
Cabin Heater	AS REQUIRED

AIR-START – NO STARTER

CAUTION

This procedure has not been evaluated by flight test and carries an increased risk of engine over temperature on start. An engine restart without the starter should only be attempted if the starter has failed.

CAUTION

An engine restart without the starter should not be attempted if the engine tachometer indicates zero Ng rpm. An engine restart without the starter may be attempted below 10% Ng but careful monitoring of the ITT is required.

CAUTION

If over temperature tendencies are encountered during an emergency air-start the fuel condition lever should be moved to the CUT OFF position periodically during acceleration to idle.

Altitude	Below 10,000 ft
Fuel Shut Off Valve	ON (push fully in, engage safety lock)
Power Lever	IDLE
Propeller Lever	MAX RPM
Fuel Condition Lever	CUT OFF
Master Switch	ON
Fuel Switch	AUTO
Fuel Pressure	5 PSI MINIMUM
Avionics Masters 1 and 2	OFF
Ignition Switch	CONTINUOUS
Airspeed	100 KIAS MINIMUM (140 KIAS if propeller feathered)
Ng	CHECK FOR ROTATION

Fuel Condition Lever	GROUND IDLE and MONITOR: - ITT (1090ºC maximum, 2 second limit above 850ºC) - Ng 52%

After stable Ng and ITT idle parameters are established

Ignition Switch	AUTO
Fuel Condition Lever	FLIGHT IDLE
Propeller Lever	AS REQUIRED
Power Lever	AS REQUIRED
Avionics Masters 1 & 2	ON

3.5 SMOKE AND FIRE

ENGINE FIRE - DURING START

Fuel Condition Lever	CUT OFF
Start Switch	MOTOR FOR 30 SECONDS THEN OFF

If fire persists proceed as for **ENGINE AND FUSELAGE FIRE ON GROUND**

ENGINE AND FUSELAGE FIRE - ON GROUND

Power Lever	IDLE
Brakes	ON and PARKED
Propeller Lever	FEATHER
Fuel Condition Lever	CUT OFF
Fuel Shut Off Valve	OFF (disengage safety lock, pull lever fully out)
Fuel Switch	OFF
Ignition Switch	OFF
Cockpit Air Vents	CLOSED
Master Switch	OFF
Airplane	Evacuate passengers and crew to a safe area

ENGINE FIRE - IN FLIGHT

Airspeed	100 KIAS (with flaps up)
Power Lever	IDLE
Propeller Lever	FEATHER
Fuel Condition Lever	CUT OFF
Flaps	UP
Fuel Shut Off Valve	OFF (disengage safety lock, pull lever fully out)
Fuel Switch	OFF
Ignition Switch	OFF
Cockpit Air Vents	CLOSED
Forced Landing	Refer to Forced Landing Without Power checklist and use sideslip to keep flames clear of cockpit.

ELECTRICAL FIRE OR SMOKE IN FLIGHT

Fuselage or cockpit fires are likely to be the result of over heated electrical equipment and will usually be evidenced by smoke and a strong acrid smell.

Cockpit Air Vents	OPEN
Generator Switch	OFF
Master Switch	OFF

WARNING

All electrically driven services will be unavailable with the GENERATOR and MASTER switches selected OFF. These include the electrically powered gyro flight instruments, avionics, engine instruments, auxiliary fuel pump, annunciator lights, wing flaps and airplane lighting. Continued flight should be conducted with reference to serviceable vacuum powered gyro instruments and pitot static instruments only.

Fire Extinguisher	CONSIDER USE
Continued Flight	ACHIEVE AND MAINTAIN VISUAL FLIGHT CONDITIONS
Land	FLAPLESS

WARNING

The extinguishant may cause irritation to the eyes and lungs. If installed, oxygen masks should be used until smoke and extinguishant clears.

If the fire goes out consider turning on only those electrical services necessary and essential to the safe conduct of the flight.

If the fire does not go out land as soon as possible – flapless landing

WING FIRE

Pitot Heat	OFF
Strobes/Navigation Lights	OFF
Landing Light	OFF

WARNING

Land as soon as possible using sideslip to keep the flames away from the fuel tanks and fuselage areas.

3.6 EMERGENCY DESCENT

ROUGH AIR

Harness and Seat Belts	TIGHT
Power Lever	IDLE
Propeller Lever	MAX RPM
Airspeed	140 KIAS (7500 lbs) 125 KIAS (6000 lbs) 108 KIAS (4500 lbs)

NOTE

The rate of descent may be increased by placing the airplane into a turn while maintaining the appropriate speed.

SMOOTH AIR

Harness and Seat Belts	TIGHT
Power Lever	IDLE
Propeller Lever	MAX RPM
Airspeed	170 KIAS

NOTE

The rate of descent may be increased by placing the airplane into a turn while maintaining the appropriate speed.

3.7 GLIDE

The airplane can glide a distance of 1.7 nautical miles per 1,000 ft of altitude lost, if the airplane is flown at a speed such that the optimum lift coefficient is maintained. The speed to fly for maximum glide is a function of weight. The recommended speeds are shown in Figure 3-1.

Weight (lbs)	Speed (KIAS)	Flaps
7,500	100	Up
6,500	93	Up
5,500	86	Up
4,500	78	Up

Figure 3-1, Recommended Glide Speeds

FORCED LANDING WITHOUT POWER

Airspeed	78-100 KIAS depending on weight (flaps up)
Power Lever	IDLE
Propeller Lever	FEATHER
Fuel Condition Lever	CUT OFF
Flaps	UP

Fuel Shut Off Valve	OFF (disengage safety lock, pull lever fully out)
Landing Area	SELECT LANDING AREA (with regard to wind velocity, terrain and obstructions)
Approach	PLAN APPROACH (with regard to wind velocity and excess height in hand)
Radio	TRANSMIT MAYDAY CALL (on 121.5 MHz or monitoring ATC frequency)
Transponder	SQUAWK 7700
Harness	TIGHT
Fuel Switch	OFF
Ignition Switch	OFF
Flaps	AS REQUIRED for landing (40^0 recommended)
Master Switch	OFF (before landing and when complete with electrical services)
Vacate Airplane	WHEN AT A COMPLETE STOP

3.8 LANDING EMERGENCIES

PRECAUTIONARY LANDING WITH POWER

Harness	TIGHT
Flaps	20º
Airspeed	90 KIAS
Landing Area	SELECT LANDING AREA (over fly to assess wind direction, terrain and obstructions)
Approach	FLY NORMAL POWERED APPROACH
Flaps	AS REQUIRED (40^0 recommended)
Touchdown	TAIL LOW
Brakes	APPLY HEAVILY

LANDING WITH FLAT MAIN TIRE

Fuel	BURN OFF EXCESS FUEL (as practical to minimize landing weight.)
Approach	FLY A NORMAL APPROACH USING 40^0 FLAP
Wind Direction	CONSIDER PUTTING WIND ON THE SIDE OF THE SOUND TIRE
Landing	NOSE HIGH TOUCHING DOWN ON INFLATED TIRE FIRST (use aileron to hold the flat tire off as long as possible)
Heading	MAINTAIN DIRECTIONAL CONTROL WITH NOSE WHEEL STEERING AND BRAKES
Engine	SHUTDOWN AFTER TOUCHDOWN

LANDING WITH FLAT NOSE TIRE

Approach	FLY A NORMAL APPROACH USING 40^0 FLAP
Touchdown	HOLD NOSE WHEEL OFF AS LONG AS POSSIBLE
Brakes	CAUTIOUS APPLICATION OF BRAKES

DITCHING

Radio	TRANSMIT MAYDAY CALL (on 121.5 MHz or monitoring ATC frequency)
Transponder	SQUAWK 7700
Loose Objects	SECURE
Harness	TIGHT
Flaps	40^0
Airspeed	80 KIAS
Power	MAINTAIN 300FT/MIN RATE OF DESCENT
Approach	High winds land INTO WIND Light winds/high swells LAND PARALLEL TO SWELLS

Touchdown	NOSE HIGH, MINIMUM RATE OF DESCENT, MINIMUM SPEED
Airplane	EVACUATE
Life Vest/Raft	INFLATE when clear of the airplane

WARNING

The ditching characteristics of the airplane are unknown.

3.9 ENGINE GEAR BOX CONTAMINATION

Amber CHIP DETECTOR annuniciator light illuminated.

Engine Instruments MONITOR

If engine temperatures and pressures are normal land as soon as practical. If engine temperatures and pressures confirm gear box contamination land as soon as possible.

3.10 ENGINE DRIVEN PUMP FAILURE

Failure of the engine driven fuel pump will be indicated by illumination of the amber **FUEL PRESS LOW** light in the annunciator panel. With the fuel switch selected to AUTO the FUEL PRESS LOW light will only be illuminated for the period of time it takes for the auxiliary fuel pump to restore operating pressure. The auxiliary fuel pump will remain on which is indicated by illumination of the blue AUX FUEL PUMP ON light.

Fuel Switch	CHECK AUTO SELECTED. CHECK AUX FUEL PUMP ANNUNCIATOR LIGHT illuminated
Land	AS SOON AS PRACTICABLE

WARNING

Further flight should not be attempted until the fuel system fault has been established and rectified.

3.11 LOW FUEL LEVEL LIGHT ILLUMINATES

Fuel Contents Indicators -	CHECK CONTENTS, IF ZERO LAND AS SOON AS POSSIBLE AS THERE IS A MAXIMUM OF 24 LITRES (6.3 U.S. GALLONS, 42 LBS OF FUEL REMAINING). At a fuel flow of 180 litres per hour (47.5 U.S. gallons per hour or 316 pounds per hour) 24 litres (6.3 U.S. GALLONS, 42 LBS) remaining would give a maximum of 8 minutes engine running time.

WARNING

If the LOW FUEL LEVEL light illuminates and the fuel contents indicators confirm that there is no fuel in the tanks preparation should be made for a forced landing without power.

If fuel is still indicated in the fuel contents indicators it is probable that there is a problem with a jet pump/s. This could be due to either a blockage or a lack of motive pressure from the engine driven fuel pump.

Fuel Flow/Pressure Indicator	CHECK PRESSURE

If the pressure is below 12 psi it indicates that the engine driven fuel pump pressure is insufficient to provide the motive force for the jet pumps. Proceed as follows:

Fuel Switch	SELECT MANUAL, CHECK AUX FUEL PUMP ON light illuminated
Fuel Contents Indicators	CHECK FUEL TRANSFER FROM REAR TO FRONT TANKS
Land	LAND AS SOON AS PRACTICABLE, RECTIFY FAULT BEFORE FURTHER FLIGHT

If fuel pressure is normal proceed as follows:

Fuel Contents Indicators	FUEL IN FRONT TANKS WILL BE AVAILABLE, EXCLUDING 87 LITRES (22.9 U.S. gallons, 139 lbs) UNUSABLE IN THE LEFT TANK WHICH INCLUDES COLLECTOR TANK, AND 79 LITRES (20.8 U.S. gallons, 139 lbs) UNUSABLE IN THE RIGHT TANK.
Land	MAKE A DECISION TO DIVERT OR CONTINUE BASED ON USEABLE FUEL REMAINING IN FRONT TANKS

3.12 FUEL FILTER BYPASS

Illumination of the amber coloured FUEL FILTER BYPASS annunciator panel light indicates that the airframe fuel system fuel filter is being bypassed and unfiltered fuel is flowing to the engine fuel system. The bypass operates when the pressure differential across the inlet and outlet ports of the fuel filter is greater than 2.5 psi ± 0.2 psi.

Land	LAND AS SOON AS PRACTICABLE, RECTIFY FAULT BEFORE FURTHER FLIGHT

3.13 LOW OIL PRESSURE

Illumination of the OIL PRESS LOW light indicates that engine oil pressure has decreased below 25 psi. Land as soon as possible using power.

3.14 GENERATOR FAILURE

A failure of the generator will be indicated by illumination of the red GENERATOR OFF light in the annunciator panel.

Ammeter	CHECK, CONFIRM FAILURE
Generator Circuit Breaker	CHECK IN
Generator Switch	ON (only one attempt to reset)
Voltmeter	CHECK VOLTAGE LEVEL
If fault persists:	
Generator Switch	OFF
Non Essential Electrics	OFF
Land As Soon As Practicable	

3.15 INADVERTENT OPENING OF AIRPLANE DOORS IN FLIGHT

RIGHT OR LEFT CREW DOORS

Speed	REDUCE TO BELOW 100 KIAS
Door	CLOSE

CARGO DOOR

The illumination of the red DOOR UNSAFE light in the annunciator panel indicates the cargo door is unlocked.

Speed	REDUCE TO BELOW 100 KIAS
Door	CLOSE and LOCK (if possible)

If unable to close and lock

Speed	MAINTAIN BELOW 100 KIAS
Land	LAND AS SOON AS PRACTICABLE

3.16 ELEVATOR TRIM RUNAWAY

Trim Interrupt	ISOLATE
Speed	ADJUST to speed which results in acceptable control forces
Elevator Trim Manual Back Up	ENGAGE and trim airplane as required

3.17 SPIN

In the event that an unintentional spin occurs the following procedure should be applied;

Power Lever	IDLE
Rudder	APPLY FULL OPPOSITE TO DIRECTION OF TURN
Ailerons	NEUTRAL
Elevator	BRISKLY FORWARD TO BREAK THE STALL (full forward stick may be required at aft CG loadings)

When rotation stops centralise the rudder and recover from the dive.

WARNING

The pilot should make every endeavour to avoid flight parameters which are conducive to the development of a spin – crossed controls at low speeds.

NOTE

If disorientation makes it difficult to identify the direction of rotation, the needle of the turn and bank indicator should be used for this information.

3.18 AMPLIFIED PROCEDURES

It is impossible to detail emergency procedures to cover every eventuality so sound airmanship must always prevail. However, the checklist procedures will provide a sound basis upon which to handle airplane emergencies. The amplifying notes provide background information which may assist the pilot in the event of an emergency.

The terminology “Land As Soon As Possible” and “Land As Soon As Practicable” is used in the checklist. “Land as Soon as Possible” means to land at the nearest available landing area with or without power. “Land As Soon As Practicable” means to land at the nearest available suitable airfield.

The success of coping with an in flight emergency relies on the pilot applying the basic airmanship principle of “fly the airplane” first and foremost.

WARNING AND CAUTION LIGHTS

The following table details the meaning of the annunciator panel lights:

LIGHT DESCRIPTION	COLOUR	MEANING	ACTIONS
Oil Press Low	RED	Engine oil pressure below 25 psi	Refer to Low Oil Pressure emergency checklist
Generator Off	RED	Generator off line	Proceed as for Generator Failure emergency checklist
Low Fuel Level	AMBER	(1) Check fuel contents, if indicating zero fuel there is a maximum of 24 litres (6.3 U.S. gallons, 42 lbs) of fuel remaining for flight. (2) Check fuel contents, if indicating that there is fuel in the tanks a fuel tank jet pump failure has occurred.	Refer Low Fuel Level Light Illuminates emergency checklist
Fuel Filter Bypass	AMBER	Airframe fuel filter has been bypassed	Refer to Fuel filter Bypass emergency checklist
Beta	BLUE	Propeller is set in beta range	Nil
Engine Anti-Ice	BLUE	Inertial separator door lowered	Vacate icing conditions
Door Unsafe	RED	Cargo door unlocked	Refer to Inadvertent Opening Of Airplane Doors In Flight emergency checklist
Chip Detector	AMBER	Engine reduction gearbox contamination	Refer to Engine Gear Box Contamination emergency checklist

LIGHT DESCRIPTION	COLOUR	MEANING	ACTIONS
Starter Energised	AMBER	Starter in operation	If light remains on after start and attaining 52% Ng select start interrupt.
Ignition On	BLUE	Igniters are operating	Deselect when finished using igniters
External Power	GREEN	External power connected	Ensure external power disconnected and light out prior to taxi
Pitot Heat Inoperative	AMBER	Pitot heat is either selected off, or if selected on the heating element in the pitot heat is defective.	Avoid moisture and icing conditions
Fuel Press Low	AMBER	Mechanical fuel pump pressure has decreased below 6 psi. Light will extinguish when pressure from the electric fuel pump increases system pressure to 9 psi.	Refer Engine Driven Pump Failure emergency checklist
Aux Fuel Pump On	BLUE	Electric fuel pump operating	Refer Engine Driven Pump Failure emergency checklist
Flap Fault	AMBER	The flap asymmetry switches have sensed a fault and isolated the flap motor.	No corrective action possible. Continue flight with flaps at failed position.

ENGINE FAILURE

GENERAL

The checklist procedures detail the actions to be taken in the event of an engine failure during various phases of flight. This includes basic details on airplane speeds and configurations.

If the engine fails during the takeoff roll the immediate priority is to stop the airplane on the remaining runway. Additional items in the checklist procedure are intended to provide additional safety following an engine failure. These items take on greater importance should an overrun of the runway appear likely.

The first priority in an engine failure immediately after takeoff is to preserve adequate airspeed to ensure that the rate of descent can be arrested in the landing flare. This will require the prompt lowering of the nose after engine failure, particularly from the steep climb out attitudes possible at light weights. ***(It is for this reason that unnecessarily steep climb attitudes immediately after takeoff are discouraged.)*** Ideally a landing area straight ahead should be used or at the most an area within 30^0 either side of the takeoff path. The altitude at the time of engine failure will ultimately determine how far the airplane is capable of gliding assuming the correct speed is maintained. Attempts to

turn back to the runway should be resisted as height and airspeed are seldom sufficient to safely complete the maneuver. As many of the checklist procedures as possible should be completed in the available time. In the event of a suspected engine failure care should be exercised not to shut down the engine unnecessarily.

NOTE

If the propeller is not feathered following engine failure the rate of descent is significantly higher and 10 knots should be added to the normal approach speed to ensure adequate flare capability.

NOTE

Feathering the propeller will significantly reduce the descent rate in the glide and improve gliding range.

For an engine failure in flight the priority is to establish the airplane in a glide at the recommended speed. The priority of tasks from this point will depend on several factors including the height above the terrain and whether the cause of the failure is obvious. However, in general the first priority should be selecting and planning an approach to a suitable landing area. Once this is completed the pilot could then attempt to diagnose the cause of the engine failure and attempt a restart if this is an option.

PARTIAL ENGINE FAILURES

Engine failures may result from a variety of causes and not all will result in a sudden or complete loss of power. Should a partial failure occur during the takeoff roll the takeoff should be discontinued and the airplane brought to an immediate stop. If beyond the point of stopping safely, or immediately after takeoff, the pilot may prefer to continue the takeoff. Such a decision will be at the pilot's discretion and based on his/her assessment of the severity of the failure, and power loss, and the availability of emergency landing areas in the takeoff path. Following any significant engine malfunction, continued flight carries an increased risk of complete engine failure. The continued use of the engine should be limited to that necessary to make a safe emergency landing with the first priority being to "preserve life".

DIAGNOSIS OF ENGINE FAILURE AND PARTIAL FAILURE

Effective and appropriate decision making following an engine failure is aided by a sound knowledge of the engine and systems. The diagnosis of an engine failure from engine instruments alone is not a simple task. The presence of noise or vibration and an awareness of environmental and engine operating conditions at time of failure may also provide valuable clues in the correct diagnosis of a malfunction. The following paragraphs offer some guidance as to what indications may be present for various modes of failure or engine malfunction.

COMPRESSOR SURGE / STALL

This is an unstable engine operating mode (possibly cause by bleed valve malfunction) often accompanied by an audible popping noise and in severe cases possible flameout. Instrument indications will likely include significant fluctuations in ITT and smaller fluctuations in torque. Ng and Np may appear quite stable. Reducing power to idle may be sufficient to allow the engine operation to stabilize and return to normal. If this is successful then power may be smoothly increased to some point below that at which the malfunction occurred and the flight continued. Engine compressor stall, to the degree of being audible, is not characteristic of normal engine operation and should be investigated.

FLAMEOUT

The symptoms of an engine flame-out will be the same as those of a total engine failure. A flameout will be noticed by a sudden and total loss of power and an associated drop in ITT, torque and Ng. A flameout may be the result of the engine running out of fuel, or possibly caused by unstable engine operation (compressor surge/ stall). Once the fuel supply has been restored and the cause of unstable operations eliminated the engine may be restarted in the manner described under airstarts.

TURBINE / COMPRESSOR BLADE FAILURE

The failure of a turbine or compressor blade may cause considerable downstream damage as it is ingested into the engine. However depending on the severity of the failure a total or sudden power loss may not be immediately obvious. An increase in engine vibration levels may be the most obvious indication. Instrument indications may show reduced readings on the torque and Ng indicators while ITT is increasing. Continued engine operation runs the risk of further engine damage and possible total failure. Ultimately the decision to shut down the damaged engine will be at the discretion of the pilot based on his/her assessment of the severity of the failure and the availability of suitable forced landing sights.

FCU FAILURE

A failure of the pneumatic or governor sections of the Fuel Control Unit (FCU) may cause the engine power to reduce to idle. Symptoms of this failure would be an ITT in the approximate range of 500ºC - 600ºC, a low torque reading of 0 – 10 psi, Ng of about 50% or higher and no response to power lever movement. No inflight rectification action is possible. The idling engine will provide no useful thrust and the engine should be shut down and a forced landing without power carried out.

CAUTION

Do not attempt a restart if the engine failure is the result of obvious mechanical failure.

Following a total failure of the engine the loss of oil pressure should eventually cause the propeller to feather. However, prompt manual feathering by the pilot is encouraged as this will significantly reduce the rate of descent and improve gliding range should the propeller not feather automatically.

GLIDE

The pilot must be flexible in the approach to handling a forced landing without power as there will always be variations in the prevailing weather, height and airplane conditions. Success will largely depend on the ability of the pilot to modify the procedures to suit the conditions. Every effort must be made to avoid becoming engrossed with the airplane checks to the detriment of flying the airplane; therefore, it is important to learn, and remain aware of the priorities. **The aim of a forced landing is to save life**. If this can be done with minimal damage to property and without destroying the airplane so much the better.

PRECAUTIONARY LANDING WITH POWER

A forced landing is sometimes necessary for reasons other than engine failure. A forced landing with power requires careful planning and airplane control to afford the pilot with the best opportunity to complete a safe landing with the aim of preserving life. The approach and landing path should be inspected from a suitable low level with regard to wind and terrain. This will allow a better assessment of wind velocity and the landing areas surface, slope, size and approach and overshoot obstructions before committing to the landing.

As a rough guide to landing distance available note the time in seconds to fly the length of the intended landing area. At a ground speed 100 knots the airplane will travel approximately 50 meters per second (54 yards per second).

GEAR BOX CONTAMINATION

Illumination of the CHIP DETECTOR light on the annunciator panel indicates that the magnetic plug in the engine gear box has picked up some debris containing metal particles. Illumination of the CHIP DETECTOR light in itself does not indicate an imminent engine failure. The pilot should check the engine indicators for signs of any abnormal engine indications which indicate the CHIP DETECTOR light illumination is associated with significant engine deterioration. If the engine is in distress the pilot should consider a forced landing with power. If the pilot elects to continue the flight a forced landing without power is a possibility. If the CHIP DETECTOR light is not accompanied with any abnormal engine indications the pilot should consider a diversion to a suitable airfield and closely monitor the engine indicators for deterioration of the engine.

FUEL SYSTEM MALFUNCTIONS

Failure of the engine driven fuel pump will be indicated by illumination of the amber FUEL PRESS LOW light in the annunciator panel. The light will remain on until the electric auxiliary fuel pump delivers sufficient fuel pressure.

In the event of a failure of the primary (engine driven) fuel pump an electrically powered auxiliary fuel pump will automatically turn on provided the fuel pump switch is selected to the AUTO position. The functioning of the auxiliary fuel pump is indicated by a blue light on the annunciator panel.

The illumination of the LOW FUEL LEVEL is activated by a float switch in the collector tank and can indicate one of two scenarios. Either the fuel contents in the fuel tanks has reduced to zero and the available usable fuel remaining comprises a maximum of the 24 litres (6.3 U.S. gallons, 42 lbs). Alternatively if fuel is still indicated on the contents indicator it is probable that a jet pump malfunction has occurred due to either a blockage or low motive pressure. A check of the fuel pressure on the fuel flow/pressure indicator will identify if the malfunction is a blockage or a low motive pressure situation.

A blockage of a jet pump/s will be indicated by normal fuel pressure on the fuel flow/pressure indicator. The fuel level in the collector tank will drop until it is the same level as the leading edge wing tanks and the tanks will continue to feed as one. Remaining fuel in the leading edge tanks is available for flight except for 87 litres (22.9 U.S. gallons, 153 lbs), includes collector tank contents, unusable in the front left tank, and 79 litres (20.8 U.S. gallons, 139 lbs) unusable in the front right tank. Fuel in the rear tanks will not be available. The pilot will need to make a decision on whether to continue or divert based on the useable fuel in the front tanks.

A low motive pressure situation will be indicated by a fuel pressure reading of less than 12 psi on the fuel flow/pressure indicator. Selecting the fuel switch to MANUAL will restore sufficient pressure to enable the normal operation of the fuel system. This will be indicated by transfer of fuel from the rear to front tanks as shown on the fuel contents indicators. The LOW FUEL LEVEL light should extinguish once the collector tank is full. The pilot should continue to monitor the normal transfer of fuel and land as soon as practicable.

LOSS OF OIL PRESSURE

The illumination of the LOW OIL PRESS light in the annunicator panel and confirmation of loss of oil pressure on the oil pressure indicator indicates the engine will eventually seize and the propeller will move into feather. The length of time that the engine will operate with a confirmed loss of oil pressure will depend on several factors including engine condition and the power setting. The pilot may be able to prolong engine operation by reducing power to the minimum required for flight. If a loss of oil pressure is confirmed the pilot will need to decide whether to attempt to complete the flight, divert to a suitable airfield or complete a forced landing with power. If the pilot elects to continue flight the engine and propeller indications should be monitored closely for evidence of an impending failure.

GENERATOR FAILURE

Failure of the generator will be displayed by illumination of the GENERATOR OFF light in the annunciator panel and the ammeter indicator showing a discharge. The generator switch should be moved to the RESET position once in an attempt to bring the generator back on line. If the generator remains off line the airplane battery is the only source of power for the airplane electrical services. The ability of the battery to sustain electrical services will depend on the condition of the battery and the number of electrical services being run. Consequently, the pilot should turn off those electrical services that are not required for the safe continuance of flight.

LANDING WITHOUT ELEVATOR CONTROL

It is possible with a combination of power and elevator trim to control and land the airplane without the primary elevator control. Flight testing has shown that the use of elevator trim to pitch the airplane is slow and makes it difficult to precisely control pitch. Power is a much more precise and powerful generator of pitching moments i.e. an increase in power will generate a nose up pitching moment and a decrease in power will generate nose down pitch.

The airplane should be positioned on a long final approach to the intended landing area. The approach may be flown with flaps retracted or in the takeoff (20^0) position. Landing flap (40^0) should not be used as pitch control is less precise. Flap configuration should not be changed within 1,000 ft of the ground.

The technique that works best is to use trim and power to establish a rate of descent of about 300 ft/min at 80 KIAS with the flaps in the takeoff (20^0) position or, 90 KIAS with the flaps retracted, then slowly add power to bring the nose up and rate of descent to zero in the landing flare.

INADVERTENT FLIGHT INTO ICING AND SNOW CONDITIONS

The airplane has not been tested for flight into icing conditions or in falling and blowing snow. Flight into icing conditions and or falling and blowing snow is prohibited. The airplane is not equipped with any airframe, engine or propeller anti or deicing equipment. The airplane has a pitot heat, and an inertial separator to minimise the ingestion of ice

and snow into the engine in the event of inadvertent icing or snow conditions being encountered.

When encountering visible moisture below $+5^0$ C (41^0F) turn the pitot heat ON, select the inertial separator to BYPASS, oil cooler heater to DEICE and select CONTINUOUS on the ignition switch.

If inadvertent icing or falling and blowing snow conditions are encountered the pilot should endeavour to fly the airplane clear of the icing and snow conditions.

WARNING

Flight in icing conditions and or falling and blowing snow conditions is prohibited.

CAUTION

Engine icing can occur without airframe icing. Visible moisture is moisture in any form: clouds, ice crystals, snow, precipitation, or any combination of these.

EMERGENCY EGRESS ON THE GROUND

When using the emergency exits adjacent to the pilot and front passenger seats it is suggested the pilot and occupant of the other front seat step from the seat back on to the leading edge root extension on the wing and then walk back along the wing and step off the trailing edge of the wing.

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