

SECTION 3

EMERGENCY PROCEDURES

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INTRODUCTION

Section 3 provides the operational checklists and amplified procedures to deal with abnormal circumstances and emergencies which may occur on the ground or during flight. Emergencies due to airplane or engine malfunctions are very rare especially if proper preflight inspections, operating procedures, and airplane maintenance and care are adhered to. Other emergencies caused by enroute weather conditions can be avoided by careful planning of the flight, and by using good judgement should unfavourable weather conditions be encountered.

In any event, in order to be prepared for any such emergency, pilots should familiarize themselves with the basic guidelines of this section. Emergency procedures associated with the Emergency Locator Transmitter (ELT) and other optional systems will be found in Section 7 and 9 respectively.

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AIRSPEEDS FOR EMERGENCY OPERATION

CONDITION	KIAS
Engine Failure after Takeoff (Flaps 20°)	72
Maneuvering Speed	118
Precautionary Landing with Engine Power	70
Best Glide Speed	90
Landing Without Engine Power:	
Wing Flaps Up	90
Wing Flaps Down	70

EMERGENCY PROCEDURES CHECKLISTS

ENGINE FAILURES

ENGINE FAILURE DURING TAKEOFF RUN

1. Throttle..... IDLE
 2. Brake APPLY AS REQUIRED
- If time permits:
3. Flaps RETRACT
 4. Mixture..... IDLE CUT-OFF
 5. Ignition Switch OFF
 6. Master Switch..... OFF
 7. Alternator Switch..... OFF

ENGINE FAILURE IMMEDIATELY AFTER TAKEOFF

1. Land..... LAND straight ahead
Straight ahead turning only to avoid obstacles.
2. Airspeed 72 KIAS (Flaps 20°)
If time permits:
 3. Mixture..... IDLE CUT-OFF
 4. Fuel Shutoff Valve OFF
 5. Ignition Switch OFF
 6. Master Switch..... OFF
 7. Alternator Switch..... OFF
 8. Flaps AS REQUIRED

ENGINE FAILURE DURING FLIGHT (Restart Procedures)

1. Airspeed..... 90 KIAS (Flaps 0°)
2. Throttle FULL BACK
3. Propeller..... COARSE (full back)
4. Fuel Selector Valve..... TO TANK WITH
MOST FUEL
5. Auxiliary Fuel Pump Switch ON
6. Mixture RICH
7. Alternate Induction Air OPEN
8. Ignition Switch..... BOTH (or START if
propeller stopped)
9. If engine does not start, proceed to *Forced Landings*
checklist, as required.

ROUGH RUNNING ENGINE OR PARTIAL LOSS OF POWER

1. Mixture..... RICH
2. Auxiliary Fuel Pump Switch ON
3. Ignition Switch..... BOTH
Check OAT and look for evidence of possible icing conditions.
If problem persists after several minutes:
4. Mixture..... Progressively LEAN
(Do not exceed Max EGT)
5. Alternate Induction Air OPEN

If smooth operation is not possible, ensure the mixture is in the RICH setting and proceed to the nearest suitable airport. Monitor engine temperatures and pressures and be prepared for an engine failure or possible need to shut down the engine.

MAXIMUM GLIDE

Conditions:

Power Off
 Propeller Windmilling, Pitch Full Coarse
 Flaps 0 degree
 Wind 0 knot

Example:

Altitude	10000 ft
Airspeed	90 kias
<hr/>	
Glide Distance	18.4 NM

Best Glide Speed = 90 kias @ 3800 lb
Maximum Glide Ratio = 11 : 1

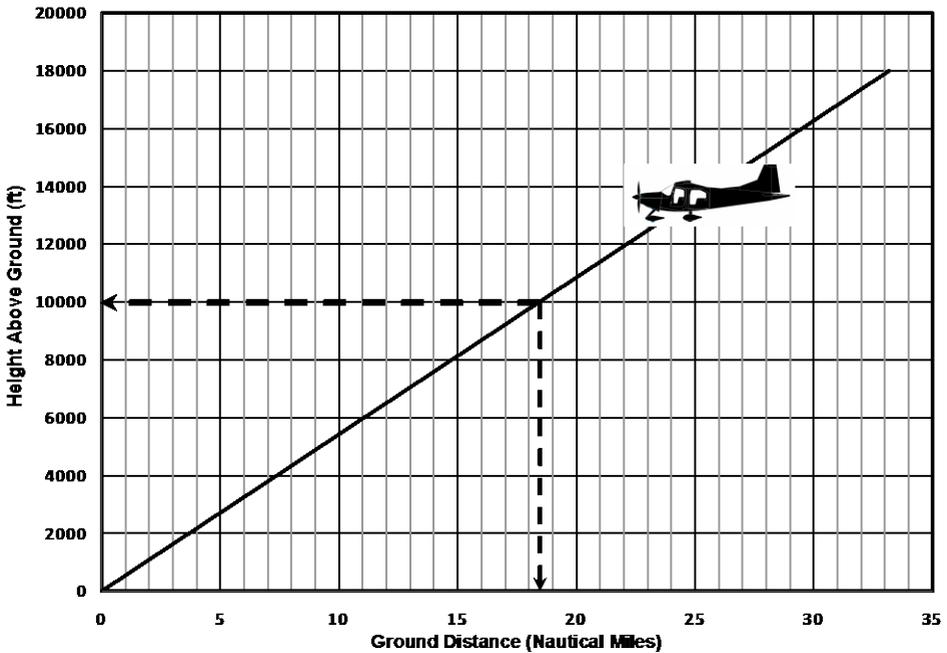


Figure 3-1 Maximum Glide

FORCED LANDINGS

EMERGENCY LANDING WITHOUT ENGINE POWER

1. Seats SECURE
2. Seat belts FASTENED
3. Loose Articles SECURE
4. Airspeed 90 KIAS (Flaps UP)
70 KIAS (Flaps 30°)

Before touchdown:

5. Mixture IDLE CUT-OFF
6. Auxiliary Fuel Pump Switch OFF
7. Fuel Shutoff Valve OFF
8. Ignition Switch OFF
9. Master Switch OFF
10. Alternator Switch OFF
11. Doors UNLATCH PRIOR TO
TOUCHDOWN

After touchdown:

12. Brakes APPLY AS REQUIRED

PRECAUTIONARY LANDING WITH ENGINE POWER

1. Seats SECURE
2. Seat Belts FASTENED
3. Loose Articles SECURE
4. Airspeed 80 KIAS Minimum
5. Flaps UP
6. Selected Field FLY OVER
Note terrain and obstructions.
7. Radio and Electrical Switches OFF
8. Flaps 20°
(or 30° for steep approach)
9. Airspeed 70 KIAS
10. Propeller HIGH RPM
11. Doors UNLATCH PRIOR TO
TOUCHDOWN

After touchdown:

12. Ignition Switch OFF
13. Master Switch OFF
14. Alternator Switch OFF
15. Brakes APPLY AS REQUIRED.

DITCHING

1. Radio TRANSMIT MAYDAY
(on 121.5 MHz giving LOCATION and INTENTIONS
and Squawk 7700)
2. Heavy Objects, Loose Articles SECURE
3. Seats SECURE
4. Seat Belts FASTENED
5. Flaps 30°
6. Doors UNLATCH PRIOR TO
TOUCHDOWN
7. Power 3 deg Approach
Establish 350 FPM
descent at 70 KIAS
8. Approach as follows
High Winds Heavy Seas - INTO WIND
Light Winds Heavy Swells - PARALLEL TO SWELLS
9. Touchdown LEVEL ATTITUDE at
ESTABLISHED
RATE OF DESCENT
10. Airplane EVACUATE through the
doors
11. Life Vests and Raft INFLATE when clear of
the airplane

FIRES

DURING START ON GROUND

IF ENGINE STARTS

1. Power IDLE
2. Engine SHUTDOWN AND INSPECT

IF ENGINE FAILS TO START

3. Mixture..... IDLE CUTOFF
4. Throttle BACK
5. Engine SECURE
 - a. Master Switch OFF
 - b. Alternator Switch..... OFF
 - c. Ignition Switch OFF
 - d. Fuel Shut-Off Valve OFF
 - e. Auxiliary Fuel Pump Switch OFF
6. Fire Extinguisher OBTAIN
7. Fire EXTINGUISH
8. Fire Damage..... INSPECT

ENGINE FIRE IN FLIGHT

1. Mixture..... IDLE CUTOFF
2. Throttle BACK
3. Fuel Shutoff Valve OFF
4. Auxiliary Fuel Pump Switch OFF
5. Master Switch OFF
6. Alternator Switch OFF
7. Cabin Heat and Air OFF
8. Airspeed..... 100 KIAS
If fire not extinguished, increase glide speed to find an incombustible mixture, within airspeed limitations
9. Forced Landing EXECUTE (as described in Emergency Landing Procedures Without Engine Power)

ELECTRICAL FIRE IN FLIGHT

1. Master Switch OFF
2. Alternator Switch OFF
3. Vents, Cabin Air, Heat CLOSE
4. Fire Extinguisher ACTIVATE
5. Avionics Master Switch OFF
6. All Other Switches (except Ignition) OFF
7. Vents/Cabin Air/Heat OPEN, when fire is completely extinguished.

WARNING

AFTER DISCHARGING FIRE EXTINGUISHER AND VERIFYING THAT FIRE HAS BEEN EXTINGUISHED, VENTILATE THE CABIN AIR. IF IT CANNOT BE DETERMINED VISUALLY THAT THE FIRE HAS BEEN EXTINGUISHED, LAND IMMEDIATELY.

If fire has been extinguished and electrical power is necessary for continuance of flight to nearest suitable airport or landing area:

8. Master Switch ON
9. Alternator Switch ON
10. Circuit Breakers Check for Faulty Circuit
DO NOT RESET
11. Radio Switches OFF
12. Avionics Master Switch ON
13. Radio/Electrical Switches ON one at a time as required, with delay after each until short circuit is localized. If short circuit is localized turn switch off.

CABIN FIRE

1. Master Switch OFF
2. Vents, Cabin Air, Heat CLOSE
3. Fire Extinguisher ACTIVATE
4. Vents/Cabin Air/Heat OPEN, when fire is completely extinguished.

WARNING

AFTER DISCHARGING FIRE EXTINGUISHER AND VERIFYING THAT FIRE HAS BEEN EXTINGUISHED, VENTILATE THE CABIN AIR. IF IT CANNOT BE DETERMINED VISUALLY THAT THE FIRE HAS BEEN EXTINGUISHED, LAND IMMEDIATELY.

5. Land the airplane as soon as possible to inspect for damage.

WING FIRE

1. Navigation Light Switch OFF
2. Strobe Light Switch OFF
3. Pitot Heat Switch OFF

NOTE

Perform a sideslip to keep the flames away from the wing fuel tank and cabin. Land as soon as possible using flaps only as required for final approach and touchdown.

ICING

INADVERTENT ICING ENCOUNTER

Flying into known icing conditions is strictly prohibited and extremely dangerous. However an inadvertent encounter with icing conditions may possibly occur. The checklist procedures for this emergency should be adhered to and turning back and/or changing altitude to escape icing conditions is highly advisable.

1. Turn pitot heat switch ON.
2. Turn back or change altitude to obtain an outside air temperature that is less conducive to icing.
3. Cabin heat to maximum and defrost full open to obtain maximum windshield defroster airflow.
4. Open Alternate Induction Air.
5. Watch for signs of engine related icing conditions. An unexplained loss in engine speed could be caused by ice blocking the air intake filter. Change the throttle position to obtain maximum RPM. This may require either advancing or retarding the throttle, dependent on where ice has accumulated in the system. Adjust the mixture as required for maximum RPM.
6. Plan a landing at the nearest airport. With an extremely rapid build-up of ice, select a suitable off-airport site.
7. With ice accumulation of 1/4-inch or more on the wing leading edges, be prepared for a significantly higher stall speed.
8. Leave flaps retracted. With a severe build-up of ice on the horizontal tail, the change in wing wake airflow direction caused by the extension of the flaps could result in loss of elevator effectiveness
9. Approach at **80 to 90 KIAS** depending upon the amount of ice accumulation.
10. Perform a landing in level attitude.

STATIC SOURCE BLOCKED
(SUSPECTED ERRONEOUS INSTRUMENT READINGS)

1. Alternate Static Source Switch..... ON
2. Pitot Heat ON
3. Airspeed..... Consult appropriate calibration
table in Section 5.

NOTE

In an emergency, on airplanes not equipped with an alternate static source, the cabin pressure can be supplied to the static pressure instruments by breaking the glass in the face of the vertical speed indicator. The vertical speed indication will be reversed in this case (i.e. the needle will indicate DOWN for climb and UP for descent).

ABNORMAL LANDINGS

LANDING WITH A FLAT MAIN TIRE

1. Approach..... NORMAL
2. Flaps..... 30°
3. Airspeed..... 70 KIAS
4. Touchdown GOOD MAIN TIRE FIRST
(hold the airplane off flat tire as long as possible using ailerons)
5. Directional Control MAINTAIN using brake on
good wheel as required.

LANDING WITH A FLAT NOSE TIRE

1. Approach..... NORMAL
2. Flaps..... 30°
3. Airspeed..... 70 KIAS
4. Touchdown ON MAIN TIRES FIRST
(hold the nose wheel off the ground as long as possible)
5. Elevator Control..... MAINTAIN full up as
airplane slows to a stop.

ELECTRICAL POWER SUPPLY SYSTEM MALFUNCTIONS

OVER VOLTAGE LIGHT ILLUMINATES DURING FLIGHT (Ammeter Indicates Excessive Rate of Charge)

1. Alternator Switch OFF
2. Non-essential Electrical Equipment OFF
3. Flight Land as soon as practical.

UNDER VOLTAGE LIGHT ILLUMINATES DURING FLIGHT (Ammeter Indicates Discharge)

NOTE

Illumination of the UNDER VOLTAGE LIGHT may occur during low RPM conditions with an electrical load on the system such as during a low RPM taxi. Under these conditions, the light will go out at higher RPM.

1. Avionics Power Switch OFF
2. Master Switch OFF
3. Alternator Switch OFF
4. Alternator Circuit Breaker CHECK IN
5. Master Switch ON
6. Alternator Switch ON
7. Under Voltage Light CHECK OFF
8. Avionics Master Switch ON

If UNDER VOLTAGE LIGHT illuminates again:

9. Alternator Switch OFF
10. Non-essential Electrical Equipment OFF
11. Flight Land as soon as practical.

ELECTRICAL SYSTEM FAILURE

In the event of the total failure of the electrical system it may be possible to recover some electrical power by activating the Backup Power Switch. This switch bypasses the main bus and feeds electrical power directly to the engine monitor and overhead crew light.

Along with the engine monitor and overhead crew light the following instruments are still operable without primary electrical power:

- Airspeed Indicator (Pitot-Static System)
- Altimeter (Pitot-Static System)
- Vertical Speed Indicator (Pitot-Static System)
- Attitude Indicator (Vacuum System)
- Heading Indicator (Vacuum System)

1. Backup Power Switch ON
2. Crew Light Switch ON as required
3. Alternator Switch OFF
4. Land as soon as practical

NOTE

Flap angle cannot be changed under this condition.

ENGINE MONITOR FAILURE

In the event of the loss of the engine monitor display the position of the engine controls shall be used to establish engine condition.

1. Mixture PUSH FULL RICH
2. Pitch PUSH FULL FINE
3. Throttle AS REQUIRED
4. Land as soon as practical

VACUUM FAILURE

(Indicated by a reading below 4.5 psi. The digital readout on the monitor will change colour from green to white when this occurs)

1. Vacuum Indicator.....CHECK to ensure vacuum within normal operating limits.

WARNING

FAILURE OF THE VACUUM SYSTEM WILL RESULT IN ERRONEOUS AND UNRELIABLE INDICATIONS ON THE STANDBY ATTITUDE INDICATOR.

ELECTRIC TRIM FAILURE

Any failure or malfunction of the electric rudder trim can be easily overcome by use of the opposing rudder input. If runaway trim is the problem, de-energize the circuit by pulling the circuit breaker and land as soon as conditions permit.

1. Airplane Control MAINTAIN MANUALLY
2. Circuit Breaker..... OFF (Pull Out)
3. Control Yoke/Rudder Pedal..... HOLD PRESSURE
4. Land as soon as practical.
5. Conduct a normal descent, approach and landing.

G500 PRIMARY/MULTI-FUNCTION FLIGHT DISPLAY FAILURE

If the malfunction results in improper information from the air data computer and/or an abnormal display of attitude information, use the standby instruments. The loss of air data (altitude, airspeed) is indicated by the affected indicator being removed from the display and replaced with a red X. Loss of attitude data (pitch, roll, heading) is indicated by the affected indicator being removed from the display and replaced with a red X.

If the MFD should malfunction or perform improperly, you may continue to utilize those portions of the MFD data that are not in question. Moving map errors may be associated with a LOI (Loss of Integrity) alarm indicating the loss of adequate GPS position containment.

Data or functions that have failed are typically removed and replaced with a red X in the appropriate area. Those functions that do not have a red X may still be usable.

AUTOPILOT

If the autopilot should malfunction or perform improperly, do not attempt to identify or analyze the problem. If the malfunction results in an abnormal change in the pitch and/or roll axis, immediately regain control of the airplane by the disengaging the autopilot using either the pilot's red disengagement button located on the control wheel. Do not, under any circumstances, reengage an autopilot that has malfunctioned until the problem is corrected.

AMPLIFIED EMERGENCY PROCEDURES

The following amplified emergency procedures provide further insight upon the information contained in the emergency procedures checklists of this section. These amplified emergency procedures also include information which cannot be adapted into a checklist format and which is not practical to refer to during a specific emergency. As such, this information should be reviewed in detail before flying the airplane and should also be reviewed on a regular basis to maintain pilot proficiency on the procedures.

ENGINE FAILURE

If an engine failure occurs during the takeoff roll, the most important thing to do is stop the airplane on the remaining runway, if possible. The additional items shown on the checklist will provide added safety after a failure of this type.

Prompt lowering of the nose in order to maintain safe airspeed and to establish a glide attitude is the first response to an engine failure immediately after takeoff. In most cases, the landing should only be planned straight ahead as there is often not enough altitude and airspeed to attempt safely a 180 degree turn and return to the airfield. Only small changes in direction should be taken to avoid obstructions. The checklist procedures do assume, however, that there is adequate time to secure the fuel and ignition systems of the airplane prior to touchdown.

The most important course of action following an engine failure in flight is to continue flying the airplane. The Best-Glide-Speed (90 KIAS) should be established as quickly as possible. Having selected a suitable landing area, the pilot should try to identify the cause of the failure and attempt an engine restart. If time permits, this engine restart should be conducted as shown in the checklist. If the engine cannot be restarted, a forced landing without power will inevitably occur. Follow the procedures for an *Emergency Landing without Engine Power* as shown in the emergency procedures checklists.

FORCED LANDINGS

The first step to executing a successful forced landing is to select a suitable field as early as possible. After choosing a suitable field, preparations for the landing can begin, as outlined in the emergency procedures checklist for *Emergency Landing without Engine Power*. Ensure that a Mayday message is transmitted on 121.5 MHz giving your location and intentions and that you squawk 7700 on your transponder.

In precautionary landings with engine power, the pilot should first fly over the landing area at a safe but low altitude and inspect the ground features for obstructions and surface conditions. The pilot can then proceed as shown in the *Precautionary Landing with Engine Power Checklist*.

In the event of a ditching attempt over water, collect items such as a folded coat to protect the occupants' face at touchdown. A Mayday transmission on 121.5 MHz giving location and intentions should be effected and the transponder should be set to squawk 7700. A landing flare prior to touchdown should be avoided because of the difficulty in judging height over the water surface. When ditching with no engine power, the airspeeds associated with minimum flap extension allow for a more favourable attitude during a power off ditching.

To prevent disabling the airplane's electrical systems prematurely during a forced landing, the avionics master and master switches should not be turned off until a landing is assured. For more detailed information on the ELT and its operation, refer to Section 9 "Supplements" in this Pilot's Operating Handbook.

LANDING WITHOUT ELEVATOR CONTROL

Loss of elevator control during flight requires use of the throttle and pitch (stabilizer) trim to maintain control. A touchdown with power on will likely be required, especially when at maximum forward C.G. position, and a landing site which provides a longer than normal landing run should be selected if available. With air speed of approximately 80 KIAS and flaps up, adjust the pitch trim and throttle to maintain horizontal flight.

Airspeed and rate of descent can be controlled by small corrections in throttle position and pitch trim.

During a flare out, power reduction will cause a significant nose down pitching moment. Coordination of pitch trim with throttle position reduction is required to perform the flare and to reduce airspeed. If the pitch trim is at full nose up position, a slight increase in engine power will provide a nose up pitch if required.

WARNING

AT EXTREME FORWARD CG POSITIONS, INSUFFICIENT NOSE UP PITCH TRIM MAY BE AVAILABLE FOR A LANDING FLARE WITH PITCH TRIM ALONE. A SLIGHT INCREASE IN ENGINE POWER WILL PROVIDE THE REQUIRED NOSE UP PITCHING MOMENT.

FIRES

If an engine fire occurs during flight, the checklist procedure outlined for *Engine Fire in Flight* should be followed. Having extinguished the fire, execute the *Forced Landings* procedure and do not attempt to restart the engine.

Electrical fires can often be detected from the obvious odour of burning insulation. Immediate action of the checklist procedure for this emergency should result in quick elimination of the fire.

STATIC SOURCE BLOCKED (SUSPECTED ERRONEOUS INSTRUMENT READINGS)

If erroneous readings of the static source instruments (airspeed, altimeter and vertical speed) are suspected, the alternate static source switch should be turned on. The alternate static source switch opens the static pressure line to the cabin and the cabin static pressure is supplied to the static pressure instruments.

NOTE

In an emergency, on airplanes not equipped with an alternate static source, the cabin pressure can be supplied to the static pressure instruments by breaking the glass in the face of the vertical speed indicator. The vertical speed indication will be reversed in this case (i.e. the needle will indicate DOWN for climb and UP for descent).

When the alternate static source is on, adjust indicated airspeed during climb or approach according to the Airspeed Calibration (Alternate Static Source) in section 5 as appropriate for the configuration.

SPINS

Although intentional spins are not approved for this aircraft, recovery from an inadvertent spin is performed as follows:

1. Retard the throttle to the IDLE position.
2. Centralize/Analyze. Place the ailerons in NEUTRAL position.
3. Apply and HOLD FULL RUDDER OPPOSITE to the direction of rotation.
4. Just after the rudder reaches the stop, move the CONTROL WHEEL BRISKLY FORWARD far enough to break the stall. Full down elevator may be required at aft center of gravity loadings to assure optimum recovery.
5. HOLD these control inputs UNTIL ROTATION STOPS. Premature relaxation of the control inputs may extend the recovery.
6. As rotation stops, NEUTRALIZE RUDDER and make a smooth RECOVERY from the resulting dive.
7. Retract the flaps.
8. Pull from dive NOT exceeding 3.8g.

ROUGH ENGINE OPERATION OR LOSS OF POWER

IMPROPER MIXTURE / FUEL STARVATION

Although rough running due to fouled spark plugs is more likely to occur after extensive idling on the ground, a rough running engine during cruising flight may be caused by an improper fuel/air mixture or other problems which can be associated with fuel starvation. Fuel starvation can be attributed to clogged fuel injector nozzles, lack of fuel in the collector tanks and main tanks, or low fuel pressure. In such a case, the mixture control should be adjusted to the RICH position and the auxiliary fuel pump switch placed in the ON position. These actions will maximize the amount of fuel into the engine. Verify that the ignition switch is in the BOTH position and also check the fuel quantities in each tank.

If the problem does not clear up within a few minutes, check the OAT temperature gauge and look for evidence of possible icing conditions. A blocked air intake will not cause the engine to stop but may be the cause of a rough running engine as well as a possible indicator of icing conditions. Open the alternate induction air source. This will bypass the normal air induction source and allow warm unfiltered air into the engine.

If icing conditions are present, attempt to get out of them. If the problem persists, follow the procedure for lean burn-off.

SPARK PLUG FOULING

Fouling of the spark plugs by carbon or lead deposits may often lead to slight engine roughness during flight. Assuming that the problem is in fact fouling of the spark plugs, adjusting the mixture to the recommended lean setting for cruising flight can help clear the spark plugs. After several minutes, if the problem does not clear up, a richer mixture may produce smoother operation. If this still does not remedy the problem, set the mixture to FULL RICH and land at the nearest airport for repairs using the BOTH position on the ignition switch.

LOW OIL PRESSURE

If the oil pressure gauge indicates low pressure but the oil temperature remains normal, it is possible the pressure sending unit or the relief valve is malfunctioning. However, land at the nearest airport to inspect the source of trouble.

If a total loss of oil pressure occurs together with a rise in oil temperature, it is reasonable to suspect an engine failure is imminent. Reduce engine power immediately and select a suitable forced landing field. Use only the minimum power needed to reach the desired touchdown spot.

ELECTRICAL POWER SUPPLY SYSTEM MALFUNCTIONS

Malfunctions in the electrical system are often difficult to determine. Periodic monitoring of the AMPS/VOLTS indicators on the engine monitor and under/over voltage lights can alert you to a problem. Problems with the alternator constitute an electrical emergency and should be dealt with immediately. Typical causes of alternator failure are the drive belt, wiring or control unit. In general, there are two types of alternator emergencies; an alternator producing an excessive rate of charge, and; an alternator producing an insufficient rate of charge.

EXCESSIVE RATE OF CHARGE

An excessive rate of charge can be indicated by the ammeter (AMPS) and/or the OVER VOLTAGE light. After starting the engine and placing heavy electrical loads on the battery at low engine speed (such as extended taxiing), the depleted condition of the battery can accept an above normal charging rate during the initial part of a flight. However, after thirty minutes of cruising flight, the charge (AMPS) indicator should be indicating less than 5 amps of charging current. If the charging rate were to remain high for a prolonged period of time, the battery would overheat and the electrolyte would evaporate creating a hazard.

A higher than normal voltage on the electrical system can also damage other sensitive electronic components. The alternator control unit contains an over-voltage sensor which automatically shuts down the alternator if the voltage reaches approximately 31.5 volts. If this safety device fails to operate, the ammeter would show an excessive rate of charge and the alternator switch should then be turned OFF. Since charging of the battery ceases when the alternator is not in operation, all non-essential electrical equipment should also be turned OFF to conserve electrical power. The flight should be terminated as soon as possible.

INSUFFICIENT RATE OF CHARGE

NOTE

Illumination of the UNDER VOLTAGE light and ammeter discharge indications may occur during low RPM conditions with an electrical load on the system, such as during low RPM taxi. Under these conditions, the light will go out at higher RPM.

Should a higher than normal voltage cause the over-voltage sensor to trip the alternator field circuit breaker (ALT) and shut down the alternator, or if the alternator output is insufficient, the UNDER VOLTAGE light will illuminate and a discharge rate will be shown on the ammeter. Since the over-voltage sensor may occasionally trip the circuit unnecessarily, an attempt should be made to reactivate the alternator system. This is accomplished by first turning the avionics master switch OFF to protect the equipment. Then, the alternator is reconnected by resetting the alternator circuit breaker (ALT). Both the master switch and the alternator switch should be turned OFF and then ON again to resume normal alternator charging. If the problem no longer exists, the UNDER VOLTAGE light will go out and the avionics power switch may be turned on again.

If the problem persists and the UNDER VOLTAGE light illuminates again, a malfunction is confirmed and the flight should be terminated as soon as possible. All non-essential electrical loads should be removed from the system to conserve battery power. The battery can supply the electrical system for only a limited period of time.

ALTERNATOR FAILURE (AT NIGHT OR DURING IFR FLIGHT CONDITIONS)

The under-voltage light will illuminate and the alternator voltage can be checked by the AMPS/VOLTS indicators. If the voltage shows 24 volts or less, the alternator has failed.

1. Turn Alternator Switch **OFF**
2. Shut down all unnecessary lights and non-essential equipment as dictated for continued safe flight. Equipment may be activated or de-activated as procedures require.
3. Land the aircraft as soon as practical.

OTHER EMERGENCIES

WINDSHIELD DAMAGE

In the rare event that a bird strike or other incident should damage the windshield to the point of creating an opening, a significant loss in performance should be expected. A landing should be attempted at the nearest airport. If the airplane performance or other condition prevents safe landing at an airport, an off-airport landing executed in accordance with the *Precautionary Landing with Engine Power* or *Ditching Checklist* should be attempted.

GARMIN G500 ABNORMAL PROCEDURES

If primary flight information (Attitude, Heading, Altitude or Airspeed) on the PFD is not available or appears invalid, utilize the standby instruments installed around and adjacent to the G500, as required.

The Attitude, Heading and Reference System (AHRS) requires at least one GPS or air data input to function properly. In the unlikely event that GPS data and air data is not received by the AHRS, the system will subsequently lose attitude and heading and the pilot will be required to use the standby instrumentation. In this instance, the PFD will not provide Attitude, Heading, Altitude, or Airspeed information; however, if the PFD is receiving valid GPS information, the reversionary data on the PFD provides GPS Track and GPS Altitude data along with course information and deviations which are still valid and may be used to navigate.

If navigation information on the PFD/MFD (HSI, RMI, WPT bearing and distance information, or Moving Map Data) is not available or appears invalid, select an alternate data source (via CDI key or 1-2 key) or utilize the data directly from the navigation equipment as required.

The synthetic vision display of terrain uses several data sources to correctly display terrain (GPS, terrain database, attitude information, etc.). If any of these data sources become unreliable or unavailable, the display of synthetic terrain will automatically revert to the non-SVT PFD display of blue over brown. Additionally, if during the course of normal operations there is any discrepancy between actual terrain around the aircraft and terrain shown on the SVT display, the display of synthetic vision should be manually turned off using the procedure in section 4.4 of this flight manual supplement.

If GPS position information from the 400W/500W/6XX/7XX is not valid due to an inability to track GPS, the own-ship icon on the MFD is removed and “NO GPS POSITION” text is overlaid on the MFD moving map. The system will annunciate a loss of integrity, “LOI” on the HSI. The LOI annunciation will be colored yellow and the HSI needle will flag. The pilot should select an alternate navigation source (via CDI key or 1-2 key). Pressing the CDI soft key will change the HSI navigation source. If GPS navigation is subsequently restored, the MFD moving map will display the own-ship icon, and the HIS navigation source may be selected to GPS; at that time the “LOI” annunciation will be removed.

GARMIN G500 ABNORMAL INDICATIONS

Heading Failure

A magnetometer failure is indicated by a HDG with a red X over it just to the left of the heading display. If the GDU 620 is still receiving valid GPS ground track from the GNS navigator, the heading will be replaced with GPS ground track in magenta. The aircraft can be flown by reference to GPS ground track instead of heading. In this case, the autopilot will continue to fly in HDG mode, but the course being sent to the autopilot will be based on ground track instead of magnetic heading.

A complete Heading Failure (magnetometer and GPS ground track failure) is indicated by the digital heading presentation being replaced with a red X and the compass rose digits being removed. The course pointer will indicate straight up and operate much like a traditional CDI with the Omni-Bearing Selector being adjusted by the PFD knob set to CRS.

Under this condition, the pilot must use an alternate source of heading such as the standby compass. If the installation includes an autopilot, the pilot workload may be reduced by operating that system in NAV mode.

AHRS Failure

A failure of the Attitude and Heading Reference System (AHRS) is indicated by a removal of the sky/ground presentation, a red X, and a yellow “AHRS FAILURE” shown on the PFD. A heading failure will also occur as described above in 3.3.1.

1. Use Standby Attitude Indicator and standby compass
2. Set course datum using CRS selection of the PFD knob
3. Seek VFR conditions or land as soon as practical

Air Data Computer (ADC) Failure

Complete loss of the Air Data Computer is indicated by a red X and yellow text over the airspeed, altimeter, vertical speed, TAS and OAT displays. Some derived functions, such as true airspeed and wind calculations, will also be lost.

1. Use Standby Airspeed Indicator and Altimeter
2. Seek VFR conditions or land as soon as practical

Loss of Electrical Power

In the event of a total loss of electrical power, the G500 system will cease to operate and the pilot must utilize the standby instruments to fly the aircraft. For installations utilizing the battery powered electric attitude gyro, the amber standby power light will start flashing. Press the “STBY PWR” button to operate the gyro via its emergency battery. If the red warning flag is in view, the gyro is inoperative and must not be used.

WARNINGS, CAUTIONS, AND ADVISORIES

The following tables show the color and significance of the warning, caution, and advisory messages which may appear on the G500 displays.

NOTE

The G500 Cockpit Reference Guide and the G500 Pilot’s Guide contain detailed descriptions of the annunciator system and all warnings, cautions and advisories.

Warning annunciations – Red		
<i>Annunciation</i>	<i>Pilot Action</i>	<i>Cause</i>
ATTITUDE FAIL	Use Standby Attitude.	Display system is not receiving attitude reference information from the AHRS; accompanied by the removal of sky/ground presentation and a red X over the attitude area.
AIRSPEED FAIL	Use Standby Airspeed.	Display system is not receiving airspeed input from the air data computer; accompanied by a red X through the airspeed display.
ALTITUDE FAIL	Use Standby Altitude.	Display system is not receiving altitude input from the air data computer; accompanied by a red X through the altimeter display.
VERT SPD FAIL	Cross check instruments.	Display system is not receiving vertical speed input from the air data computer; accompanied by a red X through the vertical speed display.
HDG	Use Standby Magnetic Compass or GPS track information.	Display system is not receiving valid heading input from the AHRS; accompanied by a red X through the digital heading display.
Red X	Reference the data source or alternate equipment.	A red X through any display field, indicates that display field is not receiving data or is corrupted.

Caution annunciations – Yellow		
<i>Annunciation</i>	<i>Pilot Action</i>	<i>Cause</i>
<p>CHECK ATTITUDE</p> <p>Autopilot will automatically disconnect.</p> <p>Note: Only appears with the installation of an optional GAD 43 adapter</p>	<p>Fly the aircraft manually and crosscheck GDU 620 attitude indication with standby attitude indicator and other sources of attitude information (airspeed, heading, altitude, etc.)</p>	<p>The GDU 620 attitude monitors have detected an AHRS malfunction, or the inability to actively monitor the AHRS output.</p>
<p>AHRS Aligning – Keep Wings Level</p>	<p>Limit aircraft banking as AHRS Aligns - OK to taxi.</p>	<p>Attitude and Heading Reference System is aligning. Keep wings level using standby attitude indicator. AHRS will align even if you must bank, but the alignment time may be slightly longer if maneuvering.</p>
<p>NO GPS POSITION</p>	<p>If the system is configured with dual GPS, press the 1-2 button.</p>	<p>GPS data on the selected system is no longer valid. The Moving Map and associated data are not updating.</p>
<p>TRAFFIC</p>	<p>Visually acquire the traffic to see and avoid.</p>	<p>The configured traffic system has determined that nearby traffic may be a threat to the aircraft.</p>
<p>No Traffic Data</p>	<p>Use vigilance, as the traffic sensor is not able to detect traffic.</p>	<p>The configured traffic system is not able to detect traffic and / or provide the pilot with any traffic awareness.</p>

Advisories – White	
<i>Annunciation</i>	<i>Pilot Action</i>
<p>Various Alert Messages may appear under the MFD - ALERTS soft key.</p>	<p>View and understand all advisory messages. Typically, they indicate communication issues within the G600 System. Refer to the G600 Cockpit Reference for appropriate pilot or service action.</p>