

**CHAPTER 7  
ABNORMAL FLOWS AND CHECKLISTS**

**TABLE OF CONTENTS**

**ELECTRICAL FAULTS .....3**

    Electrical discharge in-flight.....3

    Excessive electrical charge in-flight .....5

**INSTRUMENTS .....6**

    Low vacuum indication / vacuum failure .....6

    Erroneous airspeed / altitude / vertical speed indications .....7

**LANDING GEAR and TIRES.....8**

    Landing with a flat nose tire .....8

    Landing with a flat main tire.....9

**CAUTION**

***DO NOT RUSH THESE PROCEDURES.***

*In nearly all situations involving abnormal problems, it is important to first realize that the airplane remains completely flyable to the limits of its fuel load.*

*Although any problem addressed in this chapter is to be considered serious, it is NOT grounds for hurrying a procedure and possibly missing a step that, if properly executed, would have resulted in correcting the problem.*

*Conduct the procedures carefully and systematically as a coordinated crew (when applicable) in combination with assistance received from outside sources.*

***ELECTRICAL FAULTS***

**CAUTION**

*Whenever electrical failure is experienced in-flight, the electrical system is considered suspect even if normal operation appears to be restored after troubleshooting. The possibility of the failure re-occurring during the remainder of the flight must be kept in mind at all times, and the PIC should plan accordingly.*

*The electrical system must be checked by Maintenance as soon as possible.*

**WARNING**

Do not reset a circuit breaker if it can be avoided.  
In all cases, NEVER reset a circuit breaker more than once.

**ELECTRICAL DISCHARGE IN-FLIGHT  
(Ammeter indicates discharge / VOLTS illuminates)**

AVIONICS MASTER SWITCH..... OFF  
 ALT FLD Alternator Circuit Breaker .....CHECK IN  
 MASTER SWITCH (both sides) ..... OFF  
 MASTER SWITCH (both sides) ..... ON  
 LOW VOLTS Annunciator..... CHECK OFF  
 AMMETER / VOLTAGE ..... CHECKED

**- IF LOW VOLTS ANNUNCIATOR ILLUMINATES AGAIN -**

ALTERNATOR (left side only of Master Switch only)..... OFF  
 ALL NON-ESSENTIAL ELECTRICAL LOAD ..... OFF  
 ..... (EXCEPT BATTERY SIDE OF MASTER SWITCH)  
 BATTERY VOLTAGE ..... MONITOR CONTINUOUSLY  
 TERMINATE FLIGHT ..... AS SOON AS POSSIBLE

**ELECTRICAL DISCHARGE IN-FLIGHT  
(Ammeter indicates discharge / VOLTS illuminates),  
EXPANDED**

**AVIONICS MASTER SWITCH ..... OFF**  
 Turn the avionics master switch OFF to prevent damage to avionics during the troubleshooting steps.

**ALT FLD Alternator Circuit Breaker ..... CHECK IN**  
 Check the alternator field circuit breaker (labeled ALT FLD) and push it IN.

**MASTER SWITCH (both sides) ..... OFF**

Turn both sides of the electrical master switch to OFF.

**MASTER SWITCH (both sides) ..... ON**

After a few moments, turn both sides of the electrical master switch to ON, thereby completing recycling the master switch.

**LOW VOLTS Annunciator ..... CHECK OFF**

Check that the VOLTS light on the annunciator panel is not illuminated.

**AMMETER / VOLTAGE ..... CHECKED**

Check the ammeter for charge/discharge indications, and check the voltmeter for the correct voltage, to determine if the alternator/charging system are functioning properly.

**- IF LOW VOLTS ANNUNCIATOR ILLUMINATES AGAIN -**

Perform the following action if the VOLTS annunciator illuminates again, indicating that the charging system is still malfunctioning.

**ALTERNATOR (left side only of Master Switch only) ..... OFF**

Turn the alternator OFF, by moving the left side only of the master switch to the OFF position. The right side (battery) portion of the switch should remain on, to provide electrical power to the aircraft, supplied by the battery only.

**CAUTION**

*Compass error of as much as 25° may occur  
when the alternator side of the battery master switch is in the OFF position.*

**ALL NON-ESSENTIAL ELECTRICAL LOAD ..... OFF**

Turn OFF all non-essential electrical equipment to prolong battery life. Do not turn off the battery side of the master switch.

**BATTERY VOLTAGE ..... MONITOR**

Monitor battery voltage through the remainder of the flight to help determine when the battery is beginning to be depleted.

**TERMINATE FLIGHT ..... AS SOON AS POSSIBLE**

Head to the nearest airport and terminate the flight as soon as practical. Have the electrical system checked out by Maintenance.

**EXCESSIVE ELECTRICAL CHARGE IN-FLIGHT  
(excessive charge on Ammeter)**

ALTERNATOR (left side of the Master Switch only) ..... OFF  
 ALL NON-ESSENTIAL ELECTRICAL LOAD ..... OFF  
 BATTERY VOLTAGE ..... MONITOR CONTINUOUSLY  
 TERMINATE FLIGHT ..... AS SOON AS POSSIBLE  
 ▶ *IF IN VMC* ..... *REMAIN AND LAND VFR*  
 ▶ *IF IN IMC* ..... *OBTAIN ATC ASSISTANCE TO NEAREST VMC*

**EXCESSIVE ELECTRICAL CHARGE IN-FLIGHT  
(excessive charge on Ammeter),  
EXPANDED**

**ALTERNATOR (left side only of Master Switch only) ..... OFF**  
 Turn the alternator OFF, by moving the left side only of the master switch to the OFF position. The right side (battery) portion of the switch should remain on, to provide electrical power to the aircraft, supplied by the battery only.

**CAUTION**

*Compass error of as much as 25° may occur  
when the alternator side of the battery master switch is in the OFF position.*

**ALL NON-ESSENTIAL ELECTRICAL LOAD ..... OFF**  
 Turn off all non-essential equipment to bring the electrical load down to absolute minimum necessary for safe flight. This will allow the battery, the only remaining source of the electrical power, to last as long as possible. Ensure that the battery side of the master switch remains ON.

**BATTERY VOLTAGE ..... MONITOR**  
 Monitor battery voltage through the remainder of the flight to help determine when the battery is beginning to be depleted.

**TERMINATE FLIGHT ..... AS SOON AS POSSIBLE**  
 Head to the nearest airport and terminate the flight as soon as practical. Have the electrical system checked out by Maintenance.

- ▶ **IF IN VMC** ..... **REMAIN AND LAND VFR**  
*If in VMC, maintain VFR and divert to the nearest suitable airport to land under VFR.*
- ▶ **IF IN IMC** ..... **OBTAIN ATC ASSISTANCE TO NEAREST VMC**  
*Enlist ATC help in determining the nearest VMC/VFR conditions, and then divert to exit the IMC as soon as possible.*

**INSTRUMENTS and VACUUM FAULTS**

**LOW VACUUM INDICATION / VACUUM FAILURE**

**ANNUNCIATOR PANEL VACUUM LIGHTS** ..... CHECK  
**ENGINE RPM**.....INCREASE  
**ALTITUDE** ..... (if possible) DESCEND  
**VACUUM GAUGE** ..... (4.5” – 5.5” hg) MONITOR  
 ► *IF IN VMC* ..... *REMAIN AND LAND VFR*  
 ► *IF IN IMC*..... *OBTAIN ATC ASSISTANCE TO NEAREST VMC*

**LOW VACUUM INDICATION / VACUUM FAILURE,  
EXPANDED**

**ANNUNCIATOR PANEL VACUUM LIGHTS** ..... CHECK  
 When suspecting a vacuum system problem, check if either (L VAC) or (R VAC) annunciator panel vacuum lights have illuminated, indicating that vacuum system is malfunctioning.

**ENGINE RPM**..... INCREASE  
 Increase engine RPM, if practical, in order to increase the speed at which the vacuum pump(s) turn, thus producing the most available vacuum pressure.

**ALTITUDE**..... (if possible) DESCEND  
 If situation permits, descend to a lower altitude, which may allow the vacuum pumps to produce acceptable vacuum pressure.

**VACUUM GAUGE**..... (4.5”-5.5” Hg) MONITOR  
 Check the vacuum gauge for an indication of at least 4.5 inches Hg (Mercury). If this vacuum value cannot be maintained, the vacuum powered instruments are considered unreliable. Monitor secondary instruments and terminate the flight as soon as practical.

► **IF IN VMC** ..... **REMAIN AND LAND VFR**  
*If in VMC, maintain VFR and divert to the nearest suitable airport to land under VFR.*

► **IF IN IMC**..... **OBTAIN ATC ASSISTANCE TO NEAREST VMC**  
*Enlist ATC help in determining the nearest VMC/VFR conditions, and then divert to exit the IMC as soon as possible.*

**ERRONEOUS AIRSPEED / ALT / VSI INDICATIONS**

ALTERNATE STATIC SOURCE ..... ON  
PITOT HEAT (if in visible moisture) ..... ON

- ▶ *IF IN VMC* ..... *REMAIN AND LAND VFR*
- ▶ *IF IN IMC* ..... *OBTAIN ATC ASSISTANCE TO NEAREST VMC*

**ERRONEOUS AIRSPEED / ALT / VSI INDICATIONS,  
EXPANDED**

**ALTERNATE STATIC SOURCE ..... ON**

When erroneous pitot / static system indications are detected, activate the alternate static source by pulling the red alternate static source valve knob full out. Monitor the instruments to determine if the problem has been corrected.

**PITOT HEAT .....(as required) ON**

If pitot tube blockage is suspected, especially in visible moisture, turn the pitot heat ON. Even if there is no visible moisture, previously trapped moisture in the pitot tube may have frozen, so consider using pitot heat as situation requires.

- ▶ ***IF IN VMC*** ..... ***REMAIN AND LAND VFR***  
*If in VMC, maintain VFR and divert to the nearest suitable airport to land under VFR.*
- ▶ ***IF IN IMC*** ..... ***OBTAIN ATC ASSISTANCE TO NEAREST VMC***  
*Enlist ATC help in determining the nearest VMC/VFR conditions, and then divert to exit the IMC as soon as possible.*

## **LANDING GEAR and TIRES**

### **LANDING WITH A FLAT NOSE TIRE**

▶ **RADIO** ..... **TRANSMIT INTENTIONS**  
**BEFORE LANDING CHECKLIST** ..... **EXECUTE**  
**TOUCHDOWN** ..... **ON MAIN WHEELS ONLY**  
**NOSEWHEEL** ..... **HOLD OFF THE GROUND**  
**AFTER NOSEWHEEL TOUCHDOWN** ..... **YOKE FULL AFT**  
▶ **TAXIING** ..... **MINIMIZE**

### **LANDING WITH A FLAT NOSE TIRE, EXPANDED**

**NOTE**

If a flat tire or tire separation occurs during takeoff and an aborted takeoff is not feasible, land as soon as practical.

▶ **RADIO** ..... **TRANSMIT INTENTIONS**  
*Transmit aircraft condition and intentions on ATC, Tower, CTAF or UNICOM frequency, as appropriate.*

**BEFORE LANDING CHECKLIST** ..... **COMPLETE**  
 Execute the Before Landing Checklist in preparation for the approach. Plan to conduct a normal approach, as appropriate for the conditions.

**TOUCHDOWN** ..... **ON MAIN WHEELS ONLY**  
 Do not allow the nosewheel come in contact with the ground during touchdown.

**NOSEWHEEL** ..... **HOLD OFF THE GROUND**  
 Hold the nosewheel off the ground as long as possible while slowing down.

**AFTER NOSEWHEEL TOUCHDOWN** ..... **YOKE FULL AFT**  
 After the nosewheel touches down, maintain FULL AFT yoke deflection to take as much weight as possible off the nosewheel.

▶ **TAXIING** ..... **MINIMIZE**  
*Taxi as little as possible after landing. Clear the runway, as necessary, communicate with ATC and obtain external assistance. Do not taxi on a flat tire unless moving the aircraft is necessary for safety.*

**LANDING WITH A FLAT MAIN TIRE**

▶ **RADIO** ..... *TRANSMIT INTENTIONS*  
**BEFORE LANDING CHECKLIST** ..... **EXECUTE**  
**FLAPS** ..... **30°**  
**RUNWAY SELECTION** ..... **CROSSWIND OPPOSITE FLAT TIRE**  
**TOUCHDOWN POINT** ..... **RWY SIDE OPPOSITE FLAT TIRE**  
**TOUCHDOWN** ..... **INFLATED TIRE FIRST**  
**NOSEWHEEL** ..... **LOWER IMMEDIATELY**  
**AILERON** ..... **HOLD OFF FLAT TIRE AS LONG AS POSSIBLE**  
▶ **TAXIING** ..... *MINIMIZE*

**LANDING WITH A FLAT MAIN TIRE,  
EXPANDED**

**NOTE**

If a flat tire or tire separation occurs during takeoff and an aborted takeoff is not feasible, land as soon as practical.

▶ **RADIO** ..... *TRANSMIT INTENTIONS*  
*Transmit aircraft condition and intentions to ATC, Tower, CTAF or UNICOM frequency, as appropriate.*

**BEFORE LANDING CHECKLIST** ..... **COMPLETE**  
 Execute the Before Landing Checklist in preparation for the approach. Plan to conduct a normal approach, as appropriate for the conditions.

**FLAPS** ..... **30°**  
 Set flaps to 30°, as recommended by the POH/AFM.

**RUNWAY SELECTION** ..... **CROSSWIND OPPOSITE DEFECTIVE TIRE**  
 If possible, select a runway so that the crosswind comes from the side opposite the defective tire. It will allow the airplane to touch down on the inflated tire first. It will also assist in the directional control after touchdown, as the airplane will tend to weathervane into the wind and the force of wind will oppose the friction force of the defective tire. If no such runway is available, select the runway with the most headwind. Avoid runways with crosswind on the same side as the defective tire, as it will possibly cause a touchdown on the defective tire first, and have a detrimental effect on directional control after touchdown.

**TOUCHDOWN POINT** ..... **RUNWAY SIDE OPPOSITE DEFECTIVE TIRE**  
 Touch down on the runway side opposite the defective tire. That way, if the aircraft starts yawing toward the defective tire due to the friction drag it produces, there will be the greatest runway width safety margin while the pilot establishes aircraft directional control.

**TOUCHDOWN .....INFLATED TIRE FIRST**

Touch down on the inflated tire first. If crosswind exists from the side opposite the defective tire, the aircraft will naturally tend to touch down on the inflated tire. As the defective tire touches down following the inflated tire, anticipate immediate yawing motion toward the defective tire.

**AILERON ..... HOLD OFF FLAT TIRE AS LONG AS POSSIBLE**

If possible, use the aileron to first hold off, then lighten the load on the defective tire by applying the aileron control in the direction of the side opposite the defective tire. The aileron on the defective tire wing would then deflect down, generating more lift, and the weight on the defective tire would be reduced.

► **TAXIING .....MINIMIZE**

*Taxi as little as possible after landing. Clear the runway, as necessary, communicate with ATC and obtain external assistance. Do not taxi on a flat tire unless moving the aircraft is necessary for safety.*