



IFR Emergencies


Aviate, Navigate, Communicate

- ▶ Remember the golden rule: "Aviate, Navigate, Communicate."
 - ▶ If in holding, or on an approach, continue to perform your flying duties while executing the Emergency Procedures in a timely manner.
 - ▶ Determine the nature of the emergency, the urgency with which you should land, devise a plan and execute it.
 - ▶ Notify ATC by "Mayday" or "Pan-Pan" then advise them of your intended action requesting priority handling (assistance) as necessary.
 - ▶ The following factors will influence your decision: weather conditions, fuel remaining, aircraft status and position, airfield proximity, approach availability, and terrain. If lost, state your last known position, time, and heading since that position
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IFR Emergencies: Immediate Action

- ▶ In an emergency requiring immediate action, the pilot in command may deviate from any rule or regulation as necessary to the extent required to safely handle the emergency.
 - ▶ If this emergency authority is exercised to deviate from the provisions of an ATC clearance, the pilot in command must notify ATC as soon as possible and obtain an amended clearance.
 - ▶ Expect ATC to ask: nature of emergency, souls on board, fuel in hours/minutes, assistance requested.
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Remember 7700

- ▶ Continue squawking the assigned transponder code if in radio contact with ATC.
 - ▶ If critical support is needed, squawk code 7700 to alert ATC
 - ▶ If unable to immediately establish two-way radio communications with ATC, squawk code 7600
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In VMC?

- ▶ Remain in VMC if possible while executing the appropriate Emergency Procedures.
- ▶ Notify ATC of the nature of your emergency and your intended action.

Emergency Categories


- ▶ Emergencies are generally classified under two categories:
 - ▶ **DISTRESS:** A condition of being threatened by serious and/or imminent danger and of requiring immediate assistance.
 - ▶ **URGENCY:** A condition of being concerned about safety and of requiring timely but not immediate assistance; the potential for a distress situation exists.
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Distress Vs Urgency

- ▶ What is the difference between these conditions?



Distress

- ▶ Threatened by serious and/or imminent danger and require immediate assistance
 - ▶ In-flight fire
 - ▶ Mechanical failure
 - ▶ Structural failure
 - ▶ Medical emergency
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Urgency


- ▶ Not immediately dangerous, requires prompt assistance to avoid a potentially catastrophic event
- ▶ Low fuel quantity
- ▶ Poor weather

91.123 Compliance with ATC

- ▶ If you are given priority by ATC you may be required to submit a detailed report within 48 hours
- ▶ Or if requested by ATC



Declaring an Emergency

- ▶ PIC responsibilities IAW 91.3
 - ▶ May deviate actions if and in order to meet an emergency
 - ▶ Notify ATC on assigned frequency as soon as possible. If unable to contact on that try other ATC frequencies or 121.5
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Emergency Radio Call

Mayday versus Pan–Pan

- ▶ "Mayday" is used to signal a life–threatening emergency, while "pan–pan" is used to signal an urgent but non–life–threatening situation.

Mayday Mayday Mayday

- Used to signal a life–threatening emergency (Distress)
- Commands radio silence on the frequency in use
- Used by pilots and mariners to signal distress
- Derived from the French phrase "m'aider", which means "help me"


Pan–pan Pan–pan Pan–pan

- Used to signal an urgent but non–life–threatening situation (Urgency)
- Warns other stations not to interfere with urgency transmissions
- Derived from the French word "panne", which means failure or breakdown
- Used in boating to signal a situation that is serious, but not as severe as a "mayday" call

Transponder Codes

- ▶ Emergency 7700
- ▶ Lost Communications 7600
- ▶ Hijack/Air Piracy 7500

Minimum Fuel


- ▶ An emergency is possible should any undue delay occur
 - ▶ This is not an emergency, but an advisory
 - ▶ If you need priority to ensure a landing, declare an emergency. Do not wait until you run out of fuel
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Failed Vacuum


- ▶ What would you do?



Gyroscopic Instrument Failure

- Confirm low vacuum or low voltage warning light with other instruments
 - Use Emergency Checklist
 - Transition to partial panel
 - Notify ATC immediately
 - Cover the instrument so you are not distracted
 - Use ATC and no gyro approach if possible
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Communication Failure

- Use special procedures if published on a DP
 - Use procedures outlined in 91.185
 - If VMC stay in VMC
 - Use all available radios – consider a handheld radio and portable GPS
 - Remember – **AVEF MEA**
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Lost Comms

Note and remember:

AVEF MEA



Loss of 2-Way Radio Communications § 91.185

VFR
If radio failure occurs in VFR conditions, or if VFR conditions are encountered after the failure, each pilot shall continue the flight under VFR and land as soon as practicable.

IFR
If radio failure occurs in IFR conditions, each pilot shall continue the flight according to the following:


ROUTE

- A** **Assigned** - Fly the altitude last assigned by ATC
- V** **Vectored** - If being vectored by ATC, fly the direct route from the point of radio failure to the fix, route, or airway specified in the vector clearance
- E** **Expected** - If no assigned or vectored routes exist, fly the route that ATC told you to expect in a further clearance
- F** **Filed** - If no assigned, vectored, or expected route is applicable, fly the route filed in the flight plan

ALTITUDE

After completing the **AVEF** actions for the route, maintain the highest of the following altitudes for each segment of the flight:

- M** **Minimum Enroute Altitude**
- E** **Expected Altitude**
- A** **Assigned Altitude**




Route

- ▶ Assigned by ATC
- ▶ If being RADAR vectored direct to the fix, route or airway specified in the clearance
- ▶ Route you were told to expect
- ▶ Route you filed

Altitude

- ▶ Highest of:
 - Assigned in the last clearance
 - MEA
 - Altitude you were told to expect


Clearance Limit

- ▶ When a clearance limit is specified. Depart at the expect further clearance time. If you arrive prior to the time, hold.
 - ▶ If no EFC was received, start your approach at the ETA from your flight plan or as amended with ATC
 - ▶ Fly the approach of your choice
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Emergency Approach Procedures

- **Surveillance Approach (ASR)**
 - Available only at airports for which civil instrument approach minimums have been published
 - A "Surveillance Approach" is a non-precision instrument approach where air traffic control uses radar to provide only horizontal guidance (headings) to align the aircraft with the runway centerline.
- **Precision Approach (PAR)**
 - A "Precision Approach" uses a system like an Instrument Landing System to provide both horizontal and vertical guidance, allowing for a much more precise landing in low visibility conditions; essentially, a surveillance approach only guides the aircraft laterally, while a precision approach guides it both laterally and vertically
- **No Gyro Approach – similar to ASR with start/stop turns**

Surveillance Approach

- ▶ Controller lines you up with the extended centerline of the runway
 - ▶ Advises you when to start your descent to the MDA
 - ▶ Notifies you each mile from the end of the runway
 - ▶ Advises you when to execute a missed approach
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Precision Approach (PAR)


- ▶ Controller provides highly accurate navigational guidance in azimuth and elevation
 - ▶ Fly headings provided
 - ▶ Controller will advise 10 to 30 seconds before glide slope intercept. Begin descent when told
 - ▶ Note from the DH to threshold advisory guidance is furnished
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No Gyro Approach

- ▶ ATC will advise you to start and stop turns
- ▶ All turns should be standard rate in the enroute phase of flight
- ▶ When handed off to the final approach controller, all turns should be half standard rate

Malfunction Report

FAR 91.187 requires you to report the malfunction of any navigational, approach, or communication equipment

- Aircraft ID
 - Equipment effected
 - The degree to which your ability to operate IFR is impaired
 - Assistance desired from ATC
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Monitoring of 121.5 or 243.0

- ▶ Pilots are encouraged to monitor 121.5 or 243.0 MHz (military)
- ▶ If you monitor a beacon signal notify ATC with:
 - Position when the signal was first heard
 - Position when the signal was last heard
 - Position at maximum signal strength
 - Flight altitude and frequency


Emergency and Overdue Aircraft

- ▶ ARTCC and FSS will alert SAR system if:
 - ATC radar losses an aircraft without termination of radar services
 - An aircraft is overdue on a flight plan after 1 hour

Survival Equipment

- ▶ Take and know how to use survival equipment for the type of climate and terrain over which you will be flying
 - If it's not attached to you, you probably won't have it after you exit the plane
- ▶ A handheld VHF radio and a GPS-based iPad or tablet with EFB aviation applications can be very helpful.


What action should you take if your DME fails at FL 240?

- A. Notify ATC that it will be necessary for you to go to a lower altitude, since your DME has failed.
 - B. Advise ATC of the failure and land at the nearest available airport where repairs can be made.
 - C. Notify ATC of the failure and continue to the next airport of intended landing where repairs can be made.
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What action should you take if your DME fails at FL 240?

C. Notify ATC of the failure and continue to the next airport of intended landing where repairs can be made.

What action should you take if your No. 1 VOR receiver malfunctions while operating in controlled airspace under IFR? Your aircraft is equipped with two VOR receivers. The No. 1 receiver has Omni/Localizer/Glide Slope capability, and the No. 2 has only Omni.


- A. Continue the flight as cleared; no report is required.
 - B. Continue the approach and request a VOR or NDB approach.
 - C. Report the malfunction immediately to ATC.
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C. Report the malfunction immediately to ATC.




You enter a holding pattern at a fix, not the same as the approach fix, and receive an EFC time of 1530. At 1520 you experience complete two-way communications failure. Which procedure should you follow to execute the approach to a landing?


- A. Depart the holding fix at the EFC time, and complete the approach.
 - B. Depart the holding fix to arrive at the approach fix as close as possible to the EFC time and complete the approach.
 - C. Depart the holding fix at the EFC time or earlier if your flight planned ETA is before the EFC.
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You enter a holding pattern at a fix, not the same as the approach fix, and receive an EFC time of 1530. At 1520 you experience complete two-way communications failure. Which procedure should you follow to execute the approach to a landing?

A. Depart the holding fix at the EFC time, and complete the approach.




You are in IMC and have two-way radio communications failure. If you do not exercise emergency authority, what procedure are you expected to follow?

- A. Set transponder to code 7700 for 1 minute, then to 7600, and fly to an area with VFR weather conditions.
 - B. Set transponder to 7700 and fly to an area where you can let down in VFR conditions.
 - C. Set transponder to code 7600, continue flight on assigned route and fly at the last assigned altitude or the MEA, whichever is higher.
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You are in IMC and have two way radio communications failure. If you do not exercise emergency authority, what procedure are you expected to follow?

C. Set transponder to code 7600, continue flight on assigned route and fly at the last assigned altitude or the MEA, whichever is higher.

Which procedure should you follow if, during an IFR flight in VFR conditions, you have two way radio communications failure?


- A. Continue the flight under VFR and land as soon as practicable.
 - B. Land at the nearest airport that has VFR conditions.
 - C. Continue the flight at assigned altitude and route, start approach at your ETA, or, if late, start approach upon arrival.
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Which procedure should you follow if, during an IFR flight in VFR conditions, you have two way radio communications failure?

A. Continue the flight under VFR and land as soon as practicable.




What altitude and route should be used if you are flying in IMC and have two-way radio communications failure?

- A. Fly direct to an area that has been forecast to have VFR conditions, fly at an altitude that is at least 1,000 feet above the highest obstacles along the route.
 - B. Descend to MEA and, if clear of clouds, proceed to the nearest appropriate airport. If not clear of clouds, maintain the highest of the MEA's along the clearance route.
 - C. Continue on the route specified in your clearance, fly at an altitude that is the highest of last assigned altitude, altitude ATC has informed you to expect, or the MEA.
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What altitude and route should be used if you are flying in IMC and have two-way radio communications failure?

C. Continue on the route specified in your clearance, fly at an altitude that is the highest of last assigned altitude, altitude ATC has informed you to expect, or the MEA.



What does declaring "minimum fuel" to ATC imply?

- A. Merely an advisory that indicates an emergency situation is possible should any undue delay occur.
- B. Traffic priority is needed to the destination airport.
- C. Emergency handling is required to the nearest useable airport.

What does declaring "minimum fuel" to ATC imply?

A. Merely an advisory that indicates an emergency situation is possible should any undue delay occur.



IFR Emergency Videos and Tutorials

- ▶ **Lost Comm**

 - [IFR Lost Communications Procedures](#)

- ▶ [BoldMethod – Lost Comms](#)

- ▶ **Others**

 - <http://www.aopa.org/AOPA-Live.aspx?watch={E55C5339-1C73-4F41-88DD-43A33AEB1B79}>

 - <http://www.aopa.org/AOPA-Live.aspx?watch={E8861771-13A4-4EE8-8AF9-5F11DF6044E8}>

 - <http://www.aopa.org/AOPA-Live?watch={348499CF-492B-40EF-837B-7AAD283DD2D7}>

 - <http://flash.aopa.org/asf/pilotstories/vacuumfailure/>