Special Emphasis Areas

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Overview - Special Areas of Interest

Examiners must place special emphasis upon areas of aircraft operation considered critical to flight safety. Among these are:

1. Positive aircraft control.
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3. Stall/spin awareness.
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5. Wake turbulence avoidance.
6. LAHSO.
7. Runway incursion avoidance.
8. CFIT.
9. ADM and risk management.
10. Wire strike avoidance.
11. Checklist usage.
12. Temporary flight restrictions (TFRs).

13. Special use airspace (SUA).
14. Aviation security.
15. Single-Pilot Resource Management (SRM).
16. Other areas deemed appropriate to any phase of the practical test

Positive aircraft control

Ability of the pilot to continually control the aircraft's flight path and energy state sufficiently to safely accomplish required tasks within specified tolerances

1. Requires situational awareness and taking appropriate actions in response
2. Situational awareness - knowing the whole picture and how you fit into that situation.
    a. Ability to identify, process, and comprehend the critical elements of information about what is happening at a given point in time. It's knowing what is going on around you
3. Common factors leading to a loss of situational awareness
    a. Repetition
    b. Stress
    c. Demands from management
    d. Demands from PIC
    e. Get there-itis
    f. Proximity rule
    g. Peer pressure
    h. Sophisticated aircraft syndrome
    i. New situations
    j. Critical areas

Ask yourself, "How do these pieces fit together? Is this an important piece? Will it affect another piece of the puzzle? This is the processing and comprehension aspect of situational awareness

Examples of NOT having positive control

- Rolling the airplane past standard rate while fixated on the wrong instruments, and inadvertently entering a spiral dive
- Allowing your airspeed to decay during a climb and only recognizing it when you feel the stall buffet
- Not adding power following level off from a descent

Positive exchange of the flight controls procedure.

Requires use of a positive three-step process whenever the flight controls are exchanged - a "Double Closed-Loop" communication

1. Verbal process
    a. The “Initiating” pilot states “I’ve (you’ve) got the flight controls”
    b. The “non-initiating” pilot repeats “You’ve (I’ve) got the flight controls”
    c. Lastly the “initiating” pilot repeats “I’ve (you’ve) got the flight controls”
    d. Visually verify that the exchange of the flight controls has actually occurred
    e. Contract - *Vitally important in multi-person operations (especially during training and/or checking) that there is always a clear understanding between the crew members as to who actually has control of the aircraft*

Stall/spin awareness.

Spins

Q&A

Define a spin

A spin is an aggravated stall that typically occurs from a full stall occurring with the airplane in a yawed state and results in the airplane following a downward corkscrew path. The airplane is basically descending due to gravity, rolling, yawing, and pitching in a spiral path.

What causes a spin?

A full stall, plus a yaw.

What causes the plane to yaw?

Uncordination. Too much rudder, or not enough.

In a stall in one wing stalled, or both?

Both

Why wouldn’t you want to rely on the AI or the HI to determine spin direction?

1. Their gyros tumble.
2. Is that true for the Piper Warrior with an Aspen as well?
    a. Nope, it’s solid state and no gyros.

What are the stages of a spin?

1. Entry
2. Incipient
3. Fully Developed
4. Recovery

What characterizes both the Incipient and Fully Developed stages?

- Incipient: first 2-4 turns where aerodynamic and inertial forces have not yet reached a balance.
- Fully Developed: Plane is in equilibrium. Rate of rotation, rate of descent, and airspeed are

all stabilized in a near-vertical downward flightpath.

Types of Spins listed in AC61-67c?

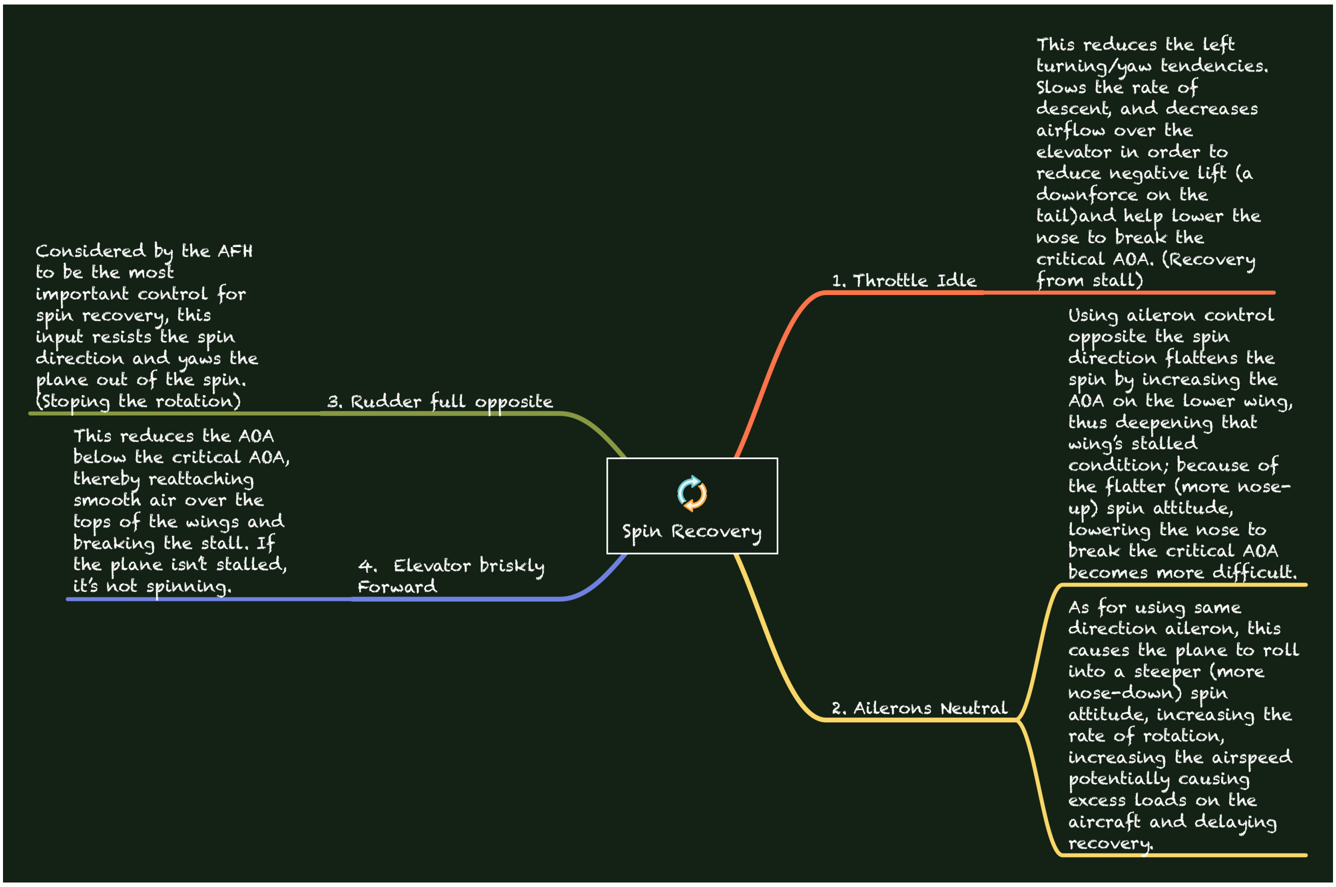
1. Incipient
2. Fully Developed
3. Flat (most dangerous)

Where and When are unintended spins most likely to occur and why?

1. Takeoff and Landing phase where airspeeds are slower, distractions are high and experiencing task saturation.
   a. Base to final turns, go-arounds, short-field TO/LDGs.
   b. Delayed recovery and bad technique while performing certain low-airspeed maneuvers such as stalls, slow-flight.

Recovery

P.A.R.E. To be performed sequentially: Power (throttle) idle, ailerons neutral, rudder full opposite the direction of the spin, elevator briskly fwd (sufficiently to break the stall). Neutralize the rudder once the spinning stops and gradually apply back pressure in order to return to level flight.



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The WHYS behind each spin recovery step.

- **Throttle idle**: this reduces the left turning/yaw tendencies, slows the rate of rotation and rate of descent, and decreases airflow over the elevator in order to reduce negative lift (a down force on the tail) and help lower the nose to break the critical AOA, i.e. recover from the stall.

- **Ailerons neutral**: using aileron control opposite the spin direction flattens the spin by increasing the AOA on the lower wing, thus deepening that wing's stalled condition; because of the flatter (more nose-up) spin attitude, lowering the nose to break the critical AOA becomes more difficult. As for using same-direction aileron, this causes the plane to roll into a steeper (more nose-down) spin attitude, increasing the rate of rotation, increasing airspeed, potentially causing excess loads on the aircraft and delaying recovery.
- **Rudder full opposite (then held in that position)**: considered by the AFH to be the most important control for spin recovery, this input resists the spin direction and yaws the plane out of the spin, i.e. stops the rotation.
- **Elevator briskly forward**: this reduces the AOA below the critical AOA, thereby reattaching smooth airflow over the tops of the wings and breaking the stall. If the plane isn't stalled, it's not spinning.

Stalls

Talk me through a left base-to-final turn resulting in a cross-control stall?

In a misguided attempt at turning faster (say, after overshooting final), pilots may apply too much rudder (beyond the necessary rudder to maintain coordination) IN THE DIRECTION OF THE TURN, in this case to the left. Because the plane is already in a left bank, the nose will point downward (remember, you're only about 500ft AGL at this point…) causing the pilot to pitch back and attempt to remove the bank by using right aileron. At this point the plane is at a low airspeed, and the pilot has applied left rudder, right aileron, and back pressure . . . all the ingredients necessary for a spin to occur, with minimal altitude available for a recovery.

What are some other flight situations conducive to cross-control stalls?

- Stalling during a fwd slip to land.
- Losing track of airspeed and stalling during a crosswind landing while using the wing low sideslip technique.
- Use of ailerons to counteract roll in a stalled condition

Collision avoidance.

Task 1_G - 🔗 Risk Management

FAR §91.111 and §91.113

1. You may not operate an aircraft so close to another aircraft to create a collision hazard
    a. Just because you are on an IFR flight plan does not mean you don't have to see and avoid traffic

If you are in VMC it is your responsibility to visually scan for and avoid other aircraft

Considerations

- Recommended scanning

- Techniques for spotting traffic
- Visual problems associated with sighting conflicting traffic
- Aircraft “right of way” rules for conflicting traffic
- Proper procedures for uncontrolled airports
- High danger areas

See and Avoid

1. **Remain constantly alert to all traffic movement within your area of operation**
    a. Effective visual scanning
        i. Periodically scan the entire visual field outside to ensure detection of conflicting traffic
        ii. Eyes may require several seconds to refocus when switching views between items in the cockpit and distant objects
        iii. Effective scanning is accomplished by a series of short, regularly-spaced eye movements that bring successive areas of the sky into the central visual field. Each movement should not exceed 10°, and each area should be observed for at least one second to enable detection.
    b. Ability to gather information from radio transmissions from ground stations and other aircraft, and
    c. Creating a mental picture of the traffic situation
2. **The performance of many aircraft, in both speed and rates of climb/descent, result in high closure rates limiting the time available for detection, decision, and evasive action**
3. Horizontal back-and-forth eye movements seem to be preferred by most pilots - you should develop a omfortable scanning pattern and stick with it
4. Peripheral vision can be most useful in spotting collision threats from other aircraft, especially when scan is stopped and the eyes are refocused
    a. Apparent movement is almost always the first perception of a collision threat
    b. Most important sight at night is peripheral vision
5. If another aircraft appears to have no relative motion, it is likely on a collision course with you. If the other aircraft shows no lateral or vertical motion, but is increasing in size, take immediate action to avoid it
6. Move your head to search around physical obstructions (e.g., door and window posts) which can block your vision of an area
7. Use all available eyes - other pilots (establish crew procedures) and brief your passengers to help you spot traffic

See and Avoid - *AIM 8-1-8*

1. Use the horizon to judge altitude of conflicting aircraft
2. Consider risk of multiple threats

3. Keep an organized cockpit to permit more scanning time
4. Keep the windshield clean
5. Lights on – day or night

Radio Use

1. Adhere to communications requirements
2. Use traffic advisory services
3. Initiate radio contact with the appropriate facility or self-announce before entering the perimeter of the service area or within 15 miles of a facility with no service area or as soon as ATC permits a switch to local frequency
4. Monitor frequencies of nearby airports and other services, even if not communicating with them
5. Transponder on
6. ADS-B system monitoring – **but remember gaps** - ADS-B doesn't always work.

Airport Traffic Patterns

1. LEFT turns (even on circle to land), unless otherwise published or instructed by ATC
2. Keep a sharp lookout for other aircraft in the pattern and communicate
3. Enter the pattern in level flight and allow plenty of spacing to avoid overtaking or cutting any aircraft off
4. Enter at traffic pattern altitude or circle to land altitude, as applicable
5. Remember VFR pilots may not know instrument intersections / reporting points

Right of Way Rules - FAR § 91.113

1. In distress – ROW over everyone else
2. Least maneuverable has right of way
   a. Balloon
   b. Glider
   c. Airship
   d. Engine driven aircraft
3. Converging – aircraft to the other one's right has the right of way, subject to the maneuverability rules (if you see a red nav light, they have the right of way)
4. Overtaking – Alter course to the right to pass well clear of the overtaken aircraft
5. Head-on – Each aircraft should alter their course to the right
6. Landing
   a. Aircraft on final approach or landing has the right of way
   b. Aircraft at the lower altitude has the right of way – but you can't use the rule to cut in front

of another on final approach

Extra Caution Around High Traffic / Danger Areas

Exercise caution where you may expect to find a high volume of traffic or special types of aircraft operation

1. Class B, C and D areas, especially in flyway routes (e.g. I-10 corridor)
    a. Airport traffic patterns, particularly at airports without a control tower
    b. Below 3,000 feet AGL within five miles of an airport
    c. Airways
    d. Vicinity of VORs
    e. Other locations aircraft tend to cluster
    f. Restricted areas
    g. Warning areas
    h. Alert areas
    i. Military Operating Areas (MOA)
    j. Intensive student training areas
    k. Military low-level training routes
    l. Instrument approach areas

NOTE What are high traffic areas in the viscinity of your home airport?

Wake turbulence avoidance.

1. Aircraft wake produces counter- rotating vortices trailing from the wing tips
    a. The vortices from larger aircraft pose problems
        i. Wake can impose rolling moments exceeding the roll-control authority of your aircraft
    b. Visualize the location of the vortex wake generated by larger aircraft and adjust their flight path accordingly
        i. Vortices sink at a rate of several hundred feet per minute
    c. Avoid the area within 100 feet of the vortex core
    d. Note the rotation or touchdown point of the preceding aircraft
        i. Take off after the touchdown point of wake generator
        ii. Land before the lift-off point of wake generator’s take off point
        iii. When landing behind a wake generator - stay at or above the wake generator’s final approach path and land after its touchdown point
        iv. When taking off behind a departing wake generator - Rotate prior to the larger aircraft’s rotation point, Continue climbing above the larger aircraft’s climb path until turning

clear of the aircraft’s wake

v. Vertical separation of 1,000 feet is generally safe in flight

e. Tailwind conditions can move the vortices of the preceding aircraft forward into the touchdown zone
f. A light quartering tailwind requires maximum caution -upwind vortex tends to remain in the touchdown zone
g. Heed “Caution - Wake Turbulence” ATC warning
h. Air traffic wake turbulence separations based on aircraft size – heavy designation (5 to 6 miles)
i. Counter control is usually effective and induced roll minimal in cases where the wingspan and ailerons of the encountering aircraft extend beyond the rotational flow field of the vortex

LAHSO.

Considerations

- Locations where LAHSO may be implemented
- Who is eligible to accept a LASHO clearance?
- Who initiates a LAHSO clearance?
- Must you accept a LAHSO?
- How is the landing distance available determined?
- Pilot responsibilities once a LASHO clearance is accepted

Locations where LAHSO may be implemented

1. At towered airports, ATC may clear a pilot to land and hold short of an intersecting runway, an intersecting taxiway, or some other designated point on a runway
2. Typically a LAHSO operation is initiated by ATC to expedite traffic
3. Pilots should only receive a LAHSO clearance when there is a minimum ceiling of 1,000 feet and 3 statute miles visibility

Who is eligible to accept a LASHO clearance?

Pilots may accept a LAHSO clearance only if the PIC determines that the aircraft can safely land and stop within the available landing distance . Pilots unfamiliar with LAHSO should not and student pilots cannot participate in LAHSO . The pilot-in-command has the final authority to accept or decline any land and hold short clearance and can decline a LAHSO clearance for any reason .. The PIC must decline a LAHSO clearance if he or she believes it would compromise safety . A LAHSO clearance, once accepted, must be adhered to, just as any other ATC clearance, unless an amended clearance is obtained or an emergency occurs. A LAHSO clearance does not preclude a rejected landing

LAHSO Signage

- Yellow hold-short markings prior to the intersecting runway or taxiway
- Holding position signs on both sides of the runway adjacent to the runway hold lines
- Red and white signage on both sides of the runway
- In-pavement lighting
  - Row of six or seven in-runway pavement unidirectional pulsing white lights that visually indicate the location of a LAHSO point on a runway. Lights will be on when LAHSO is in effect and off when LAHSO is not in effect

Published Data

1. Published available landing distance (“ALD”) (in AFD)
2. Runway slope information for all LAHSO runway combinations at each airport of intended landing (in AFD)
3. Knowledge about landing performance data (in POH)
4. As part of a pilot’s preflight planning process, pilots should determine if their destination airport has LAHSO
   a. Assess which LAHSO combinations will work given their aircraft’s required landing distance
   b. Good pilot decision making is knowing in advance whether one can accept a LAHSO clearance if offered

How is the LAHSO Landing Distance Available Determined

ALD is that portion of the runway available for landing and rollout for an aircraft cleared to land and hold short

1. Distance is measured from the landing threshold to the hold-short point
2. ATC is required to provide ALD on the ATIS, and when requested
3. PIC is responsible for determining the required landing distance (RLD) for his / her aircraft and ensuring that it does not exceed the ALD.

LAHSO ATC Communications

1. LAHSO information will be on ATIS
   a. ALD will be included in the ATIS
2. When ATIS is acknowledged to ATC, PIC should advise ATC if LAHSO cannot be accepted
3. If ATC gives you a LAHSO clearance, ATC needs a full read back that includes the words, “HOLD SHORT OF (RUNWAY/TAXIWAY/POINT)”

Pilot Responsibilities Once a LASHO Clearance Accepted

1. A pilot who accepts a LAHSO clearance must adhere to it, unless he or she obtains an amended

clearance

2. If a rejected landing becomes necessary after accepting a LAHSO clearance, the pilot must maintain safe separation from other aircraft / vehicles and notify ATC as soon as possible

Rejected LAHSO Landings

1. A rejected landing must be initiated within the first third of the ALD or 3,000 feet, whichever is less On go around, heading and/or altitude assignments must be flown as published (if published) until directed otherwise by ATC
   a. Some airports have specific rejected landing procedures – set out in AFD

Runway incursion avoidance.

See PHAK: 14-30

Definition of a runway Incursion

A runway incursion is the incorrect presence of an aircraft, vehicle or person on the protected area of a runway

Pilots should have a functional knowledge of at least the following

a. Runway and Airport signage and marking
b. Proper Radio Procedures (for both controlled and uncontrolled airports)
c. Possess and use a current airport diagram
d. Maintain proper vigilance for conflicting traffic (both aircraft and ground vehicles)
e. Airport “right of way” rules
f. Use external aircraft lighting (especially when using or transiting airport runways)

Hot Spots

1. A hot spot is a location with a history of potential risk of collision or runway incursion, and where heightened attention is necessary
2. Aircraft movements should be planned and coordinated with ATC, for another layer of safety
3. Identification of hot spots helps avoid confusion by eliminating last-minute questions and building familiarity with known problem areas

CFIT.

Controlled flight into terrain (CFIT) accidents and incidents are those in which an aircraft, under the control of the crew, is flown into terrain (or water) with no prior awareness on the part of the crew of the impending disaster

1. CFIT accounts for 17% of all GA fatalities
   - More than half of the CFIT accidents occurred during IMC
2. Get complete weather information, understand the significance of the weather information, and be able to correlate your skills and training, aircraft capabilities, and operating environment

with an accurate forecast

3. Continued flight in reduced visual conditions compounded by night operations and/or overwater flight poses risks
4. VFR pilots in reduced visual conditions may develop spatial disorientation and lose control, possibly going into a graveyard spiral, or descend to an unsafe altitude while trying to maintain visual contact with the surface
5. **CFIT risks associated with scud running**
    a. Loss of aircraft control.
    b. Loss of situational awareness
    c. Reduced reaction time to see and avoid rising terrain or obstacles
    d. Inability of the pilot to operate the aircraft at its minimum controllable airspeed
    e. Getting lost or being off the preplanned flight path and impacting terrain or obstacle
    f. Reduced pilot reaction time in the event of an aircraft maintenance problem because of a low or lowering altitude
    g. Failure to adequately understand the weather conditions that resulted in the reduced conditions
    h. Breakdown in good aeronautical decision making
    i. Failure to comply with appropriate regulations
    j. Failure to comply with minimum safe altitudes
    k. Increased risk of hitting towers, especially along major highways
    l. Failure to turn around and avoid deteriorating conditions when first able

CFIT Pilot Stupidity - Greatest Hits

This is a special category for those pilots flying below minimum safe altitudes. Some common low altitude CFIT factors are:

1. Windshear and loss of flying speed
2. Density altitude
3. Failure to operate aircraft within operating limitations
4. Failure to check an area from a safe altitude before descending into it (high reconnaissance and low reconnaissance)
5. Flying between hills or over rivers below hill tops can result in a CFIT accident if a power line or cable is strung between the hills. Not all such lines are marked or charted
6. Flying up a box canyon and not being able to fly up and out of it before impacting terrain
7. Flying over rising terrain that exceeds an aircraft’s ability or performance to climb away from the terrain
8. Errors in pilot judgement and decision making
9. Diversion of pilot attention

10. Buzzing - Don’t be Maverick
11. Crew distractions or a breakdown in crew resource management
12. Operating in an unsafe manner
13. Failure to maintain control of the aircraft when taking off or landing
14. Failure to properly pre-plan the flight
15. Operating in unfamiliar areas or depending upon untrained people to provide important flight data
16. Not having an objective standard to make go-no go decisions for launching
17. Failure to review all available data for the flight
18. Lack of terrain knowledge and elevation of the highest obstacles within your immediate operating area
19. Failure to properly plan a departure route when departing from unprepared areas such as helicopters or aircraft operating off an airport. Such factors include weight and balance, aircraft performance, height of obstacles, wind direction, trees, density altitude, rising terrain, length of takeoff area, and safe abort areas

ADM and risk management.

ADM is a systematic approach to the mental process of evaluating a given set of circumstances and determining the best course of action

Full Size Image

- There is no one right answer in ADM, rather each pilot is expected to analyze each situation in light of experience level, personal minimums, and current physical and mental readiness level, and make his or her own decision

See Task 1_G - 🔗 Risk Management for more detailed information.

- 3P: Perceive – Process – Perform
- PAVE: Pilot, Airplane, Environment, External-Pressure

Good rule of thumb for the processing phase: if you find yourself saying that it will “probably” be okay, it is definitely time for a solid reality check

LINK: AOPA - VFR Minimums Worksheet

Common Errors in Thinking

1. **Confirmation Bias**: Human beings also have a tendency to look for information that confirms a decision we have already made. E.g., you might unconsciously give more weight to the information that supports your decision to press ahead
   a. Make a conscious effort to identify your expectations, and then be alert to how reality differs
2. **Framing**: When you evaluate options for a decision, be sensitive to how you state, or "frame," your alternatives. If you frame the “continue flight” decision in positive terms you are probably more likely to decide on continuing. If, on the other hand, you frame the decision in negative terms (e.g., “I could get myself in real trouble if I push on”), you are more likely to divert to a safer destination.

Wire strike avoidance.

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While this is a higher risk for helicopter and aerial application operations, every
flight involves at least two close encounters with the ground. You need to discuss how
you will assess the risk of wires anytime you are flying at less than 1,000 AGL.
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Discuss the risk of landing in roads, are wires visible from the air.

Checklist usage.

- Aircraft checklist is a foundation of pilot standardization and cockpit safety – **USE THEM**
- Improper use, or non-use, of checklists is a major contributing factor to aircraft accidents
- Can use the checklist to do the items or to check that they’ve been done – best practice depends on circumstances and personality

Temporary flight restrictions (TFRs).

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If your response to the examiner is other than I check for TFRs before every flight
youre likely to in the hot seat. Know how and where to obtain TFR information, the
different types of TFRs, and how to  interpret the TFR NOTAM to ensure that you can
comply with its requirements.
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LINK: FAA TFR MAP

Special use airspace (SUA).

Special Use Airspace is a term used to define a group of Airspace types, those special airspace types include:

1. Prohibited Areas
    a. Airspace within which the flight of aircraft is prohibited
        i. Violating prohibited Airspace without a clearance is grounds for interception and follow-on legal action
    b. Established for security or other reasons associated with the national welfare
    c. Published in the Federal Register and are depicted on aeronautical charts
2. Restricted Areas
    a. Areas where operations are hazardous to nonparticipating aircraft and contain airspace within which the flight of aircraft, while not wholly prohibited, is subject to restrictions
    b. Denote the existence of unusual, often invisible hazards to aircraft (e.g. artillery firing, aerial gunnery, or guided missiles)
    c. Penetration without authorization from the using or controlling agency may be extremely hazardous
        i. IFR flights may be authorized to transit the airspace and are routed accordingly
    d. Restricted areas are depicted on aeronautical charts and are published in the Federal Register
3. Warning Areas
    a. Airspace of defined dimensions, extending from 3 nm outward from the coast of the US, containing activity that may be hazardous to nonparticipating aircraft
        i. The activities may be much the same as those for a restricted area
    b. The purpose is to warn nonparticipating pilots of the potential danger
    c. They are depicted on aeronautical charts
4. MOAs (Military Operation Areas)
    a. Consist of airspace with defined vertical and lateral limits established for the purpose of separating certain military training activity from IFR traffic
    b. IFR traffic may be cleared through a MOA if IFR separation can be provided by ATC, otherwise ATC will reroute the traffic
    c. There is no restriction against a pilot operating VFR in these areas
        i. A pilot should, although, be alert since training activities may include aerobatic and abrupt maneuvers
    d. MOAs are depicted on aeronautical charts
5. Alert Areas
    a. Are to advise pilots that a high volume of pilot training or unusual aerial activity is taking place
        i. Exercise caution when transitioning alert areas
    b. They are depicted on aeronautical charts
6. Controlled Firing Areas

   a. Contain activities that, if not conducted in a controlled environment, could be hazardous to nonparticipating aircraft
   b. Activities here must be suspended when a spotter aircraft, radar, or ground lookout position indicates an aircraft might be approaching the area
   c. No need to chart since they do not cause a nonparticipating aircraft to change its flight path

Aviation security.

Since 9/11, security has had an increasing emphasis. As general aviation pilots, we all share the responsibility to ensure the security of our airports and operations.

Single-Pilot Resource Management (SRM).

Recognition of hazards

1. Understanding the risk
   a. Pilot needs to ask key questions
2. Understanding the potential impact upon safety of the flight
3. Interpreting information received about the risk correctly
4. Implement risk mitigation strategy
   a. Good decision making

Internal Resources

1. POH is essential for accurate flight planning and resolving equipment malfunctions
2. Checklists verify instruments and systems are checked, set, and operating properly and ensure the proper procedures are performed in the case of an emergency
3. Satellite data, if equipped
4. App data (such as ForeFlight), if equipped for in-flight updates
5. Equipment - A thorough understanding of the equipment is necessary to fully utilize all resources
   a. Program any info ahead of time (radio frequencies, fixes, etc.)
   b. If you do not understand equipment, or rely on certain equipment (like the GPS) excessively it can be unsafe
      i. EX: If the GPS fails and you do not have a good understanding of VOR navigation, how will you maintain situation awareness and return home or divert to another field?
6. Passengers can look for traffic, and provide helpful information (strange sound/scent, checklist help)
7. Charts, other pilots, and your own ingenuity, knowledge and skill are also excellent resources

External Resources

Some of these resources are available in the air, or on the ground in case a landing is required.

1. ATC, maintenance technicians, and flight service personnel
2. 1800 WX Brief
3. Internet research (before flight – weather, notams, TFRs, airport procedures, etc.)
4. ATC/Flight Service specialists can decrease work with traffic advisories, vectors and emergency assistance, weather updates and vectoring around weather
   a. ATC May be able to access maintenance personnel, or other assistance in an emergency
5. FSS can provide weather, airport conditions
6. Other airplanes can provide PIREPs as well as radio communications
   a. Occasionally other aircraft may be able to hear your transmission, but not the controller
      i. In this case, other aircraft can relay messages between you and the controller
7. ASOS/AWOS can also provide weather conditions in flight