



Special Emphasis Areas



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- Positive aircraft control
- Procedures for positive exchange of flight controls (who is flying the airplane)
- Stall/Spin awareness
- Collision avoidance
- Wake turbulence avoidance
- Land and hold short operations (LAHSO)

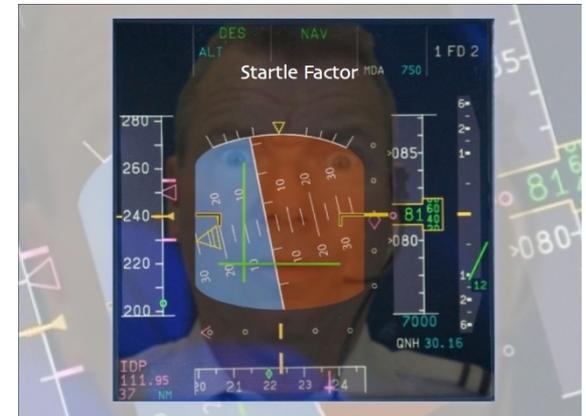


Special Emphasis Areas

- Runway incursion avoidance
 - Hot spots
- Controlled flight into terrain (CFIT)
- Aeronautical decision making (ADM)
- Checklist usage
- Single pilot resource management (SRM)
- Icing condition operational hazards, anti-icing and deicing equipment, differences, and approved use and operations

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
 - Requires situational awareness and taking appropriate actions in response
 - **Situational awareness** - knowing the whole picture and how you fit into that situation.
 - 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
 - Common factors leading to a loss of situational awareness
 - Repetition
 - Stress
 - Demands from management
 - Demands from PIC
 - Get there-itis
 - Proximity rule
 - Peer pressure
 - Sophisticated aircraft syndrome
 - New situations
 - 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



Positive Aircraft Control

- More easily explained by examples of situations that are NOT 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
- An instrument pilot is expected to be a perfectionist
 - With excellent basic attitudes, skills and positive aircraft control, excellence will become your standard.

Positive Exchange of Flight Controls

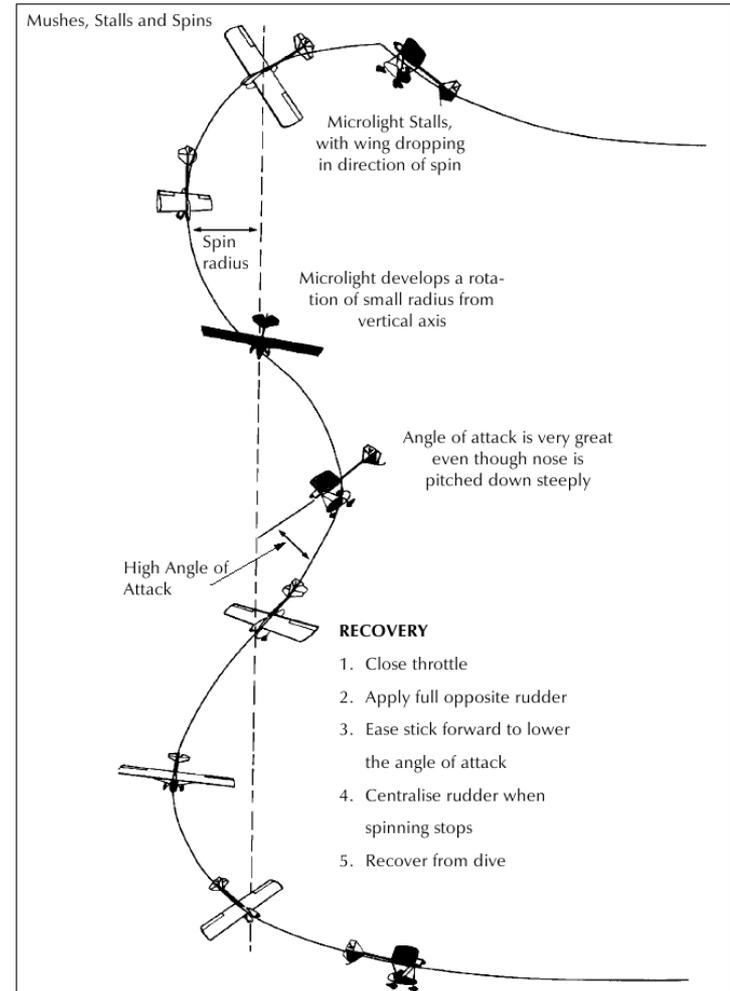
Know Who is Flying the Airplane

- Requires use of a positive three-step process whenever the flight controls are exchanged - a “Double Closed-Loop” communication
- Verbal process
 - The “Initiating” pilot states “I’ve (you’ve) got the flight controls”
 - The “non-initiating” pilot repeats “You’ve (I’ve) got the flight controls”
 - Lastly the “initiating” pilot repeats “I’ve (you’ve) got the flight controls”
- Visually verify that the exchange of the flight controls has actually occurred
- Contract - Vitally important in multi-person operations (especially during training and/or checking) that there is always a clear understanding between the crewmembers as to who actually has control of the aircraft



Stall/Spin Awareness

- Aerodynamic factors related to spins
- Flight situations where unintentional spins may occur
- Procedures for recovery from unintentional spins



Aerodynamic Factors Related to Spins

- **An aircraft must be stalled before it can spin**
- One wing must be stalled more than the other for autorotation to develop
- Aircraft must remain stalled to keep spinning
- Autorotation
 - The differential in stall amount on each wing also defines the differential in lift from each wing. A stalled wing still generates some amount of lift, just not enough to counter the weight of the airplane
 - The low wing in a spin is turning in a smaller radius than the high wing. This creates a differential in angle of attack - the real cause of the spin
 - The high, more lift-producing, wing continues to try to roll the airplane
 - The resulting loss of vertical lift component drops the nose and a spin is the outcome

Flight Situations Where Unintentional Spins May Occur

- Bank angle increased too much while airspeed slows
- During a climbing turn when the aircraft is stalled
- Any uncoordinated stall
- Out of balance flight caused by inducing (or not preventing) yaw with rudder
- Distractions may lead to uncoordinated stalls
 - Skidding turn from base to final
 - Emergency landing situation

Procedures for Recovery From Unintentional Spins

- Recovery from a spin in IMC is a stressful affair. No visual indications other than the instruments. Disorientation is highly likely!
- Technique
 - Attitude indicator may be spinning or may fail altogether. It probably won't be clear to you which way the airplane is turning. **The turn coordinator is critical – one gauge that will save you**
 - Reduce power to idle to limit acceleration
 - Neutralize the ailerons
 - Apply full opposite rudder to stop (or slow) the turn
 - Notice which wing is up on the turn coordinator and apply rudder to that side
 - Push forward on the stick or yoke to reduce the angle of attack and break the stall
 - Gently pull up to recover from the resulting dive
 - **Spin avoidance is the real objective. Don't get into the predicament to begin with**
- **Try recovery in the Redbird AATD!! It can be eye opening.**

Collision Avoidance

FAR §91.111 and §91.113

- You may not operate an aircraft so close to another aircraft to create a collision hazard
- 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



Collision Avoidance

See and Avoid

- Remain constantly alert to all traffic movement within your area of operation
 - Effective visual scanning
 - Periodically scan the entire visual field outside to ensure detection of conflicting traffic
 - Eyes may require several seconds to refocus when switching views between items in the cockpit and distant objects
 - 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.
 - Ability to gather information from radio transmissions from ground stations and other aircraft, and
 - Creating a mental picture of the traffic situation
- 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

RECOGNITION and REACTION TIMES
(from U.S. Naval Aviation Safety Bulletin)

Excerpt

Seconds

see object	0.1
recognize a/c	1.0
become aware of collision course	5.0
decision to turn left or right	4.0
muscular reaction	0.4
aircraft lag time	2.0
TOTAL	12.5

Collision Avoidance

See and Avoid

- Horizontal back-and-forth eye movements seem to be preferred by most pilots - you should develop a comfortable scanning pattern and stick with it
- Peripheral vision can be most useful in spotting collision threats from other aircraft, especially when a scan is stopped and the eyes are refocused
 - Apparent movement is almost always the first perception of a collision threat
 - Most important sight at night is peripheral vision
- 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
- Move your head to search around physical obstructions (e.g., door and window posts) which can block your vision of an area
- Use all available eyes - other pilots (establish crew procedures) and brief your passengers to help you spot traffic

Collision Avoidance

See and Avoid - AIM 8-1-8

- Use the horizon to judge altitude of conflicting aircraft
- Consider risk of multiple threats
- Keep an organized cockpit to permit more scanning time
- Keep the windshield clean
- Lights on – day or night



Collision Avoidance

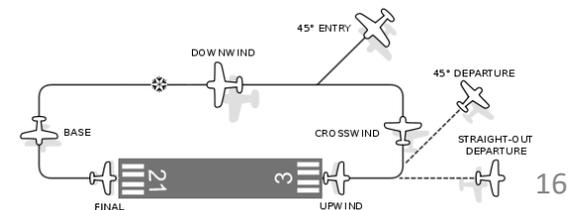
Radio Use

- Adhere to communications requirements
- Use traffic advisory services
- 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
- Monitor frequencies of nearby airports and other services, even if not communicating with them
- Transponder on
- ADS-B system monitoring – but remember gaps

Collision Avoidance

Airport Traffic Patterns

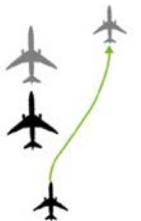
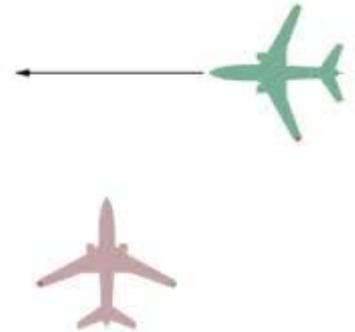
- LEFT turns (even on circle to land), unless otherwise published or instructed by ATC
- Keep a sharp lookout for other aircraft in the pattern and communicate
- Enter the pattern in level flight and allow plenty of spacing to avoid overtaking or cutting any aircraft off
- Enter at traffic pattern altitude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



Right of Way Rules

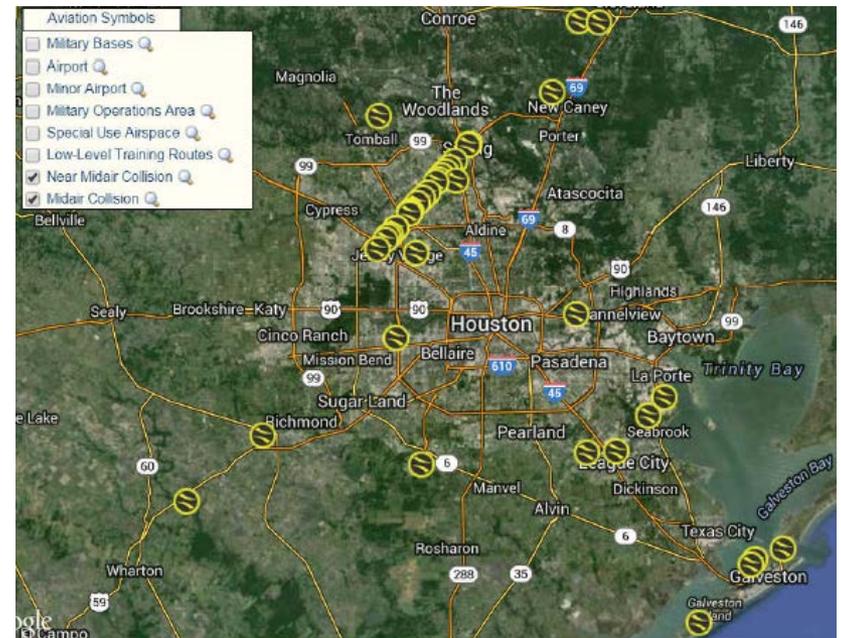
FAR § 91.113

- In distress – ROW over everyone else
- Least maneuverable has right of way
 - Balloon
 - Glider
 - Airship
 - Engine driven aircraft
- 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)
- Overtaking – Alter course to the right to pass well clear of the overtaken aircraft
- Head-on – Each aircraft should alter their course to the right
- Landing
 - Aircraft on final approach or landing has the right of way
 - 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



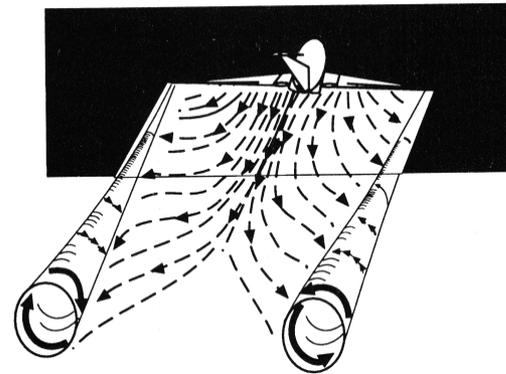
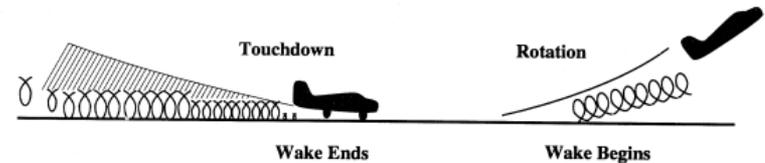
Extra Caution Around High Traffic / Danger Areas

- Exercise caution where you may expect to find a high volume of traffic or special types of aircraft operation
 - Class B, C and D areas, especially in flyway routes (e.g. I-10 corridor)
 - Airport traffic patterns, particularly at airports without a control tower
 - Below 3,000 feet AGL within five miles of an airport
 - Airways
 - Vicinity of VORs
 - Other locations aircraft tend to cluster
 - Restricted areas
 - Warning areas
 - Alert areas
 - Military Operating Areas (MOA)
 - Intensive student training areas
 - Military low-level training routes
 - Instrument approach areas



Wake Turbulence Avoidance

- Aircraft wake produces counter-rotating vortices trailing from the wing tips
- The vortices from larger aircraft pose problems
 - Wake can impose rolling moments exceeding the roll-control authority of your aircraft
- Visualize the location of the vortex wake generated by larger aircraft and adjust their flight path accordingly
 - Vortices sink at a rate of several hundred feet per minute



Wake Turbulence Avoidance

- Avoid the area within 100 feet of the vortex core
- Note the rotation or touchdown point of the preceding aircraft
 - Take off after the touchdown point of wake generator
 - Land before the lift-off point of wake generator's take off point
 - When landing behind a wake generator - stay at or above the wake generator's final approach path and land after its touchdown point
 - 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
 - Vertical separation of 1,000 feet is generally safe in flight

Wake Turbulence Avoidance

- Tailwind conditions can move the vortices of the preceding aircraft forward into the touchdown zone
- A light quartering tailwind requires maximum caution - upwind vortex tends to remain in the touchdown zone
- Heed “Caution - Wake Turbulence” ATC warning
- Air traffic wake turbulence separations based on aircraft size – heavy designation (5 to 6 miles)
- 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

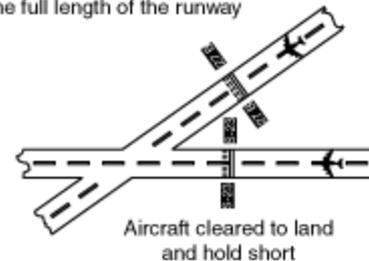
Land and Hold Short Operations (LAHSO)

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



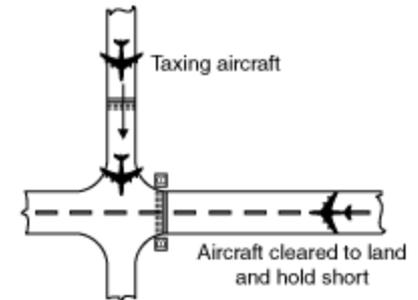
The Hazards of
“Hold Short”
of the Runway
Instructions

Aircraft cleared to land using the full length of the runway



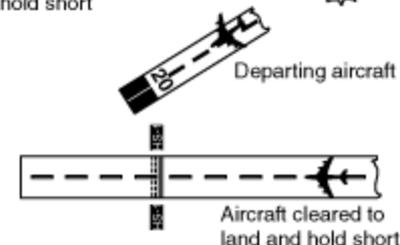
Aircraft cleared to land and hold short

Taxiing aircraft



Aircraft cleared to land and hold short

Departing aircraft



Aircraft cleared to land and hold short

Locations Where LAHSO may be Implemented

- 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
- Typically a LAHSO operation is initiated by ATC to expedite traffic
- Pilots should only receive a LAHSO clearance when there is a minimum ceiling of 1,000 feet and 3 statute miles visibility

Must you accept a LAHSO? Who is Eligible to accept a LASHO clearance

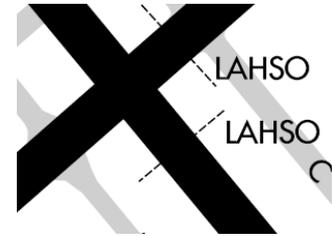
- Pilots may accept a LAHSO clearance only if the PIC determines that the aircraft can safely land and stop within the available landing distance
- Pilots unfamiliar with LAHSO should not and student pilots cannot participate in LAHSO
- The pilot-in-command has the final authority to accept or decline 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



LAHSO – Published Data



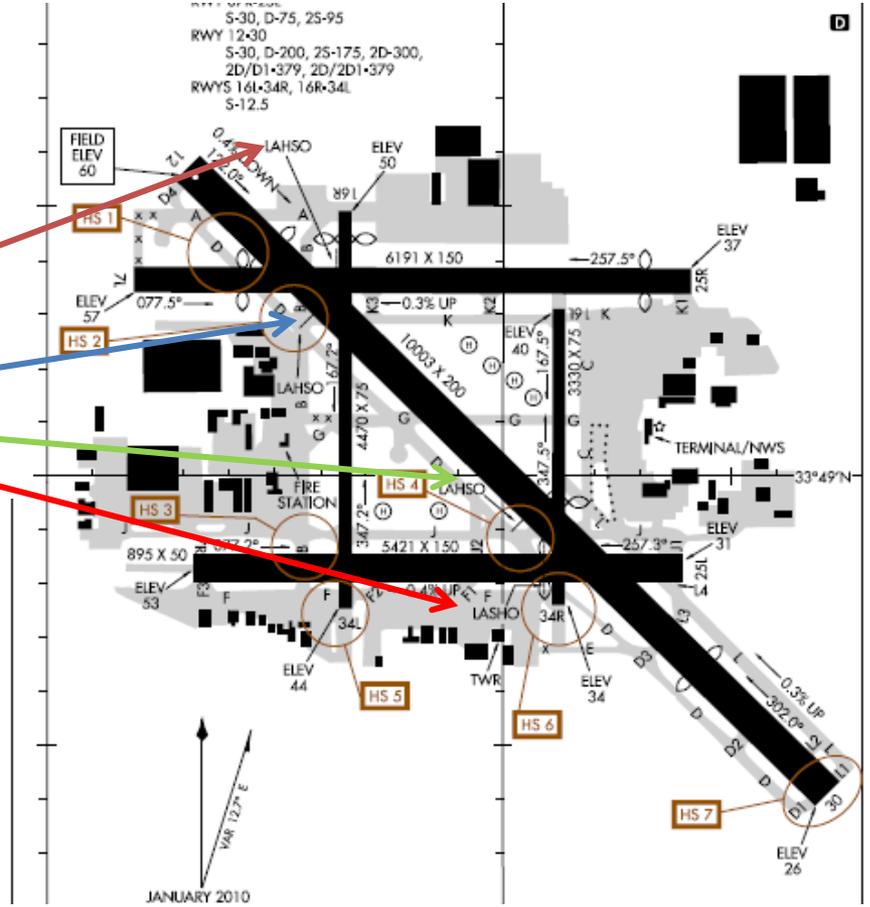
LONG BEACH (DAUGHERTY FLD) (LGB) 3 NE UTC-8(-7DT) N33°49.07' W118°09.10' LOS ANGELES
 60 B S4 FUEL 100LL, JET A OX 1, 2, 3, 4 TPA—See Remarks LRA Class I, ARFF Index C COPTER
 NOTAM FILE LGB H-4I, L-3E, 4G, A IAP, AD

RWY 12-30: H10003X200 (ASPH-GRVD) S-30, D-200, 2S-175, 2D-300 HIRL CL
RWY 12: REIL. VASI(V4L)—GA 3.0° TCH 66'. Thld dsplcd 1351'. Fence. 0.4% down.
RWY 30: MALSR. TDZL. PAPI(P4L)—GA 3.0° TCH 73'. Thld dsplcd 2002'. Tree. 0.3% up.
RWY 07L-25R: H6191X150 (ASPH-PFC) S-30, D-70, 2S-89, 2D-110 MIRL 0.3% up W
RWY 07L: Thld dsplcd 1305'. Pole.
RWY 25R: REIL. VASI(V4L)—GA 4.0° TCH 72'. Thld dsplcd 530'. Road. Rgt tfc.
RWY 07R-25L: H5421X150 (ASPH) S-30, D-75, 2S-95 HIRL 0.4% up W
RWY 07R: Tower. Rgt tfc.
RWY 25L: REIL. PAPI(P4L)—GA 4.0° TCH 38'. Thld dsplcd 1523'. Trees.
RWY 16R-34L: H4470X75 (ASPH) S-12.5
RWY 16R: VASI(V4L)—GA 4.0° TCH 36'. Thld dsplcd 310'. Fence. Rgt tfc.
RWY 34L: Road.
RWY 16L-34R: H3330X75 (ASPH) S-12.5
RWY 16L: Fence.
RWY 34R: Thld dsplcd 1156'. Road. Rgt tfc.

LAND AND HOLD-SHORT OPERATIONS

LDG RWY	HOLD-SHORT POINT	AVBL LDG DIST
RWY 07R	16L-34R	3890
RWY 12	16L-34R	4100
RWY 25R	12-30	3400
RWY 30	07L-25R	5850

RUNWAY DECLARED DISTANCE INFORMATION
RWY 30: TORA-10003 TODA-10003 ASDA-9417 LDA-7415



Situational awareness is vital to the success of LAHSO. Situational awareness starts with having current airport information in the cockpit, readily accessible to the pilot. (An airport diagram assists in identifying your location on the airport)

LAHSO Operations

- To conduct LAHSO, pilots should become familiar with all available information concerning LAHSO at their destination airport
- Should have, readily available:
 - Published available landing distance (“ALD”) (in AFD)
 - Runway slope information for all LAHSO runway combinations at each airport of intended landing (in AFD)
 - Knowledge about landing performance data (in POH)
 - As part of a pilot's preflight planning process, pilots should determine if their destination airport has LAHSO
 - Assess which LAHSO combinations will work given their aircraft's required landing distance
 - 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
 - Distance is measured from the landing threshold to the hold-short point
- ATC is required to provide ALD on the ATIS, and when requested
- PIC is responsible for determining the required landing distance (RLD) for his / her aircraft and ensuring that it does not exceed the ALD.

How is the LAHSO Required Landing Distance Determined

- RLD is:
 - POH chart distance over a 50-foot obstacle plus 1,000 feet
 - Payload 6,000 lbs or greater or 20 seats or more, must add 60% to AFM distance

LANDING DISTANCE

SHORT FIELD

CONDITIONS:
 Flaps 40°
 Power Off
 Maximum Braking
 Paved, Level, Dry Runway
 Zero Wind

NOTES:
 1. Short field technique as specified in Section 4.
 2. Decrease distances 10% for each 9 knots headwind. For operation with tailwinds up to 10 knots, increase for each 2 knots
 3. For operation on a dry, grass runway, increase distances by 45% of the "ground roll" figure.

WEIGHT LBS	SPEED AT 50 FT KIAS	PRESS ALT FT	0°C		10°C		20°C		30°C	
			GRND ROLL	TOTAL TO CLEAR 50 FT OBS						
2300	60	S.L.	495	1205	510	1235	530	1265	545	1295
		1000	510	1235	530	1265	550	1300	565	1330
		2000	530	1265	550	1300	570	1335	590	1370
		3000	550	1300	570	1335	590	1370	610	1405
		4000	570	1335	590	1370	615	1410	635	1445
		5000	590	1370	615	1415	635	1450	655	1485
		6000	615	1415	640	1455	660	1490	685	1535
		7000	640	1455	660	1495	685	1535	710	1575
8000	665	1500	690	1540	710	1580	735	1620		

Required landing distance = 1,370' + 1,000' = 2,370'

LAHSO - ATC Communications

- LAHSO information will be on ATIS
 - ALD will be included in the ATIS
- When ATIS is acknowledged to ATC, PIC should advise ATC if LAHSO cannot be accepted
- 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

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

- 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
 - Some airports have specific rejected landing procedures – set out in AFD

Runway Incursion Avoidance

- Pilots should have a functional knowledge of at least the following:
 - Runway and Airport signage and marking
 - Proper Radio Procedures (for both controlled and uncontrolled airports)
 - Possess and use a current airport diagram
 - Maintain proper vigilance for conflicting traffic (both aircraft and ground vehicles)
 - Airport “right of way” rules
 - Use external aircraft lighting (especially when using or transiting airport runways)



Runway Incursion

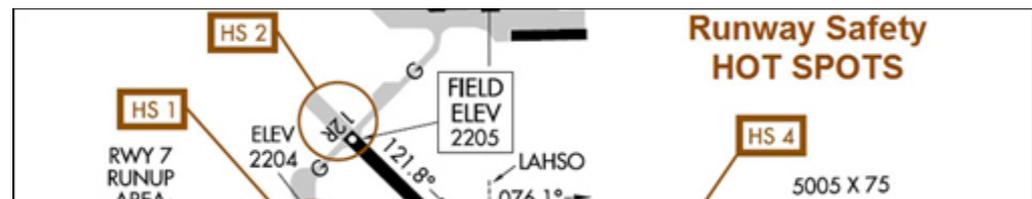
- A runway incursion is the incorrect presence of an aircraft, vehicle or person on the protected area of a runway
- Take off Hold Lights



Runway Incursion

Hot Spots

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



Controlled Flight Into Terrain (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
- CFIT accounts for 17% of all GA fatalities
 - More than half of the CFIT accidents occurred during IMC



CFIT

Scud Running

- 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
- Continued flight in reduced visual conditions compounded by night operations and/or overwater flight poses risks
 - 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

CFIT

Scud Running

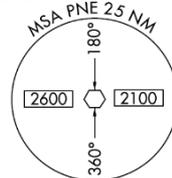
- CFIT risks associated with scud running
 - Loss of aircraft control.
 - Loss of situational awareness
 - Reduced reaction time to see and avoid rising terrain or obstacles
 - Inability of the pilot to operate the aircraft at its minimum controllable airspeed
 - Getting lost or being off the preplanned flight path and impacting terrain or obstacle
 - Reduced pilot reaction time in the event of an aircraft maintenance problem because of a low or lowering altitude
 - Failure to adequately understand the weather conditions that resulted in the reduced conditions
 - Breakdown in good aeronautical decision making
 - Failure to comply with appropriate regulations
 - Failure to comply with minimum safe altitudes
 - Increased risk of hitting towers, especially along major highways
 - Failure to turn around and avoid deteriorating conditions when first able

CFIT in IMC Conditions on an IFR Flight

- Pilot must be qualified, current, and proficient for the intended flight
- Aircraft must be properly equipped for the flight
- Must have the proper charts and approach plates for the intended flight
 - VFR charts, although not required, should be onboard as they can provide important obstacle and terrain data for an IFR flight
- Knowing the planned procedure well enough to know if ATC is issuing an unsafe clearance or if the pilot flying is not following the published procedure
- If in a crewed aircraft, both pilots have adequately briefed the flight and operation of the aircraft, including shared responsibilities
- Have complete weather data for the flight, including knowing where visual meteorological conditions exist or a safe alternative is since many GA aircraft flown IFR have limited range or speed to fly out of un-forecasted weather conditions
- Importance of maintaining situational awareness, both horizontal and vertical, throughout the flight to avoid flying into hazardous terrain or known obstacles

CFIT in IMC Conditions on an IFR Flight

- Have complete knowledge on how to operate all aircraft equipment. This includes the limitations and operations of the navigation equipment
- Follow FAA and industry recommended crew resource management principles. If a single-piloted flight, the pilot knows to use all available resources including air traffic control to help ensure a safe flight as well as any onboard resource such as a passenger or onboard charts or manuals
- Pilot in command must follow rules for making a missed approach and be prepared to make a missed approach when conditions fall below minimums, or the approach becomes destabilized
- Knowledge of minimum safe or sector altitudes and of the highest terrain in the area



CFIT in IMC Conditions on an IFR Flight

- Pilot in command must be aware of the risks involved when transitioning from visual to instrument or from instrument to visual procedures on takeoff or landing
 - Spatial disorientation
 - Not uncommon for pilots to try to continue flying by visual reference when references are inadequate - In so doing, the pilot leans forward toward the windshield and inadvertently moves the yoke slightly forward causing the airplane to descend
 - Estimations of flight visibility can be off
- Pilot in command should use all available safety equipment installed in the aircraft and on the ground
- Pilot in command should be aware of the risks involved in setting the aircraft's altimeter including inherent limitations of barometric altimeters

CFIT in IMC Conditions on an IFR Flight

- Knowing the air traffic control system well enough to be proficient in it
- Knowing when not to fly
- Properly using an installed autopilot, if so equipped, to reduce workload
- Proper use of checklists before reaching 1,000 feet AGL to minimize distractions when close to the ground
- The importance of flying a stabilized approach (maintaining a stable speed, descent rate, vertical flightpath, and configuration throughout the final segment of the approach). The idea is to reduce pilot workload and aircraft configuration changes during the critical final approach segment of an approach. The goal is to have the aircraft in the proper landing configuration, at the proper approach speed, and on the proper flightpath before descending below the minimum stabilized approach height. The following are recommended minimum stabilized approach heights
 - (1) 500 feet above the airport elevation during VFR weather conditions
 - (2) MDA or 500 feet above airport elevation, whichever is lower, for a circling approach
 - (3) **1,000 feet above the airport or touch down zone elevation during IMC**

CFIT in IMC Conditions on an IFR Flight

- Increased CFIT risk on non-precision approaches
- Increased CFIT risk on high descent rates near the ground
- The importance of good communications between the pilot and air traffic control concerning any flight instruction or clearance
- The dangers of complacency for the single-pilot, as well as multi-piloted crews, when making routine flights
- The dangers of misunderstanding air traffic control instructions or accepting an incorrect clearance
 - Ask for clarification whenever in doubt about any instruction or clearance
- The dangers of not knowing the safe altitudes for your en-route as well as your terminal area

CFIT in IMC Conditions on an IFR Flight

- The most obvious way to avoid flying from cumulus into cumulo-granite is to be aware of and abide by all published minimum altitudes. Especially during approaches. Know where you are and where Mother Earth is at all times
- When terrain elevations change frequently and quickly, it can become very challenging

CFIT Stupidity - Low-flying Aircraft Operating In VFR Conditions

- This is a special category for those pilots flying below minimum safe altitudes
- Some common low altitude CFIT factors are:
 - Windshear and loss of flying speed
 - Density altitude
 - Failure to operate aircraft within operating limitations
 - Failure to check an area from a safe altitude before descending into it (high reconnaissance and low reconnaissance)
 - 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
 - Flying up a box canyon and not being able to fly up and out of it before impacting terrain
 - Flying over rising terrain that exceeds an aircraft's ability or performance to climb away from the terrain
 - Errors in pilot judgement and decision making

CFIT Stupidity - Low-flying Aircraft Operating In VFR Conditions

- Diversion of pilot attention
- Buzzing
- Crew distractions or a breakdown in crew resource management
- Operating in an unsafe manner
- Failure to maintain control of the aircraft when taking off or landing
- Failure to properly pre-plan the flight
- Operating in unfamiliar areas or depending upon untrained people to provide important flight data
- Not having an objective standard to make go-no go decisions for launching
- Failure to review all available data for the flight
- Lack of terrain knowledge and elevation of the highest obstacles within your immediate operating area
- 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



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

Aeronautical Decision Making (ADM)

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

Aeronautical Decision Making (ADM)

3P Model

- Perceive – Process – Perform
 - **Perceive** the “given set of circumstances” for your flight
 - **Process** by evaluating the circumstances impact on flight safety
 - **Perform** by implementing the best course of action

Aeronautical Decision Making (ADM)

Perceive

- Develop a clear and comprehensive awareness of your particular situation - For each element, ask “what could hurt me, my passengers, or my aircraft”
- PAVE Model
 - **P**ilot in command
 - **A**ircraft
 - en**V**ironment
 - **E**xternal pressures

Aeronautical Decision Making (ADM) Process

- Mentally process information about the circumstances that you have perceived / identified. The goal is to evaluate their impact on the safety of your flight, and consider “why must I CARE about these circumstances?”
 - **Consequences** (e.g., departing after a full workday creates fatigue & pressure)
 - **Alternatives** (e.g., delay until morning; reschedule meeting; drive)
 - **Reality** (e.g., dangers and distractions of fatigue could lead to an accident)
 - **External pressures** (e.g., business meeting at destination might influence me)
- 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

Aeronautical Decision Making (ADM)

Perform

- Once you have perceived a hazard (step one) and processed its impact on flight safety (step two), it is time to **PERFORM** by taking the best course of action, and then evaluating its impact
 - **Mitigate** or eliminate the risk
 - **Evaluate** the outcome of your actions

Aeronautical Decision Making (ADM)

Common Errors in ADM

- “Pilot error,” is an action or inaction that leads to a deviation from intentions and expectations
 - Deficiencies in pilot’s ability to control aircraft
 - Deficiencies in pilot’s "mental airplane" systems knowledge
 - Decision errors or human limitations
 - Filtering: Brain's working capacity is limited to about seven chunks, of information at one time, so we filter the flood of information arriving through our senses thus may unconsciously screen out vital information
 - Filling in the Gaps: When there is more information than the brain can accurately perceive and process, it compensates by filling in the gaps and producing an interpretation that is not correct
 - Patterns and Expectations: The brain uses existing knowledge and experience as a shortcut to processing new information. This tendency can be useful, but it can also be dangerous

Aeronautical Decision Making (ADM)

Common Errors in ADM

- 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
 - Make a conscious effort to identify your expectations, and then be alert to how reality differs
- 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.

Aeronautical Decision Making (ADM)

- Decision Making – DECIDE Model
 - **D**etect – that change has occurred
 - **E**stimate – need to correct or react
 - **C**hoose – a course of action
 - **I**dentify – solution
 - **D**o – the necessary action
 - **E**valuate – the effect of the action

Single Pilot Resource Management (SRM)

- SRM is the **art of managing all the resources** (both onboard the aircraft and from outside sources (e.g., ATC and flight service stations) available to a pilot prior to and during flight - **to gather information, analyze it, and make decisions** to ensure a successful flight
- SRM includes the concepts of aeronautical decision-making (ADM), risk management, CFIT awareness, and situational awareness
- SRM training helps the pilot maintain situational awareness by managing automation, associated aircraft control, and navigation tasks
- This enables the pilot to accurately assess hazards, manage resulting risk potential, and make good decisions
- SRM helps pilots develop methods of gathering information, analyzing it, and making decisions

Single Pilot Resource Management (SRM)

- Recognition of hazards
 - Understanding the risk
 - Pilot needs to ask key questions
 - Understanding the potential impact upon safety of the flight
 - Interpreting information received about the risk correctly
 - Implement risk mitigation strategy
 - Good decision making

Single Pilot Resource Management (SRM)

- Use of resources
 - To make informed decisions during flight operations, a pilot must also become aware of the resources in and outside the plane
 - Useful tools and sources of information may not always be readily apparent, learning to recognize these resources is important
 - Pilot must also have the skills to evaluate when to use a particular resource and the impact its use has upon the safety of flight

Single Pilot Resource Management

Internal Resources

- Ability to manage workload is the most valuable resource a pilot has
- Passengers even those with no flying experience can help (verbal help, help reading charts, etc)
- Verbal communication reinforces an activity- even if talking to yourself. Touching also helps
- Pilot should have a thorough understanding of aircraft equipment and systems to help make good decisions
- Checklists
- Pilot's operating handbook (POH)

Single Pilot Resource Management

External Resources

- ATC – assistance not only decreases pilot workload, but also helps pilots make informed inflight decisions. ATC can provide:
 - traffic advisories
 - Radar vectors
 - assistance in emergency situations
 - Direction finding equipment
- Flight Service
 - En Route Flight Advisory Service (Flight Watch)
 - Assist lost aircraft and aircraft in emergency situations
 - DF

Single Pilot Resource Management

5P Check

- 5 Ps are:
 - Plan - basic elements of cross-country planning: weather, route, fuel, current publications, etc.
 - Plane
 - Pilot
 - “IMSAFE” checklist
 - Proficiency
 - Currency
 - Passengers and their capabilities - can read checklists, verify PIC performance of an action, re-verify that the gear is down and the lights are on, look for other aircraft, and even tune radios
 - Programming
 - Automation tends to capture the pilot’s attention and hold it for long periods of time
 - Plan ahead and know the equipment and buttonology

Single Pilot Resource Management

5P Check

- 5 Ps are used to evaluate the pilot's current situation at key decision points during the flight or when an emergency arises
 - Key decision points include preflight, pre-takeoff, hourly or at the midpoint of the flight, pre-descent, and just prior to the final approach fix or for VFR operations, just prior to entering the traffic pattern
- Theory is that pilots have essentially five variables that impact their environment and can cause the pilot to make a single critical decision or several less critical decisions that when added together can create a critical outcome
- Each of the 5 Ps can be either a help or a hindrance depending upon circumstances

