Land and Hold Short Operations

A Primer

Pilot Responsibilities When Conducting Land And Hold Short Operations (LAHSO)

Introduction

LAHSO is an acronym for "Land And Hold Short Operations." Land and hold short operations are an air traffic control procedure intended to increase airport capacity without compromising safety. This means that, as pilot-in-command (or as an operator), several minutes of valuable time can be saved during every LAHSO landing and taxi-in. Think of the savings in fuel and operating expense — not to mention freeing up the runway for others to use, thereby increasing overall system capacity. This program, however, will work more effectively only if pilots have a clear understanding of what's expected of them. That's what this booklet is all about.

For starters, LAHSO include landing and holding short of an intersecting runway, an intersecting taxiway, or some other designated point on a runway other than an intersecting runway or taxiway. (See Figures 1–3.)

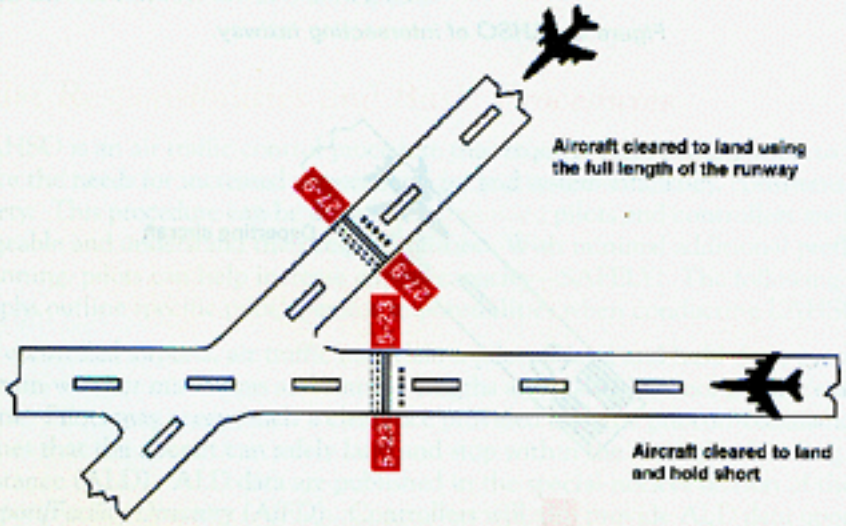

Figure 1–LAHSO of intersecting taxiway.

FIGURES 1, 2, and 3. — (1) Land and hold short of an intersecting runway; (2) Land and hold short of an intersecting taxiway; and (3) Land and hold short of a designated point on a runway other than an intersecting runway or taxiway. (In this latter case, for example, holding short at a designated point may be required to avoid conflicts with the runway safety area/flight path of a nearby runway.) Each figure shows the approximate location of LAHSO markings, signage, and in-pavement lighting when installed. For further information on LAHSO markings, signage, and lighting, see the Airman's Information Manual, Chapter 2, "Aeronautical Lighting and Other Airport Visual Aids."

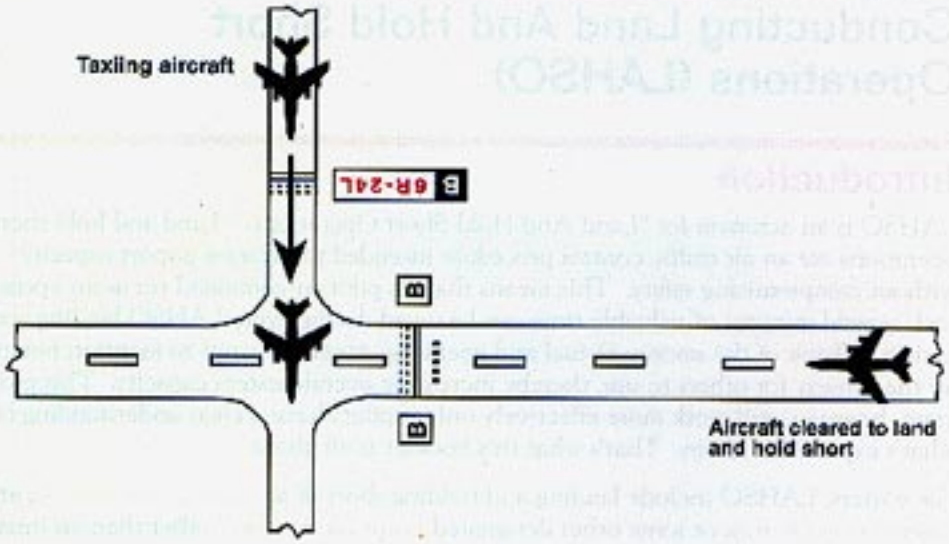

Figure 2–LAHSO of intersecting taxiway.

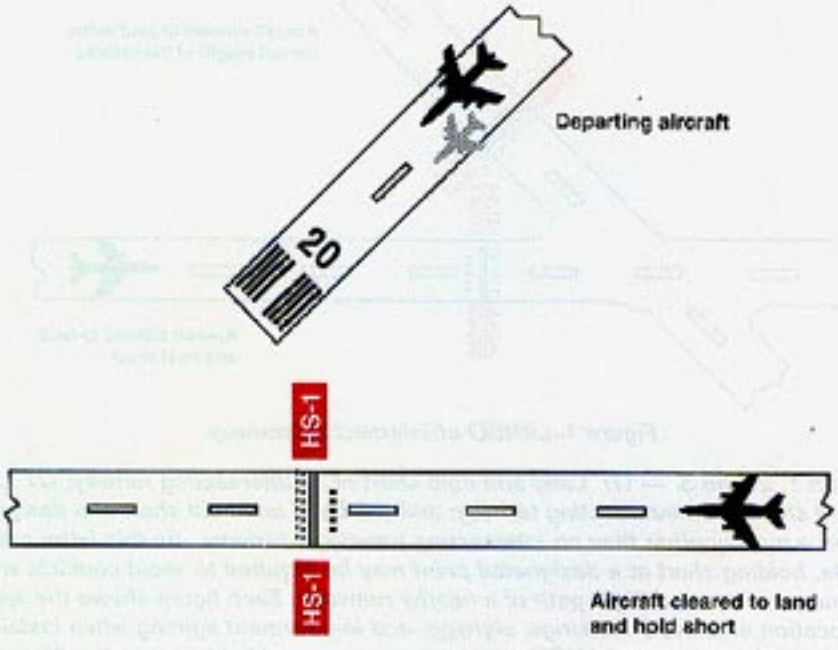

Figure 3–LAHSO of designated point on runway.

Background

For years, pilots have been asked to land and hold short of intersecting runways. Previously, the acronym "SOIR," for Simultaneous Operations on Intersecting Runways, was used exclusively to describe simultaneous operations on two intersecting runways—either two aircraft landing simultaneously or one aircraft landing while another was taking off.

SOIR has been used as a tool by air traffic controllers to increase airport capacity since 1968. SOIR has grown into a procedure now used at over 850 intersecting runway combinations at more than 220 airports in the United States, including many general aviation only (i.e., non FAR Part 139) airports.

Tens of thousands of safe landings and departures have been achieved using SOIR. As airport operations increase, operations such as SOIR will become even more important, allowing aviation to grow while keeping expensive airport construction and delays down.

The term LAHSO now replaces SOIR because SOIR is being expanded to include landing operations to hold short of an intersecting taxiway and to hold short of a designated point (such as a flight path hold short point). Increased LAHSO operations on wet runways are also anticipated.

Pilot Responsibilities and Basic Procedures

LAHSO is an air traffic control procedure that requires pilot participation to balance the needs for increased airport capacity and system efficiency, consistent with safety. This procedure can be done safely, provided pilots and controllers are knowledgeable and understand their responsibilities. With minimal additional preflight planning, pilots can help increase airport capacity—SAFELY! The following paragraphs outline specific pilot/operator responsibilities when conducting LAHSO.

At controlled airports, air traffic may clear a pilot to land and hold short provided certain weather minimums and runway lengths are available, among other considerations. Pilots may accept such a clearance provided that the pilot-in-command determines that the aircraft can safely land and stop within the Available Landing Distance (ALD). ALD data are published in the special notices section of the *Airport/Facility Directory (A/FD)*. Controllers will also provide ALD data upon request. Student pilots or pilots not familiar with LAHSO should not participate in the program.

The pilot-in-command has the final authority to accept or decline any land and hold short clearance. The safety and operation of the aircraft remain the responsibility of the pilot. Pilots are expected to decline a LAHSO clearance if they determine it will compromise safety.

FAR Part 121 and 135 operators (air carrier and air taxi) are required to develop appropriate training programs and procedures before receiving LAHSO approval authorization.

To conduct LAHSO, pilots should become familiar with all available information concerning LAHSO at their destination airport. Pilots should have, readily available, the published ALD and runway slope information for all LAHSO runway combinations at each airport of intended landing. Additionally, knowledge about the aircraft's landing performance data permits the pilot to readily determine that the ALD for the assigned runway is sufficient for safe LAHSO. As part of a pilot's preflight planning process, pilots should determine if their destination airport has LAHSO. Domestic *airports with LAHSO will have a note in the "Airport Remarks" section of the A/FD stating "See SPECIAL NOTICE—Land and Hold Short Operations."* For airports that have LAHSO, the preflight planning process should include an assessment of which LAHSO combinations would be acceptable given their aircraft's required landing distance. Good pilot decision making is knowing in advance whether one can accept a LAHSO clearance if offered.

The decision to accept a LAHSO clearance is completely up to the pilot. Many LAHSO combinations provide generous margins for most aircraft. Others may not. Consequently, it's up to the pilot or operator to establish their own margins and to use these standards as a basis to either accept or decline a LAHSO clearance.

If, for any reason, such as difficulty in discerning the location of a LAHSO intersection, wind conditions, aircraft condition, etc., the pilot elects to request to land on the full length of the runway, to land on another runway, or to decline LAHSO, the pilot is expected to promptly inform air traffic, ideally even before the clearance is issued. A LAHSO clearance, once accepted, must be adhered to, just as any other ATC clearance. The exceptions would be if an amended clearance is obtained or if an emergency occurs. A LAHSO clearance does not preclude a rejected landing.

Controllers need a full read back of all LAHSO clearances. In this read back, include the words, "HOLD SHORT OF (RUNWAY/TAXIWAY/OR POINT)." In order to reduce frequency congestion, pilots are encouraged to read back the LAHSO clearance without prompting. Don't make the controller ask for a read back!

A pilot who accepts a LAHSO clearance should land and exit the runway at the first convenient taxiway (unless directed otherwise) before reaching the hold short point. Otherwise, the pilot must stop and hold at the hold short point. If a rejected landing becomes necessary after accepting a LAHSO clearance, the pilot should maintain safe separation from other aircraft or vehicles, and should promptly notify the controller.

Determining Your Landing Distance

The following aircraft related factors apply to all LAHSO and, among other factors, should be considered when determining whether an aircraft can land and come to a full stop within the ALD, and, if necessary, can perform a rejected landing.

- The actual landing weight, flap setting, and approach speed to be flown during the final approach.
- The elevation of the airport.

- The ambient temperature. (Temperature affects density altitude and thus true airspeed. True airspeed affects ground speed as well as braking ability. It also affects rejected landing performance.)
- The atmospheric pressure, i.e., the altimeter setting.
- The wind component, i.e., whether the winds are steady or gusty.
- The effective runway gradient, i.e., the slope of the ALD.

  (NOTE: The average slope of the entire runway may differ from the slope for that portion of the runway used for LAHSO.)
- The published Threshold Crossing Height (TCH). Aircraft performance charts are based on a TCH of 50 feet. TCH data is published in the *A/FD* as well as on the instrument approach procedure charts. TCH's in excess of 50 feet will require a greater distance for landing.
- Existing runway surface conditions, as appropriate, e.g., a dry or wet runway.
- Regulatory landing requirements for the specific kind of operation. This section applies to all FAR Parts 121 and 135 LAHSO operations.

  (NOTE: All pilots conducting LAHSO must be aware of their aircraft's landing performance. This is especially true for operations conducted under FAR Part 91 (general aviation), since, unlike their air carrier counterparts, there are no regulatory "safety cushions" available to add to the aircraft's landing distance when conducting LAHSO. A good "rule-of-thumb" for any Part 91 operation is to add at least 1,000 feet to the published aircraft landing distance to cover any contingencies. General aviation pilots should recognize that landing performance data are calculated for given landing flap configurations, weights, and speeds. Any increase in the published final approach speed can result in increased landing distances.)
- Aircraft equipment required for landing should be fully operational prior to conducting LAHSO. Inoperative deceleration systems such as brake components, spoilers, anti-skid systems, etc., and their accompanying inoperative restrictions may be listed in the aircraft's Minimum Equipment List (MEL). MEL items should be reviewed prior to landing. (All pilots should consider the impact on stopping distance of any inoperative deceleration system.) Tire pressure should be checked periodically because it's critical to achieving published landing performance, especially when performing "LAHSO—Wet." An under-inflated tire increases the possibility of dynamic hydroplaning.
- Pilots in aircraft that have been modified with tires, wheels, brakes, or brake pads that differ from the original type design should consider the impacts of these modifications on landing roll out distances before accepting LAHSO clearances.

Remember... *Only accept a LAHSO landing clearance if it provides plenty of margin for the aircraft's landing performance!*

Additional Suggestions

LAHSO–General

- Airspeed control is the most important factor in achieving landing precision. Normally, the proper approach speed to be flown (for most but not all aircraft) is 1.3 Vso for the actual landing weight–often referred to as "Vref."

  (Note: Any additional airspeed on final (over and above 1.3 Vso) must be considered when determining whether an aircraft can land and stop within the published ALD. If there is ANY doubt, just say "no" and do not accept the clearance if offered.)

- Pilots should have their aircraft properly configured and stabilized for the LAHSO final approach segment. Since airspeed control is vital, coming in too fast is a set-up to landing long.
- Pilots should decline a LAHSO clearance whenever there is the potential for a wake vortex encounter from another aircraft or in potential wake vortex situations that necessitate a higher than normal approach path, resulting in a TCH greater than 50 feet and thus the possibility of landing long.
- From a flight planning perspective, if the *Airport/Facility Directory* states that LAHSO operations are conducted at a specific airport, expect and plan on receiving a LAHSO clearance. (See FAR Section 91.103.) Prior to departure, calculate your estimated required landing distance for the destination airport, and be fully prepared for a LAHSO clearance to any runway or hold short point. Don't be surprised!!
- Listen to the ATIS if available. If the ATIS says that LAHSO/SOIR operations are in effect, review all applicable LAHSO/SOIR combinations (given the existing wind conditions) and have a clear understanding of which combinations will work for you and which ones will not. If in doubt, ask the controller for the ALD.
- Pilots should be extra vigilant whenever there is a temporary displaced threshold.

  (NOTE: Controllers have ALD data readily available and will provide it upon request. It's a good idea to ask for the ALD if you are unsure or would like confirmation of the landing distance.)

- Pilots should be cautious when there is a tailwind on final. A tailwind component while on final approach or during the landing flare or roll-out can significantly increase the distance required for landing. Pilots should exercise extreme caution in accepting a LAHSO clearance whenever there is a reported tailwind component aloft of 10 knots or greater below 1,000 feet AGL.
- Pilots should consider a limiting maximum crosswind component of 15 knots (based on peak gusts) or when the Airplane Flight Manual (AFM), Pilot's Operating Handbook (POH), or Owner's Manual suggests lower limits.

- Pilots should decline a LAHSO clearance if there are reports of thunderstorms or wind shear near the airport. The reason for this is that adverse weather may require higher than normal approach speeds, and thus may contribute to landing long.
- In the event of a rejected landing, i.e., a balked landing, the pilot-in-command is responsible for maintaining safe separation from other aircraft, obstructions, including aircraft (or surface vehicles) on the intersecting runway or taxiway, and notifying ATC.

LAHSO–Situational Awareness

- 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 pilots in identifying their location on the airport, thus reducing requests for "progressive taxi instructions" from controllers.)
- Situational awareness includes effective pilot-controller radio communication. ATC expects pilots to specifically acknowledge and read back all LAHSO clearances as follows:

EXAMPLE:

ATC: "(AIRCRAFT ID) CLEARED TO LAND RUNWAY SIX RIGHT, HOLD SHORT OF TAXIWAY BRAVO FOR CROSSING TRAFFIC."

AIRCRAFT: "(AIRCRAFT ID), WILCO, CLEARED TO LAND RUNWAY SIX RIGHT TO HOLD SHORT OF TAXIWAY BRAVO."

ATC: "(AIRCRAFT ID) CROSS RUNWAY SIX RIGHT AT TAXIWAY BRAVO, LANDING AIRCRAFT WILL HOLD SHORT."

AIRCRAFT: "(AIRCRAFT ID), WILCO, CROSS RUNWAY SIX RIGHT AT BRAVO, LANDING TRAFFIC TO HOLD."

- For those airplanes flown with two crewmembers, effective intra-cockpit communication between cockpit crewmembers is also critical. There have been several instances where the pilot working the radios accepted a LAHSO clearance but then simply forgot to tell the pilot flying the aircraft.
- Situational awareness also includes a thorough understanding of the airport markings, signage, and lighting associated with LAHSO. These visual aids consist of a three-part system of yellow hold-short markings, red and white signage and, in certain cases, in-pavement lighting. Visual aids assist the pilot in determining where to hold short. Figures 1–3 depict how these markings, signage, and lighting combinations will appear once installed. Pilots are cautioned that not all airports conducting LAHSO have installed any or all of the above markings, signage, or lighting.

- Pilots should only receive a LAHSO clearance when there is a minimum ceiling of 1,000 feet and 3 statute miles visibility. The intent of having "basic" VFR weather conditions is to allow pilots to maintain visual contact with other aircraft and ground vehicle operations. Pilots should consider the effects of prevailing inflight visibility (such as landing into the sun) and how it may affect overall situational awareness.

LAHSO–Night

- Pilots should consider any additional risk factors when performing night LAHSO. For example, at night, depth perception decreases and often is compensated by crossing the runway threshold at higher than a normal TCH. This may result in the airplane touching down farther down the runway than originally planned.
- Lack of a visual or electronic "aim point" may cause an abnormal glide path, especially at night. While many runways already have 1,000 feet touchdown zone markers painted on them—sometimes referred to and used as "aim points"—runways less than 4,000 feet generally do not have these highly visible markings and therefore pilots must rely on some other visual "aim point" reference to establish the proper glide path. An improperly selected "aim point" may lead to landing long.

LAHSO–Wet Runways

- Pilots landing on wet runways face additional considerations. One such factor is the potential for dynamic hydroplaning. To minimize the risk of dynamic hydroplaning, make sure the aircraft's tires are inflated to the published tire pressure.
- Pilots are encouraged to provide braking action reports whenever conducting LAHSO, especially when performing "LAHSO-Wet."

For the most current information on LAHSO, refer to the latest edition of the Airman's Information Manual and other FAA guidance materials.

For additional copies contact:
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