



U.S. Department of  
Transportation

**Federal Aviation  
Administration**

# NSP GB

National Simulator Program  
FSTD Qualification Guidance Bulletin

**NSP GB 18-02**

**DATE: 09/20/2018**

Flight Standards Service  
Washington, DC

## **National Simulator Program Guidance Bulletin**

*An NSP GB contains valuable information for FSTD sponsors that should help them meet certain administrative, regulatory, or operational requirements with relatively low urgency or impact on safety.*

**Subject:** Modeling for FSTD Qualification Runway Status Lights (RWSL) and Land and Hold Short Operations (LAHSO)

**Purpose:** To provide FSTD sponsors guidance on the evaluation and qualification of Runway Status Lights (RWSL) and Land and Hold Short Operations (LAHSO), as necessary to accomplish training objectives.

**Regulatory References:** 14 CFR Part 60, Appendix A, Table A3C (Class II Airport Models), Sections 3.b. (runway lighting) and 3.d. (taxiway lighting).

**Background:** A runway incursion (RI) is defined as any occurrence at an airport involving the incorrect presence of an aircraft, vehicle, or person on the protected area of a surface designated for the landing and takeoff of aircraft. Reduction in the number and severity of runway incursions is one of the FAA's top priorities.

FAA data shows that pilot deviations are the largest cause of runway incursions<sup>1</sup> and there is an intense effort to expedite installation of new technologies at airports, conduct outreach, retrain pilots and improve airport infrastructure lighting, signage and markings. The FAA has also improved air traffic procedures for controllers and adopted international surface phraseology.

A heightened awareness of RI led to the development of [Runway Status Lights](#) (RWSL) and is FAA's response to [NTSB Recommendation A-00-66](#). RWSL is an automated system to provide immediate warnings of probable collisions/incursions" directly to flight crews in the cockpit analogous to the airborne conflict alert system to alert controllers to pending runway incursions". LAHSO is an acronym for "Land and Hold Short Operations." These operations 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

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<sup>1</sup> National Runway Safety Report 2013 – 2014

## REVISION HISTORY

Revision	Description of Change	Effective Date
0	Original Draft.	09/15/2018
1	On page 9 there was an error in the 3rd bullet. Changed from "Qualification of RWSL operations..." to "qualification of LAHSO operations...."	09/20/2018

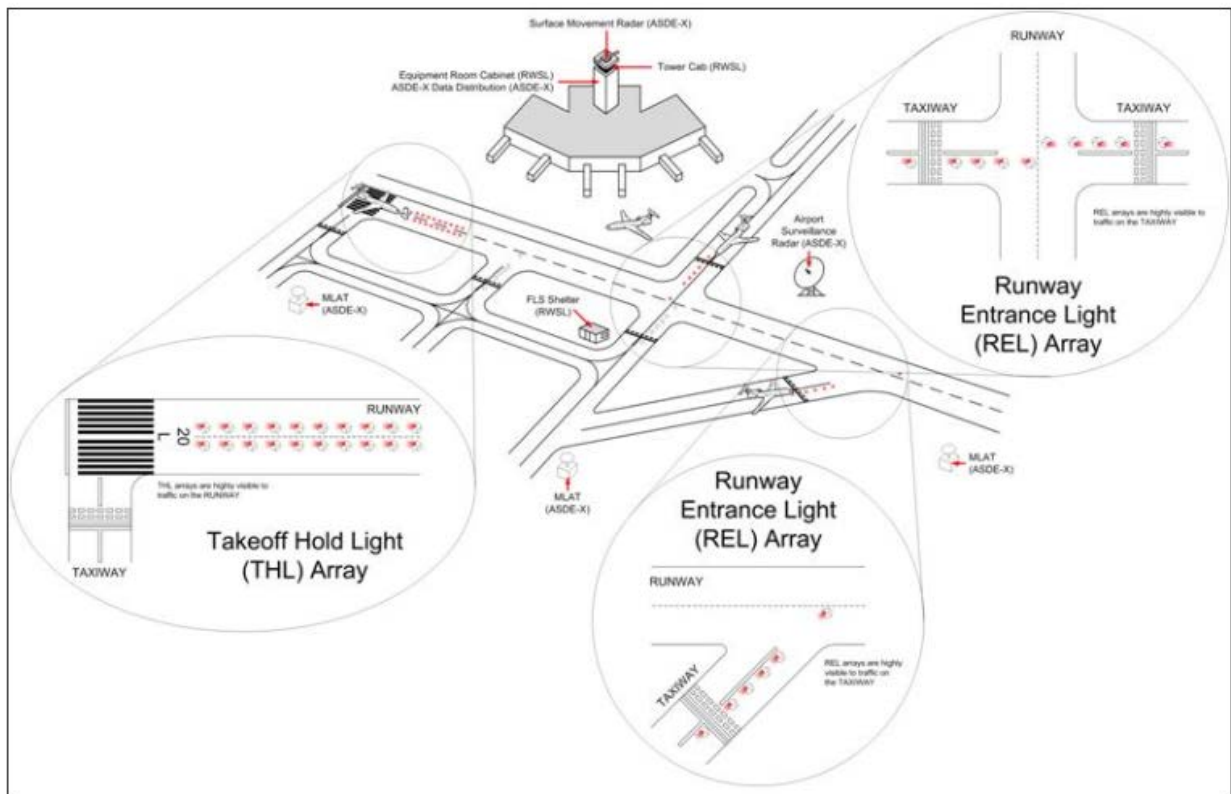
# Runway Status Lights (RWSL)

## RWSL Concept of Operations

Runway Status Lights is an essential FAA system which uses Airport Surface Detection Equipment, Model X surveillance data to determine vehicle and aircraft locations. Runway Status Lights processes this data using complex software algorithms with adjustable parameters to control airfield lights in accordance with Air Traffic operations, including anticipated separation. Red airfield lights (Runway Entrance Lights and Takeoff Hold Lights) illuminate and extinguish as vehicles and aircraft traverse the airfield.

## Runway Status Lights – RELs and THLs

Runway Entrance Lights (RELs) and Takeoff Hold Lights (THLs): RWSL are a series of red in-pavement lights that warn pilots of high-speed aircraft or vehicles on runways which operate independently of Air Traffic Control. Runway Status Lights have two states: ON (lights are illuminated red) and OFF (lights are off) and are switched automatically based on information from airport surface surveillance systems. Controllers can set in-pavement lights to one of five brightness levels to assure maximum conspicuity under all visibility and lighting conditions. Controllers can also shutdown RSL under specific conditions.



The RWSL system has two types of lights. Runway Entrance Lights (RELs) are installed at taxiways and Takeoff Hold Lights (THLs) on runways.

### **Runway Entrance Lights (REL)**

The Runway Entrance Lights system is composed of flush mounted, in-pavement, unidirectional fixtures that are parallel to and focused along the taxiway centerline and directed toward the pilot at the hold line. A specific array of Runway Entrance Lights include the first light at the hold line followed by a series of evenly spaced lights to the runway edge; and one additional light at the runway centerline in line with the last two lights before the runway edge. When activated, these red lights indicate that there is high speed traffic on the runway or there is an aircraft on final approach within the activation area.

1. Operating Characteristics – Departing Aircraft: When a departing aircraft reaches 30 knots, all taxiway intersections with Runway Entrance Lights arrays along the runway ahead of the aircraft will illuminate. As the aircraft approaches a Runway Entrance Lights equipped taxiway intersection, the lights at that intersection extinguish approximately 2 to 3 seconds before the aircraft reaches it. This allows controllers to apply "anticipated separation" to permit Air Traffic Control to move traffic more expeditiously without compromising safety. After the aircraft is declared "airborne" by the system, all lights will extinguish.
2. Operating Characteristics – Arriving Aircraft: When an aircraft on final approach is approximately 1 mile from the runway threshold all sets of Runway Entrance Light arrays along the runway will illuminate. The distance is adjustable and can be configured for specific operations at particular airports. Lights extinguish at each equipped taxiway intersection approximately 2 to 3 seconds before the aircraft reaches it to apply anticipated separation until the aircraft has slowed to approximately 80 knots (site adjustable parameter). Below 80 knots, all arrays that are not within 30 seconds of the aircraft's forward path are extinguished. Once the arriving aircraft slows to approximately 34 knots (site adjustable parameter), it is declared to be in a taxi state, and all lights extinguish.
3. What a pilot would observe: A pilot at or approaching the hold line to a runway will observe Runway Entrance Lights illuminating and extinguishing in reaction to an aircraft or vehicle operating on the runway, or an arriving aircraft operating less than 1 mile from the runway threshold.

### **Takeoff Hold Lights (THL)**


The Takeoff Hold Lights system is composed of in-pavement; unidirectional fixtures in a double longitudinal row aligned either side of the runway centerline lighting. Fixtures are focused toward the arrival end of the runway at the "line up and wait" point and they extend for 1,500 feet in front of the holding aircraft. Illuminated red lights provide a signal, to an aircraft in position for takeoff or rolling, that it is unsafe to takeoff because the runway is occupied or about to be occupied by another aircraft or ground vehicle. Two aircraft, or a surface vehicle and an aircraft, are required for the lights to illuminate. The departing aircraft must be in position for takeoff or beginning takeoff roll. Another aircraft or a surface vehicle must be on or about to cross the runway.

1. Operating Characteristics – Departing Aircraft: Takeoff Hold Lights will illuminate for an aircraft in position for departure or departing when there is another aircraft or vehicle on the runway or about to enter the runway (see FIG 2-1-9.) Once that aircraft or vehicle exits the runway, the Takeoff Hold Lights extinguish. A pilot may notice lights extinguish prior to the downfield aircraft or vehicle being completely clear of the runway but still moving. Like Runway Entrance Lights, Takeoff Hold Lights have an "anticipated separation" feature.
2. What a pilot would observe: A pilot in position to depart from a runway, or has begun takeoff roll, will observe Takeoff Hold Lights illuminating in reaction to an aircraft or vehicle on the runway or about to enter or cross it. Lights will extinguish when the runway is clear. A pilot may observe several cycles of lights illuminating and extinguishing depending on the amount of crossing traffic

## FSTD Evaluation Criteria and Considerations for RWSL Qualification

In order to issue FSTD qualification for RWSL training, the NSP will evaluate the FSTD for RWSL operations at a minimum of one correctly modeled “in-use” runway. The NSP will use the following criteria in conducting the FSTD evaluation and issuing qualification for RWSL operation:

- RWSL operation may be demonstrated at a Class I, Class II or Class III airport model.
- A method should be provided on the IOS panel to turn ON the Runway Status Lights (RWSL) function prior to RWSL operations and to activate the RWSL lights when crossing or interfering aircraft or vehicles enter the active runway environment when the own-ship is on the active runway or in position for departure.
- RWSL lights should operate automatically when conflicting ground or air traffic is selected by the instructor; however, a manual IOS operation from the IOS instructor will be acceptable.
- As of this GB release, RWSL are in operation at LAX, SFO, MCO, PHX, IAH, SEA, IAD, LAS, CLT, ORD, JFK, LGA, BOS, MSP, EWR, DFW, DTW, BWI and FLL. Where a “real world” in-use runway is equipped with RWSL at a Class I or Class II airport model, this feature should be incorporated into the FSTD’s visual models. See [Runway Status Lights for most up to date listing of airport with RWSL](#).
- On the Jeppesen approach plate, Runway Status Lights (RWSL) at an airport, such as KFLL, is carried as a note normally in the GENERAL note section of the 10-9A page.
- Qualification of RWSL operations will be indicated section 3.a. of the FSTD’s Statement of Qualification.

**KFLL/FLL**  **FT LAUDERDALE, FLA**  
 25 MAR 16 **10-9A** Eff 31 Mar **-HOLLYWOOD INTL**

<b>GENERAL</b>				
Flocks of birds on and in vicinity of airport.				
All runways are noise sensitive - noise abatement in effect; contact airport noise abatement office.				
Preferential runway use program in effect. Contact noise abatement office for details.				
Turbulence below 1000' over landfill located 2 NM west.				
ASDE-X in use. Operate transponders with altitude reporting mode and ADS-B (if equipped) enabled on all taxiways and runways.				
Air carrier aircraft use ramp pushback procedures as prescribed by airport operations.				
Arrival aircraft from the north and west maintain 6000' until abeam Rwy 28R on downwind.				
Arrival aircraft from the north maintain 6000' until abeam Rwy 10L on downwind.				
Runway status lights in operation.				
Terminal Doppler Weather Radar.				
<b>ADDITIONAL RUNWAY INFORMATION</b>				
RWY	LANDING BEYOND		TAKE-OFF	WIDTH
	Threshold	Glide Slope		

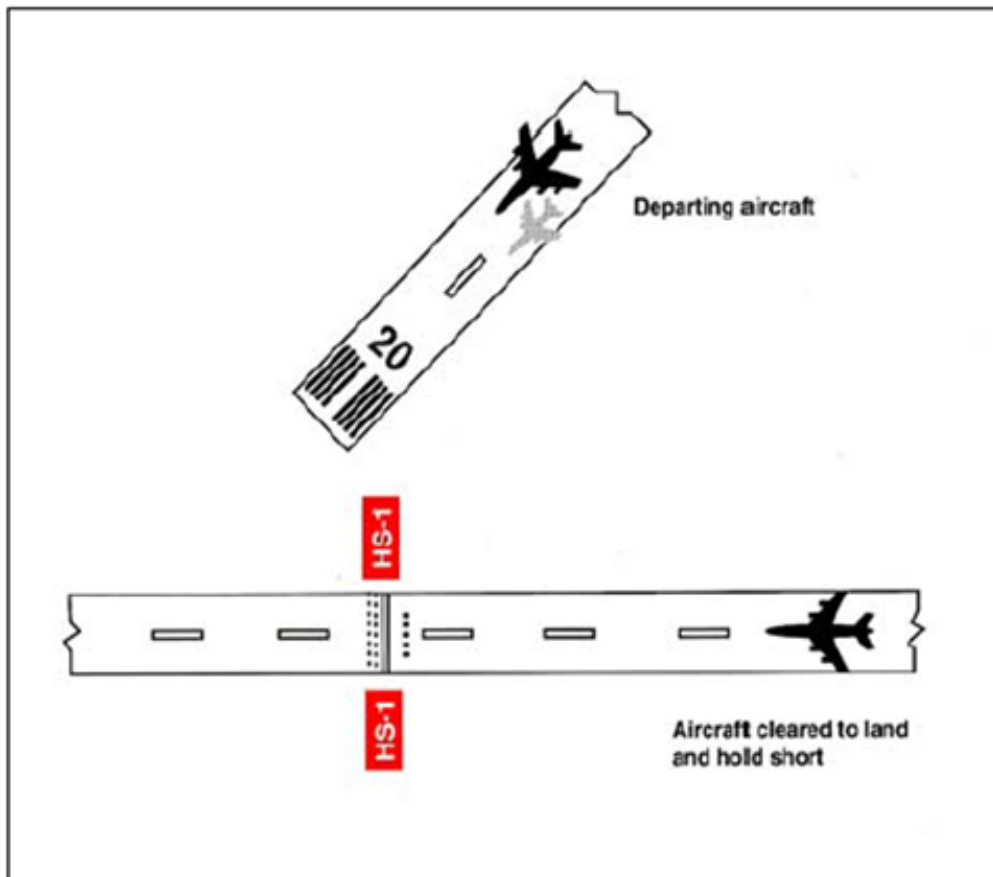
The latest information on RWSL to include active and planned airport locations, airport diagrams and photos/video of the system is available at [Runway Status Lights](#).

## Land and Hold Short Operations (LAHSO)

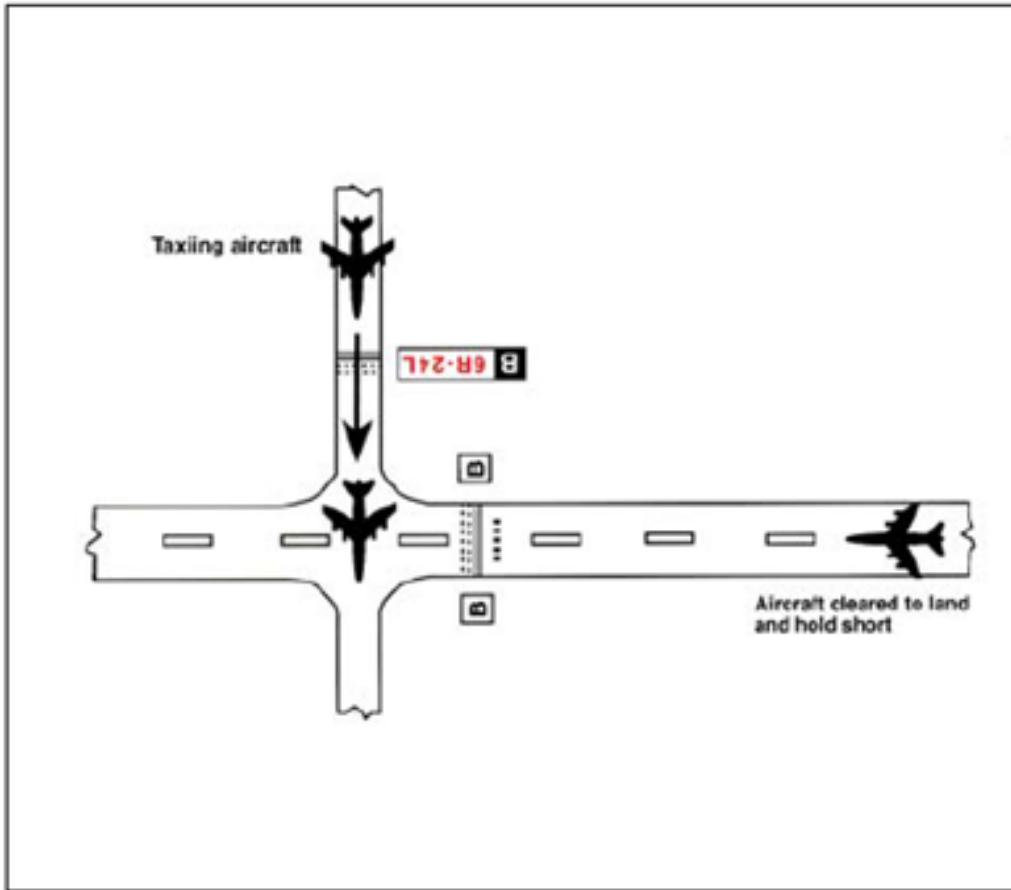
LAHSO operations include landing and holding short of an intersecting runway, an intersecting taxiway, or some other predetermined point on the runway other than on a runway or taxiway. Previously, SOIR, the acronym for "simultaneous operations on intersecting runways," was used exclusively to describe simultaneous operations on two intersecting runways -either two aircraft landing simultaneously or one aircraft landing and another one departing. The term LARSO incorporates SOIR and is expanded to include holding short of a taxiway and holding short of predetermined points on the runway.

### Examples of LAHSO Operations

Hold Short of a Designated Point on a Runway other than an Intersecting Runway or Taxiway

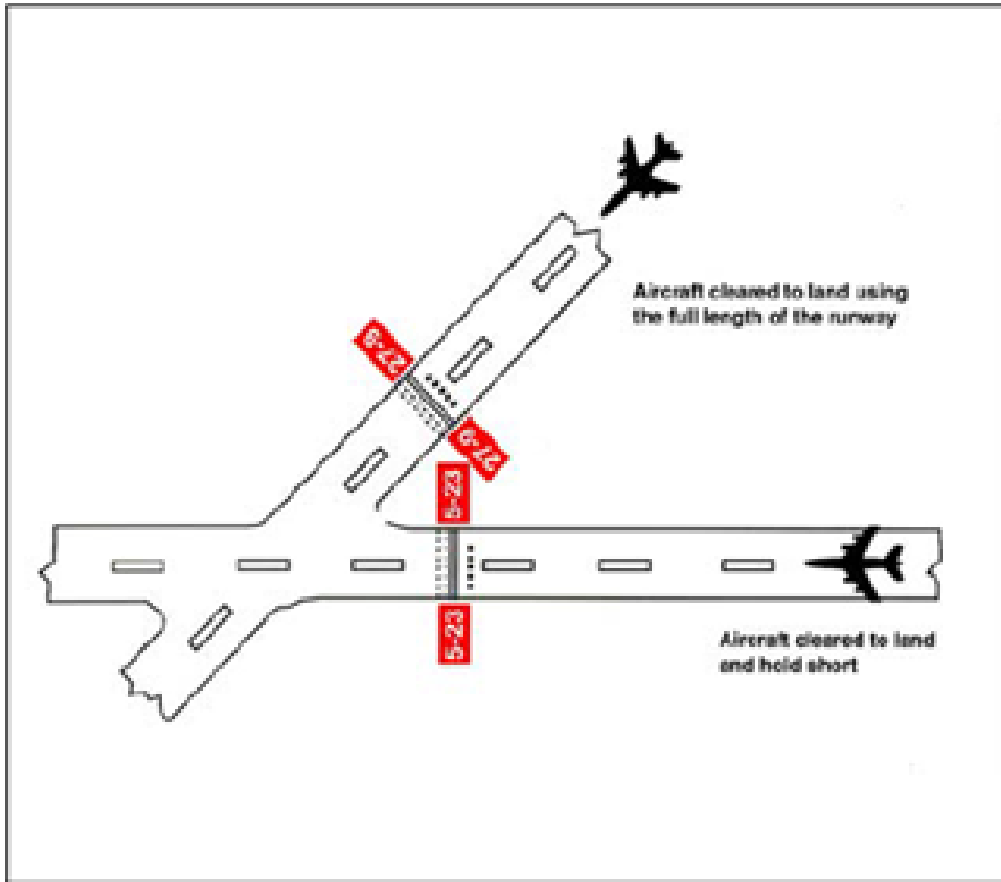


# Land and Hold Short of an Intersecting Taxiway





## Land and Hold Short of an Intersecting Runway



### FSTD Evaluation Criteria for LAHSO Qualifications

In order to issue FSTD qualification for LAHSO training, the NSP will evaluate the FSTD for LAHSO operations at a minimum of one correctly modeled “in-use” runway at a Class I, II, or III airport model.

- Where a “real world” in-use runway is equipped with LAHSO signage or lights at a Class I or Class II airport model, this feature should be incorporated into the FSTD’s visual models.
- LAHSO lighting should be controllable at the IOS.
- Qualification of LAHSO operations will be indicated section 3.a. of the FSTD’s Statement of Qualification.

The following LAHSO features will be evaluated for FSTD qualification:

**Available Landing Distance (ALD)** - *The portion of a runway available for landing and rollout for aircraft cleared for LAHSO as measured from the landing threshold to the hold-short point.*

**Hold-Short Point** - *A point on the runway beyond which a landing aircraft with a LAHSO clearance is not authorized to proceed.*

**Hold-Short Position Marking** - *The painted runway holding position marking located at the hold short point on all LAHSO runways.*

**Hold-Short Position Signs** - *Red and white holding position signs located alongside the hold short point*

**Land-And-Hold-Short Lights** - *Six or seven in-pavement, pulsing white lights at the LAHSO hold-short point*

**Vertical Guidance** - *Visual or electronic glide slope, a precision approach path indicator (PAPI) or Visual Approach Slope Indicator (VASI)*

For addition information, photos, diagrams and descriptions of LAHSO signage and lights, see references below.

#### **LAHSO References:**

[Land and Hold Short Operations \(FAA Order JO 7110.118A\)](#)

[Standards for Airport Sign Systems \(AC 150/5340-18F\)](#)

[Standards for Airport Markings \(AC 150/5340-1J\)](#)

[Runway Incursion Avoidance \(Runway Markings\)](#) pages 1-13 thru 1-22

**Contact:** Questions or comments regarding this NSP guidance bulletin can be directed to the National Simulator Program, AFS-205, at (404) 474-5620.