

RUNWAY INCURSION BASELINE REMEDIAL TRAINING LESSON PLAN

RUNWAY INCURSION REMEDIAL TRAINING CONCEPT

The baseline lesson plan is designed for a traditional ground school in a classroom environment. The plan is to include collaboration between the FAASTeam Regional Program Manager (FPM) and the respective Regional Runway Safety Group Office. This lesson plan provides a standard baseline plan that, at the discretion of the FPM, can be added to but not reduced, for the presenter to provide remedial training to a pilot found to have caused a runway incursion.

REMEDIAL TRAINING OBJECTIVE

The pilot will learn to recognize, and understand the importance, and meaning of airport signage, runway markings, correct ATC communications, and operational pre-taxi, and taxi procedures that will mitigate a pilot from causing a runway incursion.

REMEDIAL TRAINING COMPLETION STANDARD

In accordance with the remedial training contract, the pilot will demonstrate their knowledge of the meaning and importance of airport signage, runway markings, correct ATC communications, and operational pre-taxi, and taxi procedures that will mitigate a pilot from causing a runway incursion through questions, and as stipulated in the remedial training contract, perform a demonstration flight.

LESSON PLAN CONTENT

Attention—Relate the causal factors of the Runway incursion in which the pilot caused, and the mitigations available.

Relate similar personal knowledge of any similar Runway Incursion Pilot Deviation.

Motivation—Tell pilot/student that runway incursions have sometimes led to serious accidents with significant loss of life. Although they are not a new problem, current runway incursion reports indicate that general aviation operations accounts for the largest percentage of runway incursions. .

Overview—Explain what will be learned. Explain how the lesson will proceed. Define a runway incursion. Discuss complete preflight planning, to include NOTAMs, and reference to Runway Safety Group website at:

[\(http://www.faa.gov/airports/runway_safety/pilots/best_practices/\)](http://www.faa.gov/airports/runway_safety/pilots/best_practices/).

Pilots need to learn how to obtain NOTAMs, find items within the NOTAM that will affect their flight and ground operations, ie airport runway conditions, closures, and how to interpret NOTAMs. Increase the pilot's knowledge and meaning of airport signage, runway markings, the importance of a sterile cockpit, having a current airport diagram of the airports to be used, where HOT SPOTS are, writing down the taxi clearance, asking ATC to clarify anything you do not understand, and more information and procedures to come during the training. The student will be required to read the materials, and

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review/practice the procedures. The pilot will be evaluated throughout the training through question and answer sessions as developed by the presenter, in accordance with the Aviation Instructor's Handbook, appendix B.

References—FAA-H-8083-3, FAA-H-8083-25, AC 91-73; AIM, Airport AC 150/5210-20, Runway Safety Pilot's Guide to Safe Surface Operations (Line up and Wait replaced Position and Hold), NOTAM reading, specific to Runway and Taxi way closures and surface condition. Recommend using FAA Order 7930.2M., and extract Runway Surface NOTAM acronyms and explanations.

FAA NOTAM website: http://www.faa.gov/pilots/flt_plan/notams/

TRAINING SYLLABUS:

- ☑ Distinct challenges and requirements during taxi operations not found in other phases of flight operations.
 - ☑ Preflight Planning and NOTAMs
 - ☑ Taxi operation planning procedures
 - ☑ Sterile cockpit for ground operations.
 - ☑ Procedures for appropriate cockpit activities during taxiing.
 - ☑ Procedures for steering, maneuvering, maintaining taxiway and runway position situational awareness.
 - ☑ Procedures for increased awareness when Air Traffic utilizes a runway for a taxiway.
 - ☑ Procedures for eliminating distractive behavior.
 - ☑ Procedures for holding the pilot's workload to a minimum during taxi operations.
 - ☑ Procedures to insure that clearance or instructions that are actually received are adhered to rather than the ones expected to be received.
 - ☑ Procedures to maintain/enhance situational awareness when conducting taxi operations in relation to other aircraft operations in the vicinity as well as to other vehicles moving on the airport.
 - ☑ Procedures for briefing the landing roll out and runway exit.
 - ☑ Procedures for operations at an airport with an operating air traffic control tower, with emphasis on ATC communications and runway entry/crossing authorizations.
 - ☑ Procedures to mitigate a runway incursion at non-towered airports.
 - ☑ Procedures unique to night operations.
 - ☑ ATC communications and pilot actions before takeoff, before landing, and after landing at towered and non-towered airports.
 - ☑ The relevance/importance of hold lines.
 - ☑ Use of aircraft exterior lighting.
 - ☑ Low visibility operations.
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LESSON PLAN CONTENT:

1. Preflight Planning and Procedures to avoid causing a runway incursion:

- All D NOTAMs shall have one of the following keywords as the first part of the text:
 - RWY, TWY, RAMP, APRON, AD, OBST, NAV,
 - COM, SVC, AIRSPACE, (U), or (O). Note: AD means Aerodrome, OBST means Obstacle, NAV means Navigation Aid, COM means Communications, SVC means Services, AIRSPACE, self-explanatory, (U) means unverified aeronautical information, and (O) means Other Aeronautical Information received from any authorized source that may be beneficial to aircraft operations and does not meet defined NOTAM criteria. Any such NOTAM will be prefaced with “(O)” as the keyword following the location identifier.
- Taxi route planning.
 - ☑ Base your plans on information from:
 - The Automatic Terminal Information Service (ATIS),
 - Notices to Airmen (NOTAMs), recent experience at that airport, and on a review of the current airport diagram.
 - However, don't take for granted that this is the taxi route you will receive from the controller.
 - Focus pre-taxi plans on the departure airport, and pre-landing plans on the arrival airport.
 - Take time to study the airport layout of your departure and arrival airports.
 - Note and brief airport HOT SPOTS
 - Have the appropriate, current airport diagram readily available:
 - Use not only during the planning phase also during taxi.
 - Minimize cockpit tasks and always practice being in “heads up” mode.
 - While on the taxi route, especially when navigating through complex intersections, and crossing intervening runways.
 - Check the expected taxi route against the current airport diagram or taxi chart. Pay special attention to any complex intersections (for example, more than two crossing pavements along the taxi route) or specific areas designated as “Hot Spots.” Definition of Hot Spot found in FAA AFD, page 548, Definition of Hot Spot:
 - Heightened awareness when ATC utilizes a runway as a taxiway. Be alert of the possible lack of crossing runway signage and markings as you approach an intersecting runway.

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- Definition of Hot Spot: A “hot spot” is a runway safety related problem area on an airport that presents increased risk during surface operations. Typically it is a complex or confusing taxiway/taxiway or taxiway/runway intersection. The area of increased risk has either a history of or potential for runway incursions or surface incidents, due to a variety of causes, such as but not limited to: airport layout, traffic flow, airport marking, signage and lighting, situational awareness, and training. Hot spots are depicted on airport diagrams as open circles or polygons designated as “HS 1”, “HS 2”, etc. Hot spots will remain charted on airport diagrams until such time the increased risk has been reduced or eliminated.
- **Verify your assigned route** on the airport diagram or verbally after receiving taxi instructions from the controller.
- **When in doubt, stop and ask for help** or clarification from Air Traffic.
- ☑ **Air Traffic Control (ATC) Instructions** Once taxi instructions are received, you should:
 - Write down taxi instructions, especially instructions that are complex. This can help reduce your vulnerability of forgetting part of the instruction.
 - Taxi at a slow speed to permit time to stop your aircraft so to comply with an ATC hold short instruction.
 - ATC using a runway as a taxiway. Be aware of runways you must be cleared to cross. Some runways may not have hold short lines to alert you of a runway ahead. Be alert, and ask ATC if you are cleared to cross.
 - Monitor ATC clearances/instructions issued to other aircraft.
 - Be especially vigilant if another aircraft has a similar sounding call sign.
 - Listen carefully to avoid taking a clearance/instruction intended for someone else.
 - Ask immediately if you are uncertain about any ATC instruction or clearance.
 - Read back all clearances/instructions with your aircraft call sign.
 - Remember an ATC instruction to taxi to a runway **is not** a clearance to cross the assigned takeoff runway, or to taxi on that runway at any point. Current instruction reference AIM:
When assigned a takeoff runway, ATC will first specify the runway, issue taxi instructions, and state any hold short instructions or runway crossing clearances if the taxi route will cross a runway. does not authorize the aircraft to “enter” or “cross” the assigned departure runway at any point.
- Advise ATC if you anticipate a delay, or are unable to comply with their instructions.

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- Look for light gun signals from the tower if you suspect radio problems.

Maintain Situational Awareness:

- When taxiing on the airfield, you need to be aware of your location on the airfield, and how that location relates to your intended taxi route, and to other aircraft and vehicles that may be operating on the airfield. This is commonly referred to as “situational awareness.”
- Understand and follow ATC instructions and clearances.
- Use an airport diagram.
- Know the meaning of the visual aids available at the airport, such as airfield markings, signs, and lights.
- Maintain a “sterile” cockpit. You must be able to focus on your duties without being distracted by non-flight related matters like engaging in conversation about good restaurants, tee times, or who is going to meet you at the airport.
- **Advise ATC and, if necessary, request progressive taxi instructions.**
- **If you become uncertain about your location on the airport movement area, make sure you are clear of any runway and STOP THE AIRCRAFT.**

☒ **While Taxiing**

- Use extra caution when directed to taxi on a runway, especially at night and during reduced visibility conditions.
- Use all resources available to keep your aircraft on its assigned taxi route, including:
 - Have the airport taxiway diagram for reference
 - Use the heading indicator to ensure correct direction to taxi
 - Make sure you comply with hold short or crossing instructions when approaching an entrance to an active runway.
- Scan the full length of the runway and the final approaches before entering or crossing any runway, even if you have received a clearance.

☒ **After Landing:**

- Use utmost caution after landing on a runway where the exit taxiways intersect another runway.
- Determine if a taxiway exit will place the pilot in close proximity to another runway which can result in a runway incursion.
- Appropriate after landing/taxi procedures in the event the aircraft is on a taxiway that is between parallel runways.
- Do not exit onto another runway without ATC authorization.

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- Do not accept last minute turnoff instructions from the tower unless you clearly understand the instructions and are certain that you can safely comply.
- Do not initiate non-essential communications or actions after landing.
- ☑ **Use Exterior Aircraft Lights and Line Up and Wait as Follows:**
 - When ATC issues intersection “Line Up and Wait” instructions and takeoff clearances, the intersection designator will be used.
 - If two or more aircraft call the tower ready for departure, one or more at the approach end of the runway and one or more at the intersection, the controller will state the location of the aircraft at the full length of the runway when authorizing that aircraft to taxi to Line Up and Wait or when clearing that aircraft for takeoff.
 - During daytime as well as nighttime operations, exterior aircraft lights may be used to make an aircraft operating on the airport surface more conspicuous, and to convey location and intent to other pilots.
 - Engines: Running turn on the rotating beacon.
 - Taxiing: Prior to commencing taxi, turn on navigation/position, strobe*, taxi, and logo lights, if available.
 - Crossing a Runway: All exterior lights should be illuminated when crossing a runway. You should consider any adverse effects to safety that illuminating the forward facing lights will have on the vision of other pilots or ground personnel during runway crossings.
 - Entering the Departure Runway After Takeoff Clearance Received: Turn on all exterior lights* () to make your aircraft more conspicuous.
- ☑ ☐ **Line Up and Wait**
 - ATC uses the “Line Up and Wait” when a takeoff clearance cannot be immediately issued due to traffic or other reasons.
 - Pay close attention when instructed to “Line Up and Wait,” especially at night or during periods of low visibility.
 - Before entering the runway, remember to:
 - Scan the full length of the runway, and Scan for aircraft on final approach or landing roll out.
 - Turn on landing lights only when takeoff clearance is received, or when commencing takeoff roll at an airport without an operating control tower.
 - **Consider lining up slightly to the left or right of the centerline (approximately 3 feet) when holding in position at night so landing aircraft can differentiate your aircraft from runway lights.**

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- When placing you into “Line Up and Wait,” ATC should advise you of any delay in receiving your takeoff clearance, for example, landing or departing aircraft, wake turbulence, or traffic on an intersecting runway.
- If a takeoff clearance is not received within a reasonable time after instructed to “Line Up and Wait,” contact ATC. **(90 SECONDS)**

Note: There have been some collisions and several incidents involving aircraft instructed to Line Up and Wait waiting for a takeoff clearance. The FAA’s analysis indicates that two minutes or more elapsed between the time an instruction was issued to “Line Up and Wait” and the resulting collision, land over, or go around by an aircraft cleared to land. Current guidance is to contact ATC if you have been holding in position for **90 SECONDS**.

☒ **Good Radio Technique**

- Effective pilot/controller communications are key to safe surface operations. You can enhance the controller’s understanding by responding appropriately and using standard phraseology.
- Prepare first; your transmission should be well thought out. Before keying your transmitter.
- Know what you want to say and check to make sure you are on the proper frequency.
- Communication with ATC should be concise and to the point.
 - For unusual situations or lengthy communications, initial contact should be established first.
 - Acknowledge all clearances with your aircraft call sign. It is permissible to begin or end your transmission with your aircraft’s call sign.

☒ **Communications**

- Use proper communications procedures when contacting ATC. Your initial transmission should contain these elements:
 - State who you are calling
 - Use your aircraft’s call sign
 - State where you are located on the airfield
 - Provide ATC that you have alphabetical code for the ATIS, if available, and state briefly, what you want to do
 - State your position whenever making initial contact with any tower or ground controller, regardless of whether you have previously stated your position to a different controller.
 - Use standard ATC phraseology at all times in order to facilitate clear and concise pilot/controller communications.
 - Focus on what ATC is instructing. Do not perform any non-essential tasks while communicating with ATC.

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- Read back all clearances/instructions to enter a specific runway, Hold short of a runway, or “Line Up and Wait: on the runway designator, and taxiway intersection when appropriate.
- When cleared to Line Up and Wait and when on final approach, actively monitor the assigned tower frequency, or the Common Traffic Advisory Frequency (CTAF), for potential conflicts involving your runway.
- Read back all runway assignments.
- Read back all takeoff and landing clearances, including the runway designator.
- If unfamiliar with the taxi routes at an airport, ask for progressive taxi instructions.
- When you are instructed to monitor a frequency, you should listen without initiating contact. The controller will initiate contact.
- Clarify any misunderstanding or confusion concerning ATC instructions or clearances.

2. Airfield markings, signs, and lights are designed to assist you in navigating around the airfield and during landing and takeoff. Airfield Markings – Understanding the Differences

- **Airfield markings Content:**
 - Runway markings are white (although yellow taxiway centerlines may lead on, lead off, or cross the runway).
 - Taxiway markings are yellow.
 - Markings on aprons and in ramp areas may include other colors besides yellow (for example, it is common to mark vehicle roadways in white).



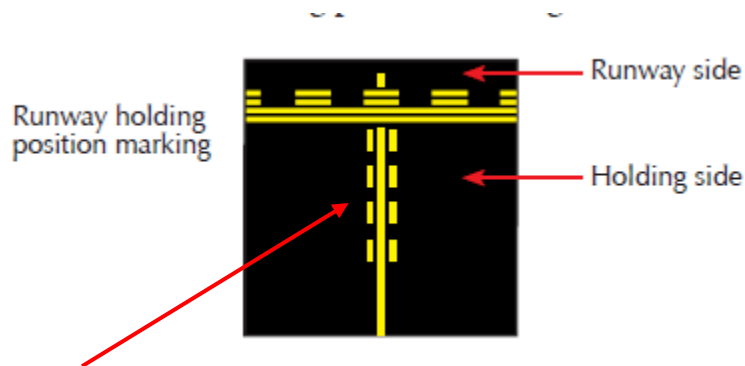
- *Taxiway marking patterns*

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- If a marking pattern consists of two or more lines - some of which are solid and some of which are dashed, It is always permissible to cross from the dashed side to the solid side.
- ATC permission is always required to cross from the solid side to the dashed side at an airport with an operating control tower.

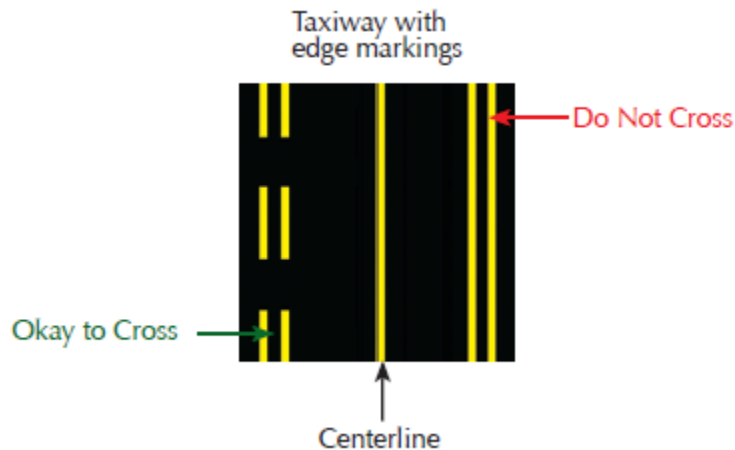


- When instructed to “Hold Short,” always stop prior to first solid line of the holding position marking.



Note: To alert pilots that they are approaching a runway, the taxiway centerline is enhanced with dashed yellow lines on both sides of the centerline 150 feet prior to the runway holding position marking at many airports.

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- Never cross solid double yellow lines on the edge of a taxiway. However, it is permissible to cross dashed, double yellow lines.
- **Airfield Signs – How to Get from Here to There Safely:**

Along with airfield markings and lights, airfield signs are designed to assist you in navigating around the airfield. • It is essential that you understand the color coding and meaning of these four types of signs when taxiing on an airfield.

- **Location Sign:** Identifies the taxiway or runway you are currently located on. It has a yellow inscription on a black background. *Remember: Black Square, You're There.*



- **Mandatory Instruction Sign:** Identifies the entrance to a runway or critical area, and areas prohibited for use by aircraft. It has a white inscription on a red background.



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- **Direction Sign:** Identifies the designations of taxiways leading out of an intersection along with an arrow indicating the approximate direction of turn needed to align the aircraft on that taxiway. They are located prior to the intersection normally on the left side. It has a black inscription on a yellow background.

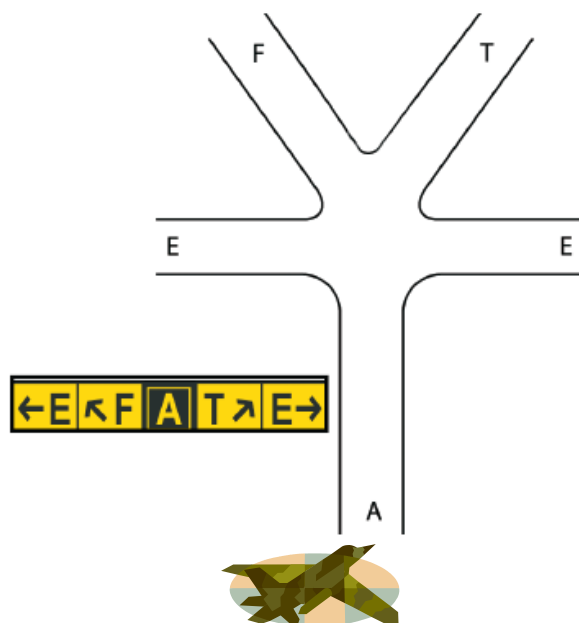


- **Destination Sign:** Identifies with arrows the directions to specific destinations on the airfield (for example, runways, terminals, and fixed base operators). It also has a black inscription on a yellow background. *Remember: Yellow Array Points the Way.*



Examples of Airfield Sign Usage:

- **Sign Arrays:** Grouping of direction signs. Orientation of signs is from left to right in a clockwise manner. Left turn signs are on the left of the location sign and right turn signs are on the right of the location sign.



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- **Holding position sign:** This sign is located next to the yellow holding position markings painted on taxiways that intersect a runway. This sign indicates that the threshold for Runway 15 is to your left; the threshold for Runway 33 is to your right.



Note - If you are facing solid lines, be sure you are cleared to enter or cross the runway. The dashed lines are always on the side toward the runway.

DO NOT CROSS THE RUNWAY HOLD LINES AND ENTER A RUNWAY UNLESS YOU ARE ABSOLUTLY POSITIVE THAT ATC HAS CLEARED YOU ONTO THE RUNWAY

Airfield Lights

There are many different lighting combinations that may be located on some airports, especially where aircraft operations are conducted in the lower visibility ranges. For taxiing operations during Visual Meteorological Condition (VMC) operations you should remember the following:

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Runway edge lights are white (although on the last 2,000 feet of an instrument runway the edge lights will be yellow). Note: Picture also shows runway centerline and touchdown zone lights.



Taxiway edge lights or reflectors are blue.

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Taxiway centerline lights or reflectors are green, except for the lead-on and lead-off lights, which alternate yellow and green to indicate the aircraft is entering or leaving the runway environment.



Runway guard lights are flashing yellow lights (either in the pavement or located on the side of the taxiway) and highlight a runway holding position.

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Runway holding position as viewed from a taxiway centerline. This holding position has both above ground and in-pavement runway guard lights.

- Never taxi across a row of illuminated red lights. This is a stopbar, do not proceed until the lights are turned off.

Remember:

BE AWARE. DO NOT CAUSE A RUNWAY INCURSION. A RUNWAY INCURSION CAN CAUSE A TREMENDOUS LOSS OF LIFE AND PROPERTY.

- A majority of runway incursions result from pilots acknowledging ATC hold short instructions and then proceeding across the hold short line anyway.
- *Runway holding position markings on taxiways* identify the locations where an aircraft is required to stop when it does not have authorization to proceed onto the runway (you will also see a red and white holding position sign).
- When instructed by ATC to “Hold short of runway ‘xx,’” you should read back the instruction and stop so no part of the aircraft extends over the first solid line of the holding position marking.
- Keep your head up, set back distances to runway holding position markings may be vary at different airports.
- When approaching the holding position marking, you should not cross the marking without ATC clearance at a controlled airport
- At uncontrolled airports, make sure that there is adequate separation from other aircraft.
- An aircraft exiting a runway is not clear of the runway until all parts of the aircraft have crossed the applicable holding position marking

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SUMMARY

Review lessons with emphasis on any weak area(s).

REMOTIVATION

Remind pilots that avoiding causing a runway incursion is at the beginning and end of every flight.

CLOSURE

Advise pilot that this these lessons and procedures must become part of their safety culture, habits, or anything else that will describe consistent safe pilot flight operational behavior.

The FPM will discuss with the pilot that if they have any questions for the safe operation of their aircraft, that they feel free to contact them, and that they should become involved in the FAASTeam program, and that enforcement for second runway incursion may lead to suspension of the pilot's certificate.