Runway Incursion Avoidance

Lesson Objective

We will take each phase of the ground portion of the flight and identify where we can help to reduce the probability of a runway incursion.

Motivation

We do not want to scratch the plane or ourselves.

We do not want to cause the deaths of others or ourselves.

We do not want to call the insurance company.

Motivation

I found out while getting insurance for my plane that most of the insurance premium is for damage on the ground, not in the air.

Insurance claims are 80-90% ground movement.

Do you want to call your insurance company with a claim you were at fault for?

Motivation

The FAA maintains a monthly running total of reported runway incursions. While the numbers vary from month to month, an average of 3-5 incursions per day are documented. Since these are only the reported incidents, we can venture to guess that many others occur that are not reported to the FAA.

https://www.faa.gov/airports/runway_safety/statistics/

https://aspm.faa.gov/aspmhelp/index/FAA_Region.html

According to FAA Order 7050.1, Runway Safety Program:

Any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle or person on the protected area of a surface designated for the landing and take-off of aircraft.

Proper planning can prevent runway incursions and the possibility of a ground collision.

Classification of Runway Incursions

Pilot Deviation (PD)

Any action of a pilot that violates a regulation in 14 CFR

Operational Errors/Deviations (OI)

An action by ATC that results in: less than the required minimum separation between 2 or more aircraft or aircraft/obstacle OR and aircraft landing or departing on a runway closed to aircraft

Vehicle/Pedestrian Deviations (V/PD)

Pedestrian, vehicle, or other object interfering with aircraft operations by entering or moving on the movement area without authorization from ATC

Other (OTH)

Other than above. Could be from equipment failure.

Categories of Runway Incursions

Category A

Serious incident in which a collision was narrowly avoided.

Category B

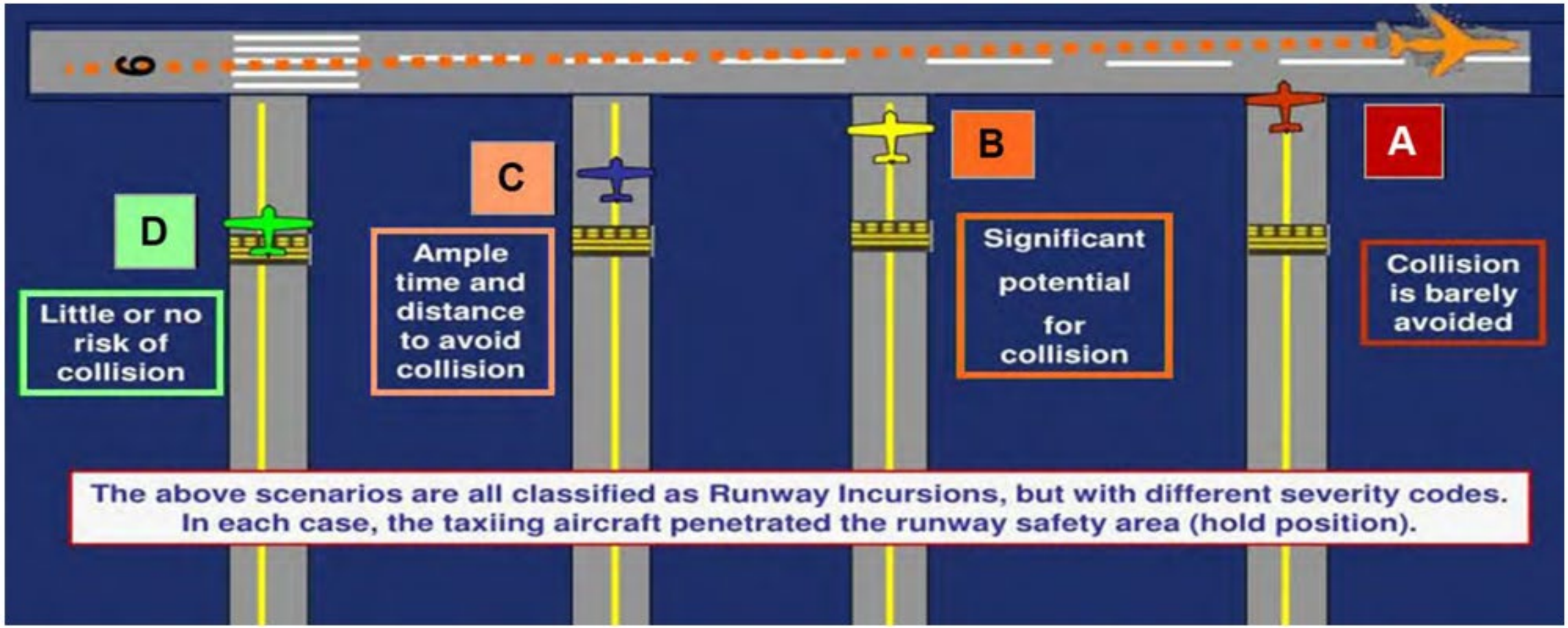
Incident in which separation decreases and there is a significant potential for collision, which may result in a time critical corrective/evasive response to avoid a collision.

Category C

Incident characterized by ample time and/or distance to avoid a collision.

Category D

Incident that meets the definition of runway incursion such as incorrect presence of a single vehicle/person/aircraft on the protected area of a surface designated for the landing and take-off of aircraft but with no immediate safety consequences.


6
D
Little or no risk of collision
C
Ample time and distance to avoid collision
B
Significant potential for collision
A
Collision is barely avoided
The above scenarios are all classified as Runway Incursions, but with different severity codes.
In each case, the taxiing aircraft penetrated the runway safety area (hold position).

Accident vs Incursion

Accident =

An occurrence associated with the operation of an aircraft that takes place between the time any person boards the aircraft with the intention of flight and all such persons have disembarked, and in which any person suffers death or serious injury, or in which the aircraft receives substantial damage.

Surface Incident vs Incursion

A runway incursion is any occurrence at an airport where an aircraft ends up on the protected surface designated for landing and takeoff without ATC Clearance.

Other surface incidents include occurrences where an aircraft crosses a non-movement area marking onto a taxiway without ATC authorization.

Surface Incident Example

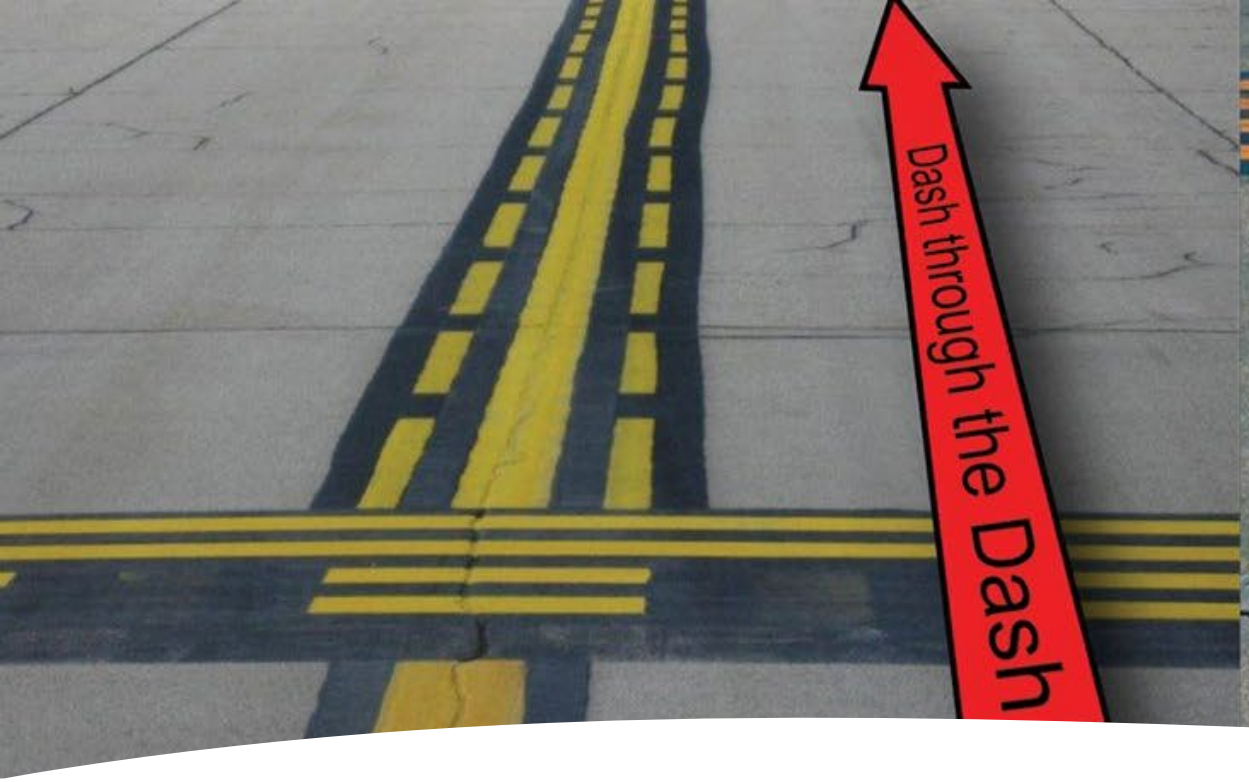
“(redacted) was damaged during taxi operations at Greensboro, Georgia. The damage occurred when a student pilot, while taxiing, struck a light pole with the left wing.”

This was in an email I received as a club member

A year later…it is still not available to fly

Challenges for new students

- Unfamiliar with airport operations in general
- Construction
- Unfamiliar (new to them) airports
- Different times of the day…things look a lot different at night with no moon
- Distractions
- Fatigue
- Do not know ‘the language’ of ATC
- Mic fright
- Taxing an aircraft is a lot different than driving



Movement Area

Movement area = runways, taxiways, and other areas of the airport that are used for taxiing, hover taxiing, air taxiing, and takeoff and landing of aircraft, exclusive of loading ramps and aircraft parking areas.

(ATC moves you around)

Non-movement Area (NMA) = area is not under control of the airport traffic control tower

The relevance/importance of hold lines

They depict the holding position or the location where the aircraft is to stop so as not to enter the runway environment.

When ATC issues a “hold short” clearance, you are expected to taxi up to, but not cross any part of the runway holding marking.

At a towered airport, runway hold markings should never be crossed without explicit ATC instructions

You must read back the entire clearance and “hold short” instruction, to include runway identifier and your call sign.

The relevance/importance of hold lines

If you are on the taxiway side of these lines, do not cross the solid lines

If you are coming off the runway, cross over the dashed lines. Stop when the complete airplane/aircraft is passed over both the dashed and solid lines.

Runway Safety Area

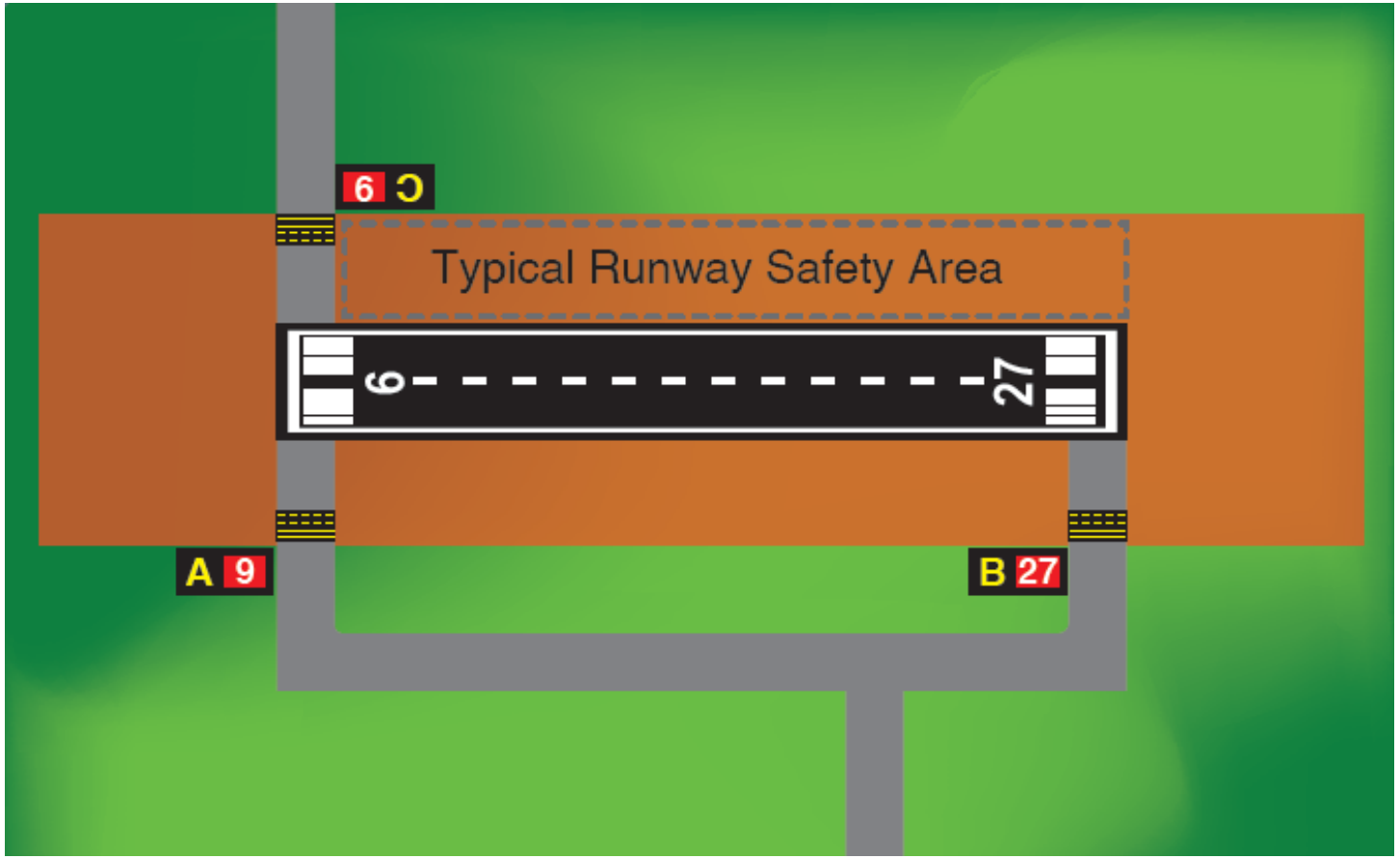
The runway safety area (RSA) is a defined surface surrounding the runway prepared, or suitable, for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway.

The RSA is typically graded and mowed.

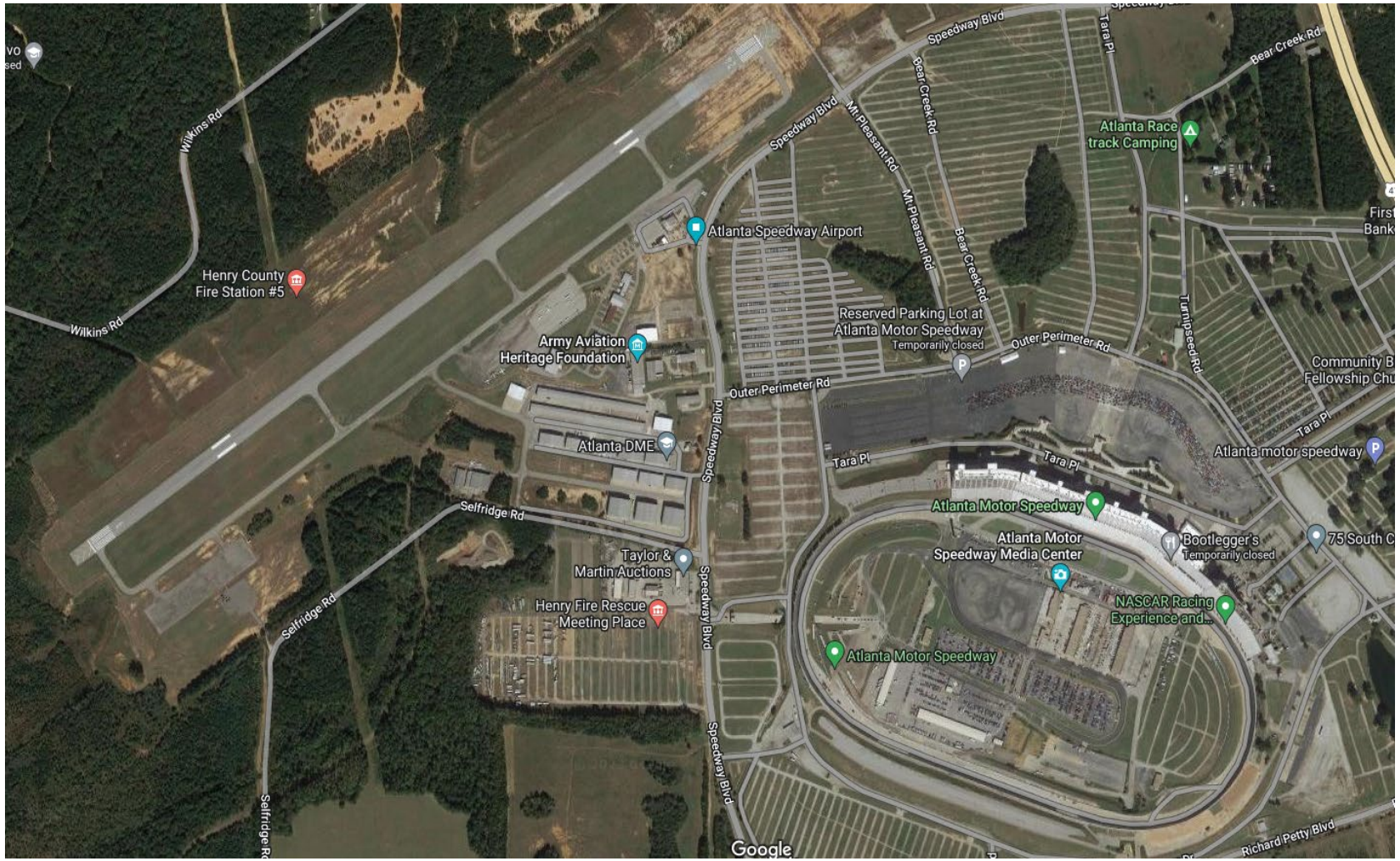
The lateral boundaries are usually identified by the presence of the runway holding position signs and markings on the adjoining taxiway stubs.

Additionally, it provides greater accessibility for firefighting and rescue equipment in emergency situations.

Runway Safety Area



Runway Safety Area



Runway Safety Area Boundary Sign

Some taxiway stubs also have a runway safety area boundary sign that faces the runway and is visible to you only when exiting the runway.

This sign has a yellow background with black markings and is typically used at towered airports where a controller commonly requests you to report clear of a runway.

Runway Holding Position Sign

Noncompliance with a runway holding position sign may result in the FAA filing a Pilot Deviation against you.

A runway holding position sign is an airport version of a stop sign.

It may be seen as a sign and/or its characters painted on the airport pavement.

The sign has white characters outlined in black on a red background.

Runway Holding Position Sign

If a taxiway intersects a runway somewhere other than at the threshold, the sign has the designation of the intersecting runway.

The runway numbers on the sign are arranged to correspond to the relative location of the respective runway thresholds.

The picture shows “18-36” to indicate the threshold for Runway 18 is to the left and the threshold for Runway 36 is to the right.

The sign also indicates that you are located on Taxiway Alpha.

When taxiing just taxi

It is easy to get distracted just setting up the GPS.

Manage the GPS when the plane is not moving or assign someone else sitting up front to do so.

The Pilot in Command (PIC) is always the one responsible for any deviations.

In your car or walking on an active ramp

You can drive around the non-movement area of an airport but be very cautious.

- Look for beacon lights
- Look and listen when driving
- Turn off music
- Keep chatter at a minimum so you can hear the planes

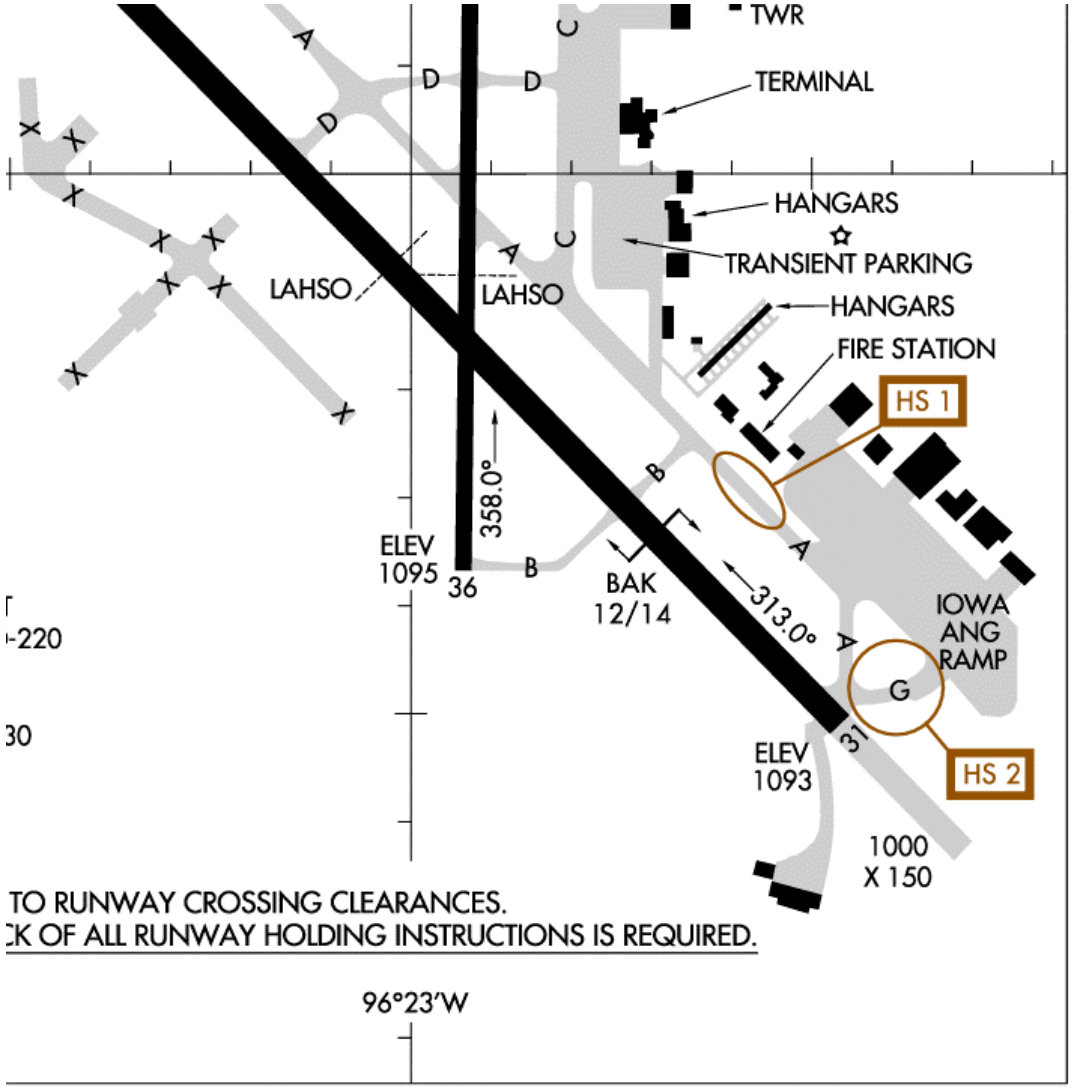
Hot Spots

A hot spot is a location on an airport movement area with a history or potential risk of collision or runway incursion, and where heightened attention by pilots and drivers is necessary.

Planning is a crucial safety activity for airport users — pilots, air traffic controllers and airfield drivers.

Proper planning helps avoid confusion by eliminating last-minute questions and building familiarity with known problem areas.

For a list see: https://www.faa.gov/airports/runway_safety/hotspots/hotspots_list/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TO RUNWAY CROSSING CLEARANCES.
CK OF ALL RUNWAY HOLDING INSTRUCTIONS IS REQUIRED.
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SIOUX CITY, IOWA
SIOUX GATEWAY/BRIG GENERAL BUD DAY FLD (SUX)

From the Pilot's Handbook of Aeronautical Knowledge

- Read back all runway crossing and/or hold instructions.
- Review airport layouts as part of preflight planning, before descending to land and while taxiing, as needed.
- Know airport signage.
- Review NOTAM for information on runway/taxiway closures and construction areas.
- Request progressive taxi instructions from ATC when unsure of the taxi route.
- Check for traffic before crossing any runway hold line and before entering a taxiway.
- Turn on aircraft lights and the rotating beacon or strobe lights while taxing.
- When landing, clear the active runway as soon as possible, then wait for taxi instructions before further movement.
- Study and use proper phraseology in order to understand and respond to ground control instructions.
- Write down complex taxi instructions at unfamiliar airports.

Any Airport Procedures - Pre-taxi

- Look at the airport diagram to understand the layout of the airport
- Obtain weather information for the airport (ATIS/AWOS/ASOS) - this will give you a clue as to which runway others are using or going to use
- You can use ForeFlight with traffic on the internet to study which runways are being used
- Have all checklists complete and GPS set
- Look out the window around you to see if anyone else is currently taxiing or going to
- Use ForeFlight as a tool if able to see if anyone else is around on the ground or inbound when you can’t see around buildings

(At Peach State it is hard to see the end of runway 31 from midfield)

Non-Towered Airport Procedures - Pre-taxi

- Make sure to have correct shared frequency in use
- Use the radio to tell others your intentions

CTAF

Common traffic advisory frequency (CTAF) is the name given to the VHF radio frequency used for air-to-air communication at United States, Canadian and Australian non-towered airports.

Many towered airports close their towers overnight, keeping the airport open for cargo operations and other activity. Pilots use the common frequency to coordinate their arrivals and departures safely, giving position reports and acknowledging other aircraft in the airfield traffic pattern.

In many locations, smaller airports use pilot-controlled lighting systems when it is uneconomical or inconvenient to have automated systems or staff to turn on the taxiway and runway lights.

Towered Airport Procedures - Pre-taxi

- Make sure to have the correct ground control frequency
- At some airports, you will contact Clearance Delivery first
- Read back all taxi instructions
- Have the airport diagram handy whether paper or electronic (or both)
- Write down instructions especially hold short/cross runways
- Brief all Hot Spots and runway crossings…and any other area of higher risk
- Even after you learn to expect directions expect the unexpected such as construction (KPDK)

Clearance Delivery

At class B and C airports, Clearance Delivery frequency is initial clearance from ATC before you call ground control.

The idea behind using a dedicated frequency for this is that it avoids tying up the ground control frequency with long clearances and readbacks.

Although mostly for IFR, you might want to file a VFR plan and have flight following.

You may have to call clearance delivery at class D airports if that is the local procedure for all departures at that airport. It depends how busy the airport is.

Any Airport Procedures - Taxiing

- Taxi with rudder pedals and differential braking
- Keep the nose wheel close to the yellow line
- Minimum workload and sterile cockpit
- Set up the aircraft before you begin taxiing
- No phones, electronic devices, or distractions
- Eyes outside while taxiing, visual scanning for traffic and monitoring position on the taxi route
- Listen and monitor to the radio for other aircraft advisories
- Keep taxi diagram available
- "Head on a swivel"

Any Airport Procedures

- At night, keep in between the blue lights
- Stop at the hold lines…keep the entire plane on the taxiway side
- Extra aware at Hot Spots…even non towered airports can have them
- Don’t stop on the ILS critical area

Non-Towered Airport Procedures

Make lots of radio calls even when it feels annoying…even when you feel alone

"Camilla-Mitchell traffic Cessna 5889J 10 miles north inbound"

"Camilla-Mitchell traffic Cessna 5889J 5 miles north inbound intending for the 45 to left downwind runway 8 Camilla-Mitchell traffic"

"Camilla-Mitchell traffic Cessna 5889J 3 miles north inbound intending for the 45 to left downwind runway 8 Camilla-Mitchell traffic"

"Camilla-Mitchell traffic Cessna 5889J entering the 45 to left downwind runway 8 Camilla-Mitchell traffic"

"Camilla-Mitchell traffic Cessna 5889J on left downwind runway 8 Camilla-Mitchell traffic"

"Camilla-Mitchell traffic Cessna 5889J turning left base runway 8 Camilla-Mitchell traffic"

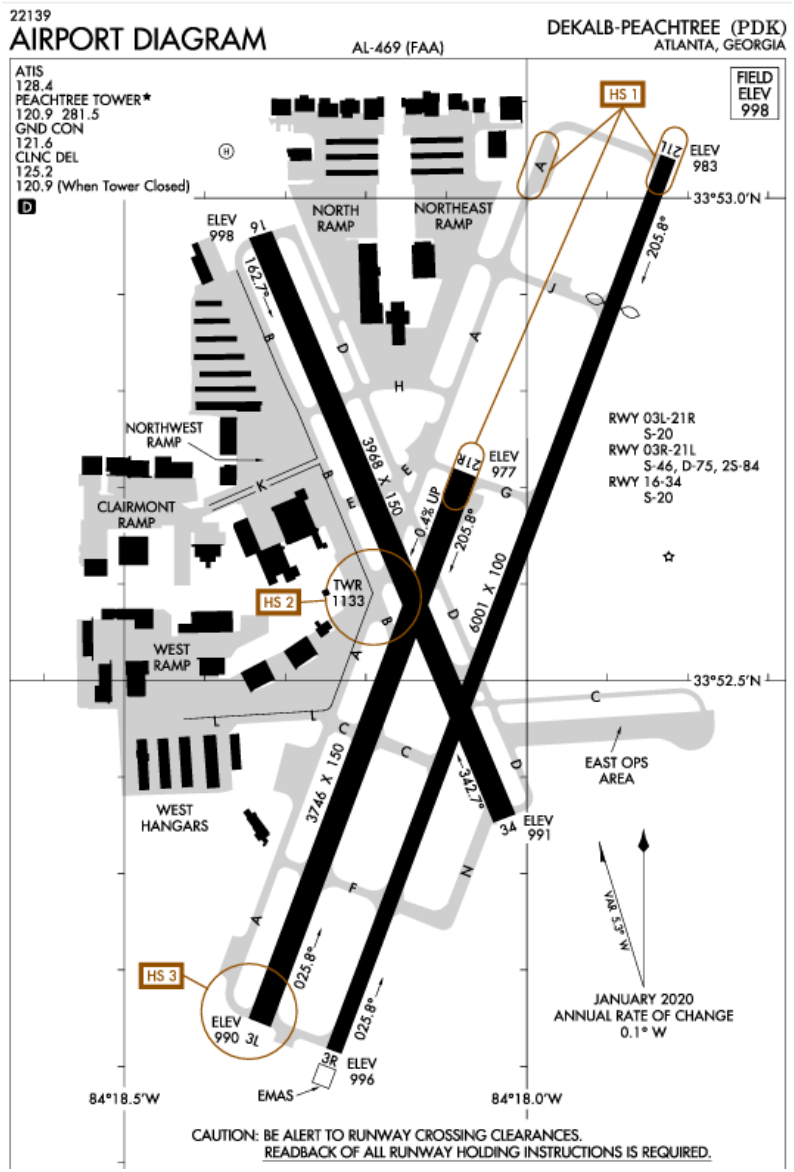
"Camilla-Mitchell traffic Cessna 5889J turning final runway 8 Camilla-Mitchell traffic"

Non-Towered Airport Procedures

Remember nobody might be listening to you…some planes do not even have electrical systems…aircraft at class G airports are not required to use radios

Towered Airport Procedures

- At KPDK, you must inform ground control you are leaving runup area, but not at KRYY
- At class C airports, they might seem similar to class D, but do not cross into the terminal area or the airport police might come have a talk with you
- When in doubt call Ground Control to request movement


22139
AIRPORT DIAGRAM
AL-469 (FAA)
DEKALB-PEACHTREE (PDK)
ATLANTA, GEORGIA
ATIS
128.4
PEACHTREE TOWER*
120.9 281.5
GND CON
121.6
CLNC DEL
125.2
120.9 (When Tower Closed)
FIELD ELEV 998
HS 1
HS 2
HS 3
ELEV 983
ELEV 998
ELEV 977
ELEV 991
ELEV 990
ELEV 996
NORTH RAMP
NORTHEAST RAMP
NORTHWEST RAMP
CLAIRMONT RAMP
WEST RAMP
WEST HANGARS
EAST OPS AREA
TWR 1133
EMAS
RWY 03L-21R
S-20
RWY 03R-21L
S-46, D-75, 2S-84
RWY 16-34
S-20
3968 X 150
6001 X 100
3746 X 150
0.4% UP
205.8°
162.7°
342.7°
025.8°
33°53.0'N
33°52.5'N
84°18.5'W
84°18.0'W
VAR 5.5° W
JANUARY 2020
ANNUAL RATE OF CHANGE
0.1° W
CAUTION: BE ALERT TO RUNWAY CROSSING CLEARANCES.
READBACK OF ALL RUNWAY HOLDING INSTRUCTIONS IS REQUIRED.

From the Flight Deck Series

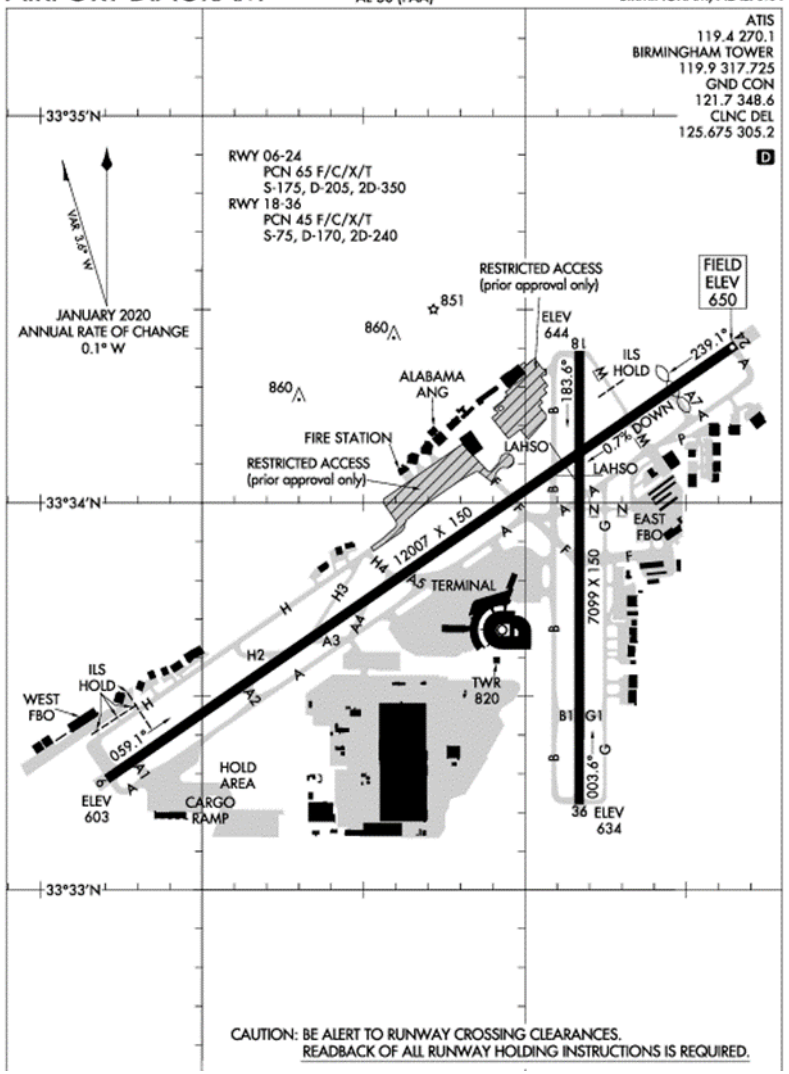
FAA's From the Flight Deck video series provides pilots with actual runway approach and airport taxiway footage captured with aircraft-mounted cameras, combined with diagrams and visual graphics to clearly identify hot spots and other safety-sensitive items at airports. Additional videos are available on general aviation safety challenges including Phraseology, Wrong Surface Landings, Human Factors and complex airfield geometry pilots may encounter. Subscribe to the FAA's YouTube channel to be notified when new videos are published.

https://youtu.be/tXWnj0odAeo&t=60s

20086

AIRPORT DIAGRAM

BIRMINGHAM-SHUTTLESWORTH INTL (BHM)
AL-50 (FAA)
BIRMINGHAM, ALABAMA



Any Airport Procedures – Before Takeoff

- Look and say Clear Right Clear Left

…even when you last heard ‘NABC12 is 3 miles out’

…even at towered airports

- Announce on shared frequency if there is no tower
- Look around for wildlife…they don’t listen to ATC
- Extra caution where you have multiple runways such as KPDK, KBHM, KRMG
- Remember a radio is not required at every airport

Towered Airport Procedures – Before Takeoff

- Switch to tower frequency
- Do not cross the hold short lines without Clearance

Any Airport Procedures – Landing

- Have a plan to taxi after landing
- Have the airport diagram available either on paper or ForeFlight…but don’t hold it while flying
- Scan the runway for planes already on the runway
- Scan the runway for vehicles driving
- Scan the sides of runway for people cutting grass and people taking videos
- Look around for wildlife
- Extra caution where you have multiple runways with no tower such as KRMG, KGAD
- Scan the taxiway if able so you don’t pull in front of someone else

Non-Towered Airport Procedures – Landing

- Announce on shared frequency
- Announce which intersection you are using if able “turning A4”
- Listening on the frequency you can hear what runway other planes are using…if it is a calm day it could be a toss up…you can also know whether to expect a lot of people in the pattern and the taxiways
- At Peach State and Cedar Ridge you typically land one runway while taking off the other way…extra diligence for other planes is a must

Towered Airport Procedures – Landing

- Know what to expect for but it might be changed
- Wait for “cleared for runway…” before turning final
- Look around for wildlife you might be the first to see it…don’t wait for the tower to tell you
- Extra caution where you have parallel runways such as KPDK
- Minimal talking on the frequency
- Do not cross another runway unless they gave Clearance to do so

Any Airport Procedures – After Landing

- Have the airport diagram available either on paper or ForeFlight
- Scan the runway for vehicles driving
- Look around for wildlife
- A taxiway is like a one lane road on a bridge
- At night keep in between the blue lights
- Expect the unexpected such as construction

Non-Towered Airport Procedures – After Landing

Announce on shared frequency your plan such as taxi to ramp or taxi back to runway

“Atlanta Speedway traffic C3889J is clear of the active, taxing to 24”

Towered Airport Procedures – After Landing

- Cross over the hold lines…then switch to ground control unless they state ‘stay on me’
- Get taxi directions before moving

Tips

- For unfamiliar airports, look at the airport diagram ahead of time.
- Use Google Maps and show satellite view ahead of time
- Use the ForeFlight diagram with the moving plane icon as a tool when at a busy airport such as Panama City…especially at night
- Some avionics show the plane moving on the airport diagram such as the G1000 NXI
- But don’t stare at these great tool so much you miss something in front of the window

Tips

- When not single pilot, use CRM…2-3 heads are better than one…4-6 ears…
- Again "Head on a swivel"
- Be super cautious at airports with parallel runways...both on the ground…and don't land on the wrong one
- Don't do what Harrison Ford did...that was not a parallel runway

Night and low visibility tips

- If possible do not fly at night to airports without much lighting when there is no moon
- You do not want to be surprised by wildlife
- When at a dark airport with no ground control, keep all your lights on
- The beacon light is a warning to others if you are starting the plane
- Avoid using strobes while taxiing it can bother other pilots

Runway Lighting

The basic runway lighting system consists of two straight parallel lines of runway edge lights.

These lights are aviation white, although aviation yellow may be substituted for a distance of 2,000 feet from the far end of the runway to indicate a caution zone.

At some airports, the intensity of the runway edge lights can be activated and adjusted by radio control.

The control system consists of a 3-step control responsive to 7, 5, and/or 3 microphone clicks.

All lighting is illuminated for a period of 15 minutes from the most recent time of activation and may not be extinguished prior to end of the 15-minute period.

Runway Lighting

Suggested use is to always initially key the mike 7 times; this assures that all controlled lights are turned on to the maximum available intensity.

If desired, adjustment can then be made, where the capability is provided, to a lower intensity by keying 5 and/or 3 times.

Even when lights are on, the pilot should always key the mike as directed when overflying an airport of intended landing or just prior to entering the final segment of an approach.

This assures the aircraft is close enough to activate the system and a full 15-minute lighting duration is available.

Runway Edge Lighting

The length limits of the runway are defined by straight lines of lights across the runway ends.

At some airports, the runway threshold lights are aviation green, and the runway end lights are aviation red.

At many airports, the taxiways are also lighted.

A taxiway edge lighting system consists of blue lights that outline the usable limits of taxi paths.

Taxiway Lights

Simply put, all taxiways are surrounded by blue lights.

Make sure to stay on pavement between blue lights from the runway to the ramp.

Go extra slow…do not catching up on email/Facebook…leave the GPS alone till stopped

GPS/Flight Plans

- Have the flight plan figured out before you walk up to the plane if able
- Have the plan in ForeFlight before starting the plane
- Have the avionics setup in the run up area

Land and Hold Short Operations (LAHSO)

What is LAHSO?

LAHSO is an air traffic control procedure that requires pilot participation.

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 (see AIM figures 4-3-4, 4-3-5, and 4-3-6).

ATC may issue a LAHSO clearance only when the ceiling is at least 1,000 feet and the visibility is at least 3 statute miles.

Land and Hold Short Operations (LAHSO)

Must the pilot accept a LAHSO clearance?

No. Pilots may accept a LAHSO clearance only if the PIC determines that the aircraft can safely land and stop within the available landing distance (ALD data are published in the A/FD special notices section.)

Pilots unfamiliar with LAHSO and student pilots can NOT participate.

The PIC has complete authority to accept or decline a LAHSO clearance.

The PIC must decline a LAHSO clearance if he or she believes it would compromise safety.

Land and Hold Short Operations (LAHSO)

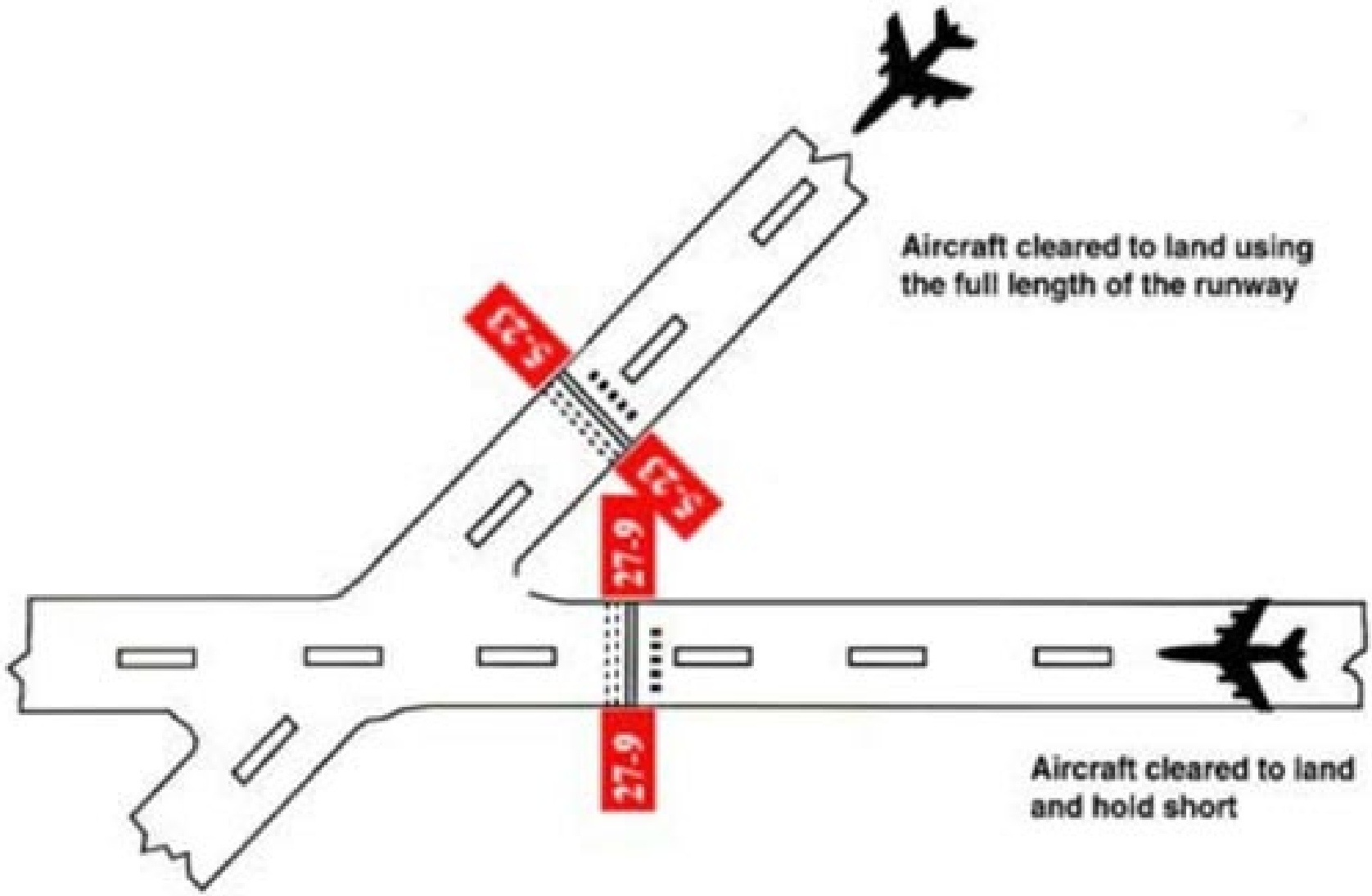
What happens if you accept a LAHSO clearance?

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

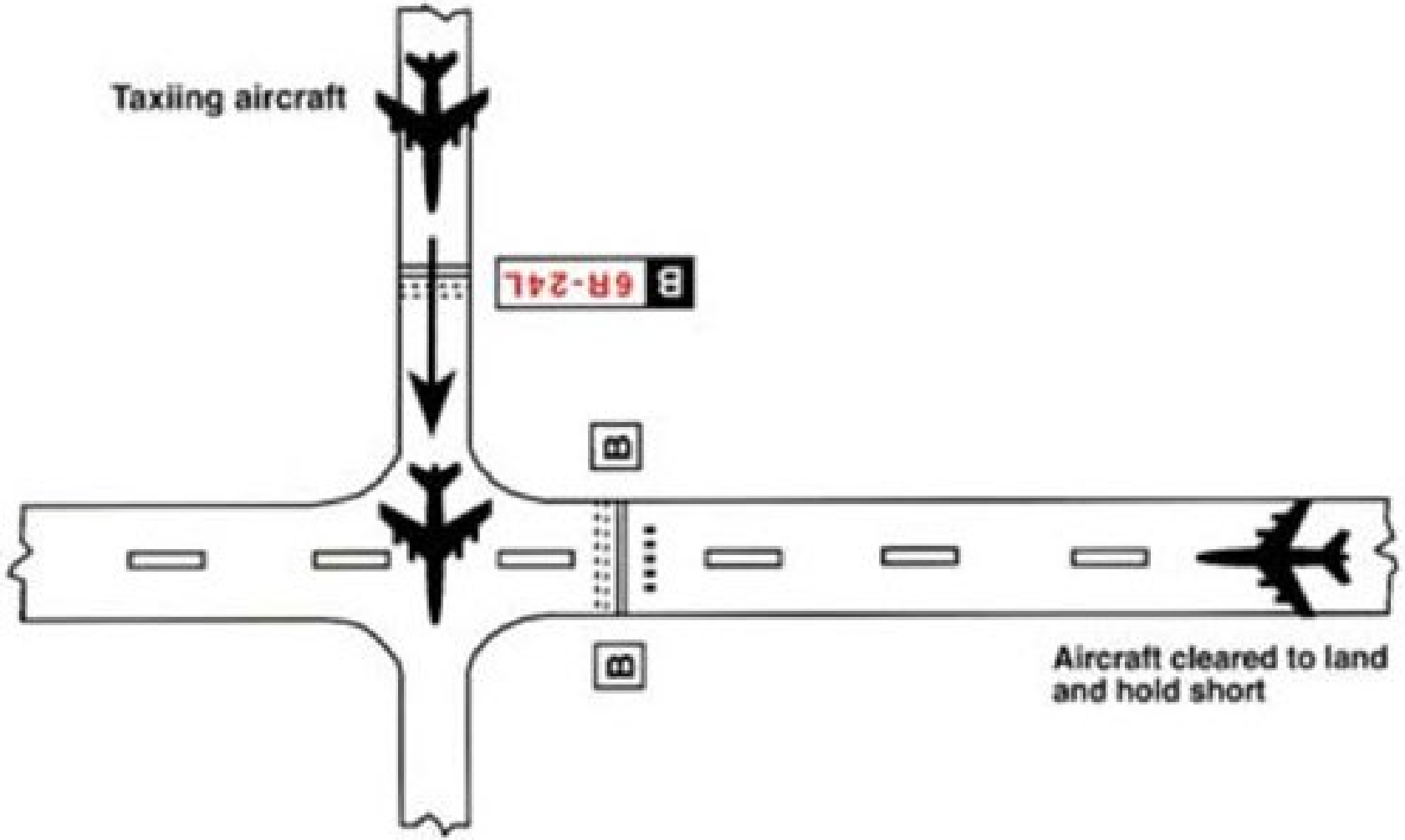
If a rejected landing becomes necessary after accepting a LAHSO clearance, the pilot must maintain safe separation from other aircraft / vehicles and notify ATC as soon as possible.

If ATC gives you a LAHSO clearance, ATC needs a full read back that includes the words, “HOLD SHORT OF (RUNWAY/TAXIWAY/POINT).”

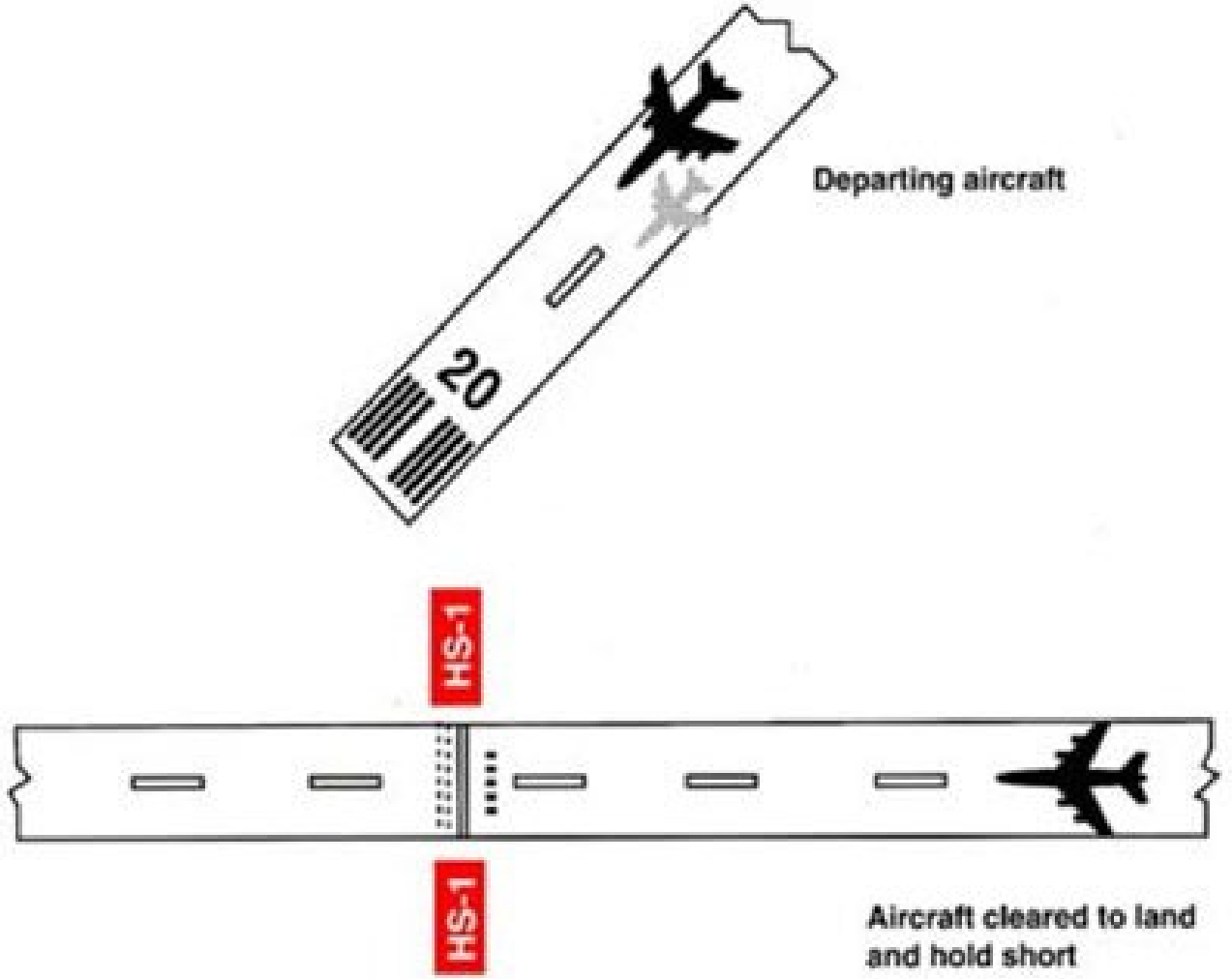
Land and Hold Short of an Intersecting Runway



Land and Hold Short of an Intersecting Taxiway



Land and Hold Short of a Designated Point on a Runway Other Than an Intersecting Runway or Taxiway



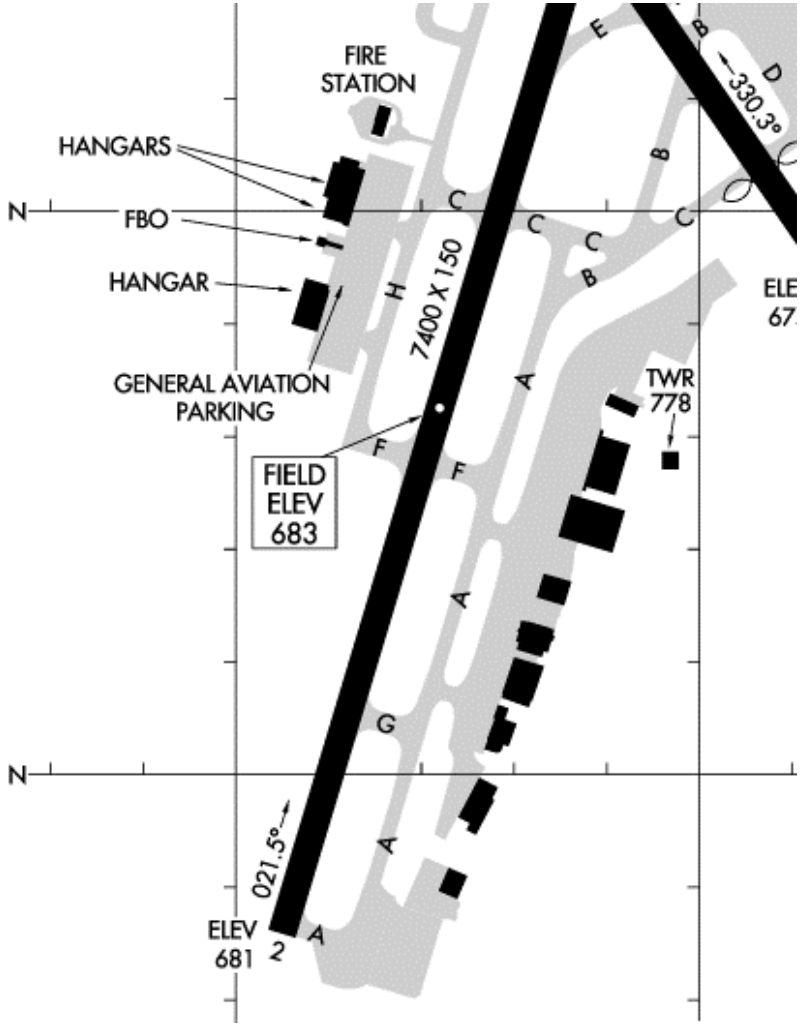
KCHA Ground Control Example

N123AB: “Chattanooga Ground Cessna 123AB ready to taxi to active runway”

Ground: “123AB taxi to runway 2 via Hotel Foxtrot cross runway 2, then Alpha”

While taxing…

Ground: “123AB would you accept an intersection departure via Golf?”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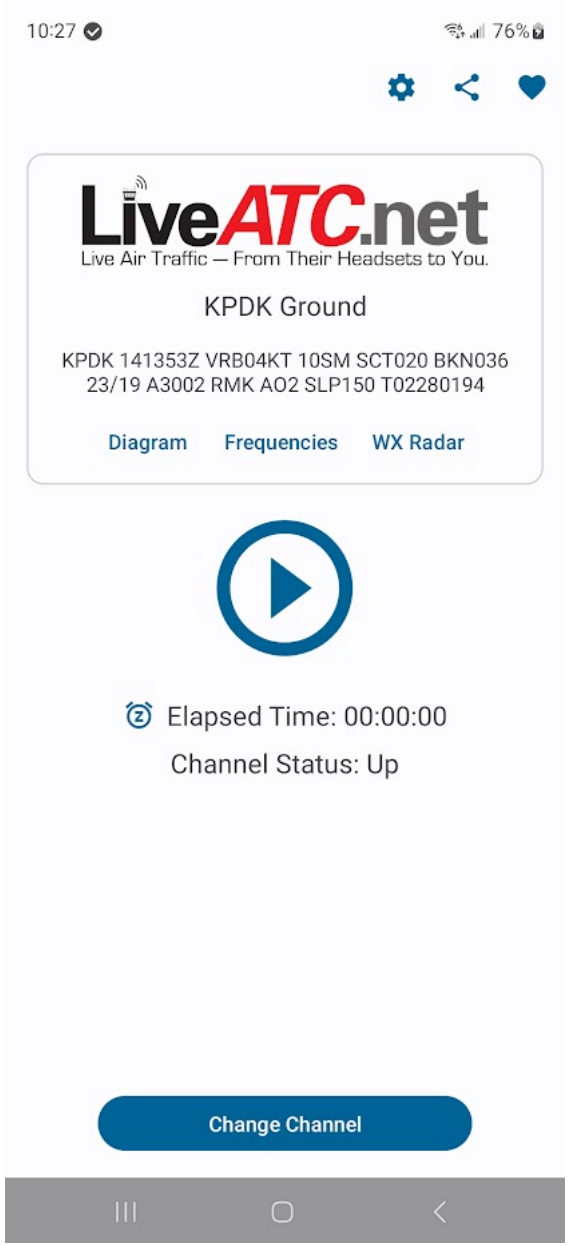
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Live Air Traffic — From Their Headsets to You.
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Diagram
Frequencies
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Elapsed Time: 00:00:00
Channel Status: Up
Change Channel

https://youtu.be/1N5THRSp4hM&t=25s

https://youtu.be/vB6PsRXUJPs

https://youtu.be/E4cewwhcL5c

https://youtu.be/c6Mp9aUJaTY

https://youtu.be/evE3WmYAvVY

For More Detailed Info

Also See

FAA AC 91-73B

Parts 91 and 135 Single Pilot, Flight School Procedures During Taxi Operations

AOPA Flash Cards

https://www.nxtbook.com/nxtbooks/aopa/runwaysafetyflashcard/

Why is the FAA Making a Big Deal?

Browse the NTSB Reports

http://www3.alpa.org/portals/alpa/runwaysafety/NTSBRunwaySafetyfactsheet.pdf

Any questions I can answer or follow up later on?