AVOIDING GENERAL AVIATION RUNWAY INCURSIONS

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Welcome

- SAFE. Booth 208

- FAA General Aviation Center of Excellence

- Goal today is to …

  - Understand the problem

  - Tips to help you avoid a runway incursion

What is a Runway Incursion (RI)?

What is a Runway Incursion?

- ICAO defines a runway incursion as:

    - 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

- In 2005 the definition was officially adopted, before then, there were 20 different definitions around the world for runway incursions

What Counts as a Runway Incursion?

- *Taxiing on/across any part of a runway without a clearance*
    - Even a *closed runway*
- *Any part of an aircraft crosses over the hold short line without a clearance*
    - Even if there is no other aircraft using the runway
    - Even just a wing crossing the hold line
- Landing or taking off *on the wrong runway*
- Landing or taking off *without a clearance*

Why Put so much Effort into Reducing Runway Incursions?

- RIs are unintentional

- It is largely through luck that most RIs don't pose a serious risk

- The severity could be is catastrophic

- A runway incursion can't lead to an accident if it never happens

How are
Runway Incursions Categorized?

Category	Definition
A	Collision narrowly avoided by extreme action or chance
B	Significant potential for a collision
C	Ample time or distance to avoid a collision
D	Single aircraft, vehicle, or person. No immediate safety consequences. Formerly considered Surface Incident

How many Runway Incursions Occurred Last Year in US?

- From Oct 2014-Oct 2015

- Data collected only at towered airports

- Reported by Controllers

- No data for non-towered airports
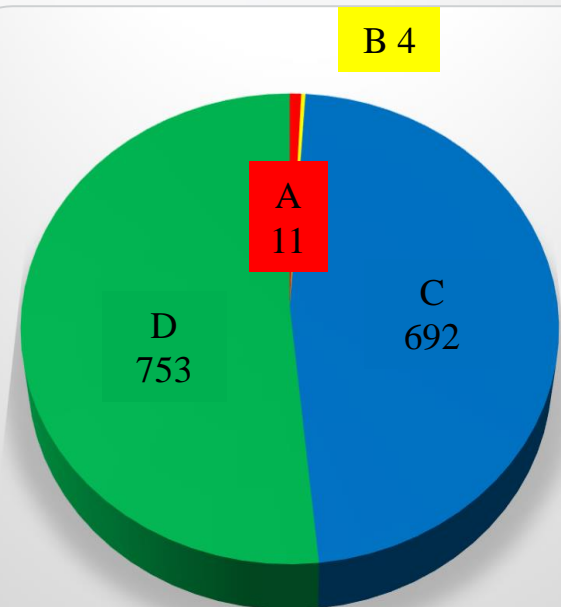
Severity Distribution at airports in US , Oct 2014- Oct 2015 (RWS database, 2016)

How does FAA classify RIs?

- Pilot Deviations (PDs) -
  - Action of a pilot that violates any Federal Aviation Regulation (FAR).
- Operational Incidents (OIs)
  - Action of an Air Traffic Controller
- Vehicle/Pedestrian Deviations (VPDs) –
  - Pedestrians or vehicles entering runways or taxiways without ATC authorization.

How Many RIs Were Attributed to Pilot Deviations Last Year in the US?

- PD's account for 58% of all RI's in 2015

- General Aviation (Part 91) aircraft represent 78% of PDs

- Only 2.7% of PDs were in IFR conditions
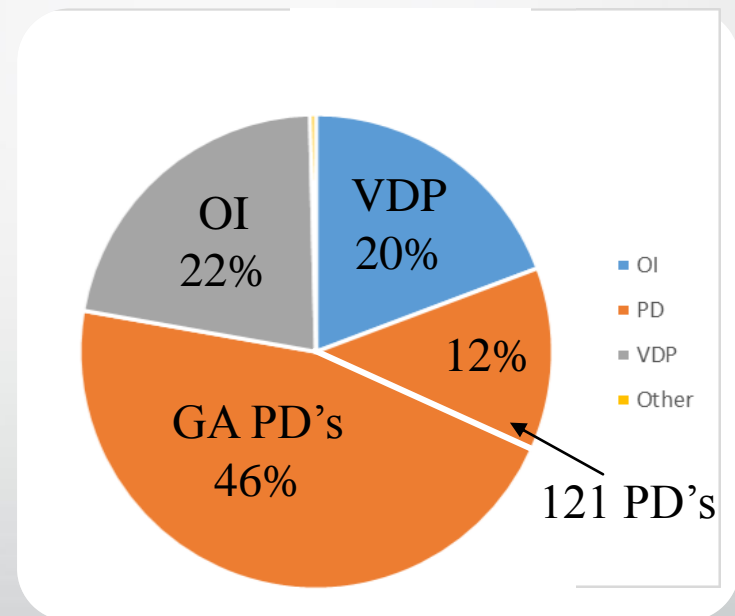
Incident Type Distribution at airports in US , Oct 2014- Oct 2015 (RWS database, 2016)

Last Year, How Severe Were The RIs Due to Pilots? To ATCs? To Vehicles and Pedestrians?

Severity	Pilot Deviation	ATC Error (OI)	VPD
A	1%	1%	0.3%
B	0.1%	0.3%	0.5%
C	32%	86%	18%
D	53%	8%	47%
N/A	14%	4%	34%
Total	100%	100%	100%

Runway Incursions at airports in US , Oct 2014-Oct 2015 (RWS database, 2016)

Top Five Scenarios

- Taxiing aircraft encroached on runway without a clearance and

    - (1) No other aircraft/vehicle/person involved

    - (2) Landing aircraft went around

    - (5) Arrival aircraft landed

- (3) Vehicle encroached on runway without clearance

- (4) Arrival aircraft landed without a clearance

FAA (2016)

Factors in Runway Incursions

- Pilot read back a clearance correctly, but execute a different maneuver (27%)

- Described pilot as distracted (47% of ASRS)

- Readback/Hearback Errors (35% or ASRS)

- of PD, its unclear why pilot acted without clearance (35%)

FAA (2016)

Factors in Runway Incursions

- Location on airport surface (19% of RI events)
  - Taxi Route Error (51%)
  - Runway Confusion (29%)
  - Surface Confusion (19%)
- Equipment (4.5% of RI events)
  - Monitored wrong frequency (52%)
  - Garbled or blocked transmission (31%)
  - Volume turned down (10%)
  - Blown tire or brake failure (36%)
- Signs and Markings (0.8% of RI events)

FAA (2016)

GA or Mix Use Airports with High Number of RI

Photo by Gideon Berkewitz

Ten Worse Airports for RIs
Not including airports that have or are slated to receive surface surveillance system

- **Falcon Field, Mesa AZ (KFFZ)**
- **Phoenix Deer Valley, AZ (KDVT)**
- **North Las Vegas (KVGT)**
- **Addison, TX (KADS)**
- **Fort Lauderdale Executive, FL (KFXE)**

- **PDK – DeKalb-Peachtree, GA**
- **TUS – Tucson International, AZ**
- **Dallas Love Field, TX (KDAL)**
- **SAT – San Antonio International, TX**
- **MRI – Merrill Field, AK**

FAA (2016)

Busy Airports, Multiple Runways

Tip: Determine the "Castlen Factor" for Air Field Complexity

Complexity Factors	Tally
Number of runways to be crossed while taxiing	1
Number of charted Hot Spots along taxi route	3
Number of Tower/Ground frequency changes expected	1
Multipliers	
IMC	
Night	
High airport traffic count	1
Unfamiliar airport	1
Total	7
1 to 2: Low Vulnerability	
3 to 5: Medium Vulnerability	
6 and Greater: High Vulnerability	X
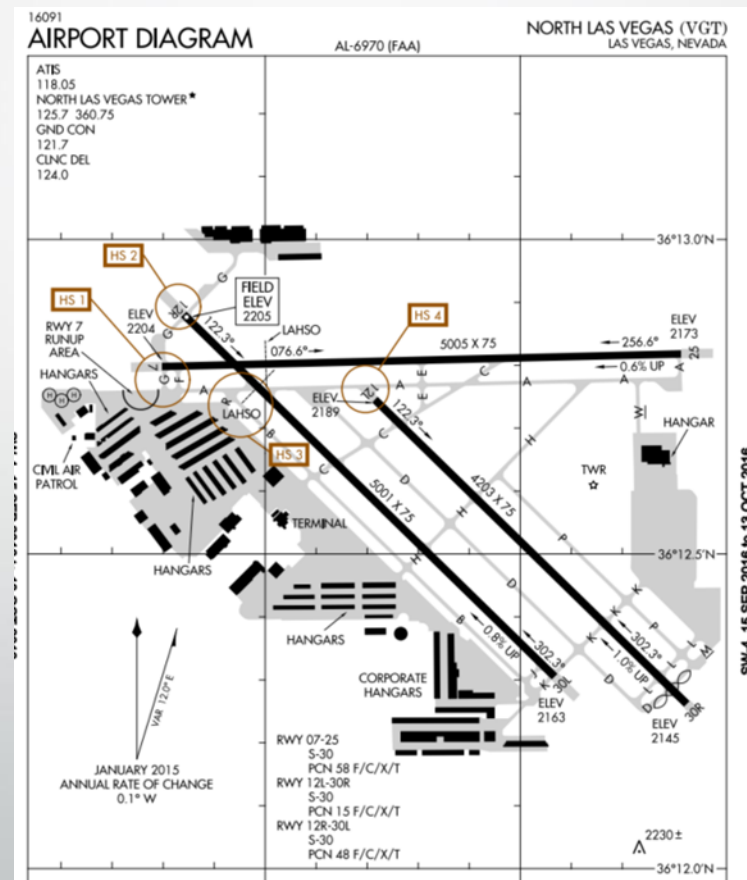
(Castlen, FAA Safety Brief, 2011)

What can Be Done to Avoid Runway Incursions?

What is the FAA doing to reduce RI's?

- Improved signage/markings
- FAA has tested and installed warning systems at major airports
  - Turn red when runway is in use
- Eliminated use of "Position and hold" clearance at smaller airports
- Read back of "Hold Short" instructions is required
- No "taxi to" clearances.
- No assumption to cross runways
- Funded research to figure out what really works

The Human Factor in Runway Incursions

- We lose situation awareness and don't realize
    - where we are
    - what is happening
    - the consequences of our actions
- Our humanness causes us to make <u>an incorrect decision.</u>
    - Impatience
    - Anticipation and Expectation
    - Hazardous Attitudes
    - Desire to fit in and be accepted

To Err is Human

- We all make mistakes
- Factors that increase our risk of making mistakes
  - Distractions
  - Workload
  - Complacency
  - Fatigue
  - Hunger
  - Stress
  - Expectations
- What can we do as pilots to minimize errors and prevent errors from causing accident?

Planning in Advance of Flight

- Consider both departure and arrival airports

- Study Current Airport Diagrams in advance

  - Hot spots, Runways that need to be crossed

  - Consider Castlen Factor

- Check NOTAMs for closed runways/taxiway
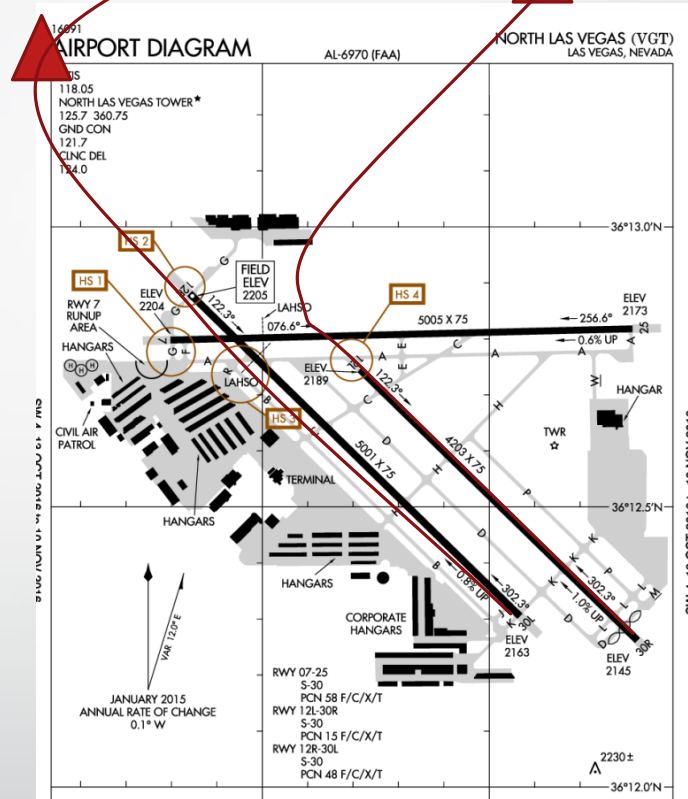
Tip: Consider a departure route that will allow takeoff from the closest runway

Bill Castlen

Establish Standard Operating Procedures for Your Own Flights

- Runway incursions can be reduced by developing and promoting standard operating procedures

- FAA to flight schools:

  - SOP's "direct the attention of the pilot to essential tasks while the aircraft is in motion.

  - The development and formalized training of safe operating procedures during taxi operations should be implemented by each operator."

FAA (n.d.)

Establish procedures that recognize everyone in the cockpit

- Single Pilot
  - Workload Management
- Multiple Pilots in the cockpit
  - Multi-pilot briefing
    - Coordinate on who is in charge/ PIC
    - Division of tasks
- Non-pilot Passengers
  - Passenger briefing
    - How they can help
    - How they can reduce distractions

Photo by Gideon Berkewitz

Prior to Taxi

- Perform set up and checklists either before or after taxiing

- Have a way to write down clearance

- Visualize taxi route on airport diagram

- Turn Transponder to "ALT"/ Mode C

TIP: Verify Heading Indicator is correct prior to taxi

Use All Your Senses and Resources

- **Look out**
  - Signs, and markings
  - Other aircraft
  - Scan runway before entering
- **Look In**
  - Use airport diagram
  - Written clearance
- **Listen**
  - Monitor radio

- **Speak up**
  - Read back ATC instructions
  - Include Aircraft's Call Sign.
  - Use standard phraseology
  - Verify - Don't assume
  - Line Up and Wait –
    - contact ATC immediately if a takeoff clearance is not received within 90 seconds

Tip: Don't taxi and focus inside aircraft at same time

Frank Gallagher, DPE

Taxiing

- Minimize distractions
  - Sterile cockpit
  - Defer tasks until stopped
- Stay Vigilant – Look Out
  - Where are you?
  - What is happening?
  - What should happen, is going to happen next?
  - What are other aircraft doing?
  - What did ATC actually say?
- When in doubt, STOP while remaining clear of the runway
  - Ask for clarification /progressive from ATC.
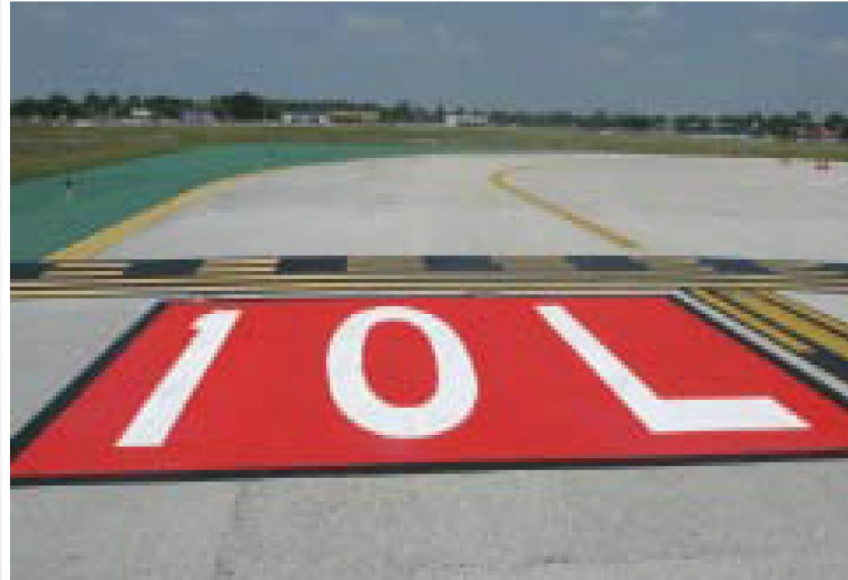
Technology as a Tool

- Have airport diagram in easy view

- Secure EFB in the cockpit

- Have a place to write

- Don't program NAV or EFB while taxiing

Tip: Don't get engrossed in your GPS or EFB.
Practice 2 clicks – look up

Jeffrey Moss (Mossy)

Photo Courtesy of MyGoFlight

Use Exterior Lights to Convey Intent, Day or Night

Standardized Aircraft Lighting						
☀ = Turn on	Rotating beacon	Navigation/Position lights	Strobe light*	Taxi lights	Logo lights	Landing lights
Engine(s) running	☀					
Taxiing	☀	☀	☀	☀	☀	
Crossing a runway	☀	☀	☀	☀	☀	☀
Entering departure runway for line up and wait	☀	☀	☀	☀	☀	
Takeoff	☀	☀	☀	☀	☀	☀

* *Strobe lights should not be illuminated if it will have an adverse effect on others.*

Operate the Transponder on the Ground

It Comes Down to
Keeping your head in the game

- Know the meaning of visual aids

- Use standard procedures

- Plan ahead

- Understand what's expected

- Use all available resources

- Minimize distractions

- Stay Vigilant – Don't get complacent

Summary of Tips

- **Consider a departure route that will allow takeoff from the closest runway**

- **Verify Heading Indicator is correct prior to taxi**

- **Don't taxi and focus inside aircraft at same time**

- **Don't get engrossed in your GPS or EFB. Practice 2 clicks – look up**

- **Practice same best practices at non-towered airports**

Resources

- FAA Runway Safety Best Practices Brochure

- AOPA Runway Safety Online Course

- FAA Pilot Handbook of Aeronautical Knowledge FAA-H-8083-25B

- Advisory Circular AC 91-73B. Parts 91 and 135 Single Pilot, Flight School Procedures During Taxi Operations
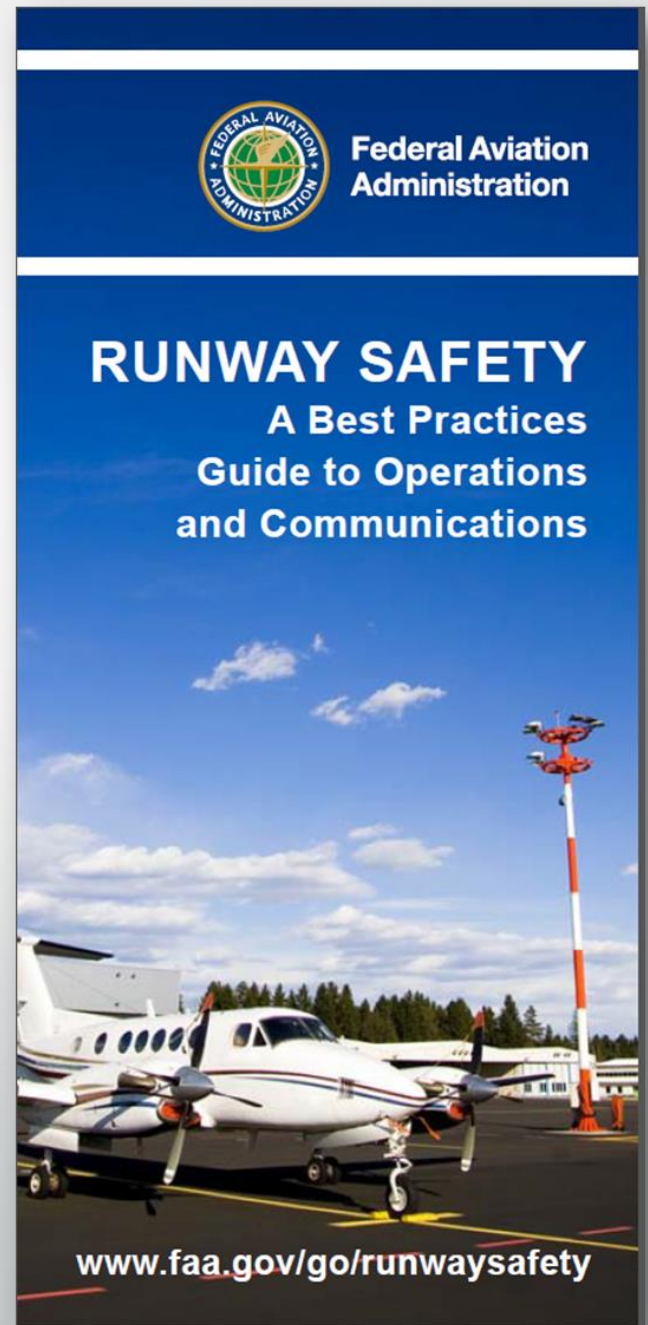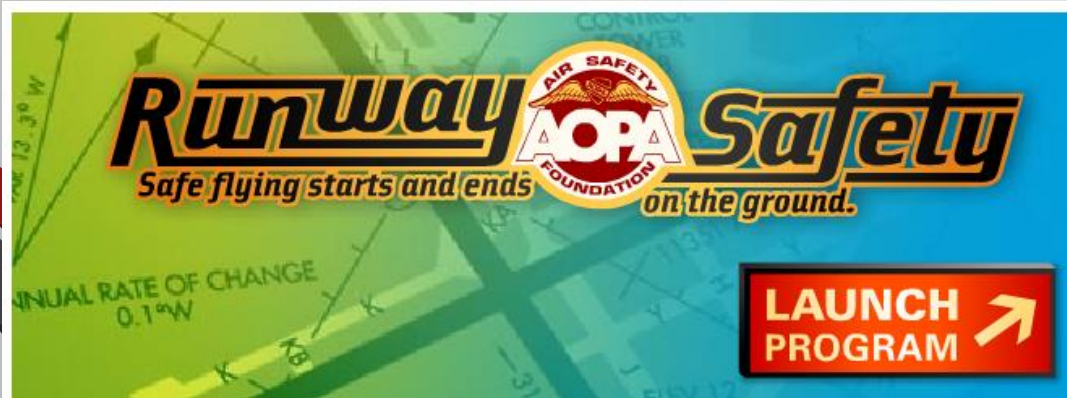
Final Take Away

- A SAFE flight starts before you get to the airport
- A SAFE flight depends on good situational awareness

**Plan Ahead,
Stay Vigilant,
and Use Good Practices**

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