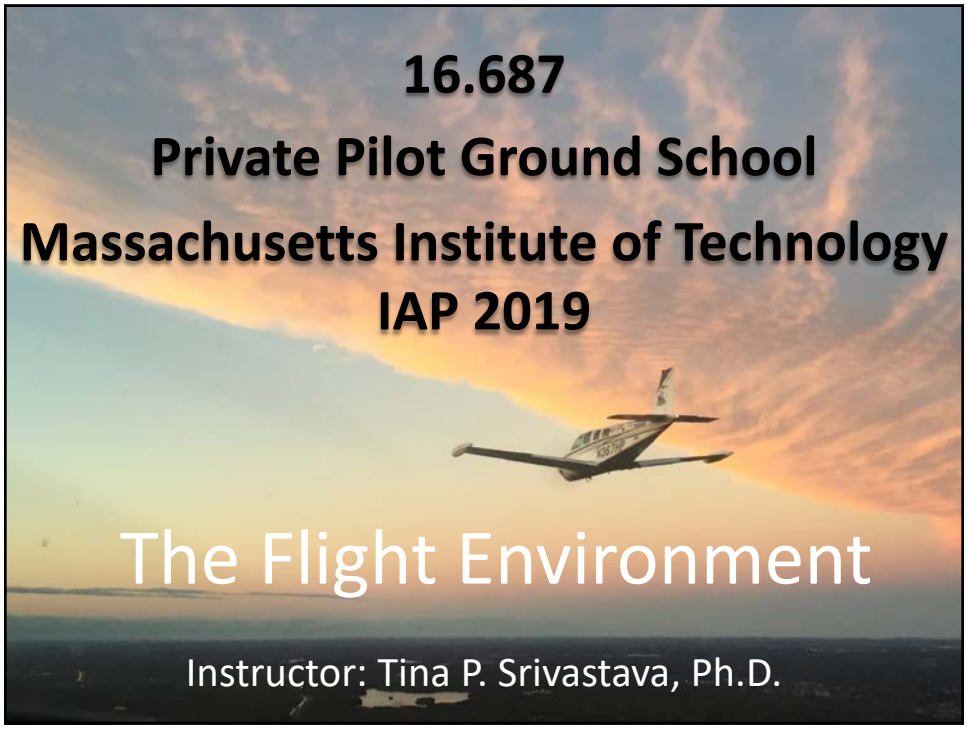


MIT AEROASTRO

16.687

Section A

FLYING

Private Pilot Ground School 2

Brandon Abel

91.103 - Preflight Action

16.687

- Pilot must become familiar with information applicable to the flight
  - Not in the vicinity of the airport
    - Weather, fuel, alternatives
  - Runway lengths available and required
  - Aircraft performance figures

Paperwork

16.687

How have you adapted to our world of smartphones, ubiquitous mobile data, and 24/7 access to database via the Internet?

FAA's answer: we bought more printers.

Instead of the authorities looking everything up by serial number and tail number, the following pieces of paper must be in the aircraft:

- **A**irworthiness Certificate
- **R**egistration (update with new hardcopy every three years)
- (Radio station license, certain international flights)
- **O**perating Limitations
  - FAA Approved Flight Manual, Instrument Placards
- **W**eight and Balance Information

Operating Limitations

16.687

- Legally binding limitations on use of aircraft, such as
  - Max speeds with and without flaps
  - Prohibition of certain maneuvers
  - How many pilots and passengers?
  - Temperature and altitude limits
- Where are they found
  - Approved Airplane Flight Manual (AFM) or Pilot's Operating Handbook (POH)
  - Placards (stickers, metal plates, imprints on panel)
  - Markings

Cirrus SR20 Limitations I

16.687

Speed	KIAS	KCAS	Remarks
V_{NE}	201	204	**Never Exceed Speed** is the speed limit that may not be exceeded at any time.
V_{NO}	164	166	**Maximum Structural Cruising Speed** is the speed that should not be exceeded except in smooth air, and then only with caution.
V_O 3150 Lb	133	135	**Operating Maneuvering Speed** is the maximum speed at which full control travel may be used. Below this speed the airplane stalls before limit loads are reached. Above this speed, full control movements can damage the airplane.
V_{FE} 50% Flaps 100% Flaps	 150 110	 152 111	**Maximum Flap Extended Speed** is the highest speed permissible with wing flaps extended.
V_{PD}	133	135	**Maximum Demonstrated Parachute Deployment Speed** is the maximum speed at which parachute deployment has been demonstrated.

Cirrus SR20 Limitations II

16.687

Maneuver Limits

Aerobatic maneuvers are prohibited.

Spins are prohibited.

This airplane is certified in the normal category and is not designed for aerobatic operations. Only those operations incidental to normal flight are approved. These operations include normal stalls, chandelles, lazy eights, and turns in which the angle of bank is limited to 60°.

• Note •

Because the aircraft has not been certified for spin recovery, the Cirrus Airframe Parachute System (CAPS) must be deployed if the airplane departs controlled flight. Refer to Section 3, *Inadvertent Spin Entry*.

Flight Load Factor Limits

Flaps UP (0%), 3150 lb. .....+3.8g, -1.9g

Flaps 50%, 3150 lb. .....+1.9g, 0g

Flaps 100% (Down), 3150 lb. .....+1.9g, 0g

Minimum Flight Crew

The minimum flight crew is one pilot.

Private Pilot Ground School 7

91.205 - Instrument and Equipment Requirements

16.687

- VFR day:
  - Airspeed indicator, altimeter, magnetic compass
  - Tachometer, oil pressure, oil temperature, manifold pressure (for turbocharged engines)
  - Fuel gauge, landing gear position indicator

91.205 - Instrument and Equipment Requirements

16.687

- For small airplanes certified after 3/11/1996: red or white anti-collision lights
- Safety belt
- For small airplanes manufactured after 7/18/1978: shoulder harness for front seats
- ELT (if required by 91.207)

91.105 - Pilots at Stations

16.687

- Pilot must stay at station with safety belt fastened
  - Except for aircraft or physiological needs
- Must wear shoulder harness during taxiing, takeoff, and landing
  - Unless it interferes with operation of the aircraft
  - Or there isn't one

91.107 - Use of Safety Belts, etc.

16.687

- Pilot in command is responsible to ensure…
- Everybody must be in an approved seat and
  - Wearing a seatbelt during surface operations
  - Under age 2 can be held by adult
  - Children can be in child seat
  - Skydivers can sit on the floor

91.11 - Interference with Crewmembers

16.687

- No person may assault, threaten, intimidate, or interfere with a crewmember in the performance of the crewmember's duties aboard an aircraft being operated

Homework: Try telling this to a spoiled 10-year-old.

FAR 91.121: Altimeter Setting

16.687

- Use local altimeter setting
- If not available, use airport elevation

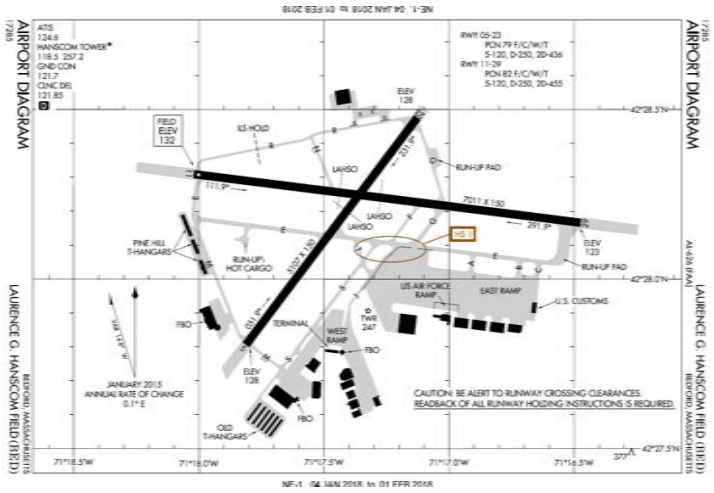
91.21 - Portable Electronic Devices

16.687

- Must be turned off **under IFR**
  - A few specific items are exempt
  - PIC can also allow other items if they will not interfere with onboard communications or navigation equipment

Airport Diagram

16.687



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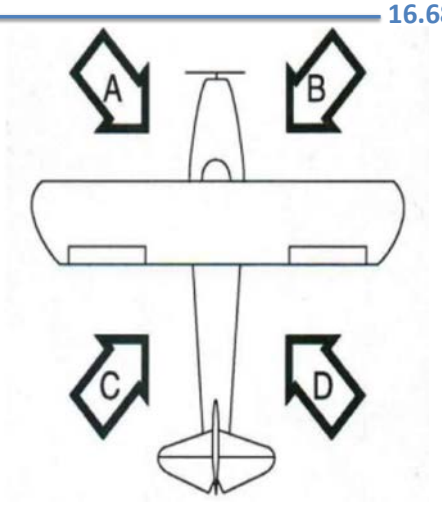
Taxiing in Wind (Tricycle Gear)

16.687

- Quartering tailwind
  - Most critical situation
  - "Dive Away"
- Quarter headwind
  - Aileron into the wind
  - Elevator neutral
- Less relevant with heavier aircraft



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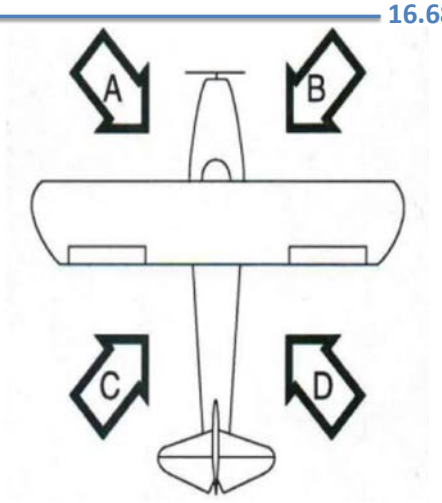
Taxiing in Wind (Tail Wheel)

16.687

- A.K.A. "Conventional Gear"
- Quartering tailwind
  - "Dive Away"
- Quarter headwind
  - Aileron into the wind
  - Elevator up



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Taxiway and Runway Markings

16.687

ILS	**ILS critical area holding position sign** When the ILS is in use ATC may hold you short of this sign so your aircraft does not interfere with the ILS signal.		**Runway boundary sign** This sign faces the runway and is visible to pilots exiting the runway. Taxi past this sign to be sure you are clear of the runway.
15-APCH	**Runway approach area holding position sign** You must hold at this sign until cleared to cross the runway, to avoid interference with runway operations.		**Taxiway ending marker** This sign indicates the termination of the taxiway. It is located at the far end of the intersection.
A	**Taxiway location sign** This sign indicates which taxiway you're on. It may be posted next to direction or holding position signs.	X	**Closed runway and taxiway marking** Located at both ends of permanently closed runways and at 1,000-foot intervals. It is also placed at taxiway entrances if they are permanently closed.
15-33	**Runway holding position sign** Until cleared onto the runway you must hold at this sign. In this example, the runway 15 threshold is to the left and the runway 33 threshold is to the right.	←B	**Direction sign for runway exit** This sign will indicate the approaching taxiway while on the runway. In this example, taxiway Bravo is approaching to the left.
-C A A/C-	**Destination signs and location sign** This sign indicates current position and direction to other taxiways. In this example, you are on taxiway Alpha. Taxiway Charlie passes from right to left and Alpha continues ahead to the right.		**ILS critical area boundary sign** Indicates when you are safely clear of the ILS critical area. It is located directly beside the ILS holding position markings. While ILS approaches are in use, taxi past the sign before stopping on the taxiway.
27•33→	**Outbound destination sign** This sign indicates directions to common taxi routes. In this example, runway 27 and 33 are to the right. The dot in the middle separates destinations identified on the sign.	A - 5-23 - 9-27	**Holding position and location signs** In this example you are on taxiway Alpha; runway 5-23 passes perpendicular to your position. Runway 9-27 passes at an angle starting ahead and left of your position to behind and right of your position.
MIL→	**Inbound destination sign** This sign directs pilots to destinations on the airport. This example indicates that the military installation is to the right.	22	**Runway location sign** This sign identifies the runway on which your aircraft is located.

Source: Public Domain

Visual Scanning

16.687

- Most midair collisions occur
  - Near airports
  - In good weather
- Scan entire area before maneuvering
  - Short eye movements, scan 10 degree sectors
- Shallow banks during climb/descent on airway
- Collision course shows no relative movement

Who has the right of way?

16.687

- Blimp
- Aircraft refueling another aircraft
- Glider

FAR 91.113: Right of Way Rules

16.687

- Right of way belongs to (descending order)
  - Aircraft in distress
  - Balloon
  - Glider
  - Towing or aerial refueling
  - Aircraft on the right
- Approaching head-on or overtaking: alter course to the right
- Approaching airport
  - Lower aircraft has right of way
  - Cannot be abused ("cutting" the pattern)

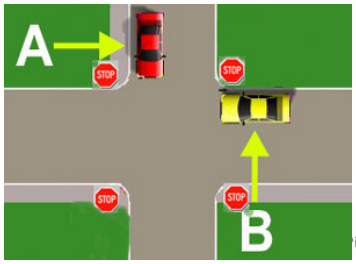
Reality: rare to see another aircraft except near airport.

21

91.113 - Right-of-way Rules (Except water operations)

16.687

- When in visual conditions must see and avoid other aircraft
- Aircraft in distress has top priority
- Two aircraft of same category converging: aircraft on right has right-of-way



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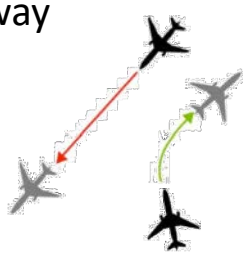


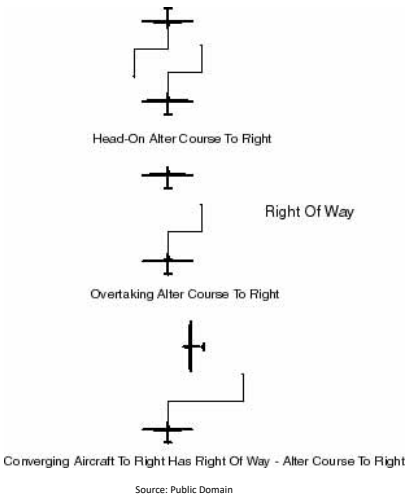
ilot Ground School

22

91.113 - Right-of-way Rules (Except water operations)

16.687

- Approaching head-on: alter course to right
- Overtaking: alter course to right
- Landing
  - Aircraft on final approach has right-of-way
  - Lower aircraft has right-of-way



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Private Pilot Ground School 23

91.113 - Right-of-way Rules (Except water operations)

16.687

- Converging, different categories
  - Balloon over all others
  - Glider over powered aircraft
  - Airship over other powered aircraft
  - Towing or refueling over other powered aircraft

Source: Public Domain

24

91.119 - Minimum Safe Altitudes: General

16.687

- Anywhere: allow for emergency landing without undue hazard to persons or property on surface (e.g. power failure)
- Over congested area: 1,000 feet above highest obstacle within 2,000 feet
- Other than congested area: 500 feet above the surface
- Over water or sparsely populated area: 500 feet from any person, vessel, vehicle, structure

Helicopters: can go below these minimums if not hazardous to persons or property on the surface

91.13 - Careless or Reckless Operation

16.687

- Not allowed to endanger life and property of another
  - In the air
  - On the surface of an airport used for air commerce

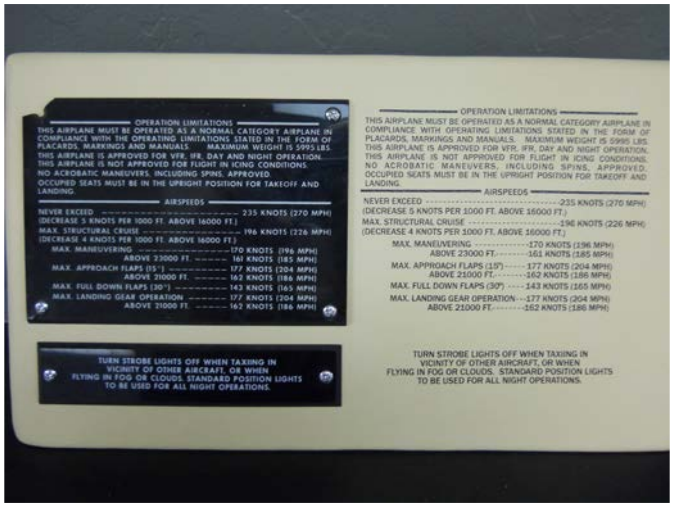
91.9 - Flight Manual, Markings, and Placards

16.687

- Must comply with limitations in Airplane Flight Manual (AFM), on placards, and on markings
- AFM must be onboard
- Aircraft must have proper registration marks (tail number)

Placards

16.687



91.15 - Dropping Objects

16.687

- Not allowed to create a hazard to persons or property

91.111 - Operating Near Other Aircraft

16.687

- Not allowed to create a collision hazard
- Formation flight requires prior arrangement with each PIC
  - Not allowed if carrying passengers for hire

91.117 – Aircraft Speed

16.687

- Max 250 knots below 10,000 feet
- Max 200 knots below 2,500 feet and within 4 NM of Class C or D airport
- Max 200 knots beneath Class B airspace

Good news for SR-71 owners: faster is okay to avoid stalling.

16.687

Section B

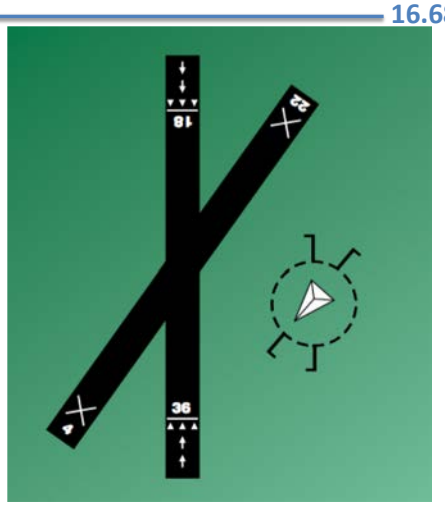
LANDING AT AN AIRPORT

Runway Numbers

16.687

- Magnetic Heading of Approach or Take-Off Direction
  - Round to nearest 10
  - Drop the last zero
- Examples
  - Landing on north heading of 358: Runway 36
  - Landing SW heading 223 => Runway 22

Explained in FAA's *Aeronautical Information Manual*



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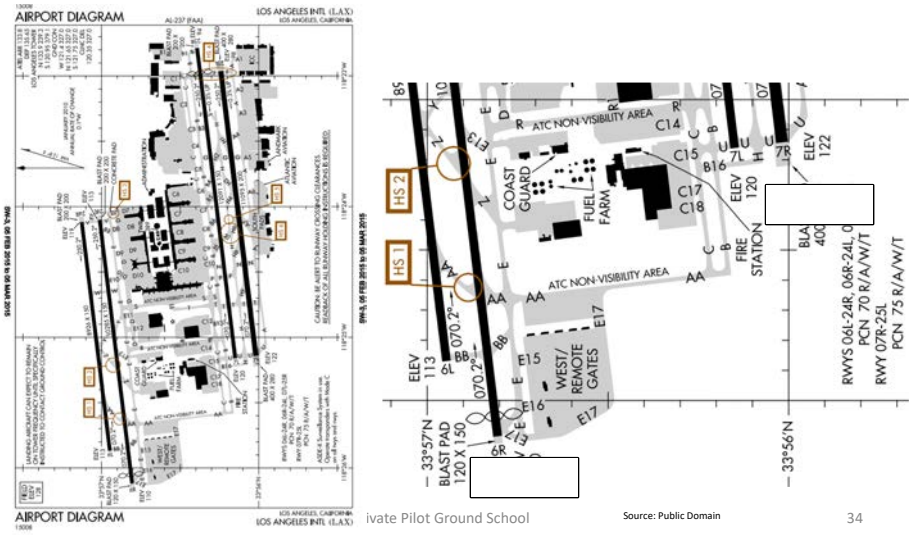
Runway Numbers: Add L, C, or R; then increment (KLAX)

16.687



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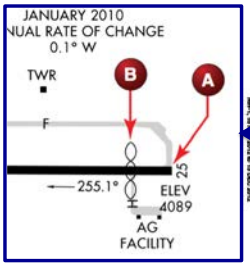
Runway Markings

16.687

- B – Displaced Threshold



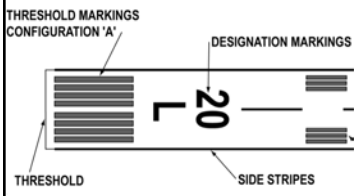
  - Taxi and Takeoff
  - NO landings allowed

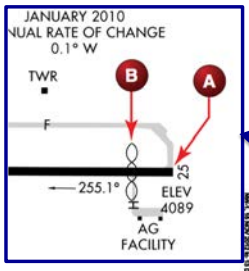
Source: Public Domain

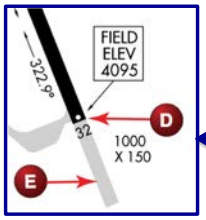
Runway Markings

16.687

- B,D – Threshold







Takeoff, taxi, landing allowed

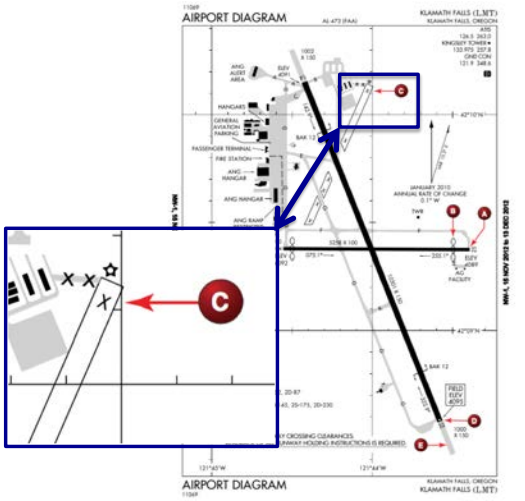
Source: Public Domain

Runway Markings

16.687

- C – Closed runway, taxiway

– Temporary or permanent closure warning



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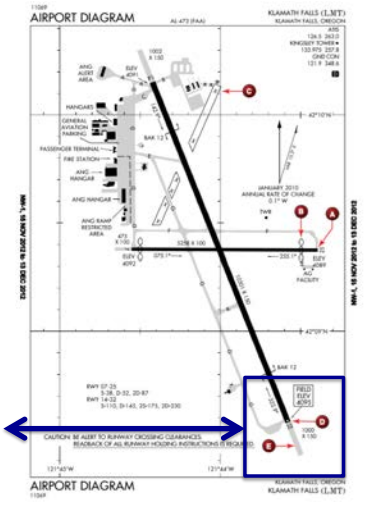
Runway Markings

16.687

- E – Overrun

– Also called “Stopway”
– Emergency use only



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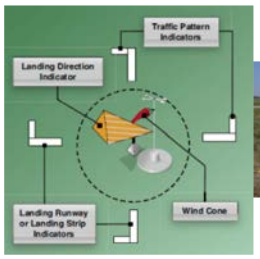
Wind Direction Indicators

16.687

- Windsocks
  - Shows wind direction, speed, gust characteristics
  - Full inflation normally 15kt
- Other wind indicators
  - Tetrahedron, Wind Tee
- Segmented Circle
  - Surrounds wind direction indicator
  - Indicates direction of traffic pattern



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Visual Glide Slope Indicator

16.687

Best way to fly is looking out the window.

Lights next to the runway indicate “high”, “low”, or “on glide slope”.

Reassuring at night: guaranteed obstacle clearance if on or above the glide slope and lined up with the runway.

Types you will see in the U.S.:
- VASI (two rows of lights)
- PAPI (one row of lights)

Types that might be on the test:
- Tri-color
- PVASI (pulsating)
- Alignment of Elements

VASI

16.687

Most common: two-bar Visual Approach Slope Indicator (VASI)

- Above: White over White (high as a kite, fly all night)
- On: Red over White (you're alright)
- Below: Red over Red (you're dead)

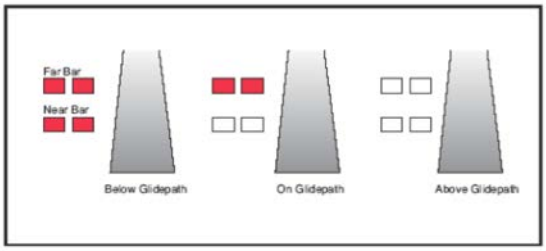

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Figure 12-6. 2-Bar VASI system.

PAPI

16.687

Bigger/better jet-oriented airports: Precision Approach Path Indicator (PAPI)

Runway 11/29 at Hanscom, for example. Almost every runway at Logan.

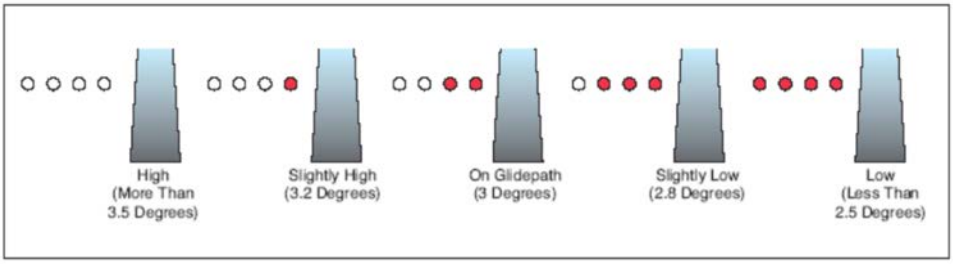

Figure 12-7. Precision approach path indicator.

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Tri-Color

16.687

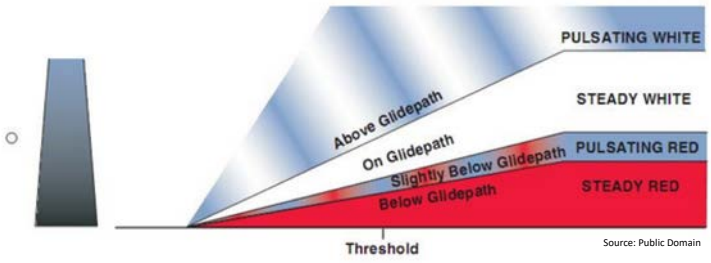
Tri-Color Visual Approach Slope Indicator (single light)

Source: Public Domain

Pulsating VASI

16.687

- Pulsating Approach Slope Indicator (single light)
  - Above: Pulsating white
  - On: Steady white
  - Below: Steady red



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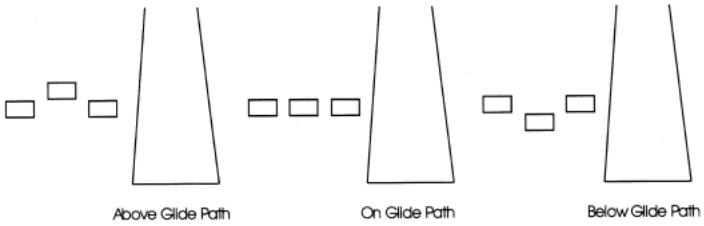
Alignment of Elements

16.687

Approach Path Alignment Panel/Alignment of Elements Systems

AIM: “a low−cost system consisting of painted plywood panels, normally black and white or fluorescent orange”



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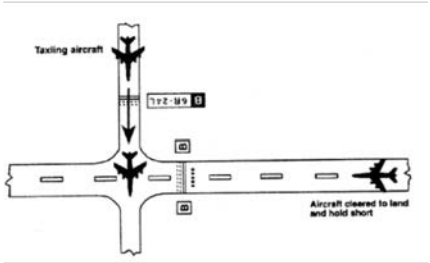
LAHSO Procedures

16.687

- Land and Hold Short Operations (LAHSO)
- Not mandatory – can refuse clearance
  - If clearance is accepted, MUST comply
- Should not accept LAHSO clearance as student pilot
- Visibility must be 3 statute miles or greater
- Available landing distance published in Airport/Facility Directory (A/FD)
  - Also available from ATC



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91.125 - ATC Light Signals

16.687

Color and type	Meaning on surface	Meaning in flight
Steady green	Cleared for takeoff	Cleared to land
Flashing green	Cleared to taxi	Return for landing
Steady red	Stop	Give way and continue circling
Flashing red	Taxi clear of runway in use	Airport unsafe - do not land
Flashing white	Return to starting point on airport	N/A
Alternating red and green	Exercise extreme caution	

Resources

16.687

- Interactive set of US sectionals
  - www.skyvector.com (good airport data, including Chart Supplement)
  - www.vfrmap.com
- Online airport information
  - www.airnav.com
- Sporty's Study Buddy and Sample Tests
  - http://www.sportys.com/pilotshop/learn-to-fly/study-buddy.html
- Online quizzes (choose topics/subjects)
  - www.exams4pilots.org

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