



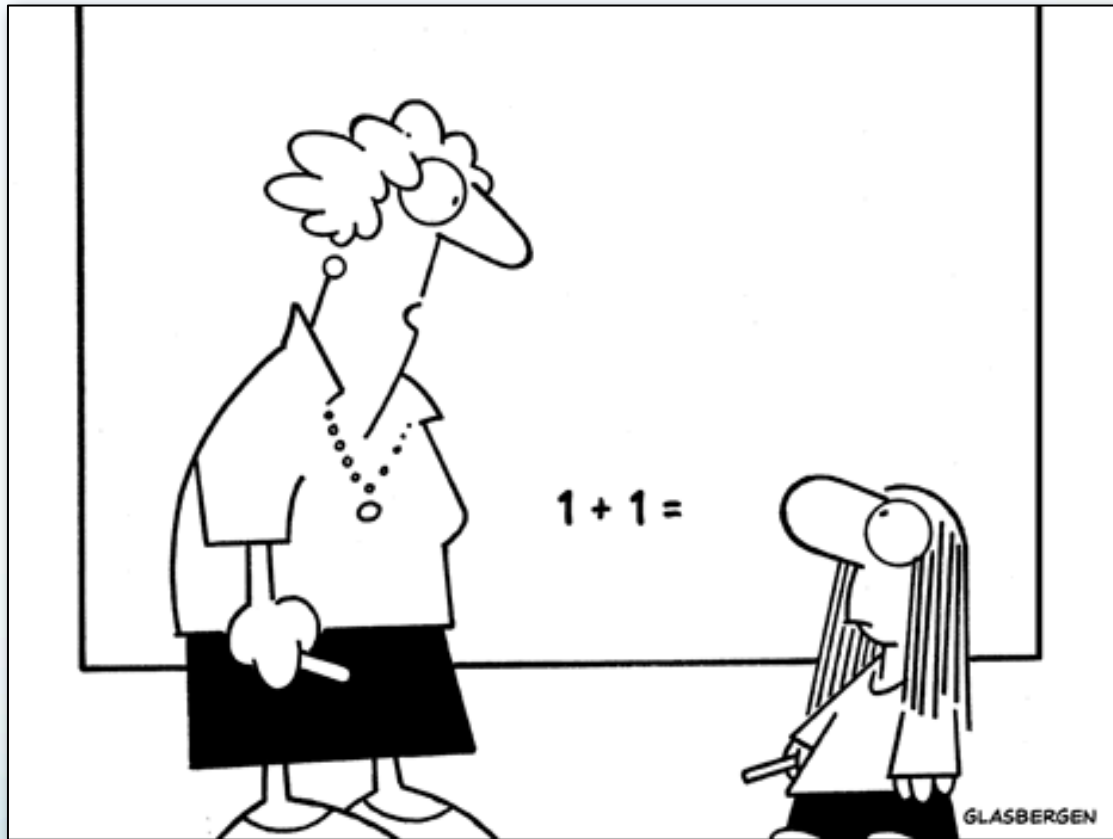
Some ILS Elevation Thoughts

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Note: Most of this material is from the US Standard for Terminal Instrument Procedures (TERPS) – Other Countries and ICAO may have different standards

8260.3C - United States Standard for
Terminal Instrument Procedures (TERPS) –
March 14, 2016

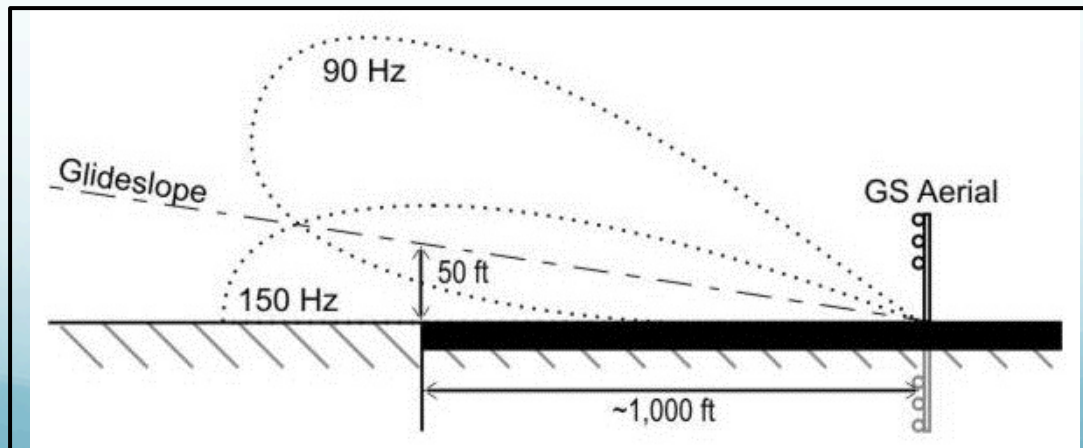
TERPS



Yes, this will be useful when you become a pilot!

Objective and Agenda

- Objective: Gain Appreciation for Vertical Obstacle Clearance While Flying an ILS
- Agenda:
 - Required Obstacle Clearance
 - Obstacle Clearance Surface
 - Some Flying Tips



Required Obstacle Clearance (ROC)

Figure 1-1. Minimum Segment Altitude. Par 202a

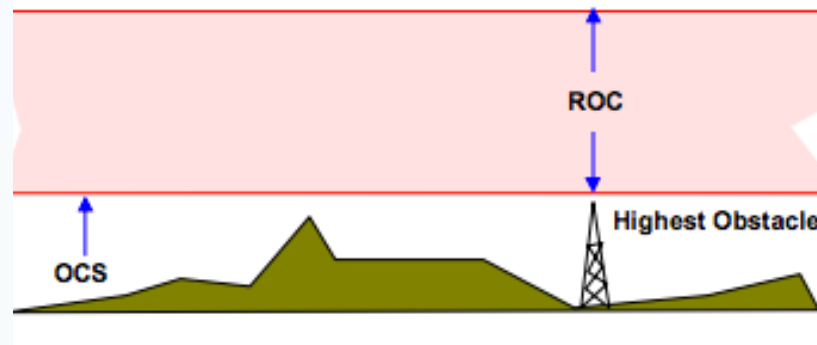
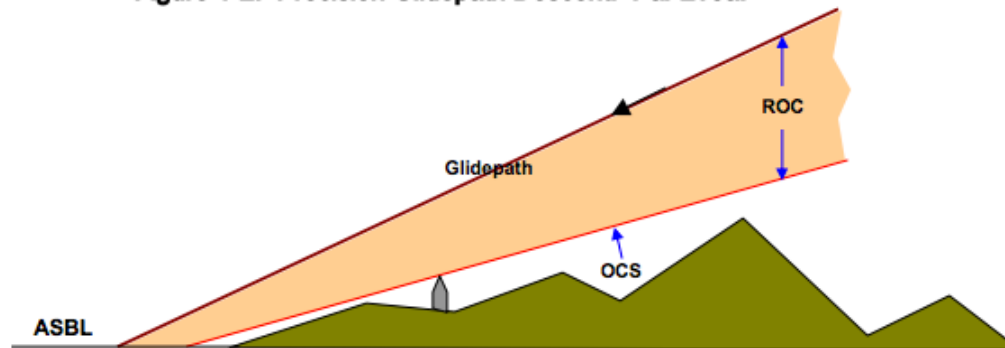


Figure 1-2. Precision Glidepath Descent. Par 203a.



ROC (cont.)

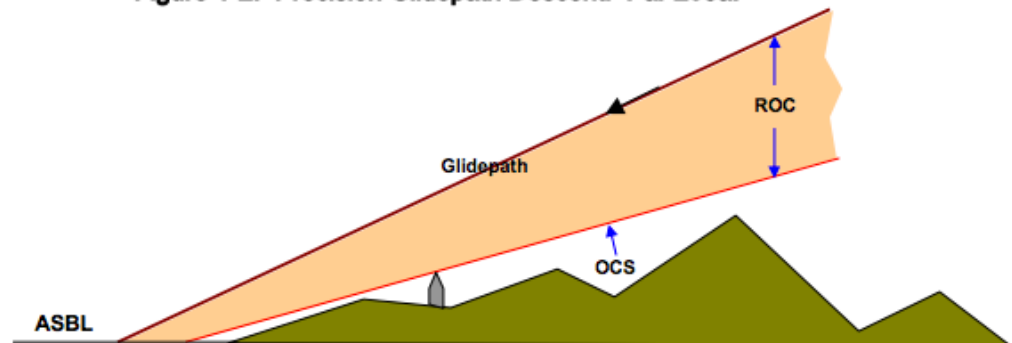
- Unlike Enroute Where 1,000' or 2,000' is Specified, For An ILS There is No One Safety Margin From An Obstacle
- Instead Safety Margins (the ROC Zone) Are Established by Boundaries
- On an ILS, the Boundaries are:
 - Glidepath
 - Obstacle Clearance Surface
- With a Bit of Trigonometry at DH/DA on KHYI ILS, the ROC is ~ 88'

ILS Obstacle Clearance Surface*

- OCS is Expressed as a Gradient
- We Have Heard a 34:1 Ratio Means a 3 Degree Glideslope
- Not Quite – This is the OCS Gradient *For* a 3 Degree GS
- Defines Required Obstacle Clearance Boundary

* May see glide-path qualification surface (GQS) from DH to runway – this term seems to be replaced with OCS in last two TERPS releases

Figure 1-2. Precision Glidepath Descent. Par 203a.



OCS (cont.)

- OCS Gradient is Expressed as the Distance Versus Rise
- For a 3 Degree Glideslope No Obstacle May Penetrate an OCS That Has a 34:1 Gradient
- This Means The OCS Has an Angle of:
 - a) 3.0 Degrees
 - b) 2.0 Degrees
 - c) 1.68 Degrees

Hint: Compute the ARCTAN of (1/34)

OCS (cont.)

- Congratulations – It is 1.68 Degrees
 - Margin of Required Obstacle Clearance 1.32 Degrees
- So What? You Ask...
- What is the Full Scale Deflection of the Glideslope?
- Each Dot *About* 0.12 Degrees*
 - Full Scale Deflection *About* 0.7 Degrees*
 - We Can Use Up Over Half Our Safety Margin By Sloppy Flying

**Everybody Say ‘Yikes!’ – We Really
Are Doing Precision Flying!**

* You May See It Expressed as a Smaller Value or in Feet

ILS Flying Tips

- **An ILS Flown At or Below Full Scale Up Deflection Cannot Ensure ROC**
- Fly At or Above Glide Slope from FAF to DH/DA
 - Part 135 Operations Require This
 - USAF (SAC) Used to Require 1 Dot Above
- Be Cognizant of GS Antenna Placement
 - A Factor in Big Aircraft
 - Today Most are Blade on Belly
 - Some are Mounted Higher, i.e. Windshield (next page)
- Plan to Cross Threshold at 50' AGL and Touch Down ~ 1,000' From Approach End

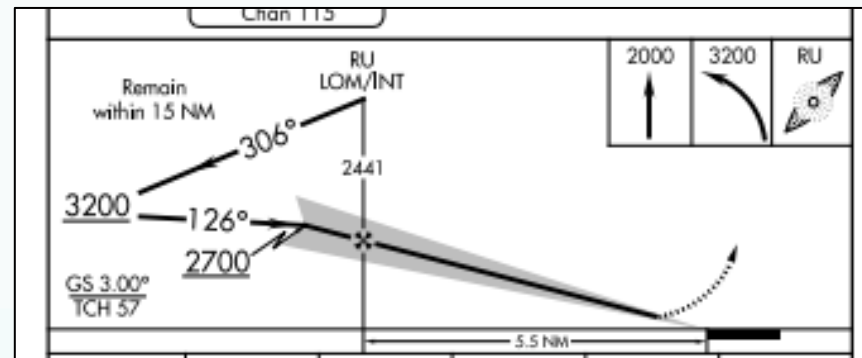
ILS Flying Tips (cont.)



- ROC Gets Smaller As You Approach Runway
E.g., On 1/4 Mile Final the ROC About 35'
At Runway Threshold About 29'

Last Elevation/GS Tip

- Altimeter Check at OM
- Verify the Glide Slope Altitude at OM on IAP
 - E.g., At RU when on GS Altimeter Should be 2441' MSL



- It's the Last Sanity Check of the Altimeter
 - You Did Remember to Reset it Descending Through FL 180, Right?

Questions?

IF THERE ARE NO STUPID QUESTIONS,
THEN WHAT KIND OF QUESTIONS DO
STUPID PEOPLE ASK? DO THEY GET
SMART JUST IN TIME TO ASK QUESTIONS?

