



**SPATIAL
DISORIENTATION
THE USAF EXPERIENCE
FY 1991 – FY 2000
HOW MUCH ARE WE
WILLING TO PAY?**

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Where Am I Going with This?

- ✍* Assumptions**
- ✍* Data**
- ✍* Op Ed Slides**



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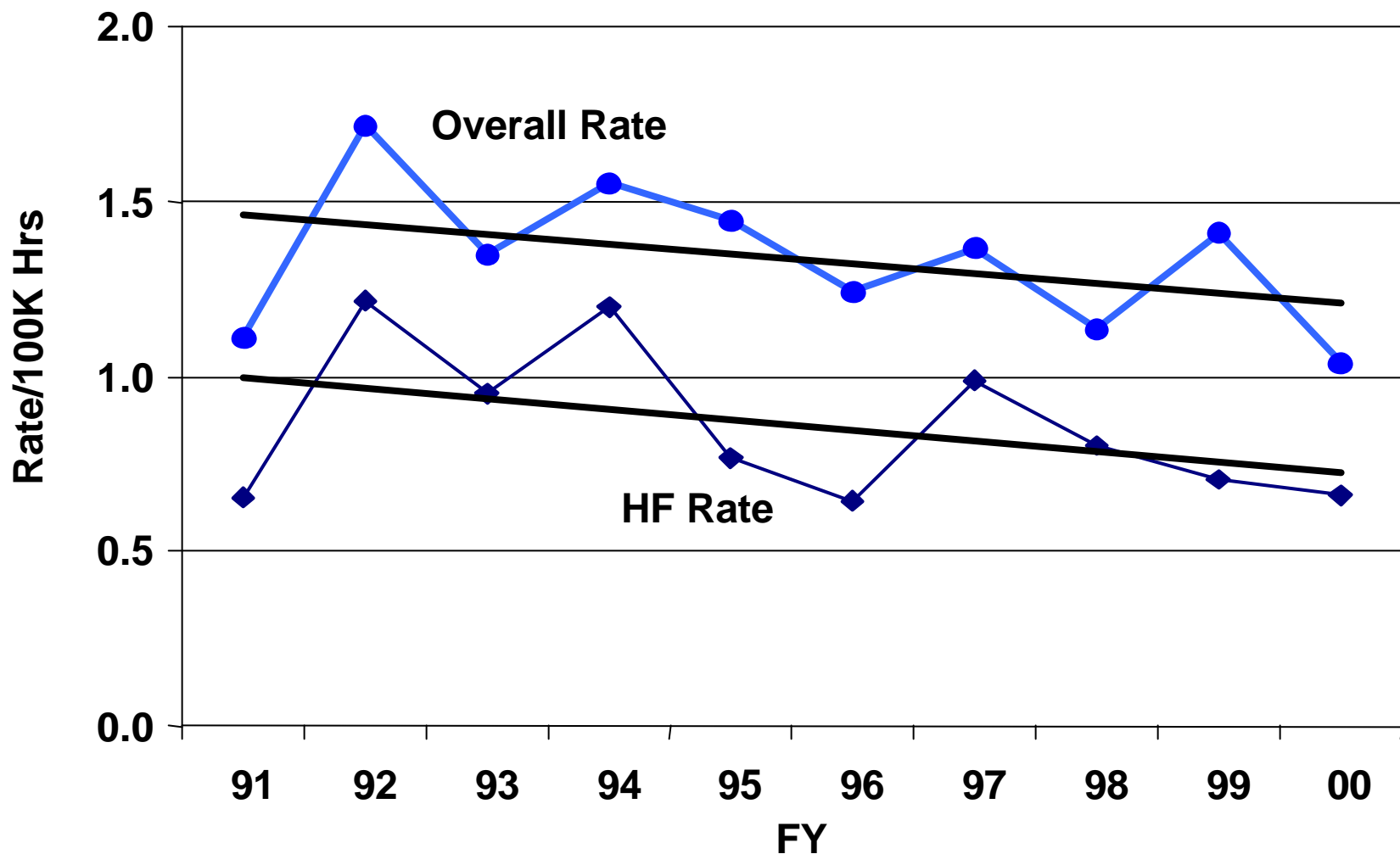
DATA ASSUMPTIONS

- ✍ SD Definition from AFPAM 11-243**
- ✍ Data Retrieved From AFSC Database**
- ✍ Mishaps Where SIB Life Sciences Team Coded SD As a Causal Or Major Contributing Factor**
- ✍ Excluded Mid-Air Collisions, F-16 Engine Loss/Hit House, A-10 Collision with Tower**



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HF v. Overall Class A Rates





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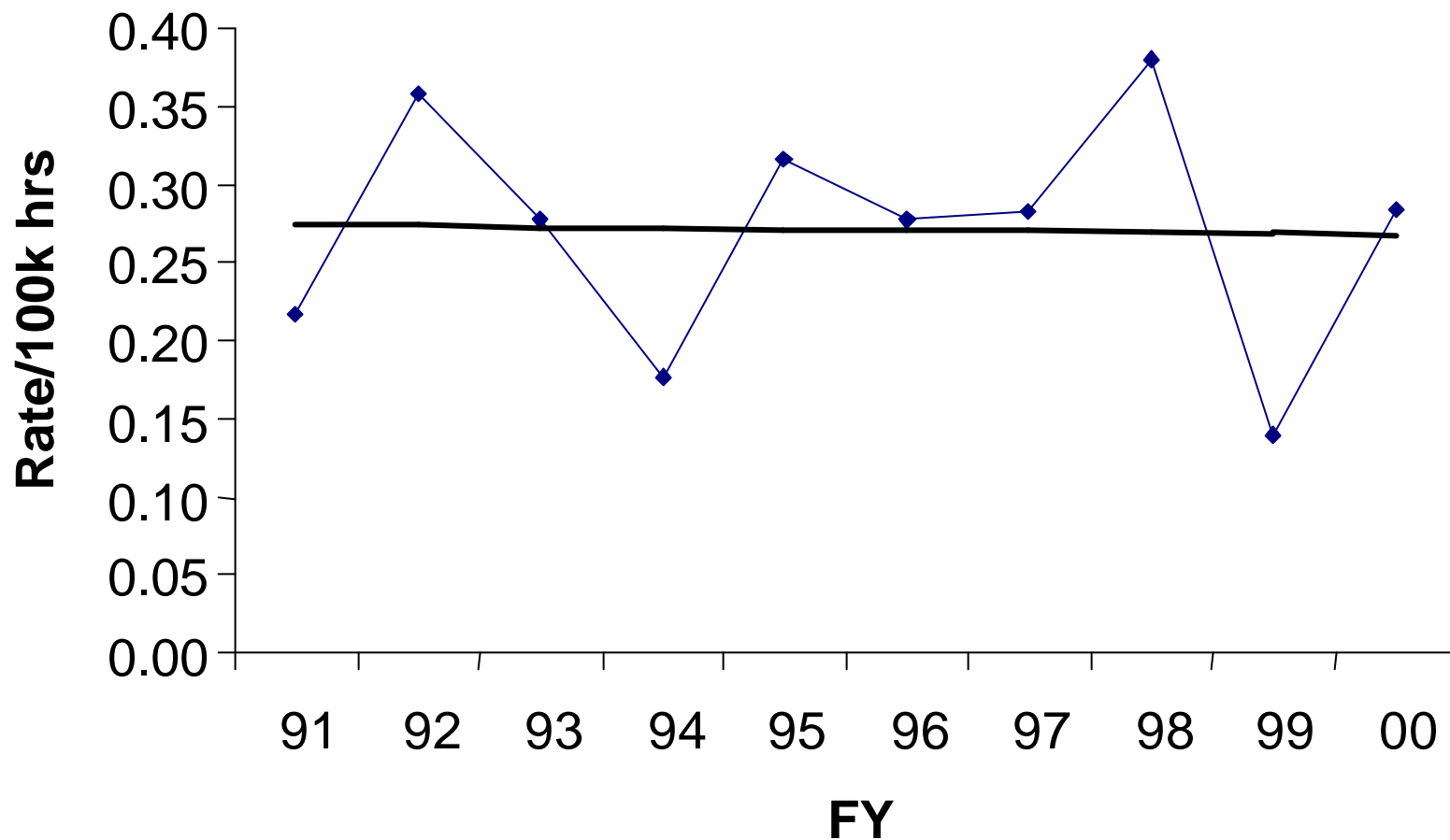
SD Costs to USAF: FY 1991- FY2000

Category	Total FY 91-00	SDO / % of Class A	GLOC / % Class A
Class A Mishaps	323	65 / 20.2%	11 / 3.5%
Cost	\$5.5 Billion	>\$1.4 Billion / 26.8%	\$174 Mil / 3.2%
Fatal Incidents	92	36 / 39%	7 / 7.6%
Fatalities	310	60 / 19.4%	8 / 2.5%

*GLOC used as comparison



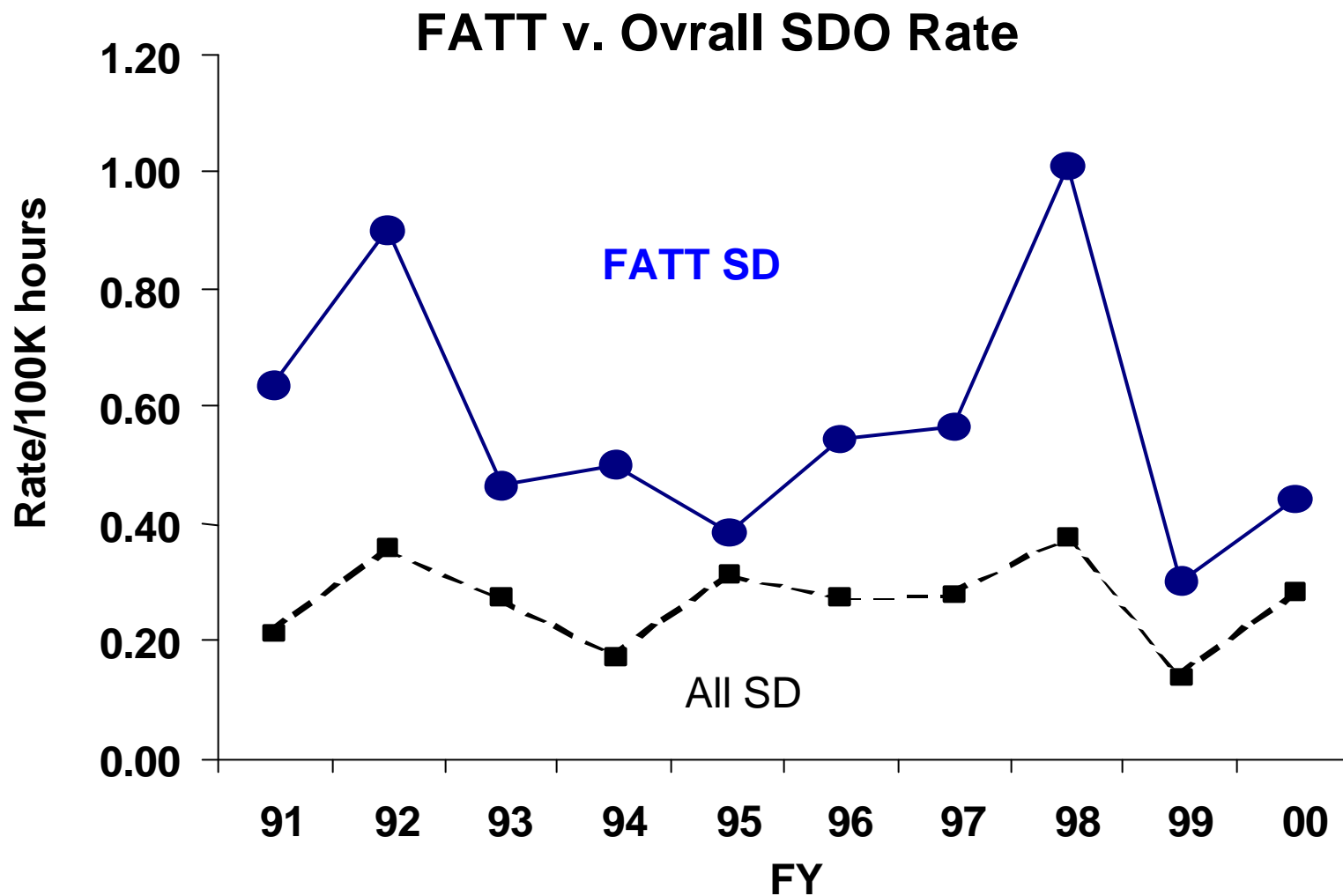
SD Rate Across All MDS





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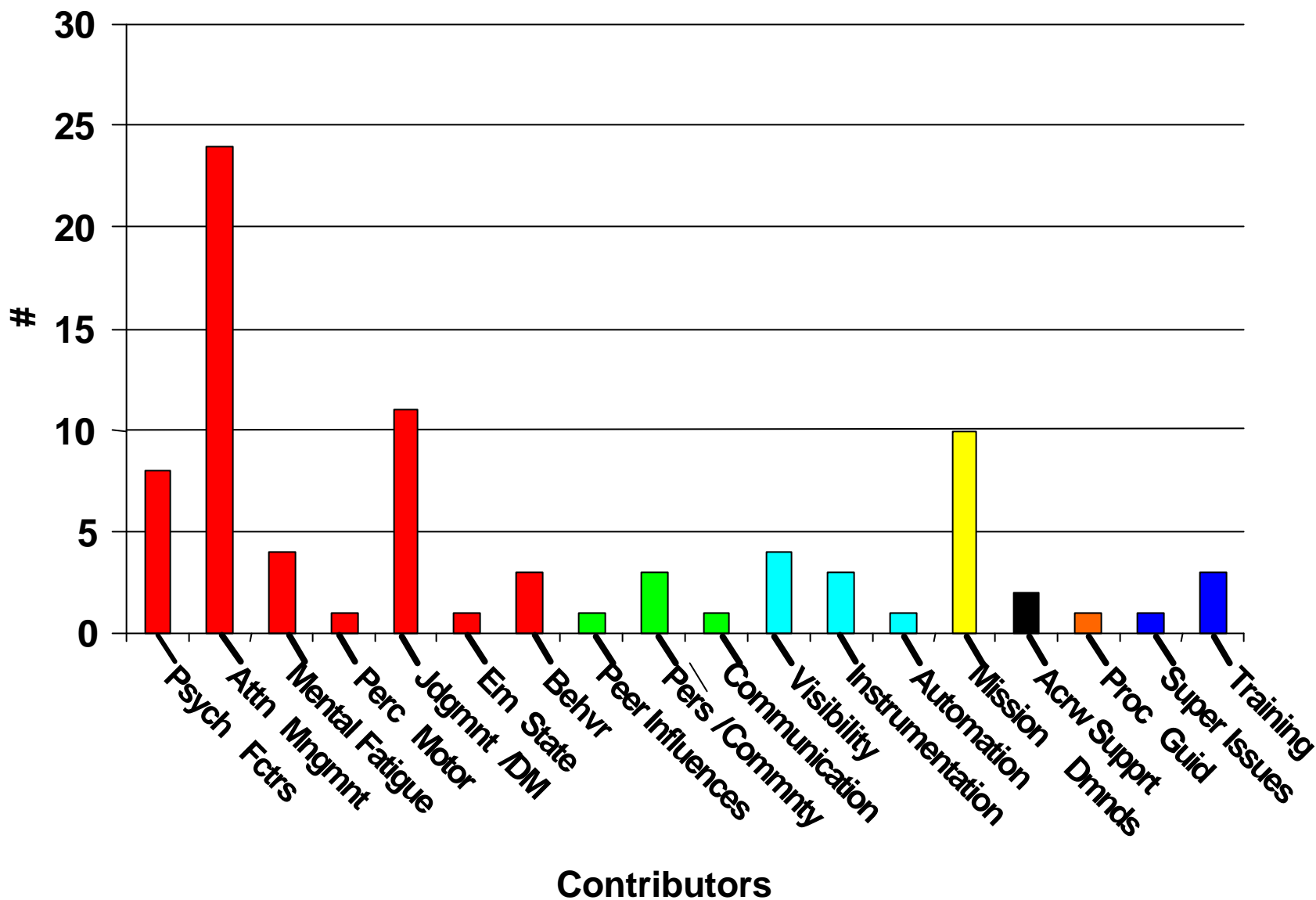
SD Rate for Fighter/Attack (FATT)





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SD Contributing Factors

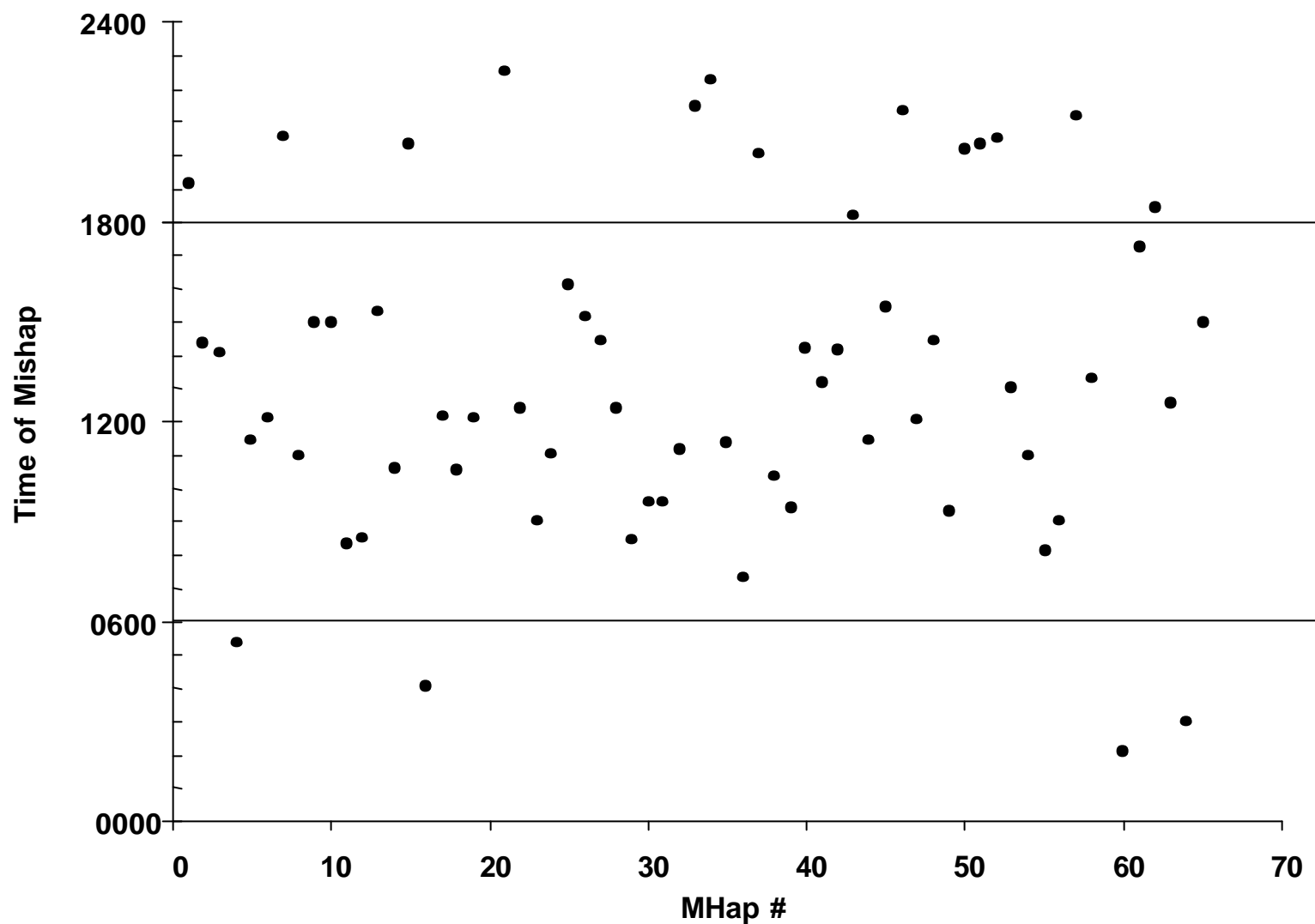


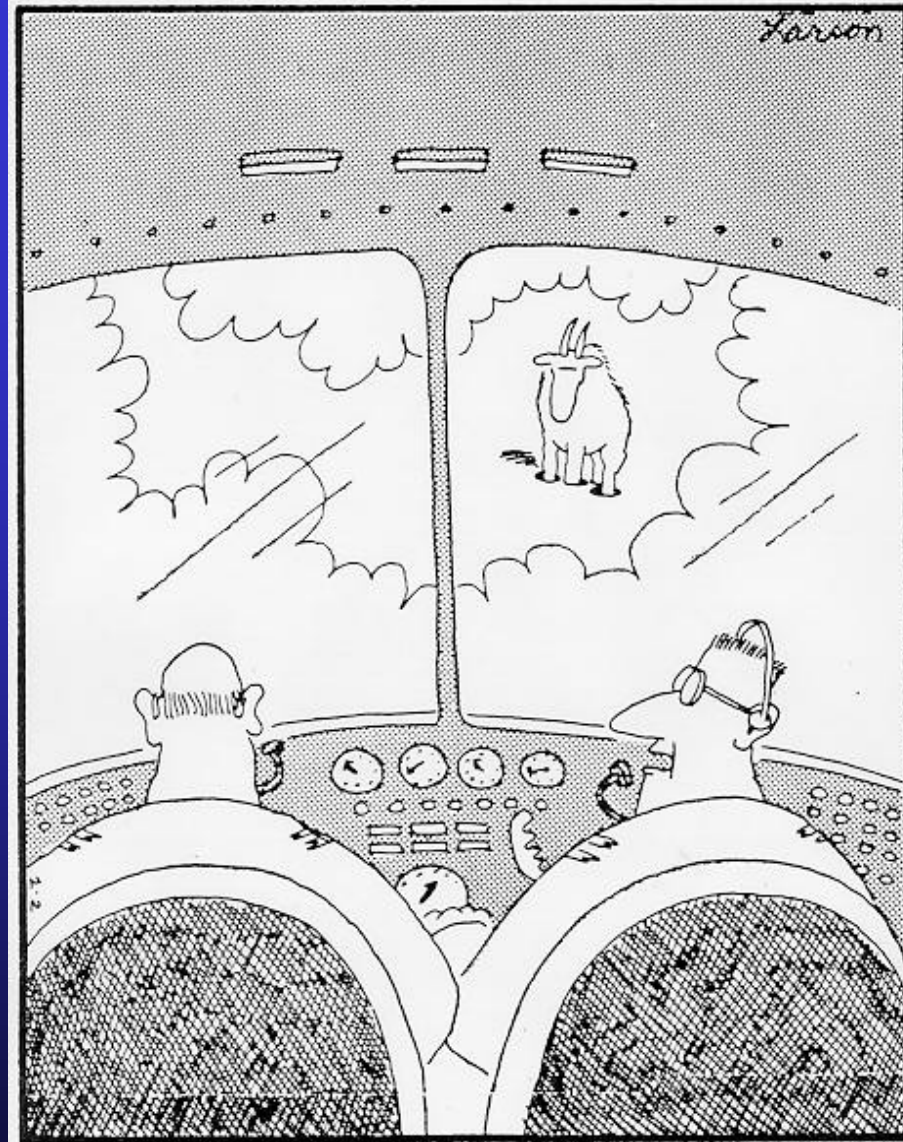


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SD: Night v. Day*

Mishap Time (L)



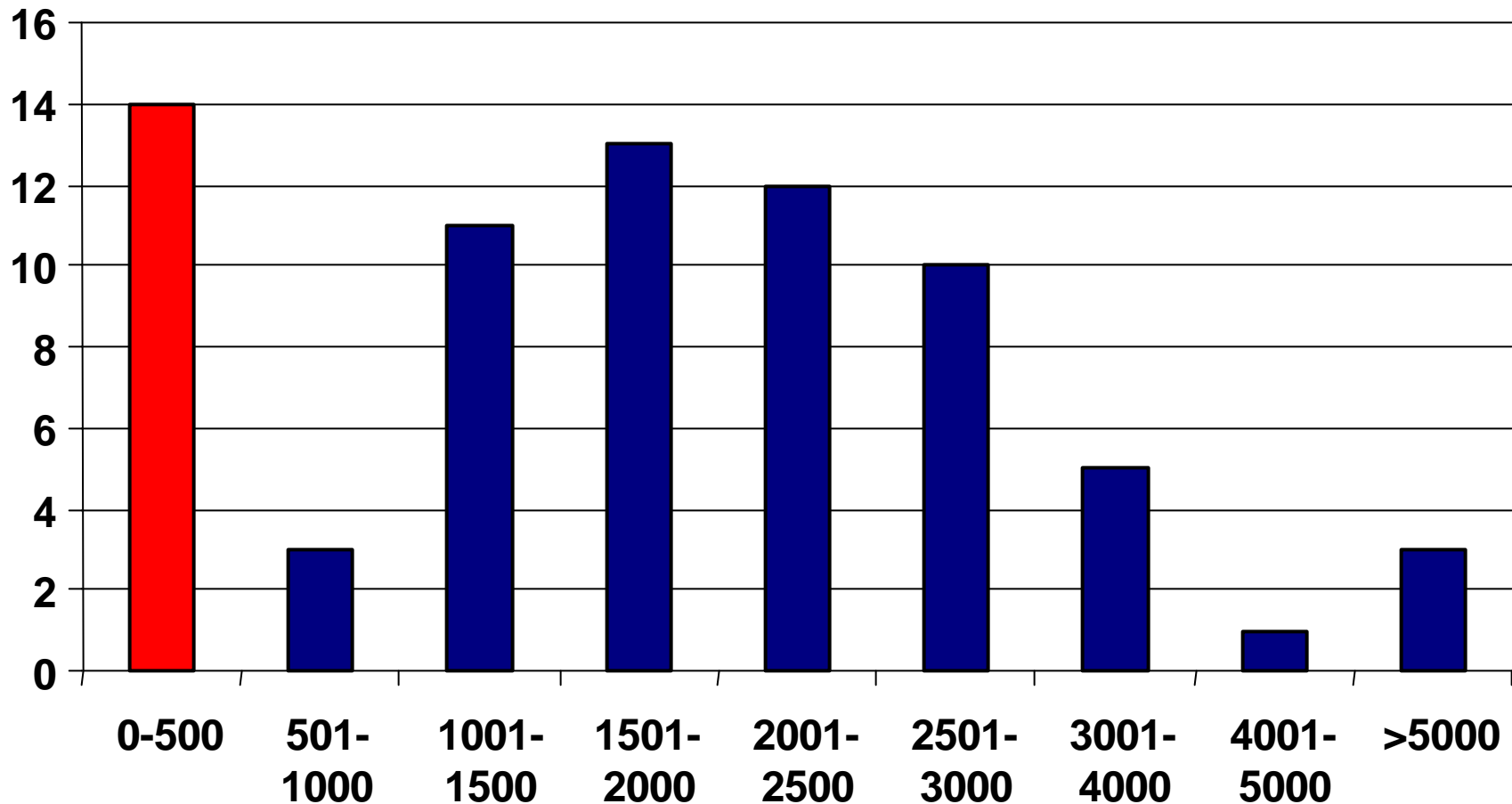


“Say, What’s a Mountain Goat Doing Way Up Here in the Clouds?”



Pilot Total Hours in SD Mishaps

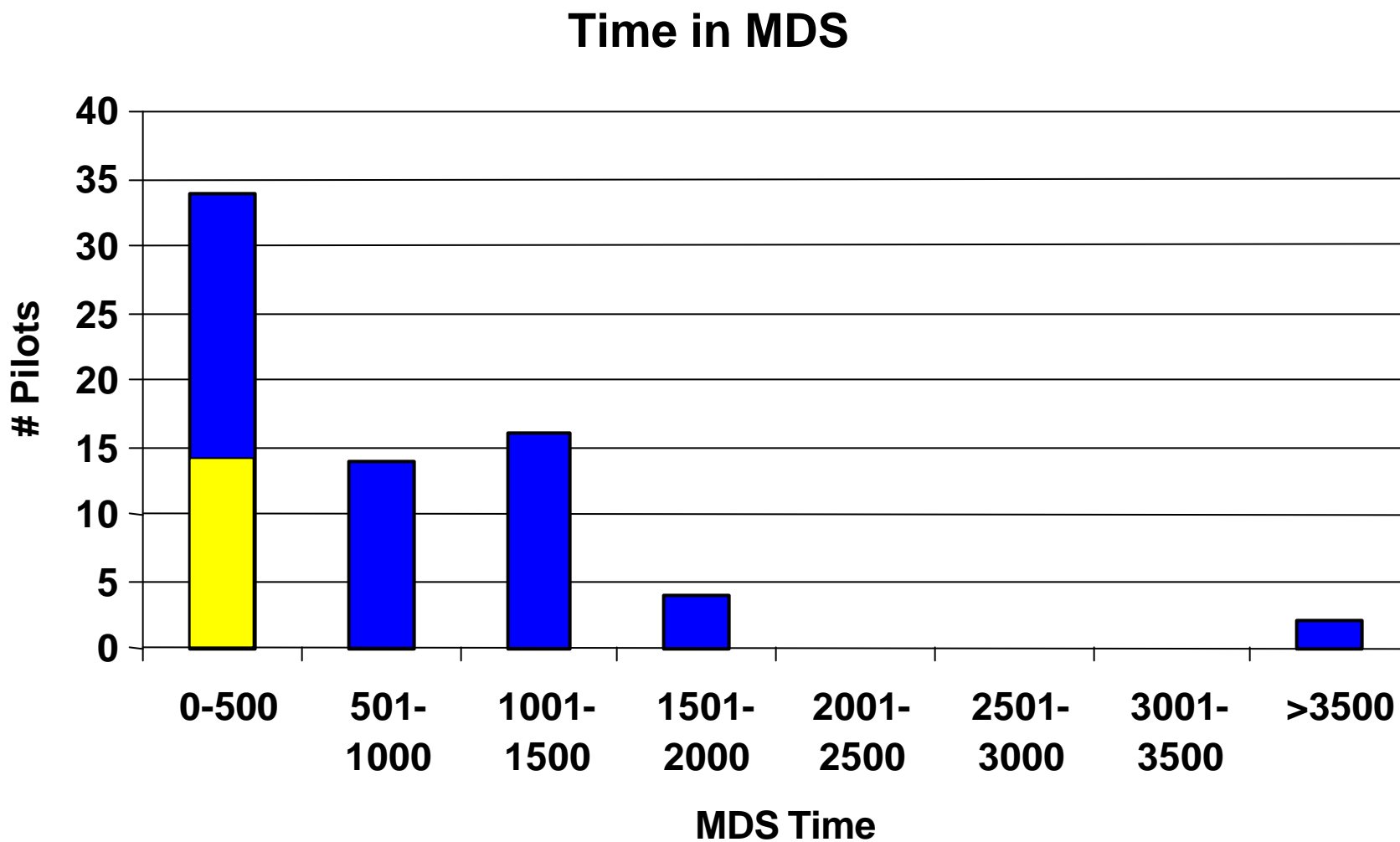
(N = 80)





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Pilot Hours in MDS

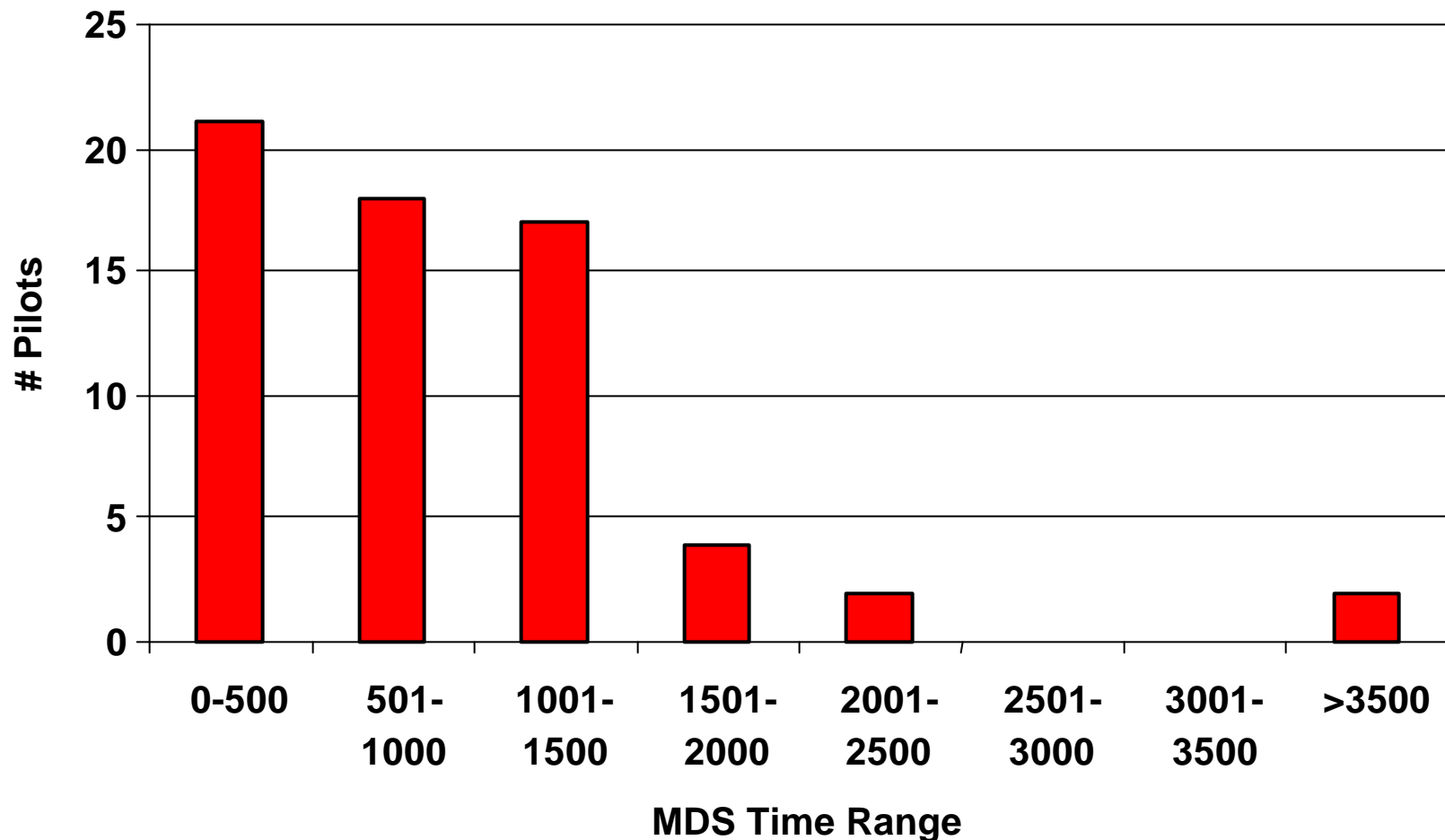




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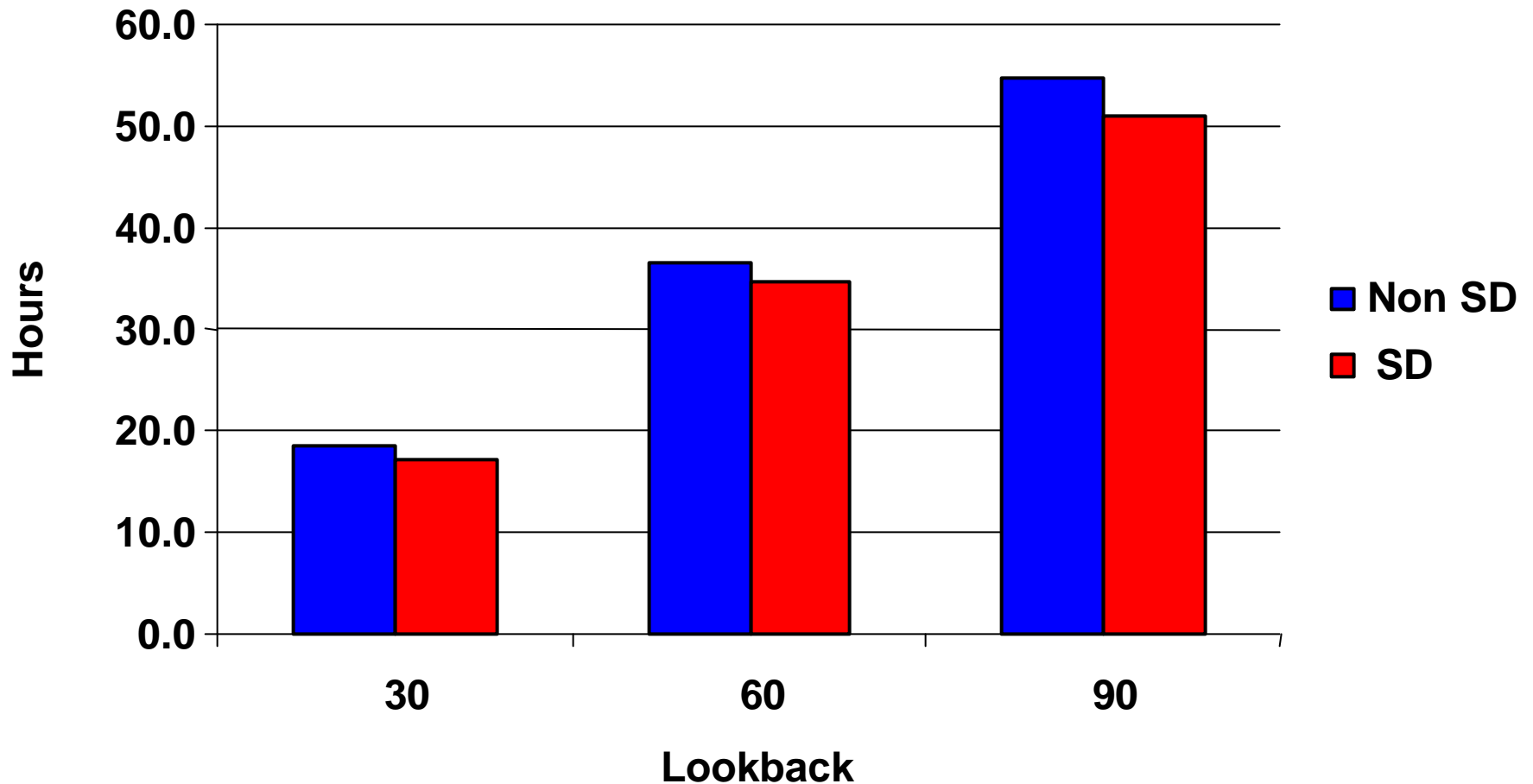
Pilot Hours in Weapon System

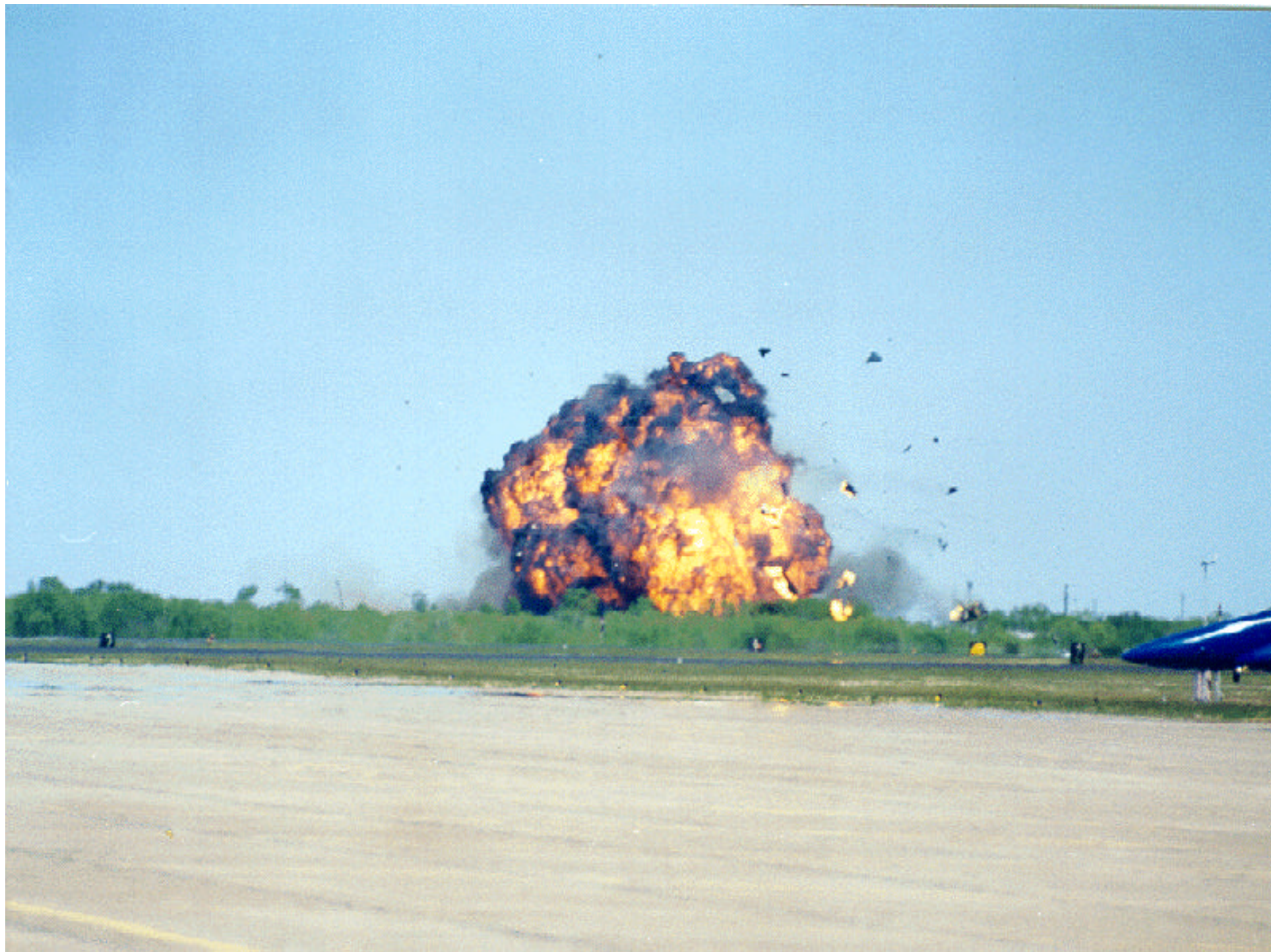
**MDS Time in SD Mishaps for
Pilots With > 500 Hrs Total Time (N = 64)**





Pilot 30/60/90 Day Flight Hour Look-backs







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Where Should We Look?

- ✍ SD Complex with Multi-System Interaction**
 - ✍ Vestibular/Somatosensory: Mechanical**
 - ✍ Visual: Cognitive**

- ✍ Recognition and Recovery Requires Conscious Attention**

- ✍ Most Contributors are Cognitive (Distraction, Task-Saturation, Channelized Attention)**

- ✍ If Looking to Prevent (Using Human-Based Intervention)-Treat SD as a Cognitive Phenomenon**



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What Can We Do?

✍ Can We Eliminate the SD Environment?

✍ Mitigation Strategies:

✍ Hardware Upgrades (AGCAS, CAPT Rupert's Vest, HUD/HMD Symbolologies, Etc)

✍ Expense?

✍ Long Term

✍ Liveware Upgrades (Training)

✍ Cost v. Benefit?

✍ Short to Mid Term

✍ Stop Gap until Hardware Upgrades On-Line?



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✍ **How Do We TRAIN Flyers for SD?**

✍ **Didactic**

✍ **Few Get ASD Demonstrator Rides**

✍ **Effective?**

✍ **What do We Need to Capture?**

✍ **How “Real” Do We Have to Get to
Capture SD Inducing Scenarios?**

✍ **How Much Acceleration Do We Need?**

✍ **Can We Achieve Effect with Visual
Mission Task Trainers?**



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Bottom Line

- ✍ SD Costs the USAF a Lot of Lives (and Money)**
- ✍ SD is Always a Threat (Unless We can Change the Environment)**
- ✍ SD Recognition and Recovery Requires Conscious Intervention**
- ✍ Training??????**
- ✍ Hardware Solutions?????**

How Much are We willing to Pay?

Exciting Stuff, Eh?



Questions?