Managing Vigilance, Distraction, & Boredom in the Cockpit

SOCAL AVIATION ASSOCIATION
AVIATION COMMUNITY ADVOCATES

Disclaimer – this is a boring presentation

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Vigilance – What is it?

"A state of readiness to detect and respond to certain small changes occurring at random time intervals in the environment."

- Mackworth

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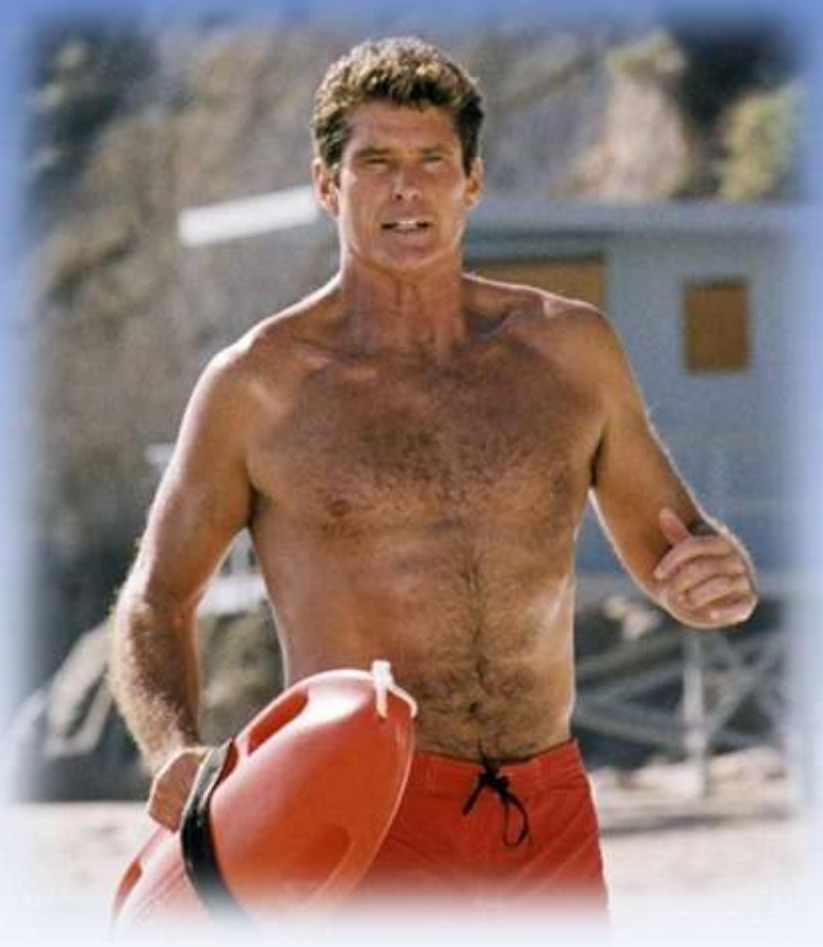
Vigilance in Action



- **Monitoring**
- **Inspection**
- **Detection**

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Limits of Vigilance

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Vigilance Task

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Inattentional Blindness

Yeah, But I saw it… (sure.)

50% *"hit" rate*

No evidence that individual differences or abilities make a difference

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Haine's HUD Experiment (NASA)

Rd
Airport Rd
Elite Fire Protection
eod Way
A
Marcair
The Blue Hangar Café
Lindbergh Dr
Douglas Dr
Boeing Way
Cleveland Gibbs Rd
Airport Rd
Texas Aeroplastics
North as Aero
Boeing Way
Phantom Way
Dallas Air Repair
Airway Blvd
Northwest Regional Airport

PHILLIPS
66
BLUE HANGAR Cafe
CLOSED
EMERGENCY FUEL SHUTOFF
06/17/2011

What about training?

Gulfstream 650 Initial – Day One

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Kangaroos, Senior Citizens, and Rejected Landings

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Situational Awareness

Exposure Ratio

(Shameless Product Placement)

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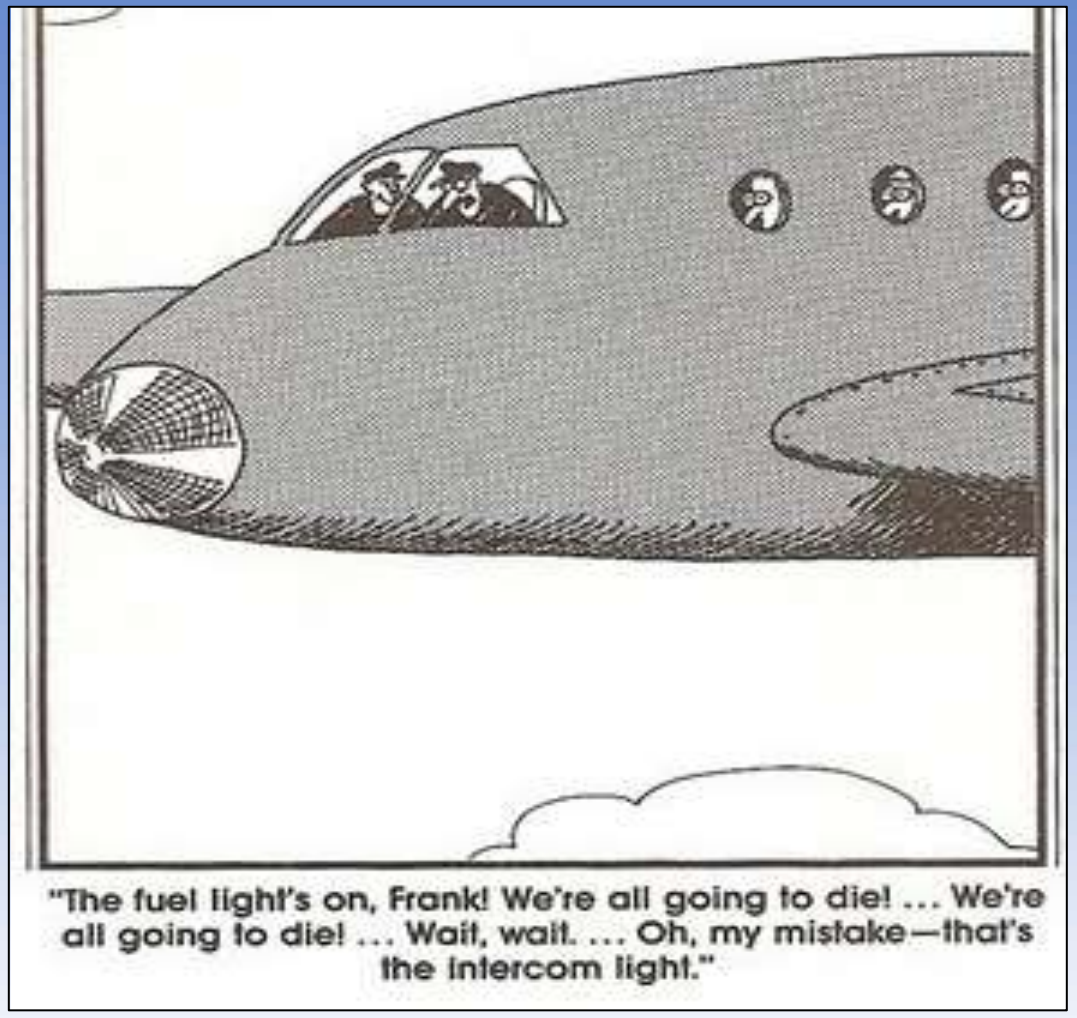
Change Blindness



"Comparison Failure"

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Tell me when it changes…

How long has it been that way?

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Change…

"Well I've been afraid of changing…"

- "Landslide," Stevie Nicks, Fleetwood Mac

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Lack of Feedback - effects

We only detect things we detect…
(never know what we miss)

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Types of Attention

Directed – Divided - Distracted

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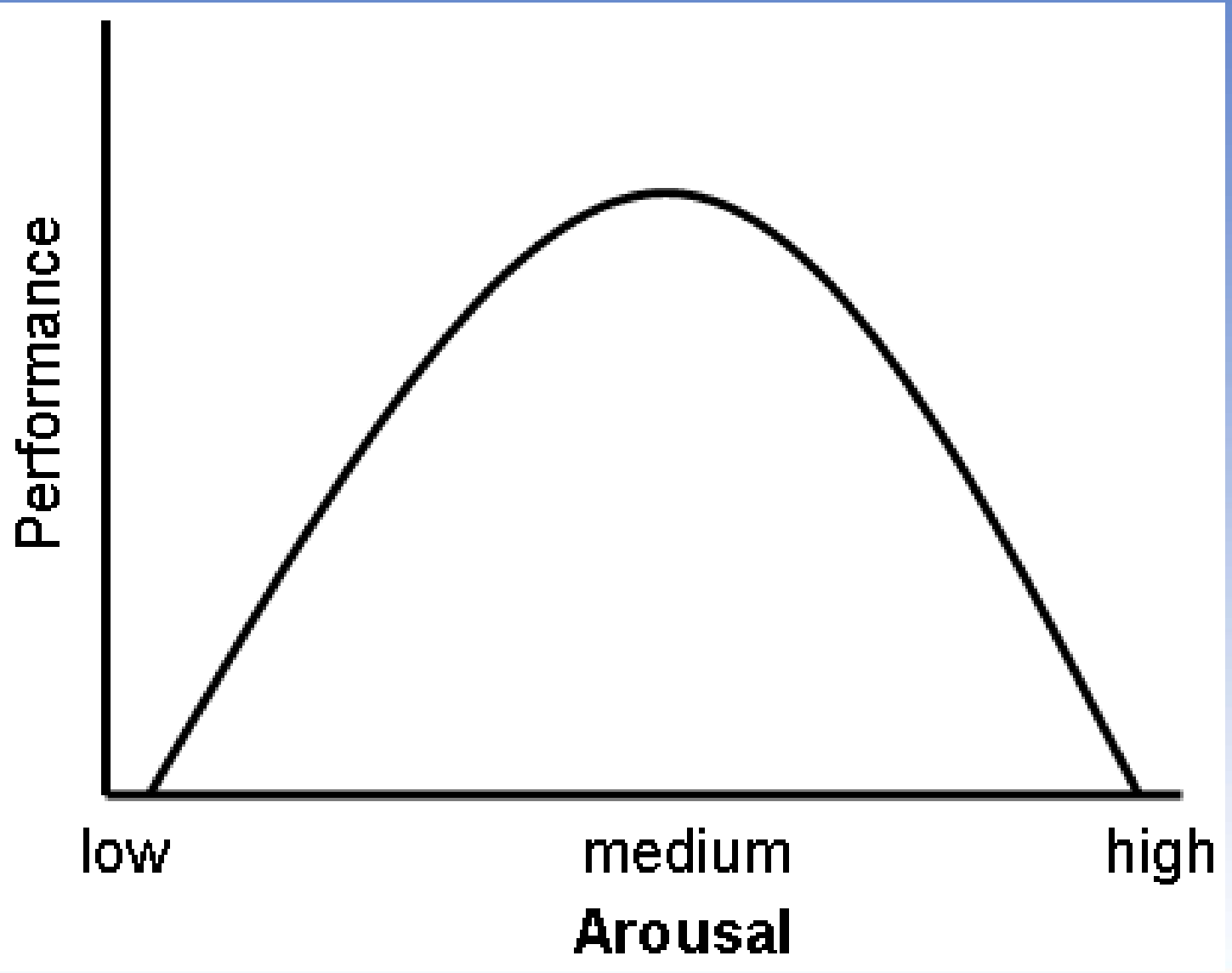
Managing Attention



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Multi-tasking

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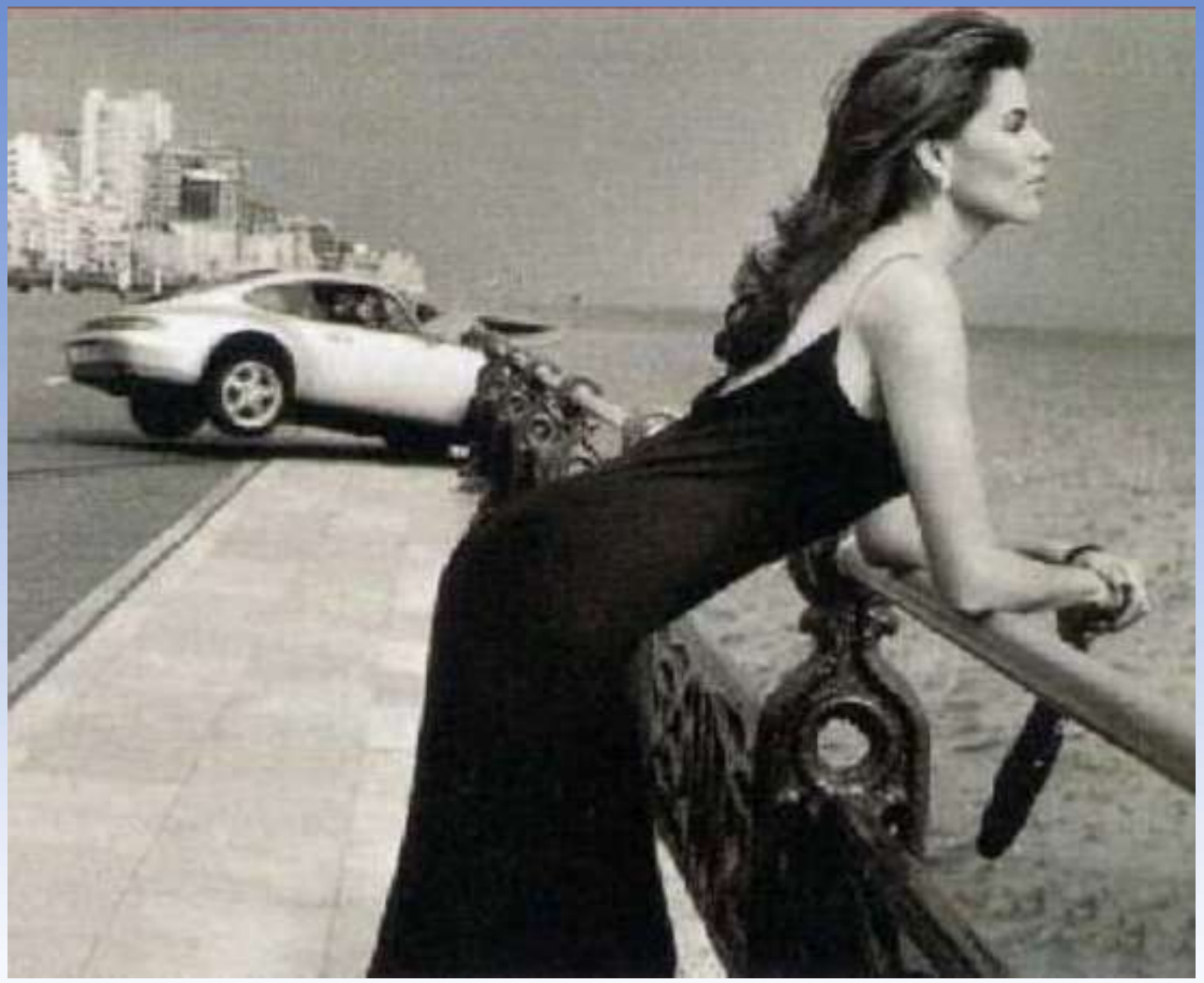
Distraction



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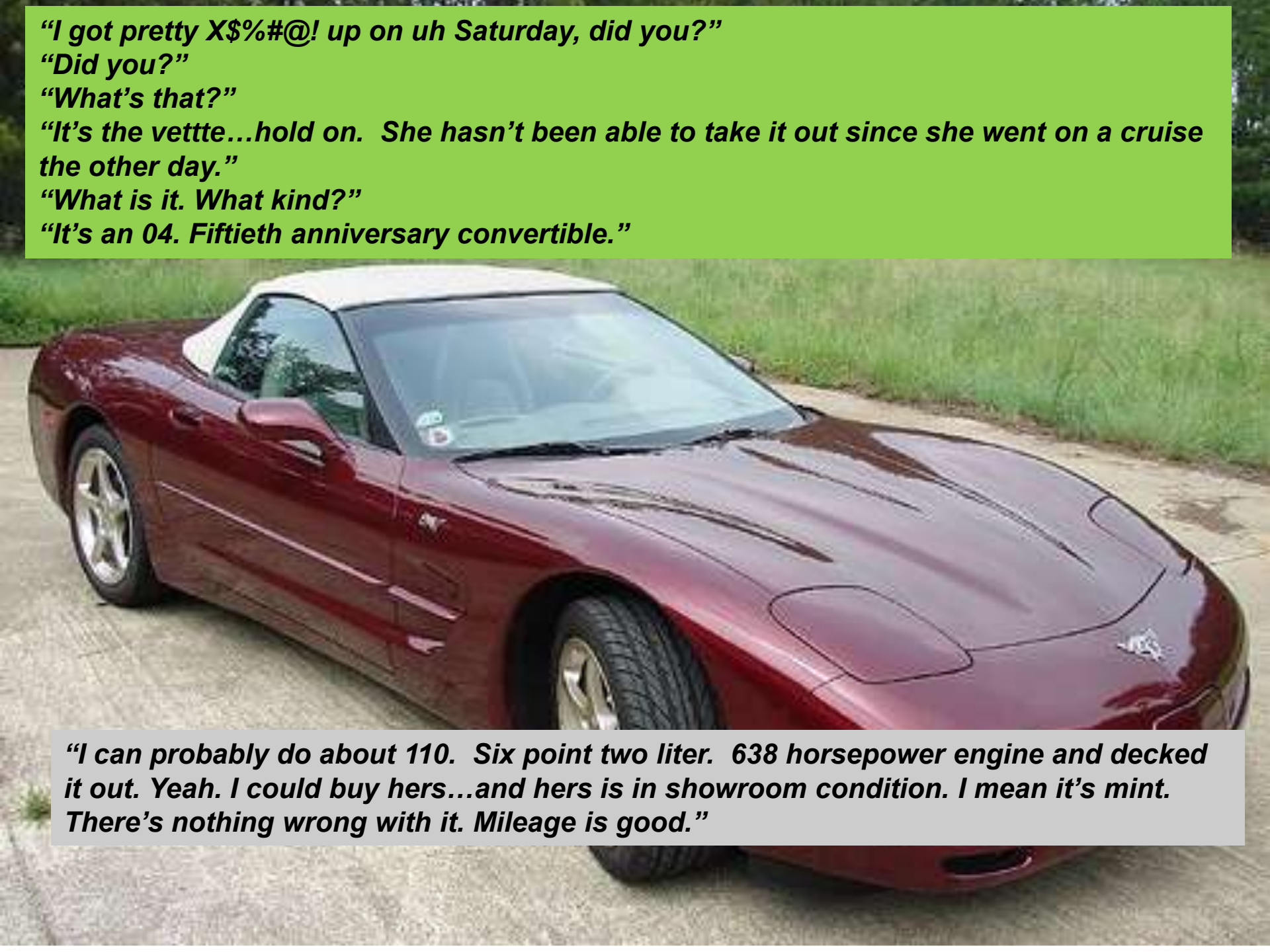
“I got pretty X$%#@! up on uh Saturday, did you?”
“Did you?”
“What’s that?”
“It’s the vettte…hold on. She hasn’t been able to take it out since she went on a cruise the other day.”
“What is it. What kind?”
“It’s an 04. Fiftieth anniversary convertible.”



“I can probably do about 110. Six point two liter. 638 horsepower engine and decked it out. Yeah. I could buy hers…and hers is in showroom condition. I mean it’s mint. There’s nothing wrong with it. Mileage is good.”

DEVIATIONS FROM CHECKLIST SOPs

Instance	Deviation
2	Begun from Memory
3	Done entirely from memory
9	Responding without looking
2	Responding then looking
1	Calling items without looking up
3	Item not set properly and not caught
8	Not initiated on time
5	Self initiated (prematurely)
4	Interrupted/suspended & never done
1	Extra item performed
6	Responded “set” instead of number
24	Flow not performed

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Mandatory Vigilance?

2912 **Federal Register** / Vol. 78, No. 10 / Tuesday, January 15, 2013 / Proposed Rules

(3) Replacement at any time of an elevator trim tab arm with an airworthy part that has a P/N other than P/N 115E–3758, will terminate the repetitive requirement in paragraph (f)(1) of this AD.

(g) Credit for Actions Accomplished in Accordance With Previous Service Information

This AD provides credit for the actions required in this AD if already done before the effective date of this AD following Grob Aircraft Service Bulletin No. MSB1078–186/2, dated March 28, 2012; Grob Aircraft Service Bulletin No. MSB1078–186/1, dated March 8, 2012; or Grob Aircraft Service Bulletin No. MSB1078–186, dated February 15, 2012.

(h) Other FAA AD Provisions

The following provisions also apply to this AD:

(1) *Alternative Methods of Compliance (AMOCs):* The Manager, Standards Office, FAA, has the authority to approve AMOCs for this AD, if requested using the procedures found in 14 CFR 39.19. Send information to ATTN: Taylor Martin, Aerospace Engineer, FAA, Small Airplane Directorate, 901 Locust, Room 301, Kansas City, Missouri 64106; telephone: (816) 329–4138; fax: (816) 329–4090; email: *taylor.martin@faa.gov*. Before using any approved AMOC on any airplane to which the AMOC applies, notify your appropriate principal inspector (PI) in the FAA Flight Standards District Office (FSDO), or lacking a PI, your local FSDO.

(2) *Airworthy Product:* For any requirement in this AD to obtain corrective actions from a manufacturer or other source, use these actions if they are FAA-approved. Corrective actions are considered FAA-approved if they are approved by the State of Design Authority (or their delegated agent). You are required to assure the product is airworthy before it is returned to service.

(3) *Reporting Requirements:* For any reporting requirement in this AD, a federal agency may not conduct or sponsor, and a person is not required to respond to, nor shall a person be subject to a penalty for failure to comply with a collection of information subject to the requirements of the Paperwork Reduction Act unless that collection of information displays a current valid OMB Control Number. The OMB Control Number for this information collection is 2120–0056. Public reporting for this collection of information is estimated to be approximately 5 minutes per response, including the time for reviewing instructions, completing and reviewing the collection of information. All responses to this collection of information are mandatory. Comments concerning the accuracy of this burden and suggestions for reducing the burden should be directed to the FAA at: 800 Independence Ave. SW., Washington, DC 20591, Attn: Information Collection Clearance Officer, AES–200.

(i) Related Information

Refer to MCAI European Aviation Safety Agency (EASA) AD No.: 2012–0155, dated August 20, 2012; and Grob Aircraft Service Bulletin No. MSB1078–186/3, dated August 3, 2012, for related information. For service information related to this AD, contact Grob Aircraft AG, Lettenbachstrasse 9, D–86874 Tussenhausen-Mattsies, Germany; phone: +49 (0) 8268 998 139; fax: +49 (0) 8268 998 200; email: *productsupport@grob-aircraft.de*; Internet: *www.grob-aircraft.com/index.php/g-115e.html*. You may review copies of the referenced service information at the FAA, Small Airplane Directorate, 901 Locust, Kansas City, Missouri 64106. For information on the availability of this material at the FAA, call (816) 329–4148.

Issued in Kansas City, Missouri, on January 8, 2013.

John Colomy,

Acting Manager, Small Airplane Directorate, Aircraft Certification Service.

[FR Doc. 2013–00667 Filed 1–14–13; 8:45 am]

BILLING CODE 4910–13–P

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 121

[Docket No. FAA–2012–0929; Notice No. 13–02]

RIN 2120–AJ17

Prohibition on Personal Use of Electronic Devices on the Flight Deck

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of proposed rulemaking (NPRM).

SUMMARY: The proposed rule would prohibit flightcrew members in operations under part 121 from using a personal wireless communications device or laptop computer for personal use while at their duty station on the flight deck while the aircraft is being operated. This rule, which conforms FAA regulations with recent legislation, is intended to ensure that certain non-essential activities do not contribute to the challenge of task management on the flight deck or a loss of situational awareness due to attention to non-essential tasks.

DATES: Send comments on or before March 18, 2013.

ADDRESSES: Send comments identified by docket number FAA–2012–0929 using any of the following methods:

- *Federal eRulemaking Portal:* Go to *http://www.regulations.gov* and follow the online instructions for sending your comments electronically.
- *Mail:* Send comments to Docket Operations, M–30; U.S. Department of Transportation (DOT), 1200 New Jersey Avenue SE., Room W12–140, West Building Ground Floor, Washington, DC 20590–0001.
- *Hand Delivery or Courier:* Take comments to Docket Operations in Room W12–140 of the West Building Ground Floor at 1200 New Jersey Avenue SE., Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.
- *Fax:* Fax comments to Docket Operations at 202–493–2251.

Privacy: The FAA will post all comments it receives, without change, to *http://www.regulations.gov*, including any personal information the commenter provides. Using the search function of the docket Web site, anyone can find and read the electronic form of all comments received into any FAA docket, including the name of the individual sending the comment (or signing the comment for an association, business, labor union, etc.). DOT's complete Privacy Act Statement can be found in the **Federal Register** published on April 11, 2000 (65 FR 19477–19478), as well as at *http://DocketsInfo.dot.gov*.

Docket: Background documents or comments received may be read at *http://www.regulations.gov* at any time. Follow the online instructions for accessing the docket or go to the Docket Operations in Room W12–140 of the West Building Ground Floor at 1200 New Jersey Avenue SE., Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

FOR FURTHER INFORMATION CONTACT: For technical questions concerning this proposed rule, contact Nancy Lauck Claussen, Air Transportation Division (AFS–200), Flight Standards Service, Federal Aviation Administration, 800 Independence Avenue SW., Washington, DC 20591; telephone (202) 267–8166; email *Nancy.L.Claussen@faa.gov*.

For legal questions concerning this action, contact Nancy Sanchez, Office of the Chief Counsel, Regulations Division, AGC–200, Federal Aviation Administration, 800 Independence Avenue SW., Washington, DC 20591; telephone (202) 267–3073; email *Nancy.Sanchez@faa.gov*.

SUPPLEMENTARY INFORMATION: See the "Additional Information" section for information on how to comment on this proposal and how the FAA will handle comments received. The "Additional Information" section also contains related information about the docket, privacy, the handling of proprietary or confidential business information. In addition, there is information on obtaining copies of related rulemaking documents.

Authority for This Rulemaking

The FAA's authority to issue rules on aviation safety is found in Title 49 of the United States Code. Subtitle I, Section

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration
14 CFR Part 121
[Docket No. FAA–2012–0929; Notice No. 13–02] RIN 2120–AJ17

Prohibition on Personal Use of Electronic Devices on the Flight Deck

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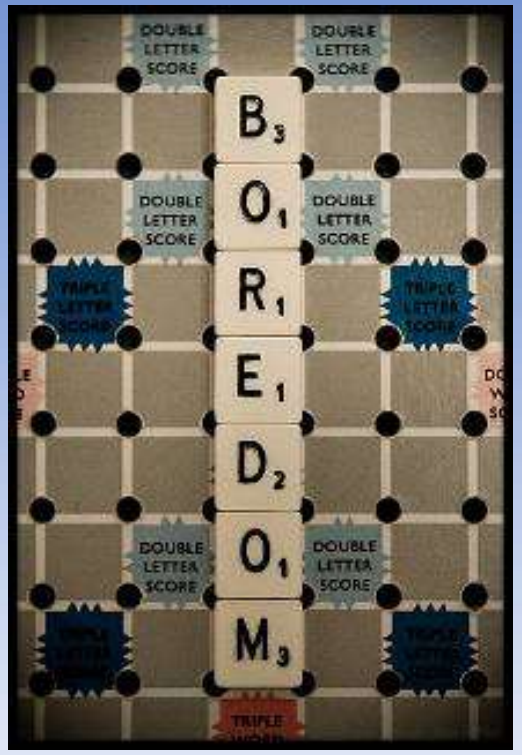

"About 10 minutes after leveling at FL380, the stick shaker activated disconnecting the autopilot.

Safe recovery from a near stall required descending 2000-3000 feet."

"For 20 minutes before the stick shaker until the time of the stick shaker my attention was on a crossword puzzle…

So the primary reason for the stick shaker was not monitoring the flight instruments, and doing a Sudoku crossword puzzle instead.

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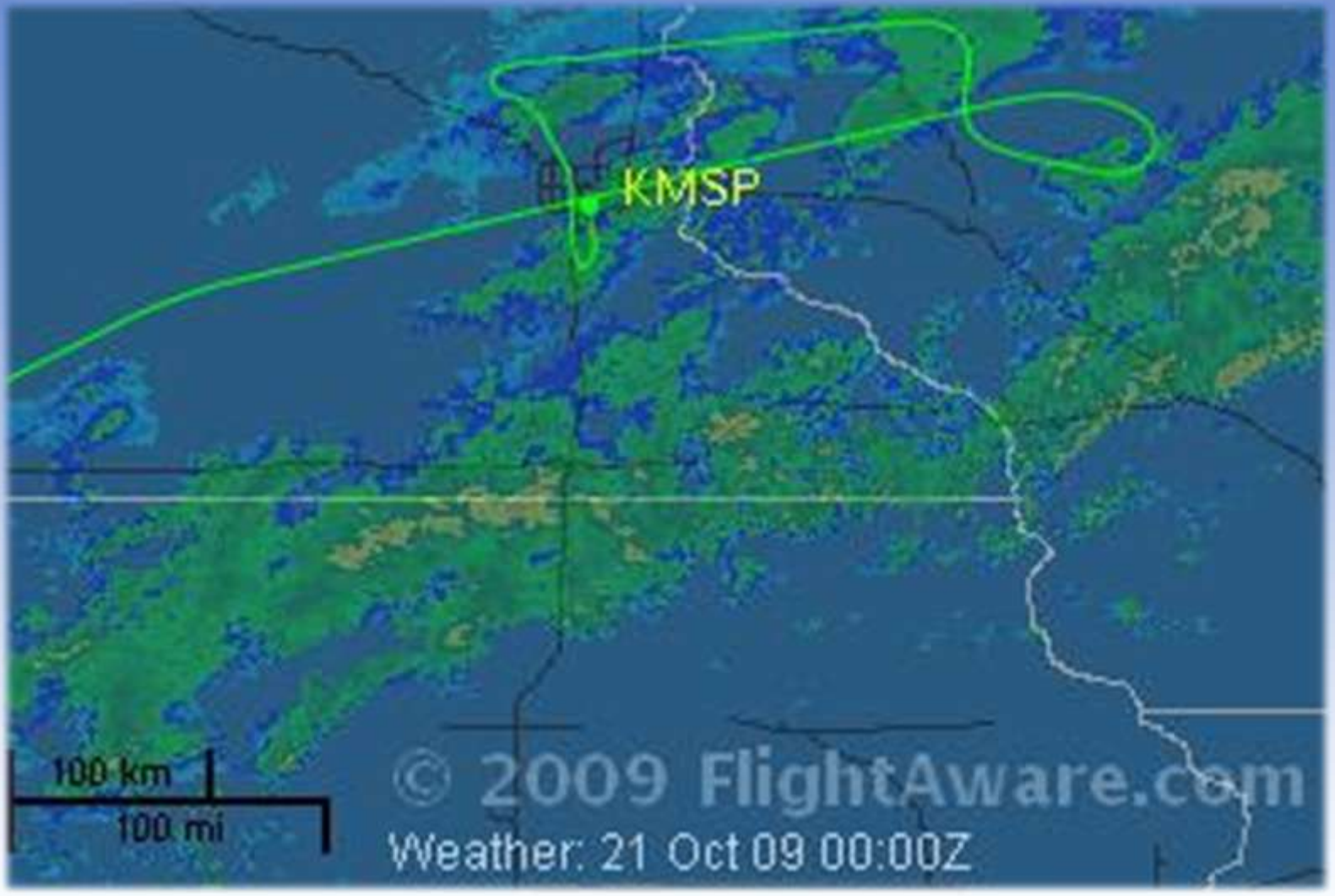
Communicate… Aviate… Navigate



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Intentional Non-compliance

"…we don't have any passengers on board so we decided to have a little fun and come on up here…"

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Airline allowed crews to follow the same policy as passengers regarding the use of electronic devices in-flight… (May 2010)

First officer (FF) felt "something not quite right" at 1000 feet – could not identify it.

Captain's phone began receiving texts below 2500 on approach…..

Even experts make errors…

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Monitoring

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SAFETY CONSEQUENCES OF MONITORING ERRORS

Safety Consequence	Percent
Altitude Deviation	54
Course/heading/track deviation	17
Departure from assigned speed	6
Controlled flight towards terrain	4
System or Equipment Damage or Shutdown	3
Runway Incursion	3
Stall buffet or warning/loss of aircraft control	3
Departure from pavement	6
Other	4

As reported by NASA ASRS Monitoring study (228 citations/200 Reports)

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Monitor
Recognize
Challenge
Corrective Action

How does automation affect boredom/monitoring/vigilance?

Automation Addiction?

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What type of Aircraft?

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At what cost…

“We can rebuild him.
We have the technology.
We can make him better than he was before.”

- *Six Million Dollar Man*

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Automation – FAA Report 2011

Causal factors

Failure to detect disconnect

Inappropriate control inputs

Dual inputs

Lack of Monitoring

Common Pitfalls

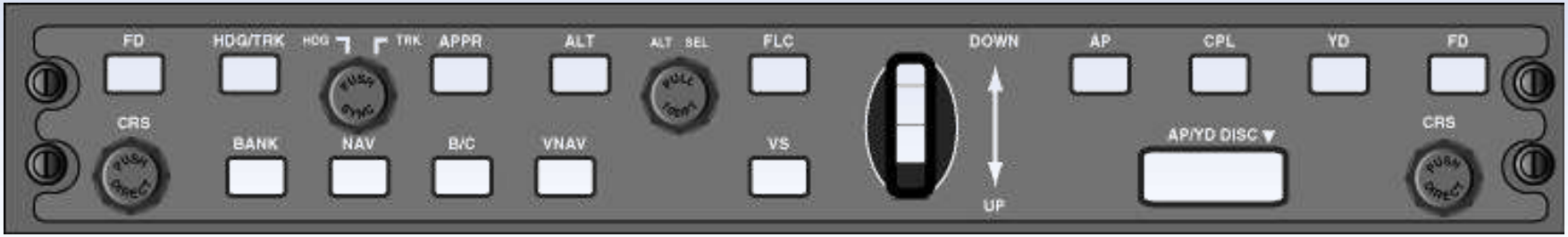
Automation dependency Unwavering trust – performance Calculations

Areas of Vulnerability

Manual Handling

FMS Programming & use

Managing Malfunctions



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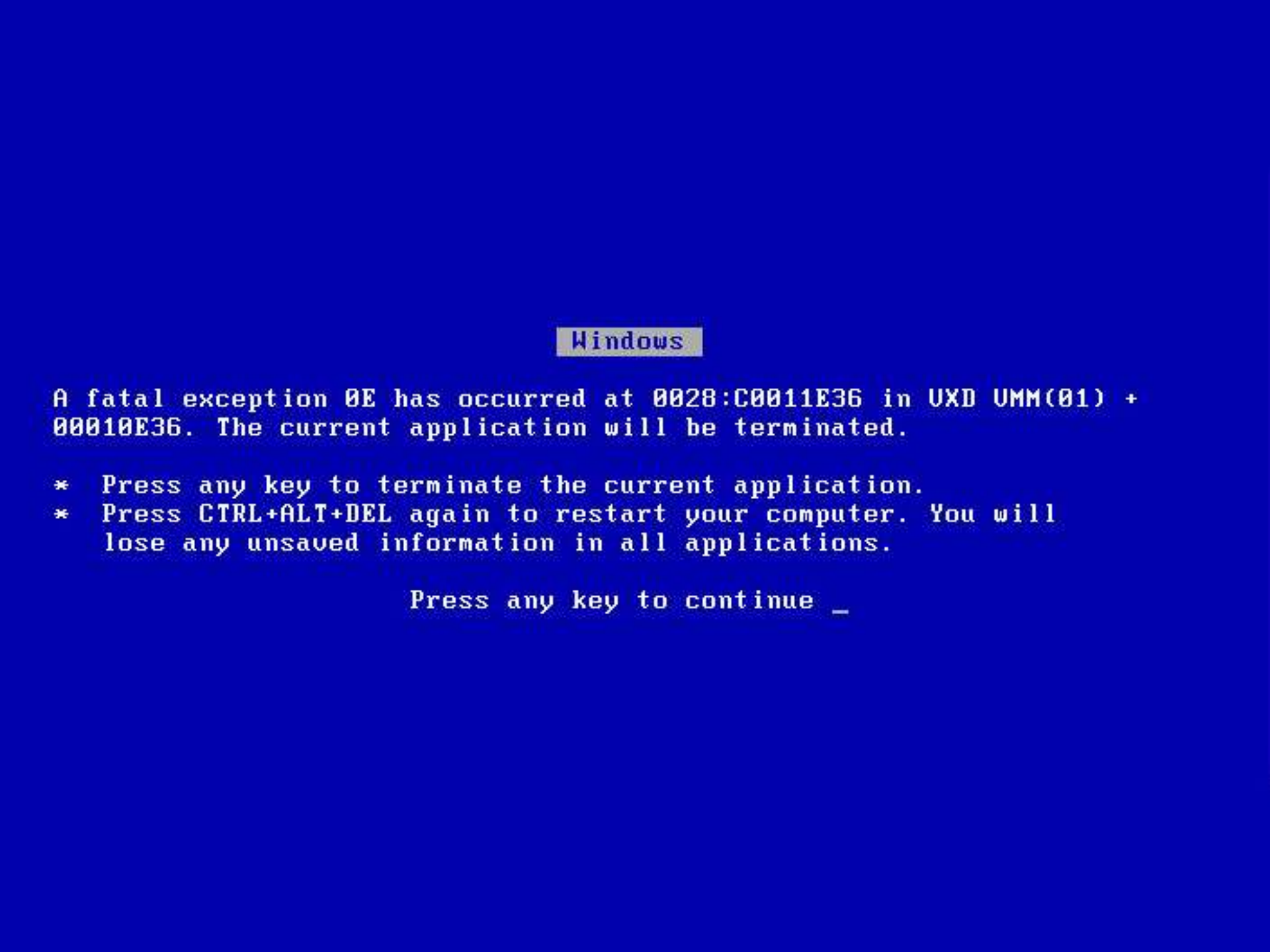
Windows
A fatal exception 0E has occurred at 0028:C0011E36 in VXD VMM(01) +
00010E36. The current application will be terminated.
* Press any key to terminate the current application.
* Press CTRL+ALT+DEL again to restart your computer. You will
lose any unsaved information in all applications.
Press any key to continue _

“Failure assessment is difficult, failure recovery is difficult, and the failure modes were not anticipated by the designers.”

- Dr. Kathy Abbott, FAA Human Factors

Werner von Braun on Automation

"Man is the best computer we can put aboard a spacecraft…"

"…and the only one that can be mass produced with unskilled labor."

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Boredom

"The experience of being disengaged and stuck in an endless dissatisfying present." ***Eastwood et al. (2012)***

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Cognitive Definition

"Failure of attentional processes resulting in the inability to focus or engage attention" ***(Fisher, 1993)***

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Someone once said…

Flying is hours and hours of boredom, punctuated by moments of terror.

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"When you have to fly an airplane for 19 hours to demonstrate extended endurance capabilities, you have some time to cover a lot of the United States, and Boeing likes to make such flights interesting." *– Wired Magazine, February 2012*

CRM and Boredom

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Acceptable Uses in Aviation?

1. *Terminal Procedures*
2. *Fantasy Football Updates*
3. *Weight & Balance*
4. *Fuel Planning*
5. *Nearest In and Out Burger*
6. *Manuals*
7. *House Wives of O.C reruns*
8. *Enroute Charts*
9. *How to spell Saskatchewan*
10. *Obtaining Weather*

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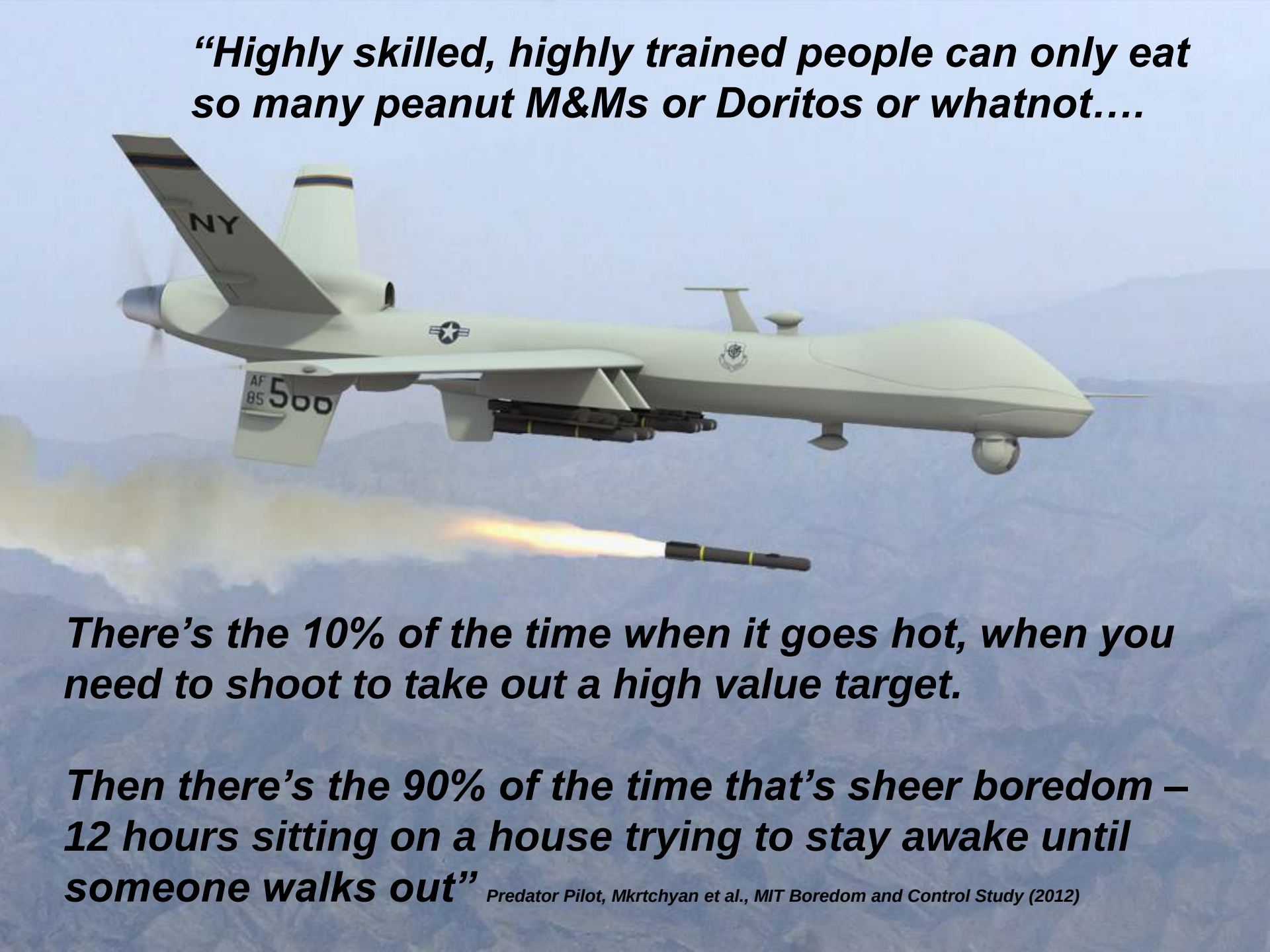
“Highly skilled, highly trained people can only eat so many peanut M&Ms or Doritos or whatnot….



There’s the 10% of the time when it goes hot, when you need to shoot to take out a high value target.

Then there’s the 90% of the time that’s sheer boredom – 12 hours sitting on a house trying to stay awake until someone walks out” *Predator Pilot, Mkrtchyan et al., MIT Boredom and Control Study (2012)*

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Hours of boredom punctuated by moments of terror?
YOU ARE HERE

Intraoperative Reading Study

- ***Analyzed 172 Anesthetic cases in academic Medical Center in San Diego, California***
- ***Studied activity between induction and emergence***
- ***It is common to observe reading, listening to music, personal hygiene, internet surfing, or conversing during this time.***
- ***Studied Vigilance using a random alarm light***

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Reading observed in 35% of cases – on average about 25% of the time.

Reading was the most common countermeasure for boredom.

Did not appear to affect vigilance.

Mandating “no distractions” during long periods of low activity is unrealistic and may be detrimental

When boredom is managed seems to be the more relevant factor.

Does Choice Matter?

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Perception?

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Suggestions – Voluntary Distractors

Boredom mitigated by distraction when task does not require directed attention –
York University (2012)

***Not available* during critical periods**

***B*est within a specified interval**

Avoid divided attention (multi-tasking)

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Managing Vigilance, Distraction, & Boredom in the Cockpit

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