Simple Ways to Recall the Fundamentals of Human Factors in Maintenance

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Little Rock Repair Station Human Factors Seminar
Little Rock, AK
April 12, 2007

Agenda – Easy to Recall Information

Why bother with Human Factors: Data Review
Put on your HF Spectacles
PEAR: People-Environment-Action-Resources
Discussion as time permits

Find slides at www.hfskyway.com
The U.S. Repair Station Industry

Number of Repair Stations vs Number of Employees

World Airline Accidents and Fatalities 1997-2006

World Airline Fatal Accidents and Fatalities 1997-2006

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Federal Aviation Administration

2 of 37
US Air Carrier Accident Rates/Targets

COMPARISON of AIR CARRIER FATAL ACCIDENT RATES/TARGETS
(Air Carrier includes all Part 121 and Scheduled 135 Carriers)

FY 2007 (as of January)

Fatal Accidents per 100,000 Departures

- Annual - 12 Month Lookback
- 3 Yr Aver - 36 Month Lookback

BASELINE = 0.051

<table>
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<tr>
<th>Year</th>
<th>FY 2007</th>
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<td>2007P</td>
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GA Fatal Accidents

COMPARISON of GENERAL AVIATION FATAL ACCIDENTS/TARGETS
(General Aviation includes General Aviation and Unscheduled Part 135)

- Target (not to exceed)
- Fatal Accidents
- YTD thru January

<table>
<thead>
<tr>
<th>Year</th>
<th>GA Fatal Accidents</th>
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<tr>
<td>1990</td>
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<td>2006</td>
<td>99</td>
</tr>
<tr>
<td>2007P</td>
<td>99</td>
</tr>
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</table>
**Human Factors #1 Causal Factor**

**FATAL AIRLINE CRASHES BY ACCIDENT CATEGORY/MAIN CAUSAL FACTOR**

<table>
<thead>
<tr>
<th>Category</th>
<th>Number of Accidents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controlled flight into terrain</td>
<td>11</td>
</tr>
<tr>
<td>Human factors</td>
<td>4</td>
</tr>
<tr>
<td>Technical/maintenance</td>
<td>5</td>
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<tr>
<td>Unknown</td>
<td>6</td>
</tr>
</tbody>
</table>

**Events where Maintenance was a Factor**

- American Airlines DC-10: 1979
- Eastern Airlines L1011: 1982
- Aloha Airlines B737: 1983
- United Airlines DC-10: 1989
- Continental Express EMB120: 1994
- Northwest Airlines: 1995
- ValuJet DC-9: 1996
- Lufthansa A320: 2001

*With Permission of LTTHF.COM*
**Example Maintenance Error**

<table>
<thead>
<tr>
<th>Date</th>
<th>Airline</th>
<th>Aircraft Type</th>
<th>Issue Description</th>
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<tbody>
<tr>
<td>Jan 2000</td>
<td>Alaska Airlines</td>
<td>Boeing MD-80</td>
<td>Jackscrew for Elevator Control</td>
</tr>
<tr>
<td>Mar 2001</td>
<td>Lufthansa Airbus</td>
<td>A320</td>
<td>Mis-wired side stick</td>
</tr>
<tr>
<td>Apr 2001</td>
<td>Emery Worldwide</td>
<td>DC-8</td>
<td>Reversed hyd. check-valve</td>
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<tr>
<td>Aug 2001</td>
<td>Air Transat</td>
<td>A310</td>
<td>Fuel exhaustion over Atlantic</td>
</tr>
<tr>
<td>May 2002</td>
<td>China Airlines</td>
<td>B747-200</td>
<td>In flight break-up at 35K Ft.</td>
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<tr>
<td>Jan 2003</td>
<td>Air Midwest</td>
<td>Beech1900D</td>
<td>Trim Rigging</td>
</tr>
<tr>
<td>Aug 2003</td>
<td>Colgan Air</td>
<td>Beech 1900D</td>
<td>Trim Rigging</td>
</tr>
<tr>
<td>Jan 2006</td>
<td>Continental</td>
<td>B737-500</td>
<td>Engine Run-up</td>
</tr>
<tr>
<td>July 2006</td>
<td>Spectrum Aircraft</td>
<td>Spectrum 33</td>
<td>Mis-Rigging</td>
</tr>
</tbody>
</table>

**Implications of the 2005-2006 Safety Stats for Mx HF**

- There are “opportunities for improvement”
- Maintenance and technical issues are areas of concern
- Technical manuals!!
- Human factors challenges are ever present
Human Factors Goal – Simply Stated

Ensure continuing safety and efficiency by paying attention to issues that affect human performance.

The Disciplines of Human Factors

[Diagram showing various disciplines related to human factors]
Agenda – Easy to Recall Information

- Why bother with Human Factors: Data Review
- Put on your HF Spectacles
- PEAR: People-Environment-Action-Resources
- The Operator's Manual for Human Factors
- Discussion as time permits

Put on your “Human Factors Spectacles”
**The Dirty Dozen**

- Lack of Communication
- Lack of Teamwork
- Norms
- Pressure
- Complacency
- Lack of Knowledge
- Lack of Awareness
- Lack of Resources
- Distraction
- Assertiveness
- Fatigue
- Stress

But first, look at the “Person in the mirror”
### Agenda – Easy to Recall Information

<table>
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<tr>
<th>Topic</th>
<th>Details</th>
</tr>
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<tbody>
<tr>
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<td></td>
</tr>
<tr>
<td>Discussion as time permits</td>
<td></td>
</tr>
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</table>

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**The PEAR MODEL**

*People, Environment, Actions, Resources*

Maddox & Johnson, 1996
For More Information – April ’07 Publications

www.hfskyway.com

PEAR

PEOPLE

ENVIRONMENT

ACTIONS

RESOURCES
Let’s review one
What does this mean?

Timing is Everything?
Types of Fatigue

**Acute Fatigue**
- Intense
- Short Duration
- Cured with a good night’s sleep

**Chronic Fatigue (harder to fix)**
- Frequent recurrence
- Long duration
- Slow recovery
- Often a physical sickness or mental stress causing chronic fatigue.

An Excellent Website about Sleep

National Sleep Foundation
- **Get Involved**
- **Donate Now**
- **Sleep & Sleep**
- **Sleep and Activities**
- **Trends and News**
- **Press Room**
- **Sleep Help**
- **SleepOnline.org**
- **Sleep.org**

**All About Sleep**
- **Are You Getting Good Sleep?**
- **Do I Have a Sleep Disorder?**
- **Why Is Sleep Important?**
- **Sleep for All Ages**
- **How Can I Get a Better Night?**

**Resources**
- **Topics A-Z**:
  - New Sleep Words
  - Sleep for All Ages
  - NSF Programs & Initiatives
  - News and Activities
  - Trends and News
  - Press Room
  - Sleep Help
  - SleepOnline.org
  - Sleep.org

**Features**
- **Get an Official Sleep Challenge T-shirt or Door Hanger!**
- **National Sleep Awareness Week!**
Regarding sleep: Do what your mama told you.

www.nationalsleepfoundation.org

Environment

Physical – the easy one

Weather extremes
Location (in/out)
Workspace
Lighting
Sound levels
Housekeeping
Physical safety issues

Organizational

Personnel
Supervision
Labor - Management
Size of company
Profitability
Job security
Morale
Corporate culture
Safety culture
Actions

What do you need to know?
What skills are necessary?
Steps to perform a task
Sequence of actions
Communication requirements
Information requirements
Inspection requirements
Certification requirements

Actions - What can you do today?

How do you communicate error events?

Are there enough people to do the job?

Do personnel understand the cost of A/C damage?

How can you motivate one another to care more?

Are you responsible for the things that others do?
Resources

Technical documentation systems
Test equipment
Enough time
Enough people
Lifts, ladders, stands, seats
Materials
Portable lighting, heating, cooling
Training

Please Offer your Example of Resources

• Are resources ever a problem?
• What are the solutions?
• Give an example?
• What advice can you offer?
**Agenda – Easy to Recall Information**

- The Spectacles
- PEAR: People-Environment-Action-Resources
- The Operator’s Manual for Human Factors
- Discussion as time permits

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**Spectacles & PEAR & HF Manual**

Find slides at www.hfskyway.com

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Thank You
You are Invited!

2007 HF Symposium
19th FAA/ATA International Symposium

Human Factors in Maintenance and Airport Service Safety

September 5-6, 2007
Evening “Kick-off” Reception on September 4, 2007
Hyatt Regency Orlando International Airport Hotel
Orlando, Florida, USA

Go to www.airlines.org