

Headquarters U.S. Air Force

Integrity - Service - Excellence

Air Force Fleet Viability Board Update



U.S. AIR FORCE

**DoD Maintenance Symposium
24 October 2005**

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DoD Mx Symposium

AF FVB Overview

Background

- Aging Aircraft Story
- Impacts of Age

Fleet Viability Board

- Origin
- Assessment Process
- Completed Assessments

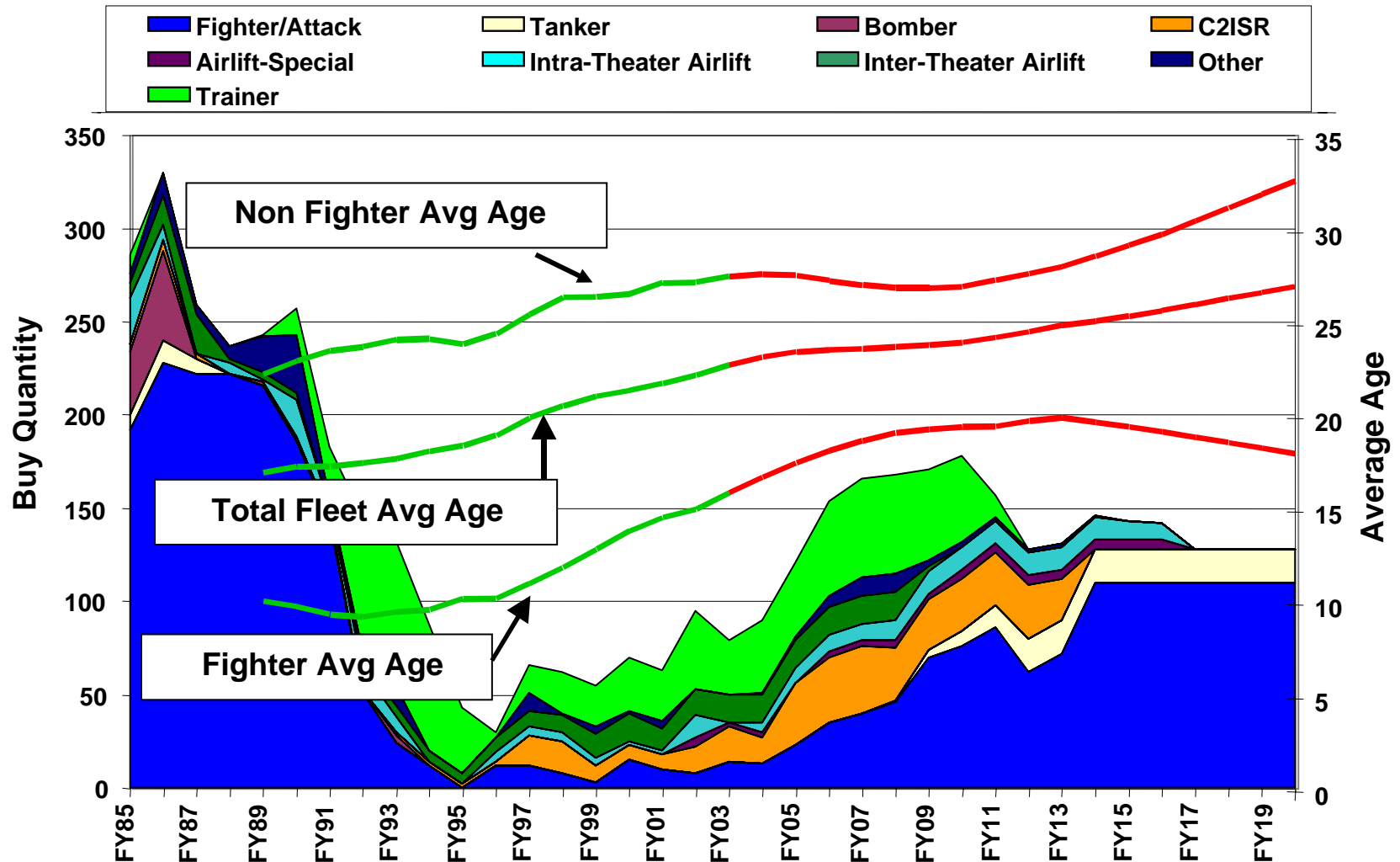
Some Paradigms

- Are they valid?





An Aging Population



We have men & women who are retiring that are younger than the aircraft they maintain

KC-135E example (A/C is 43 years old; 18-year old enters AF, serves for 20 years = 38 years)



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Aging Challenges

Fighter/Attack



A-10: 21 years



F-15C: 18 Years



F-16: 13 Years



F-15E: 9 Years

Bomber



B-1: 15 Years



B-2: 8 Years*



B-52: 41 years



F-117: 15 Years

Tanker/Transport



C-5A: 34 Years



C-130: 25 Years



KC-135: 39 Years



KC-135R: 41 Years

KC-135E: 44 Years

Other



E-3: 23 Years



HH-60: 12 Years



HH-53: 31 Years



UH-1: 31 Years

**Late 1970s Technology*



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Old Systems...New Problems



KC-135 Skin Replacement



KC-135 Wiring



EC-135 Landing Gear Failure



**KC-135E Engine Strut
Corrosion**



F-15 Vertical Failure

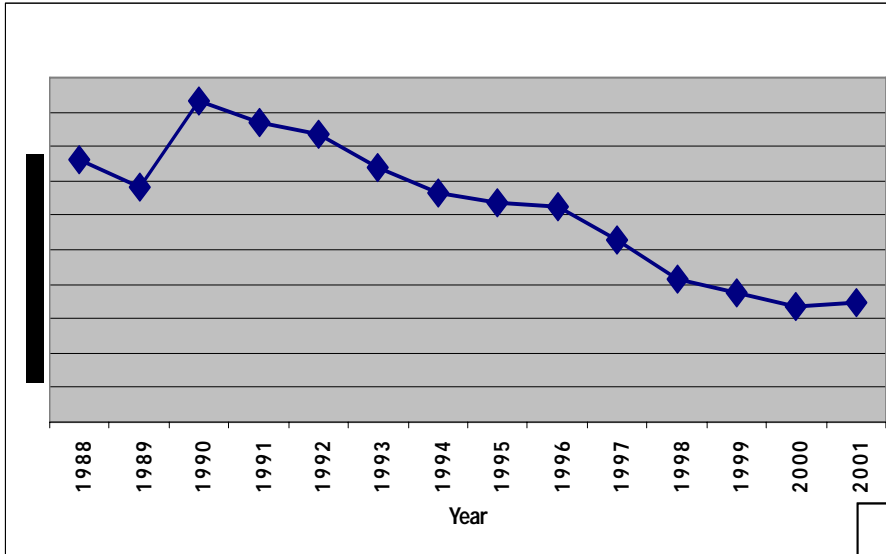


C-130E Wing Spar Corrosion

And, initial problems revisited: e.g. KC-135 fuel tank topcoat, wing reskin



Theoretical Impact of Age

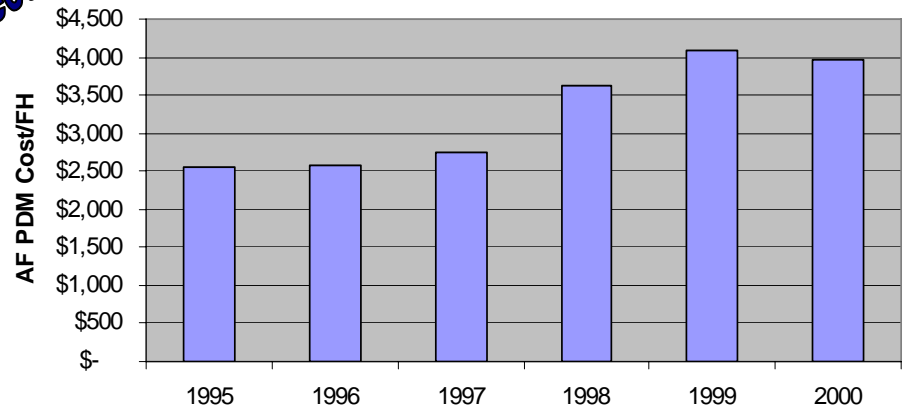


**Mission
Capability
Rates**

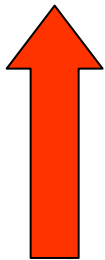


Fleet Wide View

AF Depot Maintenance Cost Per Flying Hour



Costs: GAO Report, GAO/01-533T
Flying Hours: USAF Statistical Digest



**Depot Maintenance
Cost Per Flying Hour**

Today's Challenge

Aging Fleet

- Corrosion
- Fatigue Cracking
- Parts Unavailability
- Material Degradation
- Wear



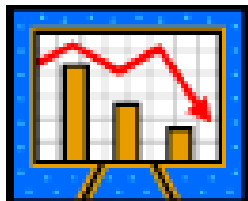
Modernization
\$\$ Decrease



Repair Density
Increases



Flow Rates Decrease



Mission Capable Rates &
Acft Availability Decrease

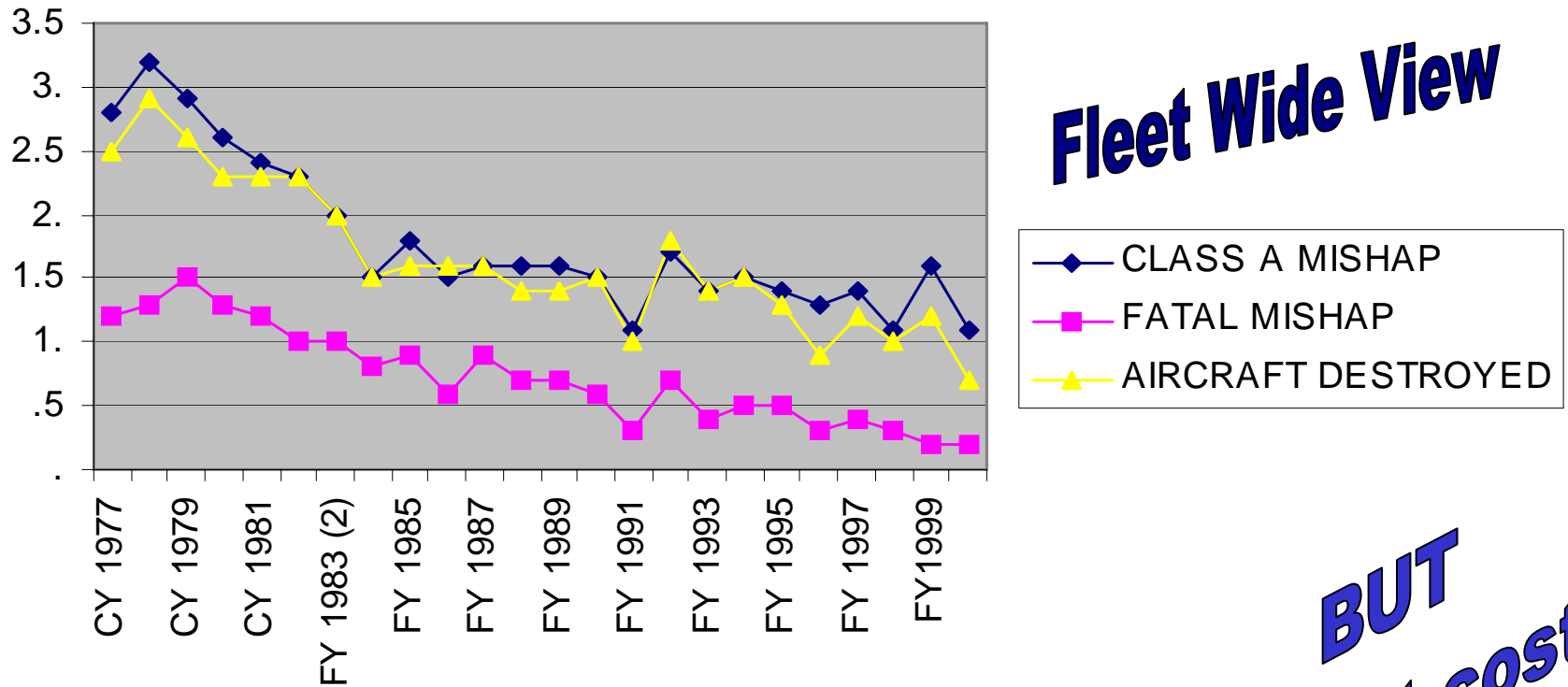


Maintenance \$\$ Increase



Excellent Safety Record Despite Aging Fleet

Aircraft Mishap Rates Per 100,000 Flying Hours



Fleet Wide View

**BUT
At what cost?**

FOOTNOTES:

- (1) Data are based on major/Class A mishap classification IAW AFI 91-204
 - (2) Beginning with FY 83, rates on fiscal year vice calendar year basis
- OPR: HQ AFSC/SEP, Ms. Atkins, (505) 846-1448 or DSN 246-1448

SO HOW CAN WE BETTER COPE WITH THIS AGING AIRCRAFT PHENOMENON?

"Retired"
F-84s





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Air Force Fleet Viability Board Mission

- **Provide SECAF/CSAF technical assessments of aging Air Force fleets leading to sustainment or retirement decisions**
 - **Determine fleet viability—i.e. system meets users needs**



C-5A AF FVB's first assessment



AF FVB Composition

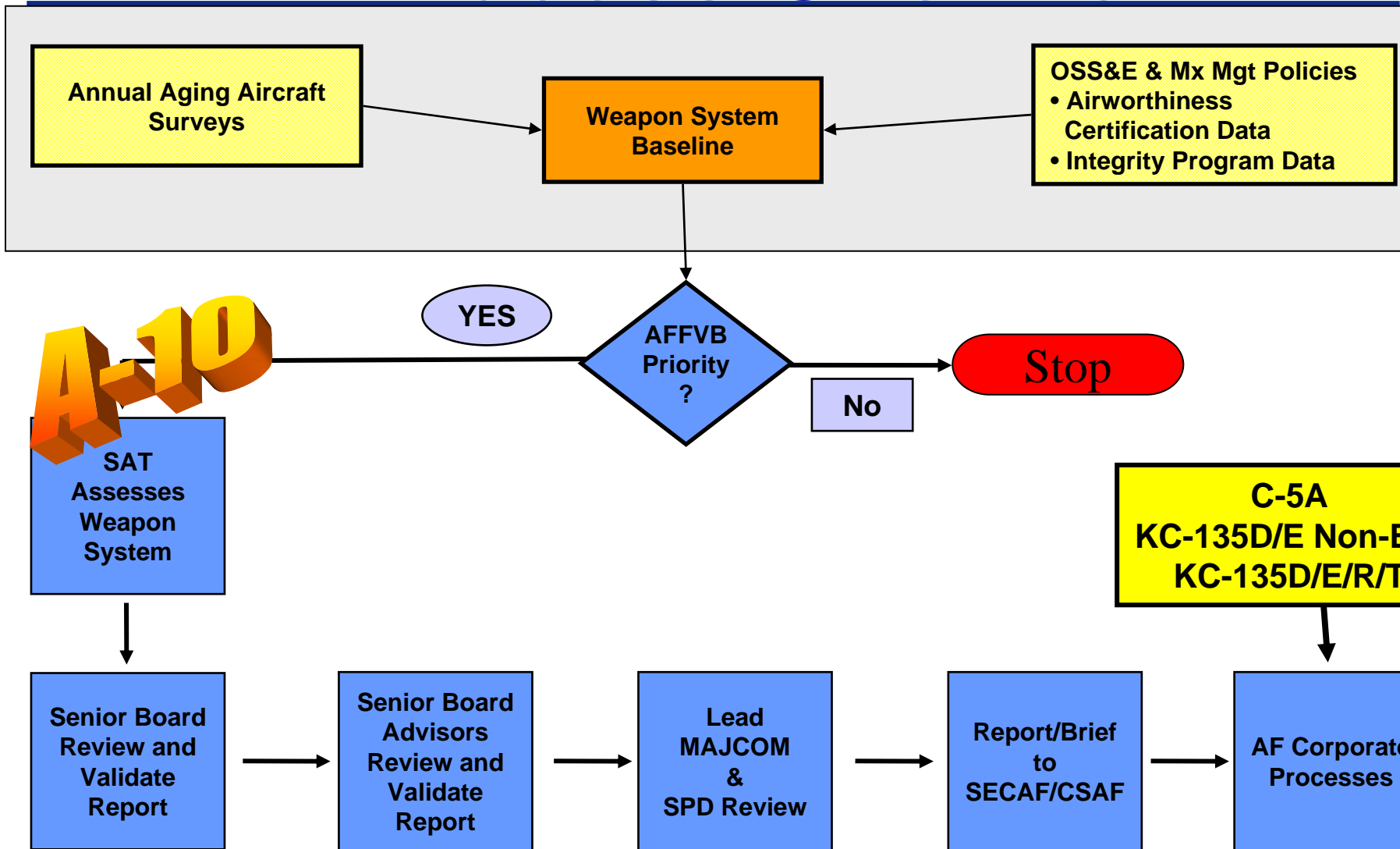
- **Survey and Assessment Team (SAT)– Full Time Staff**
 - 6 Engineers
 - 2 Cost Analysts
 - 2 Sustainment Logisticians
 - 1 Mx Analyst
 - 1 Administrative
- **Senior Board Members—SES/SL level expertise**
 - Director
 - Engineering Representatives (structures, avionics, propulsion, subsystems)
 - Logistics and Cost Leaders
- **Senior Board Advisors—SES or industry equivalents**
 - US Navy
 - NASA
 - Defense Logistics Agency
 - Federal Aviation Administration
 - Industry

Hybrid Team
• AF/IL: OPCON
• ASC: ADCON

Engineering Representatives are nationally recognized experts



Process Overview



Not in Scope

- **Assessment does not include**
 - **An analysis of alternatives**
 - **Force structure**
 - **Appropriate fleet mixes**
 - **Operational impact**

- **All inputs to Capability Review and Risk Analysis (CRRRA)—like AF FVB assessments**



AF FVB

Evaluation Methodology

Assessment Methodology: Historical & Future Outlook

- O & S and Modification Costs: \$
- Aircraft Availability: %
- Operational Health:

6-, 14-, and 25-year projection

Most Viable	GREEN	No impact on the ability of the MDS to accomplish its mission, or no significant impact to meeting a defined OSS&E, Air Force, or MAJCOM threshold
	YELLOW	Minor/Medium impact on the MDS' ability to accomplish its mission*, or significantly impacts the ability to meet a defined OSS&E, Air Force, or MAJCOM threshold
	ORANGE	Able to accomplish the mission, but with major mission limitation
	RED	Unable to accomplish its mission or a grounding event.**
Not Viable		

* For Reliability and Maintenance Burden, Yellow denotes declining trend

** Aircraft operation may continue if risk is accepted by appropriate Air Force authority



C-5A Assessment

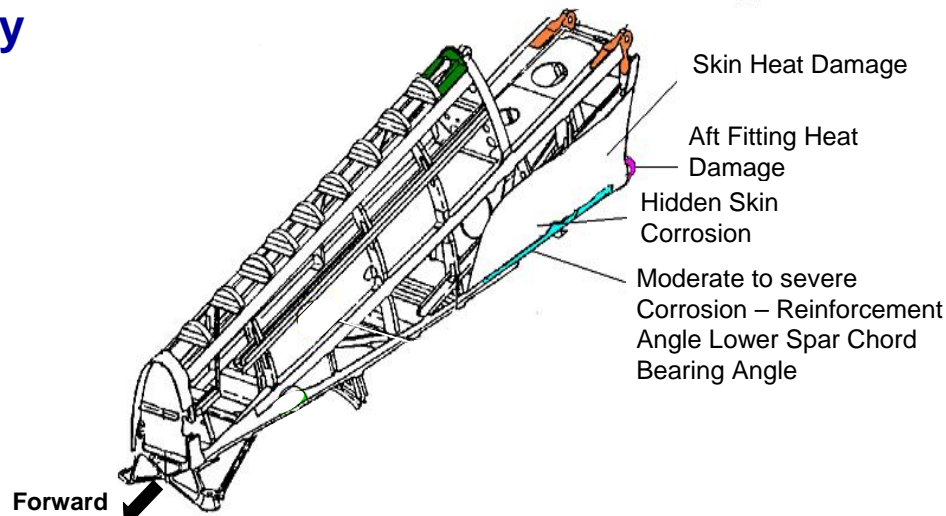
- **Released July 2004**
 - **C-5A has at least 25-years service life with planned upgrades**
 - **Operational health Orange (major limitations) through FY29**
 - Short-term engines, Long-term avionics
 - **Operating costs/composite availability improve over 25 Yrs**
 - **Pending no major structural issues during C-5A teardown**
 - **AF FVB review C-5A again CY08**
 - **Validate AMP/RERP improvements based on testing**
 - **Include final C-5A, #69-0004 teardown results**



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Special KC-135E Assessment

- **SecAF Task, 17 Jun 04: Assess SPO decision to ground aircraft on 1 Oct 04 due to engine pylon support strut problems**
- **Pending temp repair (EIR), AF FVB recommended**
 - **Ground 25 of 30 assessed aircraft**
 - **Loss of material strength properties**
 - **Retain flight restrictions on remaining aircraft in assessed fleet**
 - **Interim repairs do not fully restore the struts' strength capability**





Assessment Priorities

Next fleet assessments

1. C-5A
2. 30 KC-135E acft not scheduled for Expanded Interim (strut) Repair
3. KC-135E/KC-135R
4. A-10
5. C-130
6. F-16A/B (Block10/15)
7. B-52H





Paradigm Vs Reality

Things to Consider

- **Based on just two assessments**
 - **Transport aircraft only**
- **Caveat: Future assessments may prove different**
 - **Or concepts may only apply to categories**
 - **Fighters, bombers, transports, etc.**
- **Ideas evolving**
 - **But, some findings counterintuitive**



DLA-LMI Study on Consumables Four Major Hypotheses for Study

- **Hypothesis 1**: As aircraft age, they experience ***increased demand*** for consumable items
- **Hypothesis 2**: As aircraft age, they experience ***price increases*** for consumable items
- **Hypothesis 3**: As aircraft age, they experience ***longer procurement cycles*** for consumable items
- **Hypothesis 4**: As aircraft age, they experience ***declining availability*** of consumable items



Paradigm Vs Reality

Things to Consider

- **Paradigm: As aircraft age, their Mission Capable Rate degrades**
- **Consider: Mission Capable Rates rise or fall according to the level of support**
 - **Unsustained fleets of any age are not viable**



Paradigm Vs Reality

Things to Consider

- **Paradigm: The long-held standard for measuring fleet performance been Mission Capable Rate**
- **Consider: Large percentages of fleets tied-up in depot**
 - **90 percent MC Rate little use if large percentage of fleet depot possessed**
 - **Composite availability (i.e. percentage of fleet possessed & mission capable) better indicator of fleet performance**



Paradigm Vs Reality

Things to Consider

- **Paradigm: Safety/Technical fitness issues focus of attention for fleet retirement decision**
- **Consider: Nearly anything can be fixed**
 - **What is important is the impact on cost (i.e. budget) and aircraft availability (i.e. warfighter capability)**
 - **Cost/Available aircraft better indicator**
 - **Compared to other alternatives**



Paradigm Vs Reality

Things to Consider

- **Paradigm: Maintenance Main-Hour per Flying Hour is a good indicator for historical comparison of aging fleets**
- **Consider: Maintenance Man-Hour per Flying Hours more sensitive to UTE rate than aging**
 - **Surges operations tend to economize metrics**
 - **MMH per possessed or available aircraft better indicator to assess long-term performance**



Paradigm Vs Reality

Things to Consider

- **Paradigm: Total O&S Cost per Flying Hour is a good indicator for historical comparison of aging fleets**
- **Consider: Cost per flying hours is more sensitive to UTE rate than aging.**
 - **Most cost elements, though having increased over time, are fairly stable (except unit level consumption) in comparison to recent surges in flying hours**
 - **Cost per available aircraft or per possessed aircraft better indicators to assess long-term cost performance**



Paradigm Vs Reality

Things to Consider

- **Paradigm: As aircraft age, operations and support (O&S) costs increase**
- **Consider: Discounting inflation, as aircraft age, O&S costs do increase**



Paradigm Vs Reality

Things to Consider

- **Paradigm: Mission personnel, unit level consumption, & depot maintenance comprise the largest O&S cost elements**
- **Consider: These three O&S cost elements continue to be “big three;” however, indications have depot maintenance as the fastest growing cost component**