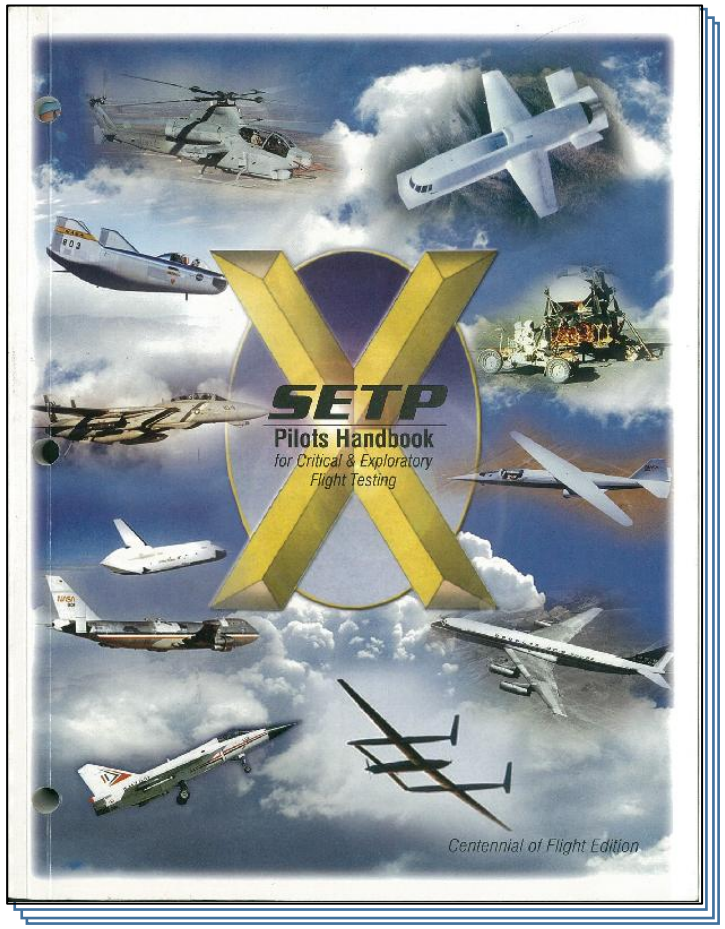
Should We Brief a Safety Card Rather Than a THA/GMC??

James Sergeant

4 May 2016

Flight Test Safety Workshop



SETP Pilots Handbook

For Critical & Exploratory Testing, 2003

Section 5, Hi AoA Testing, pg. 5-21

Test Hazard Analysis (THA)
General Minimizing Consideration (GMC)

Example

Just 1 Example of Several Typically Used for a Test Flight

FQ0020/PR0040
GMCs

- SRC shall be ARMED prior to entering into high angle of attack maneuvers.
- The SRC will be SAFED prior to air refueling, RTB, or discontinuing high AoA testing.
- Prop maneuvers w/ throttle transients during a/c sideslips will be accomplished with the windward engine transient prior to the leeward engine transient (when possible).
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UNCLASSIFIED 9

HAZARD Stabilization recovery parachute fails to recover aircraft	FQ0020/PR0040
CAUSE •Mechanical malfunction or parachute failure. •Recovery parachute has insufficient authority to recover the aircraft •SRC jettison is outside planned release parameters, secondary departure •Chute is damaged by high engine thrust	
EFFECT: Loss of aircraft	
MINIMIZING PROCEDURES •Safety chase or SPORT radar will assist test control in monitoring the 10Kft MSL ejection alt •**Safety chase, optical tracking, or SRC load instrumentation is required to monitor parachute deployment.** Safety chase or SPORT is required to monitor altitude. Altitude will be calibrated before each test as a part of the pre-maneuver checklist. **Control room or chase will advise the pilot of parachute conditions after deployment** •Prior to maneuvering, the pilot will verify the SRC is switched to ARM, the ARM light is Green and the P-Bit Fail Lamp is not illuminated •Thrust to idle prior to deployment to reduce the risk of chute canopy thermal damage •Temperatures will be monitored in the MCR to ensure that there is no damage to the SRC struts •All of the following criteria must be satisfied to jettison the stabilization recovery parachute following deployment and will be briefed prior to each mission -AOA < xx degrees -Sideslip < x degrees -Airspeed > xxx KCAS and increasing -Aircraft nose below horizon (recommend thrust to idle, xxx KCAS, -30° θ) -Low angular rates	
CORRECTIVE ACTIONS •If the spin chute does not recover the aircraft, the pilot will continue recovery controls as per the Recovery Procedures, and may consider jettisoning the chute, in an attempt to recover •The pilot may continue recovery attempts until 10'K MSL / 7'K AGL. If controlled flight is not regained by 10'K MSL / 7'K AGL, the pilot will eject	

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THA/GMC

- Developed in 1970's at Edwards AFB with Safety Process
  - Successful in reducing mishaps
  - But how do we actually implement and use them?
- Requirement or Urban Legend that THA/GMC Documents have to be <u>shown</u>?
  - AFTC says the THA/GMCs have to be <u>briefed</u>
  - No real requirement or desire that every word be read
- Does projecting all the documents make sense anyway??
- TMI (too much information)?
  - Written by engineers & pilots & added to by Safety Board
  - But perhaps a little too wordy to operate by?
  - More isn't Always Better
  - Lots of Good Info but presented in Document Form
  - Can Be Hard to Read
  - Do You Know What to Do?

THA/GMC Example

FQ0020/PR0040
GMCs

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THA/GMC

Easier to show the documents up on the screen

- **Easier for preparation**
- **But maybe a poorer product (Safety, Focus, Efficiency)**
- **Slide show brief can be numbing**
- **And what is actually getting briefed?**
  - **Differs by briefer**
  - **What are you <u>focusing</u> on?**
- **Are you paying attention?**

Test Hazard Analysis (THA)
General Minimizing Consideration (GMC)

Example

FQ0020/PR0040
GMCs

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UNCLASSIFIED 9

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CAUSE
- Mechanical malfunction or parachute failure.
- Recovery parachute has insufficient authority to recover the aircraft
- SRC jettison is outside planned release parameters, secondary departure
- Chute is damaged by high engine thrust

EFFECT: Loss of aircraft

MINIMIZING PROCEDURES
- Safety chase or SPORT radar will assist test control in monitoring the 10Kft MSL ejection alt
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- All of the following criteria must be satisfied to jettison the stabilization recovery parachute following deployment and will be briefed prior to each mission
  - -AOA < xx degrees
  - -Sideslip < x degrees
  - -Airspeed > xxx KCAS and increasing
  - -Aircraft nose below horizon (recommend thrust to idle, xxx KCAS, -30° θ)
  - -Low angular rates

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Briefing Time!!

Warning: Quiz Ahead!

A Quiz

1. Is Chase Required?
2. For 30-35K’ Testing what Altitude do you begin recovery by?
3. What is desired Throttle position prior to Chute Deploy?
4. Who Monitors Altitude (besides Mission Control Room)?
5. Who Calls Chute Condition after Deployment?
6. What is Recommended Θ for Chute Jettison?
7. What is Your Favourite Color?

A Quiz

Answers

1. Is Chase Required? **Yes**
2. For 30-35K' Testing what Altitude do you begin recovery by? **30K'**
3. What is desired Throttle position prior to Chute Deploy? **IDLE**
4. Who Monitors Altitude (besides Mission Control Room)? **Chase or Sport**
5. Who Calls Chute Condition after Deployment? **Chase (Visual) or MCR (SRC Load)**
6. What is Recommended Θ for Chute Jettison? **- 30 Deg.**
7. What is Your Favourite Color? ***Blue….No wait, Red!***

How Did You Do?

Would you do any better during the Hi AOA Test Flight?

A Safety Card Instead?

- Used in F-16 CTF and other places in the Good Old Days
- No longer in Style, for some Reason
  - Easier to just flash the THAs/GMCs on the screen?
  - Perception that entire document had to be shown/briefed

THA/GMC

FQ0020/PR0040
GMCs

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Same Info
But Condensed
for Briefing

A Safety Card

Hi AOA

Requirements/Restrictions

Chase/ VFR w Horizon/ Spin Area Subsonic/ Chase or SPORT Altitude Calls
Terminate for Unexpected AB No-Lights/Blowouts
No closer than 20 NM to Thunderstorm Cloud Buildup

Ops

- **SRC – ARM, GREEN Light ON, No P-Bit Fail Light** Prior to Hi AOA Maneuvers
- **SRC – SAFE** Prior to AR, RTB, End of Hi AOA Maneuvers
- Prop Transients w/ Sideslips – Windward prior to Leeward
- 30-35K' Testing – Begin recovery at **30K'**
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- Use Non-Test Engine to maintain airspeed/altitude - Slow Throttle inputs
- IDLE Prior to Chute Deploy - MCR Monitor SRC Temps
- Chase, Tracker, or SRC Load monitor chute deploy – Call Chute Condition

Chute Jettision

xx° AOA **xx°** Deg. **XXX** kcas & Increasing Low Angular Rates
Nose Below Horizon (Recommend **IDLE**, **xxx** kcas, **-30° Θ**)

- No Recovery w/ Chute - Continue recovery controls, Consider jettisoning chute

10K' MSL / 7K' AGL

- Chase/Sport Assist MCR Monitoring
- No Recovery – **EJECT**

The Safety Card

- **End of Run Card Deck**
- **Provides Focus**
  - **Simpler**
  - **Condensed**
  - **More like a Checklist**
  - **Better Organized**
  - **Main Points & Procedures**
  - **Key numbers**
  - **Quick, Line-by-Line Review**
- **Final Review at end of Briefing**
- **Test Team & Pilot walk away from briefing with a copy**

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10K' MSL / 7K' AGL

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- No Recovery **– EJECT**

Safety Card

Can Develop 1 Card for Several Types of Tests

- **Can Add Other Test THA/GMCs to Same Card**
- **Only Brief those to be Flown on that Flight**

Hi AOA

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Flutter

- The Quick Brown Fox Jumped over the Lazy Dog
- Hope You Don't Get Any
- Don't Run w/ Scissors
- Terminate if you get Flutter
- Yada Yada Yada
- E=Mc2

Loads

- The Quick Brown Fox Jumped over the Lazy Dog
- F=ma
- May Your Loads be Less than 100%

In Conclusion

What Kind of THA/GMC or Safety Brief Do You Do for Your Test Flight?

THA/GMC

Slideshow on a Screen

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UNCLASSIFIED 10

Safety Card

Briefed

Hi AOA

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