When Holes Line Up: The Path to a Test Safety Incident

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Outline

• Mission background
• What happened
• What really happened
• Lessons learned
Mission Background

- **AIMP**
- **Crew Composition**
  - Operational Test AC
  - Qualified Test Pilot FO – Government Contractor
  - Qualified FTE TD
  - Contractor Support Engineer
  - Remainder of crew were operational test, including OJT AC

- **Flight Objectives**
  - Flight #32
  - EMC HF vs Autopilot and Radar Altimeters
  - Repeat night lighting focused on EFDS
Mission Background

• Mission Briefing
  – Day to Night flight
  – Takeoff from CFB Greenwood. Landing in Halifax desired, not required
  – Halifax weather was worsening throughout the evening
  – Halifax Glideslope offline because of construction
  – CFB Greenwood was VFR all night

• Weather Limits
  – Day IFR, clear of cloud for testing
  – Night VFR/VMC
What Happened

- EMC was uneventful, ended with coupled approaches to Charlottetown (2030L). QTP demo’d coupled FMS approach to new OT pilot.
- Flew north, looking for targets for night lighting.
- Autopilot lateral modes malfunction, with codes.
- Contractor in-flight analysis indicated EGIs as possible source of malfunction.
- EGI drift looked higher than normal (still within spec of 2nm/hr)
- EGI drift was climbing at a high rate.
- Decision made to RTB (2115L). Direct to Halifax IAF.
- Pilots stored target waypoint in case mission was continued.
- EGIs gave INS POS UNCERTAIN message.
What Happened

- Weather update showed Halifax as still being VFR, but degrading.
- High speed during RTB (Halifax), ETA was “night”
- QTP directed NFP to set up radios
- NFP heard tones and saw a good LOC. Told QTP radios were set up. Put same freq in VOR/LOC #2 as he saw in VOR/LOC #1.
- #1 aircraft conducted a visual approach/landing
- At FAF (approx), fog bank was between aircraft and airfield.
- At 1000’ (approx), QTP lost LOC: “Where’s my LOC? Where’s my LOC? Overshooting.”
- QTP called for flaps, added power and overshot (essentially leveled out)
What Happened

• In overshoot, NFP checked radios and realized mistake.
• NFP asked for TD to come forward to look at weather, asked for weather update.
• QTP noted flap overspeed. 190 Kt limit, 227 max, 1:40 (m:ss) overspeed.
• “Special” METAR came out with 300 ft ceiling.
• RTB CFB Greenwood WFI.
What Really Happened

• During FMS approach, “Command” bit got out of synch.
What Really Happened

- There was no EMI.
- Contractor engineer had recently reviewed EGI drift from last flight. Last flight had abnormally small drift, subject flight had normal drift.
- Incident happened during Schuler cycle increase.
Allowable drift

Looking at EGI Drift
What Really Happened

• QTP directed NFP (new to program) to enter target mark point. Actually re-positioned EGIs.
TRK 000  00:01:47z  WPT N45W075
GS 200  NAVSIM  BRG 014
ALT 374  DTG 9.0
W/V 014/ 0  TTG 00:02:42
E  AD2 MAG

INU UPDATE  STORE PT
<GPS          WAYPOINT>
<TACAN
<MSN COMPUTER

<ON TOP>  ON TOP>
What Really Happened

• Charlottetown LOC remained in VOR #1, but still had good LOC (100 nm, 5–10K)
What Really Happened

- Charlottetown and Halifax idents very close. NFP didn’t check freqs or ident LOC.
What Really Happened

• In descent, lost Charlottetown LOC.
• In post overshoot thoughts about radios, discussion of weather limits etc, NFP missed “flaps” call.
• The only aircraft malfunction had been the autopilot.
Lessons

What Went Wrong

• CRM & Airmanship
• “Get Home–itis”
• In–flight analysis
  – Recency (EGI drift)
  – Fear of unknown (EMI)
• Complex or inappropriate weather limits

What Went Right

• Decision to RTB
• Go around decision
• CDU HFE problem identified
• Autopilot bit problem identified