



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.

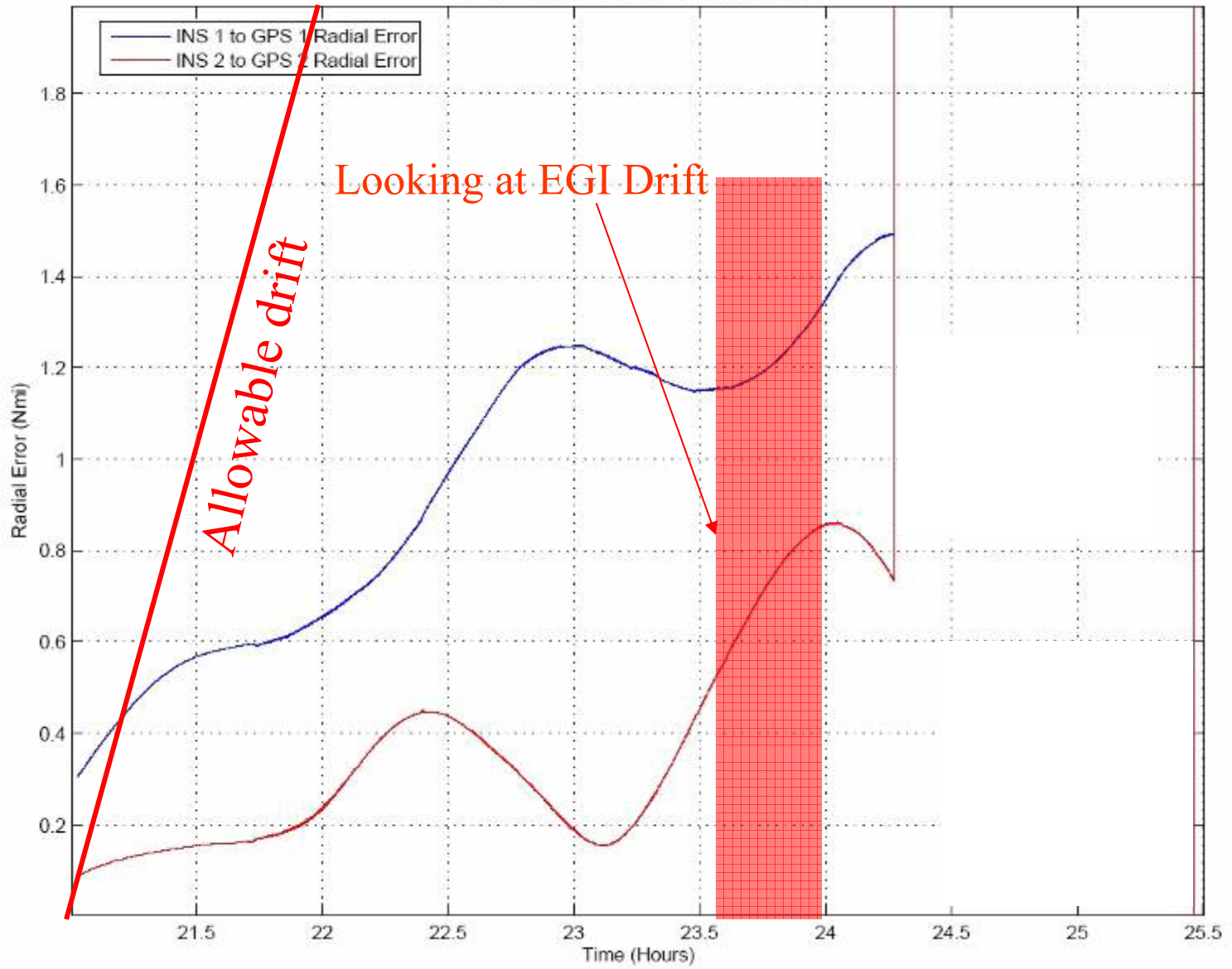


What Really Happened

- 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.



05-07-08 2101z INS to GPS Radial Error



What Really Happened

- QTP directed NFP (new to program) to enter target mark point. Actually re-positioned EGIs.



OFT

NPA

MSG

CDU

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

FIX MENU

INU UPDATE

STORE PT

<GPS

WAYPOINT>

<ON TOP

ON TOP>

<TACAN

<MSN COMPUTER

PRV

LTR

A
COM

B
NAV

C
FPN

D
FIX

E
1

F
2

G
3



OFT

NPA

MSG

CDU

TRK 014 00:02:01z WPT N45W075
GS 200 NAVSIM BRG 014
ALT 374 DTG 8.4
W/V 014/ 0 TTTG 00:02:30

[E]

AD2 MAG

ON TOP STORE PT

>ON TOP POS MGRS<

N 45:24.63

W 075:40.25

>OFFSET MOBILE<

BRG 014 SPD/CRS 0/ 014

RNG 0.0 RV TIME 00:02:01z

>MARK XALT/ELEV<

0/ 0

STORE PT POS WPT

N 45:24.630 ASSIGNED --- NAME<

W 075:40.250 AVAIL 494

>STORE RTN>

[N _ : _ . _]

PRV

LTR

A
COM

B
NAV

C
FPN

D
FIX

E
1

F
2

G
3



OFT NPA MSG CDU

TRK 014 00:02:16z WPT N45W075
GS 200 NAVSIM BRG 014
ALT 374 DTG 7.7
W/V 014/ 0 TTG 00:02:18

AD2 MAG
ON TOP UPDATE

>UPDATE MGRS<
INU-1 | INU-2 | BOTH

>WAYPOINT
 4 N45W075

>MARK

UPDATE POS TIME DELTA
N 45:32.975 00:02:16z INU-1
W 075:40.250 INU-2

ACCEPT RTN>
[]



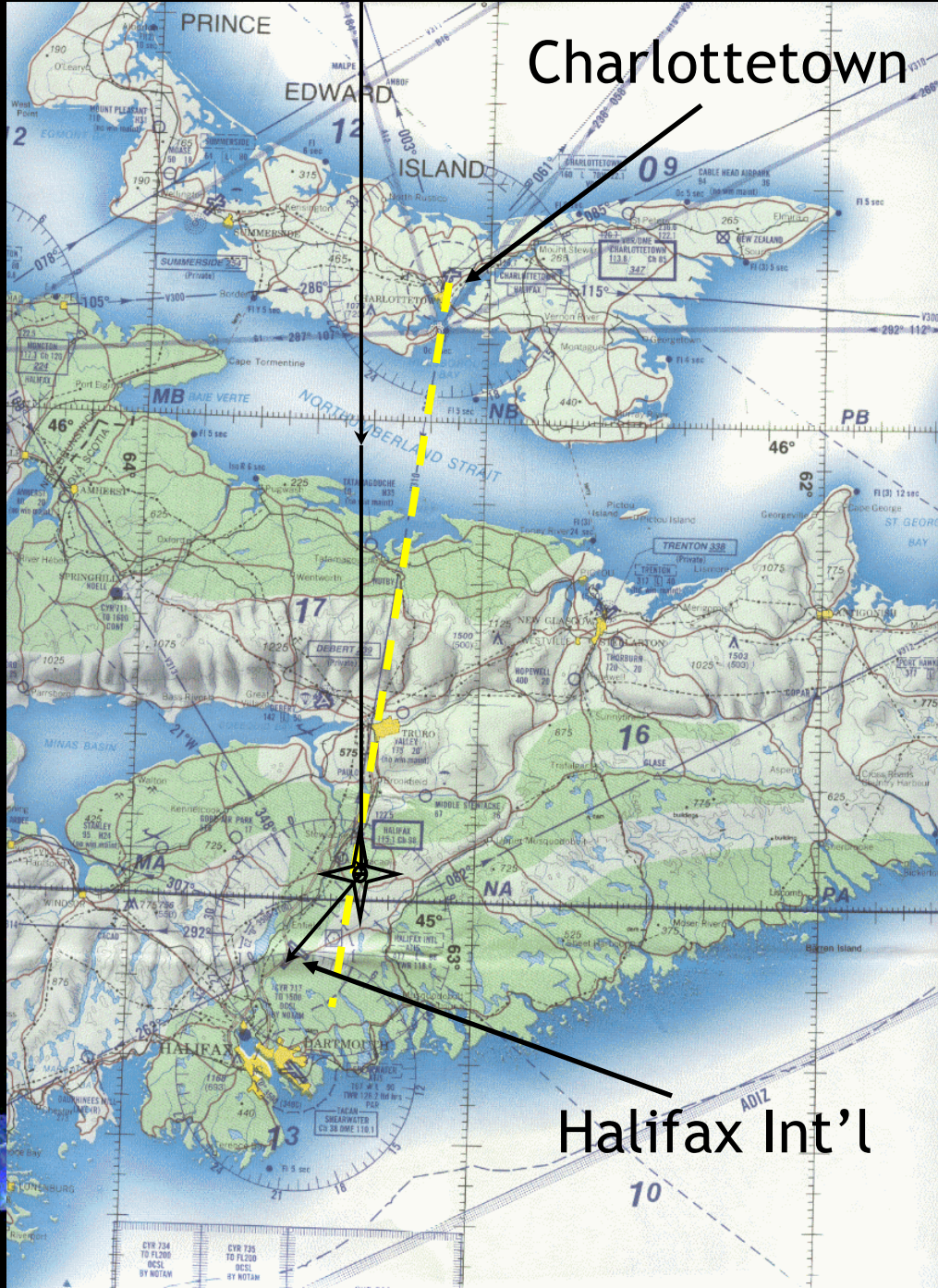
PRV LTR A COM B NAV C FPN D FIX E 1 F 2 G 3



What Really Happened

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





Charlottetown

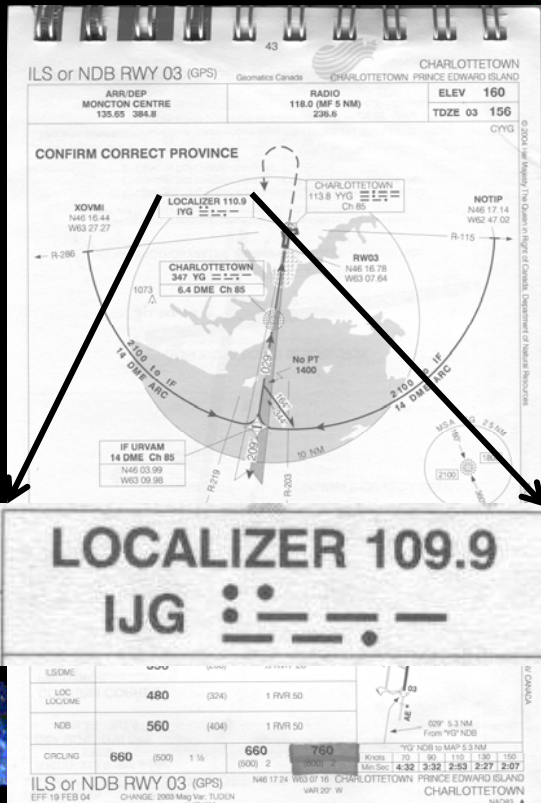
Halifax Int'l





What Really Happened

- Charlottetown and Halifax ident very close. NFP didn't check freqs or ident LOC.



Charlottetown



Halifax



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





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AETE/IDS