

1989: DC10 Sioux City

■ General context

- Commercial flight Denver-Chicago
- 285 pax & 11 crewmembers
- Cruising at FL370

■ Situational context

- Loud bang/explosion
- Followed by:
 - Vibration and shuddering of the airframe
 - Failure of #2 engine
 - Failure of the 3 hydraulics systems
 - Aircraft cannot be controlled
- Capt informed pax about engine failure
- A company training check airman in the cabin **volunteering** his assistance

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■ Situation management

- Captain send
 - ➔ the check airman in the cabin for visual inspection of the **wings**
 - ➔ (later) the FE in the cabin for visual inspection of the **horizontal stabilizer** after report from CA
- Crew has never been **trained** to such a situation
 - ➔ According to manufacturer the probability to lose the 3 hydraulic system is close to... **0**
- Captain control the **path** of the aircraft
- Check Airman control the **throttles**
- FO (radio, call out, PA, etc.)
- But aircraft **cannot** be maintained in a stabilized flight

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■ Causes (NTSB)

- **Defects** cause failure of #2 engine whose fractures and fragments severed the 3 hydraulic systems
- Failure of the **company** to detect the crack which developed from the defect
- Failure of the **manufacturer** to protect airframe from random release and dispersion of fragments from rotating parts
- Inadequate consideration to **Human Factors limitations** in the inspection and quality control procedures used by the company resulting a faulty component that remained installed on the aircraft: procedures, trainings, supervision, performances, etc.

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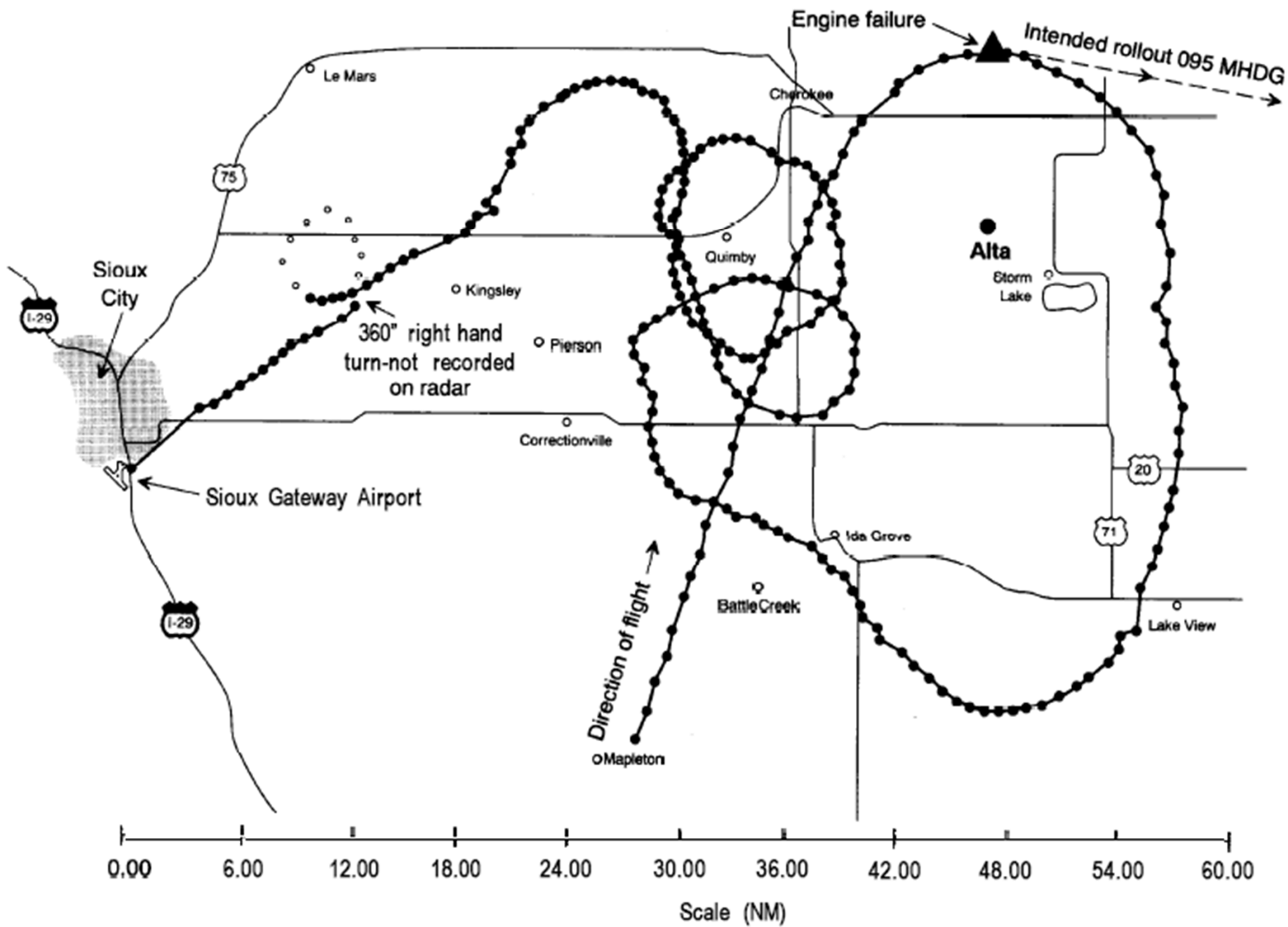
- Comments regarding simulator studies
 - Aircraft was **marginally flyable** using asymmetrical thrust on engines 1 & 3
 - Increasing-decreasing thrust has a **limited** effect on pitch attitude
 - No direct control of airspeed
 - Consequently, landing at a predetermined point and airspeed on a runway is a **highly random event**
 - Such manoeuvre:
 - ➔ Involves many unknown variables
 - ➔ Is **not trainable**
 - ➔ Rendered the landing virtually impossible due the degree of controllability during approach and landing
- **But remember DHL A300F in Baghdad (2003)...**

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- Watch the video of the event on:

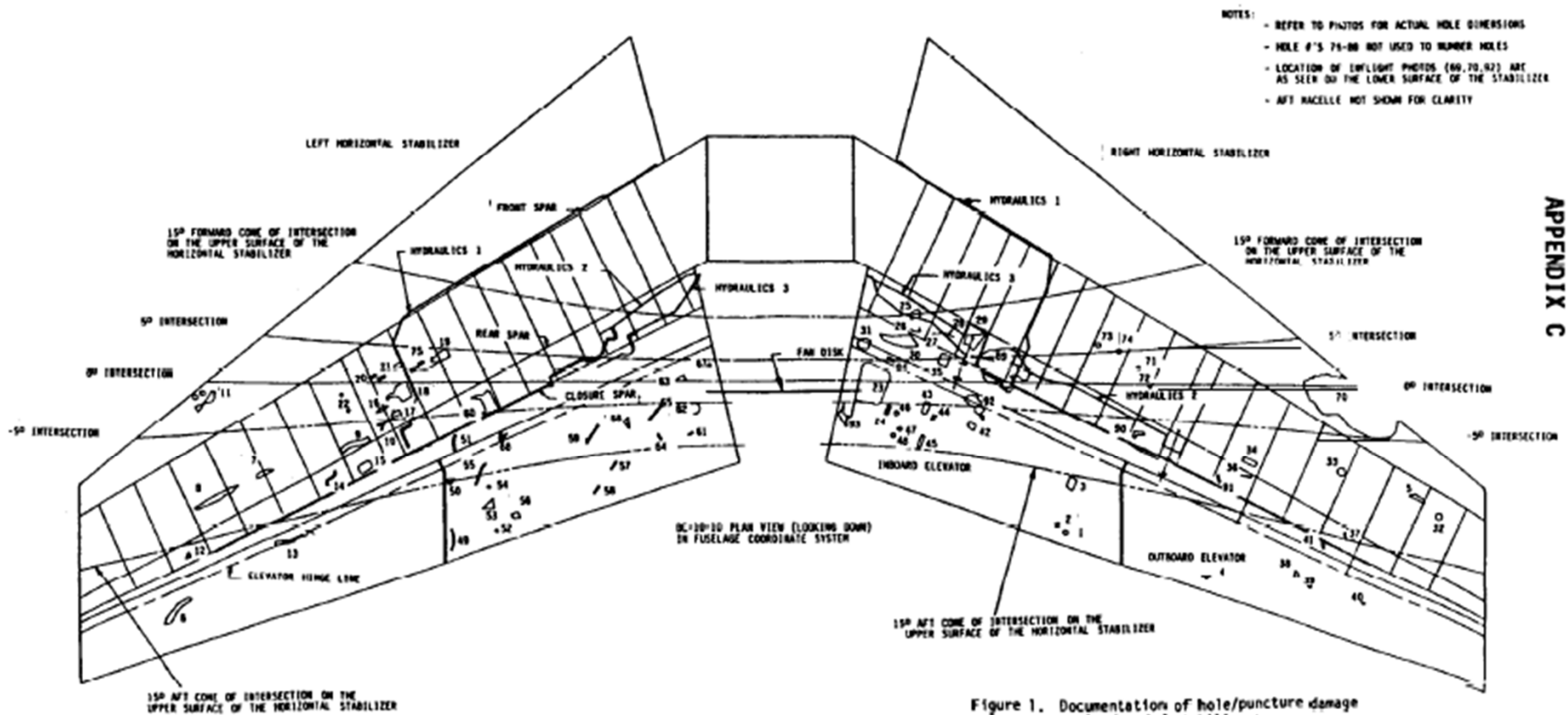
http://www.liveleak.com/view?i=4f9_1251410014





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HORIZONTAL STABILIZER DAMAGE DIAGRAM



APPENDIX C

Figure 1. Documentation of hole/puncture damage to horizontal stabilizers.