



**National
Transportation
Safety Board**

Midair Collision Between Cessna 150M and Lockheed Martin F-16CM

Moncks Corner,
South Carolina
July 7, 2015

Investigator-in-Charge
Presentation

Accident

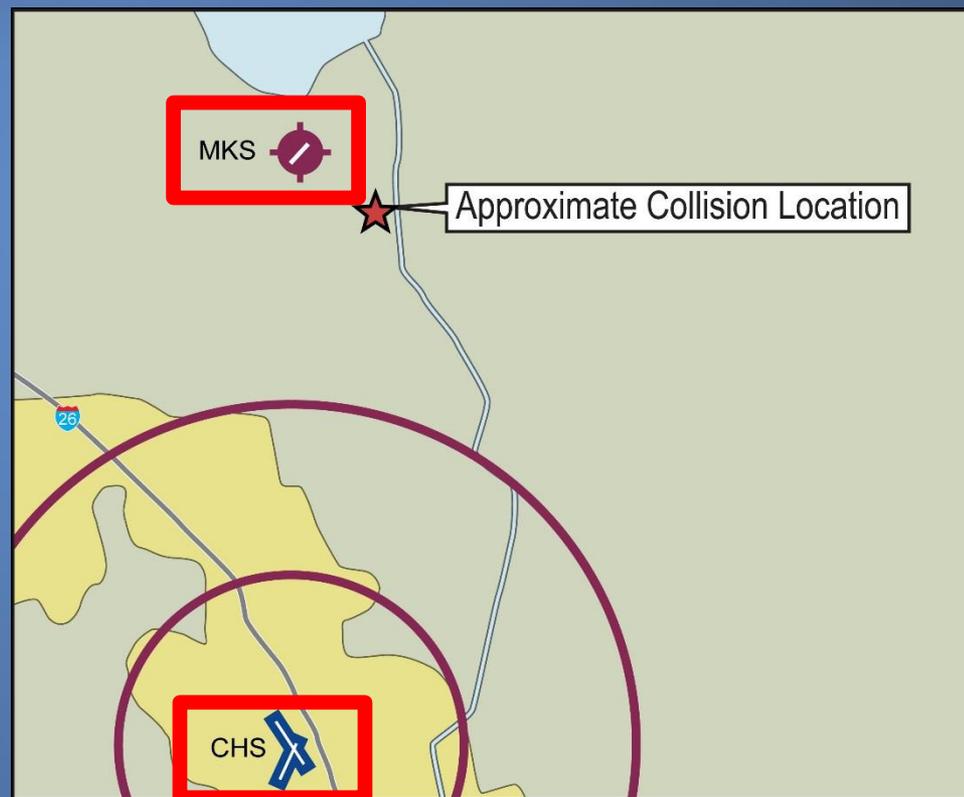
- Cessna pilot and passenger fatally injured
- F-16 pilot ejected, minor injury



**Wreckage
Location**

History of the Flights

- F-16
 - Practice approach at CHS
 - IFR
 - Radar and radio contact with ATC
- Cessna
 - Departed MKS
 - VFR
 - No ATC contact, not required

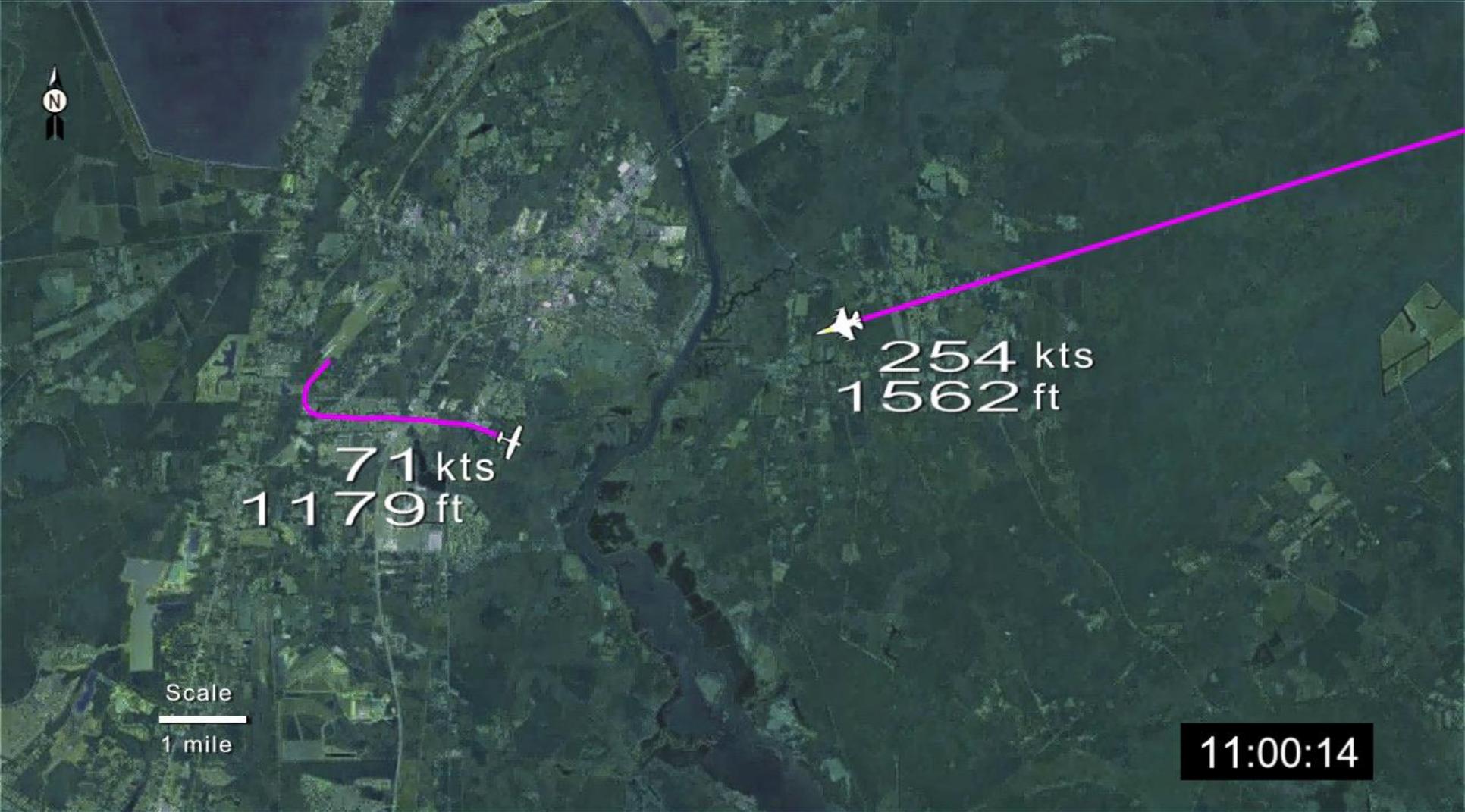


Air Traffic Control

- F-16 on radar vectors at 1,600 ft
- Cessna appeared on radar near MKS at indicated altitude of 200 ft
- Airplanes were within 3.5 nm
- Controller issued traffic advisory to F-16

The Collision





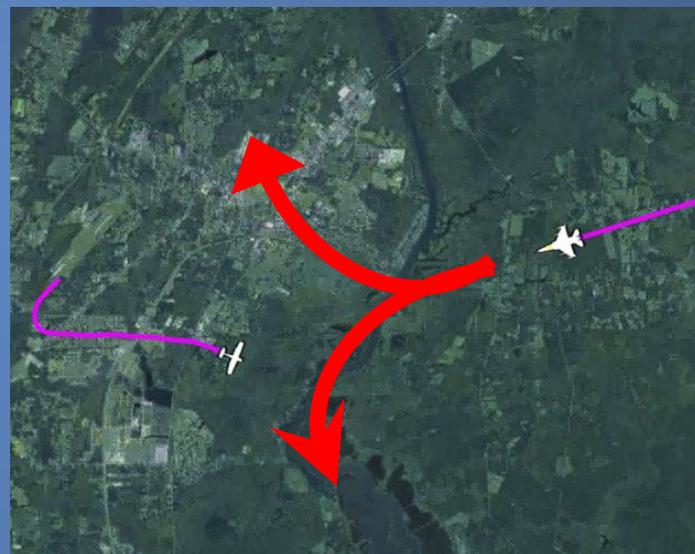
11:00:14

Air Traffic Controller

- Thought Cessna would remain in traffic pattern at MKS
- Recognized conflict and issued traffic advisory
- Closure rate of 300 kts
- Tried to separate airplanes visually
- Left few options

ATC Actions and Alternatives

- Instructed F-16 to turn left
 - Flightpath would cross in front of the Cessna
 - Dependent on timely action for success
- Best action would have been to instruct F-16 to turn before airplanes were close and away from Cessna's path



ATC and F-16 Pilot Actions

- Pilot's response signified confusion
- Controller expected high performance turn
- “Immediately” held a different meaning for controller and pilot
- Use of clarifying phrase would have removed ambiguity

See and Avoid

- Relies on pilot to identify threats and take action
- Inherent limitations
 - Visual and information processing
 - Competing tasks
 - Limited field of view
 - Environment

See and Avoid - Environment

- Low traffic density
- Visual meteorological conditions
- Cessna
 - Transponder and single communication radio
 - No traffic display or alert technology
 - Was not in contact with ATC

See and Avoid - Environment

- F-16
 - See and avoid with ATC traffic advisories
 - Tactical radar system did not detect Cessna
 - Also did not have in-cockpit traffic display or alert technologies

See and Avoid - Visibility Study

- Small, stationary, or slow-moving objects
- Both pilots would have had difficulty detecting other airplane





11:00:14



NTSB

WEST

death four one traffic twelve o'clock two miles
opposite direction one thousand two hundred
indicated type unknown

11:00:17



NTSB

Probable Cause

The approach controller's failure to provide an appropriate resolution to the conflict between the F-16 and the Cessna. Contributing to the accident were the inherent limitations of the see-and-avoid concept, resulting in both pilots' inability to take evasive action in time to avert the collision.

Safety Issues

- Air traffic controller judgment
- Collision avoidance technologies



National Transportation Safety Board