



NTSB National Transportation Safety Board

Office of Aviation Safety

American Airlines Flight 1400 St. Louis, Missouri

Harald Reichel
Powerplants



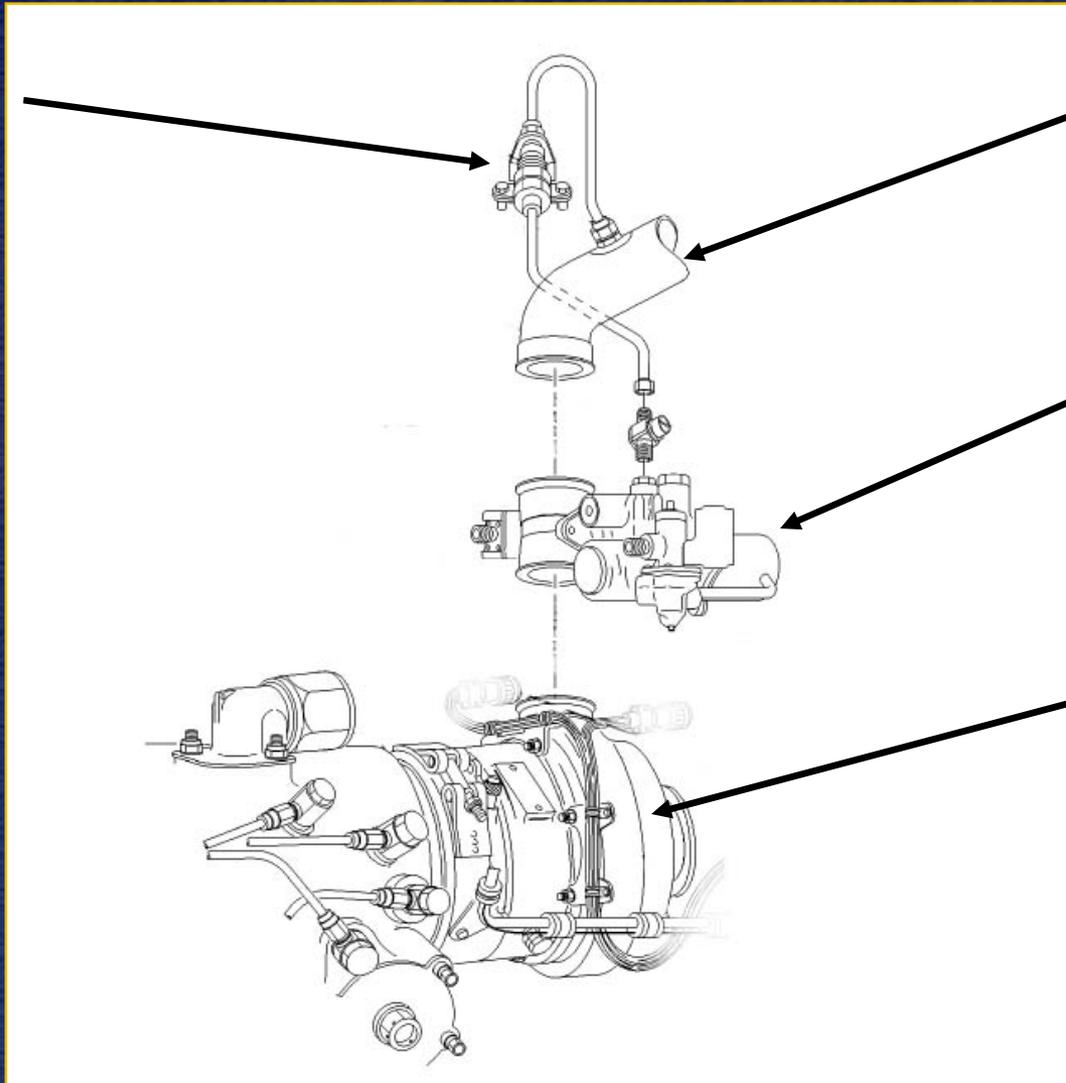
Left Nacelle Findings

- Significant fire occurred
- Fire confined to nacelle cavity
- No engine core problems
- Combustible fluid source could not be determined
- The ignition source of the fire was the start system failure



Engine Start System Overview

ATSV air filter



Pneumatic supply line

Air turbine start valve (ATSV)

Air turbine starter (ATS)

Air Turbine Starter Findings

- Does not normally operate during flight
- Uncommanded operation during takeoff and climb
- Failed, acting as ignition source



Event air turbine starter

ATSV Air Filter Findings

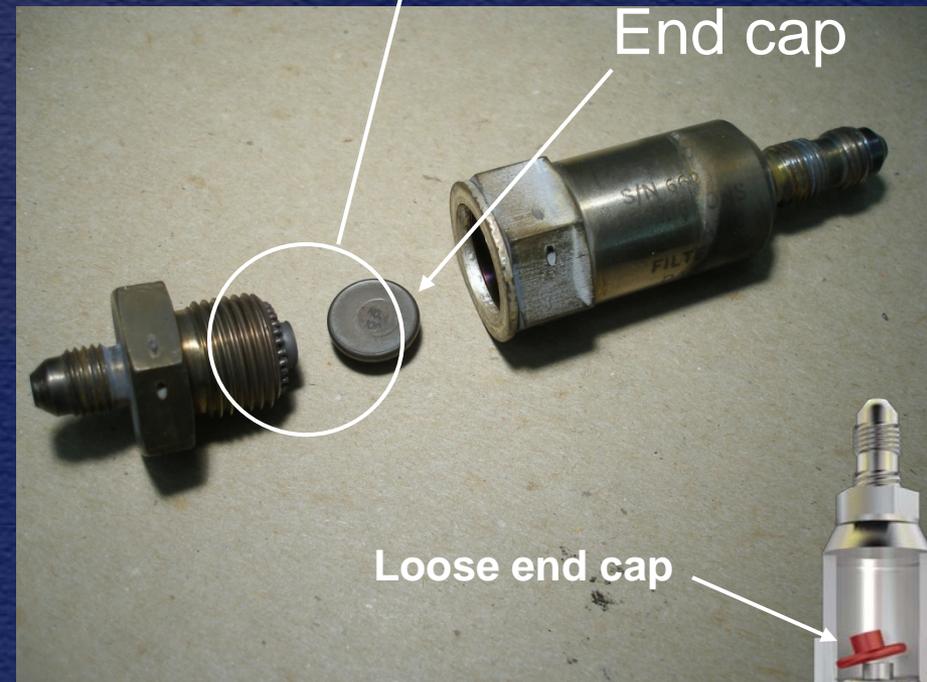
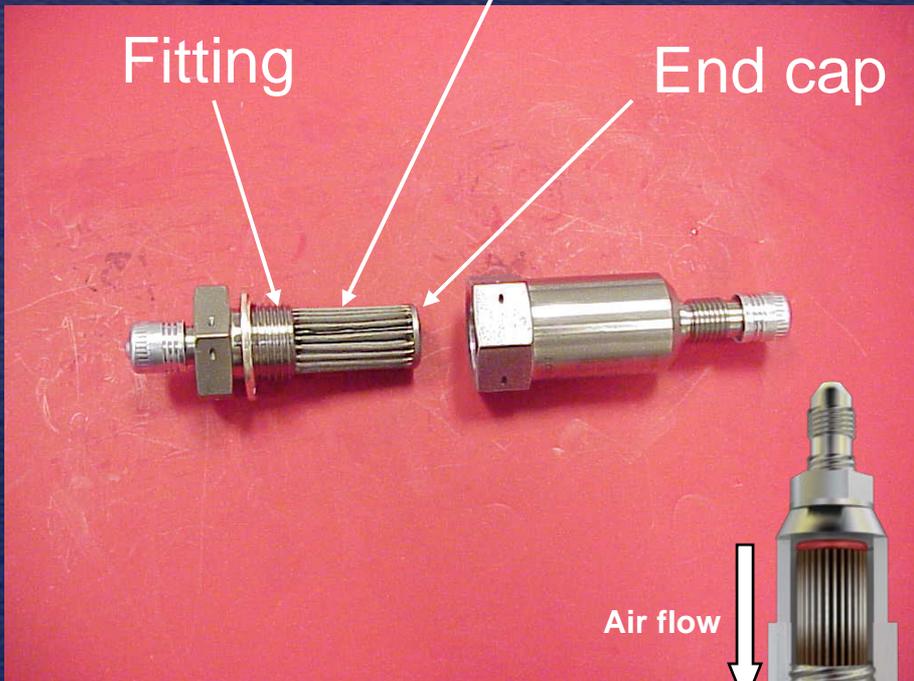
Filter element

Filter element missing

Fitting

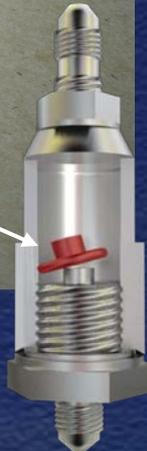
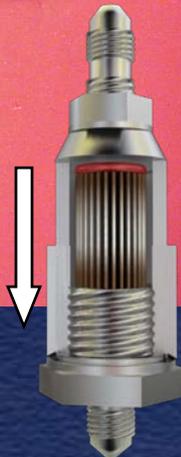
End cap

End cap

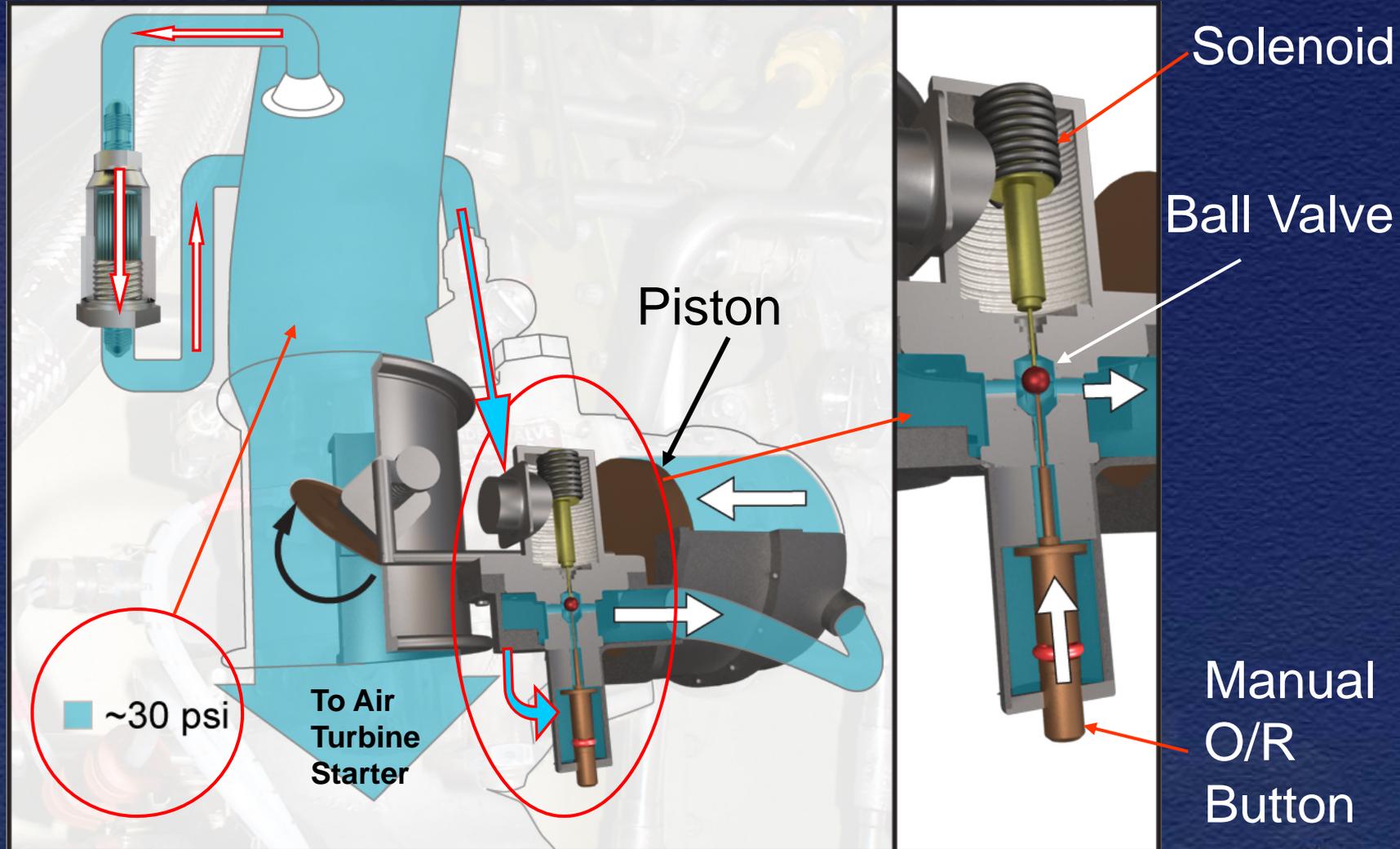


New ATSV air filter

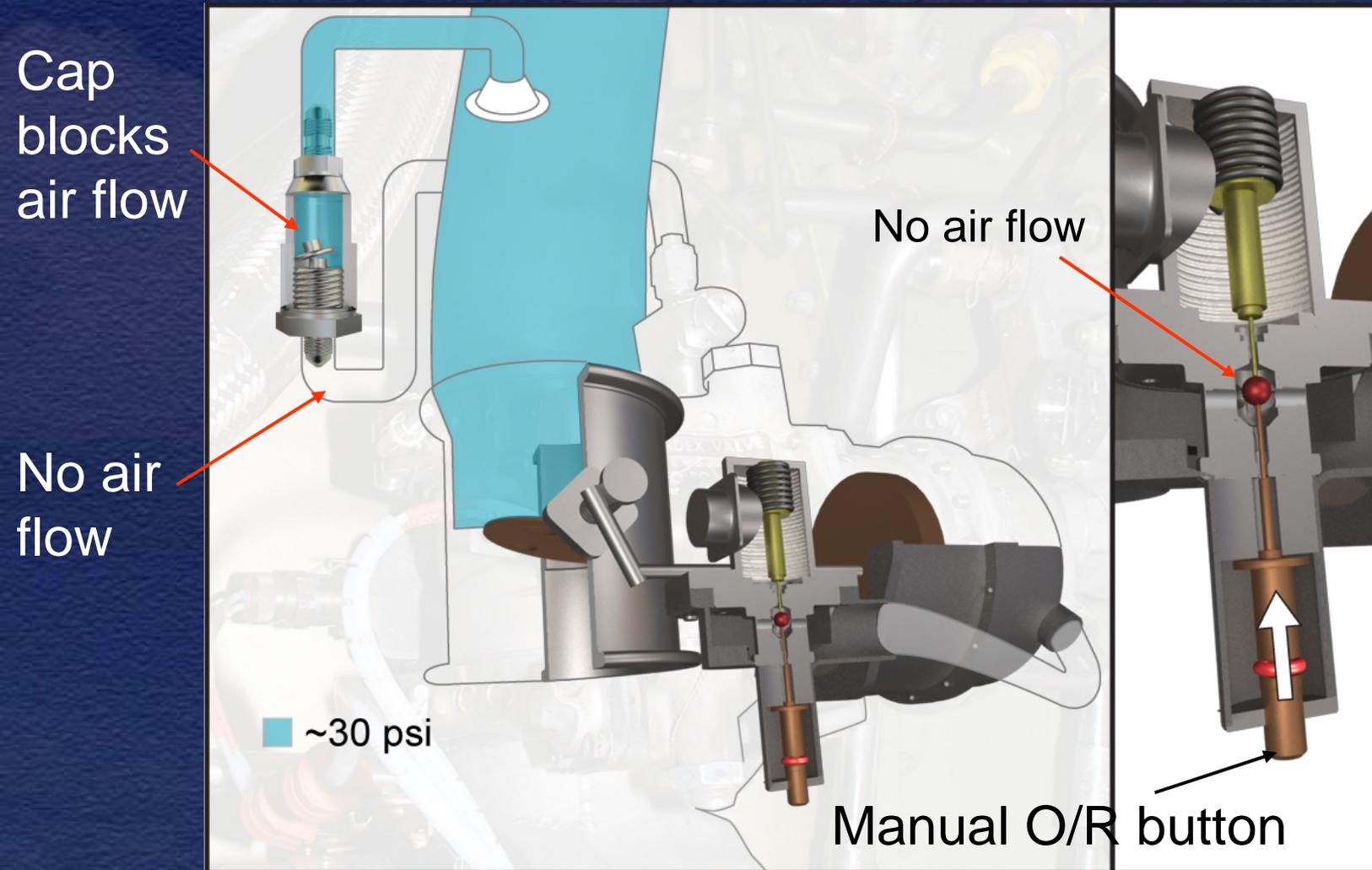
AA1400 ATSV air filter



Air Turbine Start Valve- Normal Operation

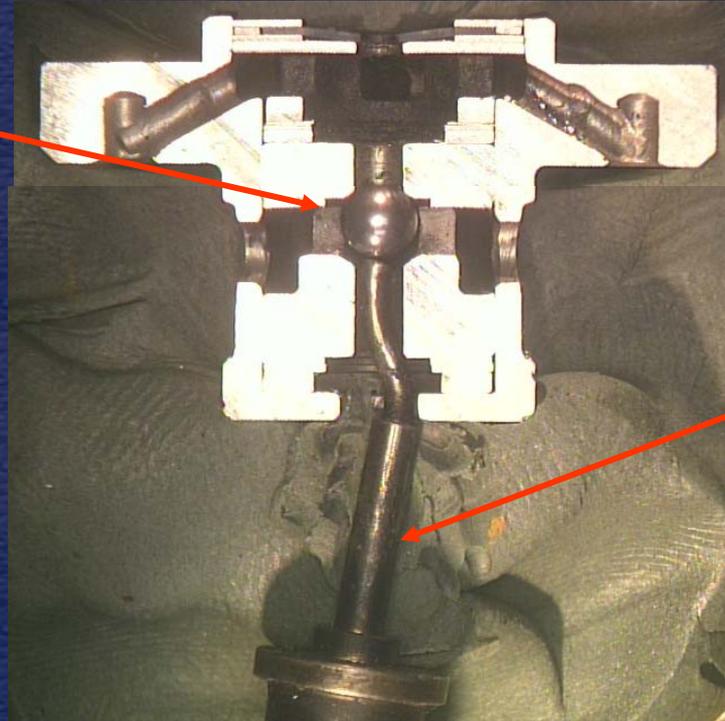


AA1400 Event No-Start History



Manual Override Pin and Ball Valve

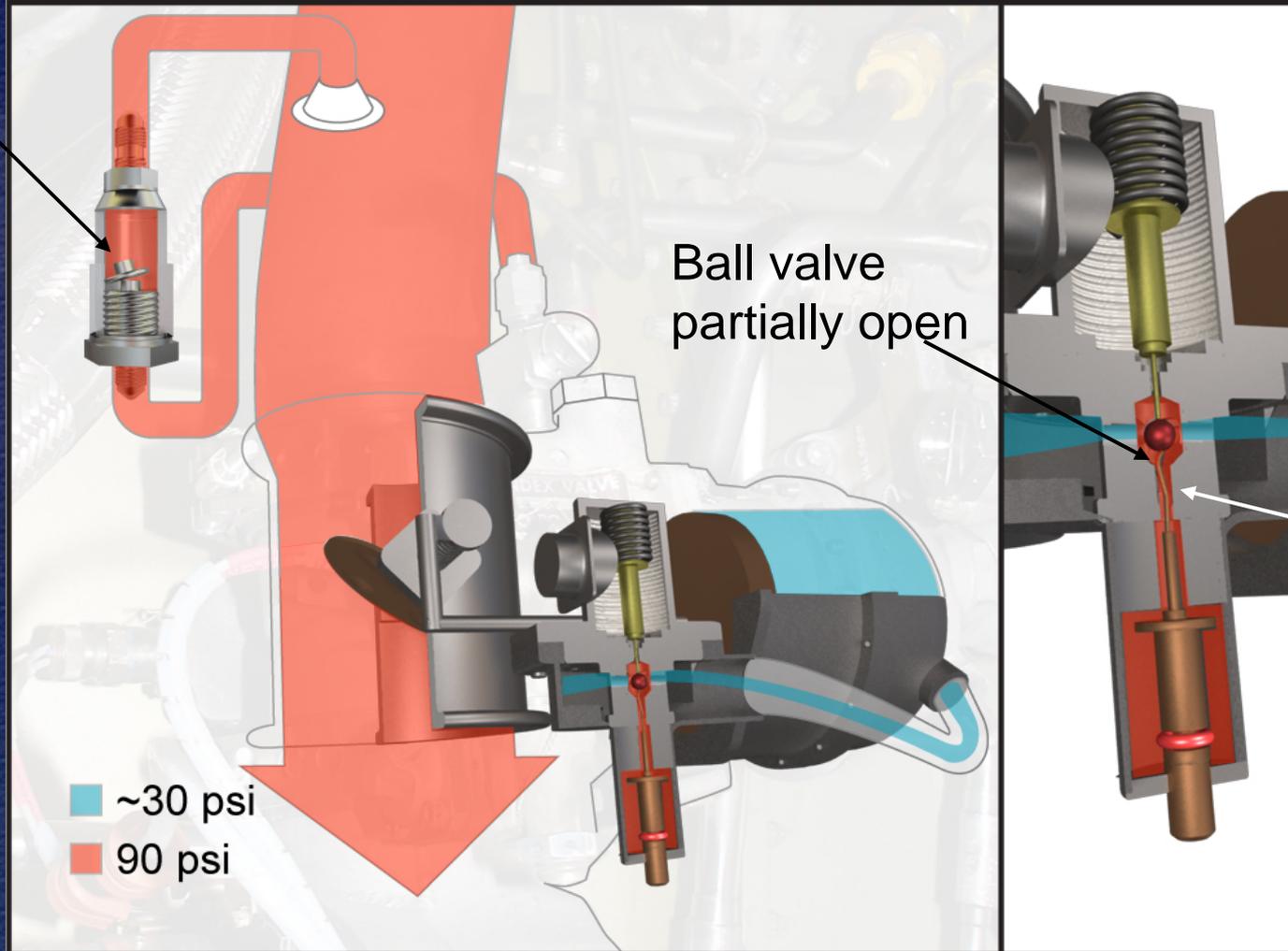
Ball valve



Manual override
pin bent

AA1400 Event Takeoff and Climb

Cap vibrates and allows air flow



Summary

- Disintegrated ATSV-air filter caused intermittent no-starts
- ATSV manual override pin was found bent
- Bent pin caused uncommanded ATS activation at takeoff
- Catastrophic failure of the ATS ignited combustible fluid present in the nacelle



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