EXECUTIVE SUMMARY
AIRCRAFT ACCIDENT INVESTIGATION
E-4B AIRCRAFT, S/N 73-1677
OFFUTT AIR FORCE BASE, NE
13 MAY 2002

On 13 May 02, the mishap aircraft (MA), an E-4B, S/N 73-1677, suffered a High Frequency (HF) Antenna assembly (wire antenna) failure. The exact time and location of the mishap is unknown. The MA and mishap crew (MC) were assigned to the 1 Airborne Command and Control Squadron (1 ACCS), 55th Wing, Offutt Air Force Base NE. The MC planned and flew a pilot proficiency training sortie that included pattern work followed by air refueling (A/R). During A/R, the KC-135E boom operator noticed the HF antenna had failed and was lashing the upper aft fuselage. Once notified of the antenna failure, the crew returned immediately to Offutt AFB and recovered without further incident. During the post-flight inspection, damage appeared minor and reparable at the unit level. After careful scrutiny, however, the unit determined the damage exceeded its ability to repair it. 1 ACCS asked the Air Logistics Center, Tinker AFB OK (OC-ALC Tinker) for guidance. They, in turn, contracted Boeing Aerospace to assess the damage, determine the best course of action and the cost of repairs. The assessment was staggering: extensive damage to the tail, crown skin panels and windows required Boeing to remove and replace 7 and repair 11 crown skin panels. The AF will remove and replace 17 windows. Each ding is relatively minor but collectively the final bill for the contracted work is $5,082,648, making it a Class A Safety mishap. The mishap caused no military injury and no civilian injuries or property damage were reported.

The Board interviewed 15 witnesses and researched the history of E-4B HF antenna failures. The crew and maintenance specialist were well trained and did not contribute to the mishap. While the aircraft hit four birds inflight, the crew did not know they hit birds and there was no evidence birds caused the antenna failure. Weather was clear and smooth and the flight was flown within aircraft limitations. The Board determined the HF antenna assembly failed inflight and the chuck assembly, which attaches the antenna to the tail, detached automatically per its design. The failed parts were never recovered.

The Board cited one cause and two contributing factors to this mishap. Additionally, there is one supply issue worthy of note. **Cause**: The mishap was caused by an operationally unsupportable HF antenna design. Annual antenna failure rates average approximately 1.5 failures per year. Wire antennas will fail, therefore, a more reliable design is warranted. Similar damage was discovered on two aircraft in the 98/99 timeframe amounting to over $3M. These mishaps prompted OC-ALC Tinker to research solutions and make recommendations. They recommended a TCTO designed to baseline parts and procedures. 1 ACCS maintainers found the TCTO inadequate and proposed a redesigned antenna instead. In the end the TCTO was the only option implemented. Following the TCTO, four antenna failures occurred in 29 months but were not reported to Tinker engineers. The fifth antenna failure, the MA, was the first failure known to Tinker. Clearly the TCTO did not solve the problem. **Contributing Factor 1**: The 98/99 mishaps were not reported to flight Safety and were not investigated despite repair costs in excess of $3M. Had they been investigated in '99, this mishap may not have occurred. **Contributing Factor 2**: There was no follow-up plan to assess the success of the TCTO. Tinker made no attempt to determine if there were subsequent failures and 1 ACCS did not report the failures as they occurred. **Of note**, there were unauthorized parts in the E-4B supply system as late as 1 Jul 02, more than 2.5 years after the TCTO was implemented. **Conclusions:** The Board concluded wire antennas will fail, Tinker engineers and the unit failed to properly follow-up after the TCTO, the decision to implement the TCTO instead of redesigning the antenna did not apply Operational Risk Management principals; and finally, Safety should have been notified of the 98/99 mishaps discovered at Depot. Had a proper Safety investigation been accomplished this recent mishap may have been avoided. Bottom line: If the antenna is not redesigned, this mishap will occur again.