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TechData Sheet

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METHODS FOR PREVENTING OVERHEATING OF THE BAMS UAV

Technology Description

The Global Hawk, the Preproduction Broad Area Maritime Surveillance (BAMS) Unmanned Aerial Vehicle (UAV) and by extension related UAVs can suffer from limitations due to excessive heat loading during ground support activities. These heat problems are caused by the UAV using the fuel (via heat exchanger) as a heat sink to cool the avionics. The aircraft flags an overheat condition if the fuel temperature exceeds 105 °F. The overheat flag is a cause to abort launch, however it is possible to override this until the fuel reaches 135 °F. These aircraft operate at very high altitude with ambient temperatures that cause JP-8 to gel; transferring the heat from avionics to the fuel, heats the fuel and prevents gelling with minimal use of fuel heaters.

USAF RQ-4 Global Hawk. This type of aircraft's literature was studied during preproduction of the BAMS for analysis of potential overheating issues.

This tasking was to determine a cost effective solution so the fuel system does not overheat during ground operations. It was found that when the aircraft is operated by motivated trained personnel that minimize the time the UAV is exposed to direct sunlight the fuel system does not overheat

To prevent excessive heat loading, whenever practical the BAMS UAV should be based in locations with a minimal number of days with a daytime high temperature over 100 °F. Where this is not practical, the recommendation that additional training to enable ground crews to minimize the time that the UAV is exposed to direct sun is the most cost effective method to eliminate ground overheat issues. The goal of this training is to reduce the quantity of time required to safely move the aircraft from the hangar to the flight line and launch the aircraft. Under conditions where the first two approaches are not acceptable solutions the most energy efficient method with the lowest cost for design and assembly is to provide a portable shade structure that covers only the wings during run up with an available high-pressure water misting system for times with extreme heat.

Value to the Warfighter

This study concluded that expensive and heavily energy-consuming air conditioned hangars are not necessary for operation of the BAMS UAV. This greatly expands the number of existing facilities that can be used for the

operation of the BAMS as well as reducing the energy consumption of the required hangar space.

Economics of the Technology: ROI or Payback
Multiple air-conditioned hangars were not built at potential cost of 50 to 75 million dollars per facility; however later revisions of the aircraft were reported to be more heat tolerant by design also mitigating this need.

Technology Transition Documentation

Transition Category 4 - to provide the Government the knowledge base or information to make decisions
TR-NAVFAC ESC CI-1226 “Methods for Preventing Overheating of the BAMS UAV” is available upon request.

Site Implementation

More advanced versions of BAMS UAV, now called TRITON, are reported to be more heat tolerant, largely mitigating need for expensive efforts to reduce heat loads.

Specific Applications

This report provided specific inputs regarding facility requirements during preproduction of an aircraft. The conclusion stated that costly facilities could be avoided by basing the aircraft in locations with a minimal number of days with a daytime high temperature over 100 °F. Where this is not practical, and it frequently is not, the most cost effective method to avoid aircraft overheat during ground operation is to reduce time on ground during run up operations.

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