

Checking for Leaks

Helium Is the Safe Alternative to Freon

Personnel from the Naval Air Depot (NADEP) Jacksonville Materials Engineering Laboratory are adopting a helium-based system for fuel tank system leaks as a safer, less expensive and environmentally friendly alternative to the traditional Freon-based system.

inject a small amount of Freon-113 into the wing section and then pressurize the wing. A halogen leak detector was then used to inspect the outside of the wing to determine leak locations.

However, since Freon-113 was made unavailable and no similar substitute performed as well as Freon, attempts were made to come up with acceptable alternatives. One procedure used air to pressurize the wing section and then spray on a soap solution to see if the soap bubbled anywhere on the wing—not a particularly effective or reliable method for detecting leaks.

The detector gives the operator a visual and audible alarm when a leak is found.

Background

Like many aviation depots, the Naval Air Depot (NADEP) at Jacksonville regularly checks integral fuel tank systems for leaks. When Freon-113 was available, it was common to

Jeff Tapley and Lee Pearl went to NADEP Jacksonville's Materials Engineering Laboratory during the summer of 2002. Both Jeff and Lee worked in the NADEP's wing shop and complained to the Laboratory's scientists that the "soap method" just did not work very well. As it happens, leaks are often located in areas where the soap solution is difficult to spray. Even if the soap solution is sprayed into such an area, one may not even be able to determine if a leak is present—if bubbles appear on the sprayed area. (These areas are known as "blind" areas.) What the wing shop needed was a method that worked as well as the Freon-113-based method and incorporated an environmentally acceptable solvent or gas.



The small size of the portable helium leak detector makes it easy to carry.



The portable helium leak detector is used for examining blind areas in the wing section.

A Helium-Based System

Such a system is now available. The new system is a portable leak detection unit that uses helium as the detection gas. The process is very similar to the old Freon-113 method. But instead of using Freon-113, the system employs helium. Helium from a compressed gas bottle is introduced into the wing section. The wing is then pressurized with compressed air. Now, instead of using a halogen leak detector to determine the location of the leak, one can use the helium leak detector.

One weekend, about five different artisans spent about two working days trying to find a leak in one EA-6B wing section. The same leak probably would have been found in a couple of hours or even minutes if the portable helium leak detection unit had been available.

Jacksonville's wing shop now has the ability to check for leaks more efficiently and in an environmentally and occupationally safe manner.

Potential for Additional Applications

In addition, this leak system has an expanded application for checking leaks in large systems such as P-3 wings. AEROWING has developed equipment and accessories that allow the leaks to be located on the outside of the wing but also can check for the origin of the leak on the inside of the fuel tank. Personnel from NADEP Jacksonville hope to prototype this system for outside leak detection in the fall of 2003.

Helium is inexpensive, non-explosive, non-reactive, and environmentally safe.

The detection unit is portable and employs a handheld probe with attachments. As one scans the surface, the detector gives the operator a visual and audible alarm when a leak is found.

Helium is inexpensive, non-explosive, non-reactive, and environmentally safe. Using this leak detection method, a standard size commercial helium bottle will probably last for a couple of years.

Last year, the manufacturer of this portable system, AEROWING Company of Miami, Florida, demonstrated the unit for Jacksonville's wing shop on an F/A-18 wing section. The demonstration was very successful. Many blind areas were located as well as other leaks. The unit was so popular that NADEP Jacksonville purchased a basic unit. In January 2003, the manufacturer trained several artisans in the wing shop.

The entire system is affordable, durable, and portable and can be used in a squadron where repairs must be done in a timely manner without the complications associated with bulky or delicate equipment. ⚓

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