

## **ERGONOMICS STRESSORS RESOLVED FOR MAINTENANCE OF EA-6B PROWLER TACTICAL JAMMING SYSTEM**

Fleet Readiness Center (FRC) Northwest (NW), Oak Harbor, WA, is the primary maintenance and repair facility for the EA-6B Prowler, a twin-engine, mid-wing electronic warfare aircraft. The heart of the EA-6B is the AN/ALQ-99 Tactical Jamming System (TJS). Receiving type equipment is mounted in a fin-tip pod, while electronic counter-measure equipment (referred to as assets) is located in under-wing and under-belly pods.



Fin-tip, under-belly, and under-wing pods of the EA-6B electronic warfare aircraft contain electronics equipment requiring maintenance.

The system is capable of intercepting, automatically processing, and jamming radio frequency signals. Depending on mission requirements, the EA-6B can carry any mix of five pods (one under the belly and two under each wing) consisting of jamming pods, fuel tanks and/or anti-radiation missiles.

FRC NW is the primary repair facility for the AN/ALQ-99 equipment.



350+ lb asset transportation fixtures were manually moved within various facilities.

Electronics technicians are responsible for maintaining and repairing the EA-6B Prowler's electronic countermeasure apparatus.

During transportation from the pod facility (where the assets are removed from the pods) to the repair area, technicians previously moved the assets with transportation fixtures that were manually lifted by two people (see picture at left). The assets weigh between 275-350 pounds with most of the weight being distributed at one end.

Once at the repair center, the assets were lifted from the transportation fixtures, with a boom hoist, into handling rotating units (HRUs) to allow performance of repair and maintenance tasks. Each asset was moved a number of times (by manually lifting them in the transportation fixture or pushing them in the HRUs) depending on which repair, test, or storage function the technicians were performing.

Technicians are required to work on all sides of the countermeasure equipment. They had to maneuver their bodies to reach all areas, often assuming awkward positions for extended periods (see picture below). The asset repair work required sustained awkward postures of the back, neck, and shoulders as well as the potential for high spinal forces associated with lifting and carrying the transportation fixtures and pushing the HRUs.



Original HRU was difficult to push and forced technicians to work in awkward postures due to its rear support structure and lack of height adjustability.

Prowler maintenance and repair process. Naval Facilities Engineering Command (NAVFAC) manages the MPHA Program. One aspect of this program provides [ergonomics](#) technical support to assist customers in identifying and solving ergonomics areas of concern.

A Certified Professional Ergonomist (CPE) visited the FRC NW repair facility to perform a site analysis. During the analysis, the CPE identified ergonomics risk factors and proposed abatement options to reduce the risks associated with the repair function while not compromising mission readiness. The site analysis was based upon on-site surveys, interviews, and design reviews with the EA-6B An/ALQ-99 Prowler's repair shop workers, supervisors, and safety and health personnel.

The combination of awkward postures and heavy lifting created a significant risk of low back injury when there was not adequate time for rest or recovery between tasks. Maintenance operations involving awkward postures, reaching, heavy lifting, and forceful exertions, increased the risk of [work related musculoskeletal disorders](#) WMSDs.

In support of their ongoing initiative to reduce work-related injuries and illness, FRC NW requested a formal site visit through the Navy's Mishap Prevention and Hazard Abatement (MPHA) Program to evaluate the EA-6B An/ALQ-99



eHRU eliminates ergonomics injury risks

The CPE worked with shop personnel to evaluate various options to resolve the identified ergonomics stressors in the repair shop. Options included cost/benefit trade-off studies. The CPE helped execute the solution that would ultimately benefit the FRC NW personnel - the re-design of the HRU and retrofitting the transportation fixtures with wheeled dollies.

FRC NW worked with Naval Facilities Engineering Services Center and NAVFAC



eHRU incorporates wheeled design improving maneuverability and access to assets

on the prototype design and end user testing to develop an ergonomic HRU, or eHRU, that eliminates ergonomics stressors during shore repair and maintenance operations on the EA-6B Prowler. Since the eHRU is only intended for shore operations, the eHRU design incorporated a wheeled design. Access to the equipment to be maintained/repared was greatly improved on the eHRU through alternative bracing, providing full access of the asset from both sides of the eHRU. Other ergonomics improvements incorporated in the eHRU include: pushing handles, clips to hold the Radiation Hazard Monitor probe, height adjustability, a drip tray that slides out, and a

cradle that attaches to the interface device holding fixture for power supply repair. These improvements reduced the amount of pushing, pulling, repeated bending, exertion of forces on wrists and the spine, and the need to assume awkward postures for long periods while working.

Transportation fixtures used to move assets were retro-fitted with wheeled dollies and provided to the two main asset handling shops at FRC NW. The dolly is placed under the carrying fixture so that the fixture can be wheeled to the maintenance area rather than carried. The dollies mitigated the hazards associated with manually carrying the transportation fixtures containing assets.



Transportation fixture retro-fitted with a wheeled dolly eliminates carrying heavy assets.

Re-design of the HRU and providing a wheeled dolly for the transportation fixtures virtually eliminated exposure to ergonomics risk factors in the EB EA-6B An/ALQ-99 Prowler maintenance/repair shop. Benefits from ergonomics solutions include increased quality and productivity, improved health and safety, decreased Workers' Compensation costs, and improved comfort. [More information on ergonomics and the technical support

available through the MPHA Program can be found on the NAVFAC's Ergonomics website page at [www.navfac.navy.mil/safety](http://www.navfac.navy.mil/safety) (select ergonomics)].

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