

# Low Cost Manufacturing for SEWIP Block 2 Electronic Warfare System

**Status:** Implemented

## PROBLEM / OBJECTIVE

The Surface Electronic Warfare Improvement Program (SEWIP) Block 2 upgrade currently faces manufacturing challenges with some of its critical elements. The Low Cost Antenna Assembly for the SEWIP Block 2 ManTech project addressed these challenges in manufacturing the critical elements of the SEWIP system. The project did so by leveraging advancements in the commercial industry to develop the manufacturing technologies and infrastructure sufficient to design, build and test an improved XiMod Transmitter, HPOI Switch Matrix, Precision Direction Finding (PDF) RF Module (RFM), and RF Switch Module for the SEWIP Block 2 upgrade utilized on DDG-51, CVN-78, and other Naval Combatant platforms.

The objective of this project was to develop the manufacturing processes necessary for automated test assembly and test processes for RF Tuner optimization, for new packaging technologies for wide band transmitter electronics, for ruggedization of COTS mechanical enclosures, and for development of advanced packaging technologies for integrated microwave assemblies (IMA).

## ACCOMPLISHMENTS / PAYOFF

This ManTech project focused on improving manufacturability of the COTS Fiber Optic Transmitter, which previously contained a number of individual parts and small circuit cards that prohibited it from meeting the desired cost, size, and MTBF for the SEWIP Block II program. The legacy COTS transmitter was repackaged, resulting in a transmitter that possessed double the electronics density in the same form factor as the legacy transmitter. This activity provided production models to integrate / hybridize the RF front end, modulator bias control, and power supply in order to simplify assembly and test, reducing cost and size, and thereby reducing top-side weight. A common set of components were then identified between two transmitter assemblies that supported a new integrated COTS dual transmitter design that possessed twice the capability as the legacy transmitter.

Furthermore, improvements to packaging, by implementing surface mount technology (SMT), of legacy COTS discrete components into single IMAs reduced sparing and improved reliability beyond that of the legacy hardware.

### **Process Improvement:**

Linear Photonics' dual transmitter module testing was successful and, as a result, the dual transmitter board design has transitioned into the Engineering Development Model (EDM) units.



**Linear Photonics Dual Transmitter Module**



### **Linear Photonics Dual Transmitter Module Blind-Mate Interface**

PDF RF Distribution Module:

Narda West has completed successful passband measurements for the Quadraplexer, created the microcontroller and circuit driver schematic for the automated test and alignment task and completed the top-level layout for the PDF RFM assembly consolidating functional blocks. The number of tuning screws within the Quadraplexer and Pentaplexer tuners has been reduced, from 174 to 20, resulting in 120 hours of tune and test labor savings per PDF RFM. Automated test of assemblies has been demonstrated for a 200 hour tune and test labor savings, with improved accuracy.

### **Implementation and Technology Transfer:**

Navy applications for implementation of this technology are the DDG 51, CVN 78, and DDG 1000.

### **Expected Benefits and Warfighter Impact:**

These improvements significantly improved the SEWIP Block 2 producibility and addressed current cost drivers. The SEWIP Block 2 ManTech Project resulted in cost savings of \$1M per ship. Hardware improvements have resulted in a significant maintainability and supportability improvements of targeted hardware reducing sparing and life cycle costs. The manufacturing processes developed within this project will be directly transferable to the industrial base because of Lockheed Martin's open SEWIP design. These manufacturing processes, and the hardware developed for the SEWIP program, will be platform independent and be transferable to any US Navy asset.

## TIME LINE / MILESTONE

Start Date: October 2010  
End Date: April 2012

## FUNDING

ONR Navy ManTech Investment: \$2.72M

## PARTICIPANTS

COE EMPF  
Lockheed Martin MS2