Gigabit Ethernet Data Multiplex System

Status: Pending Implementation

PROBLEM / OBJECTIVE

For over 20 years, the most expensive component in the production of the CV-4414/USQ-82(V), the input/output unit (IOU), has been the flexible circuit assemblies. The cost of these assemblies is over 30 percent of the total cost of the unit. With the recent addition of gigabit Ethernet interface capability to the IOU, the flex cable assemblies must be updated to support the higher signaling rates. While the new gigabit Ethernet modules can operate at a 1,000 Mbit/sec link speed, the existing flexible circuits introduce an impedance discontinuity interface that limits the performance to a 100 Mbit/sec link speed. The continual upgrade of the Navy's equipment to Internet Protocol (IP) based interfaces is driving the need for the higher data rate interfaces to the GEDMS IOU equipment. Hence, there is an urgent need to develop a cost effective and producible IOU flex cable solution that meets the performance requirements. The objective is to develop high yielding design rules for flexible circuits that will accommodate the presently used 42-pin M28840 connector that provides an interface to the external user systems. The approach will utilize reproducible and transportable processes, as well as reducing the amount of touch labor in the manufacturing process.

ACCOMPLISHEMENTS / PAYOFF

Process Improvements

The introduction of these IOU flex cable solutions will improve performance by providing higher link speeds, increase producibility, increase reliability, lower acquisition costs, and lower total ownership costs by reducing touch labor in the manufacturing process. A savings of $120K will be realized per hull and a total savings of $4.95M when the modernizations of all the current DDG Flight I platforms using DMS and the expected modernizations of the Flight II hulls are completed.

Implementation and Technology Transfer:

The strategy for implementing the new flexible circuit design into the DDG program begins with the design team currently responsible for the maintenance of the AN/USQ-82(V) technical data package, thus minimizing the familiarization time for the team. Upon successful testing of the redesigned, flex cable assemblies, the IOU technical data package are being updated to include the designs created because of the ManTech project.

High performance IOU flex cable is needed for the third DMS network backbone upgrade - GEDMS

The cost reductions will be realized beginning with the FY14 DDG Modernization ships and new construction DDGs.

This ManTech project leveraged Boeing's investment in manufacturing enhancement work to assemble and package prototypes for performance validation and inclusion in the government's production design package.

The transition point for the project was the successful completion of the prototype rigid-flex circuits test, review and approval of the test results by the GEDMS Program Manager, and the incorporation of the design changes into the design production package.

TIME LINE / MILESTONE

Program Start:	June 2012
Program End:	February 2014

FUNDING

Navy ManTech Investment: $938K

PARTICIPANTS

DDG 51 Program Office – Stakeholder
Naval Surface Warfare Center Dahlgren Division W64
PMS 400D & 400F
The Boeing Company–Design Agent, production
EMPF – Project management, technical support

