

**The Secretary of Defense Performance-Based Logistics Awards Program
For
Excellence in Performance-Based Logistics
In
Life Cycle Product Support**

**Section 2
Summary of Criteria Accomplishments**

Warfighter-Based Capabilities and Outcomes

Mission Success: The overall objective of the H-46/H-53 Auxiliary Power Unit (APU) PBL contract is to meet and exceed fleet readiness expectations and requirements. The Naval Inventory Control Point, Philadelphia, PA, selected Hamilton Sundstrand Power Systems (HSPS) as the Prime Contractor for the ten-year Performance Based Logistics support contract. As part of this PBL contract, HSPS has partnered with the Fleet Readiness Center - East (FRC-E) Cherry Point, North Carolina and AAR Defense Systems & Logistics to provide support to both the H-46 and H-53 Auxiliary Power Units. Since the first year of the PBL program, the government/industry team has filled all outstanding backorders, improved product availability and reliability, and initiated activities to resolve significant obsolescence and Diminishing Manufacturing Sources (DMS) issues. Over the first six years of the program, the PBL achieved an average material availability of 97.8% (achieving 100% availability in calendar years 2008 and 2009), and filled 1296 Fleet requisitions in accordance with metric timeframes. [See Figure 1 for full performance information.]

Materiel Availability: The two product lines covered by the APU PBL contract were historically subject to periodic weapons system availability degradation. Both the H-46 and H-53 APUs are mission essential to their respective aircraft, and intermittent poor system availability had a direct contribution to decreased readiness of the helicopters they support. The PBL provides support to 16 individual components including APUs, pumps, and fuel controls. HSPS responsibilities under the PBL include

inventory management, requirements determination, repair/overhaul/replace decisions, obsolescence management, technology insertion, warehousing/custody of wholesale inventory, requisition processing, and transportation to Fleet customers. HSPS is responsible to manage all facets of the supply chain and related Integrated Logistics Support (ILS) elements to ensure availability of spares to the warfighter. The PBL includes coverage to 120% of forecasted flight hours to ensure availability during surges in Fleet operations. The team has achieved availability performance of 97.8% to date, and 100% in calendar years 2008 and 2009.

Materiel Reliability: The H-46/H-53 APUs are legacy equipment in use since the 1960's. Due to their age, they had reached a state of "inherent unreliability," as they had never been upgraded and had numerous sub-components reaching their life limits. APUs are mission essential to their respective aircraft, and poor product reliability had a direct contribution to decreased readiness of the helicopters they support. Product reliability at the start of the contract was 608 hours for the H-46 APU and 623 hours for the H-53 APU. The contract required HSPS to improve reliability, defined as Mean Flight Hours Between Repairs (MFHBR,) to 684 hours for the H-46 APU and 701 hours for the H-53 APU by the end of FY09. The team has exceeded both metrics by achieving 1320 hours and 963 hours on the H-46 and H-53 APUs, respectively [see Figures 2 and 3.] HSPS and FRC-E focus on long-term reliability in order to keep the products operating and keep total ownership costs down. Reliability and maintainability data and repair trends are monitored, and corrective actions are taken to improve reliability. Class 2 ECP incorporation, repair process changes, and configuration upgrades have improved reliability and increased time-on-wing.

Ownership Cost Reduction: The contract was priced on an all-inclusive, price per flight hour basis for a total of \$74.8 over ten years (five-year base period with five one-year incentive terms). The NAVICP Business Case Analysis (BCA) documents a cost avoidance of \$14.3M over the ten years of

the contract. The long-term nature of the PBL allowed HSPS to meet the affordability criteria of the BCA by enabling a reengineering of the support process. With a guaranteed business base, HSPS, as the Original Equipment Manufacturer (OEM), brings its best practices and in-depth knowledge of APUs to sustainment support. The firm-fixed price per flight hour nature of the PBL incentivizes HSPS to make investments and support decisions that pay off over the long-term through improved parts support, investments in reliability, optimized depot processes, and decreased depot returns. HSPS quickly and efficiently directs resources where required to deliver the performance outcome specified in the contract. Pricing by the flight hour allows for precise accounting of Flying Hour Program (FHP)/Aviation Depot Level Repairable (AVDLR) expenditures for APUs, adding stability to the FHP budget. The contract is funded entirely by Navy Working Capital Fund, compensated by the FHP, and provides for APU depot repair, engineering and logistics support, reliability centered maintenance and fleet reps while reducing the Navy/Marine Corps Intermediate Maintenance Activity (IMA) manpower requirement.

Sustainment of Warfighter Capabilities

Public-Private Partnering: As part of the PBL, HSPS established a partnership for repair with FRC-E, the pre-PBL organic depot, in accordance with 10 USC 2474. A Commercial Services Agreement (CSA) was executed between HSPS and the FRC to enable the partnership and provide support to the PBL. Under the terms of the CSA, HSPS is responsible for providing funding, Not-Ready for Issue (NRFI) parts, repair parts, technical support, and transportation to the FRC. FRC-E provides supervision, labor, facilities, and equipment for depot repair of H-46/H-53 APU assets. The partnership has brought significant improvement to the repair process. Since implementation of the partnership, repair turn-around-time (RTAT) has decreased by 66% (180 days to 60 days) for H-46, and 79% (260 days to 55 days) for H-53 [See Figure 4.] HSPS sub-contracted with AAR, a 3rd party logistics (3PL) provider for warehousing, transportation and repair parts management. AAR's on-time delivery of

repair parts to FRC-E is 98.7%. The team has worked together to eliminate repair procedures causing early failures and improve repair procedures to increase APU reliability. This has resulted in fewer APUs returned to the depot for repair. To validate the effectiveness of the repair process changes, HSPS monitors all APUs returned from the fleet for repair. At the start of the program, 26% of H-46 and 24% of H-53 APUs repaired at FRC-E were returned for repair within one year. At present, 9% of H-46 and 12% of H-53 APUs are returned within one year, a reduction of 65% and 50%, respectively.

Systems Engineering Approach: The APU Team provides dedicated systems engineering support for the H-46/H-53 APUs, accomplished through the use of reliability and maintainability improvements, obsolescence management, comprehensive failure mode analysis, integrated logistics support, and on-site performance monitoring and technical assistance. This proactive approach has resulted in changes and improvements at the FRC including repair/overhaul manual rewrites, revised repair procedures, training, repair parts ordering process changes, and revision of test specifications. Failure mode analysis showed that the purge valve, wiring harnesses, air/fuel lines and thermocouple relay were contributing to early APU failure. Repair procedures were modified to make these 100% replacement items during the APU repair cycle. Repair process review determined that several repair procedures were also contributing to early APU failures, so 5 procedures were eliminated, and 8 were improved. Additional efficiency was brought to the repair process by upgrading all sub-assemblies to the latest configuration. The team has completed several fleet visits to provide IMA training. The resultant I-level maintenance process changes (fuel control assembly modification, 100% replacement of purge valves, wiring harnesses, and V-band clamps) has enabled additional repairs to be completed at I-level, offsetting Beyond Capability of Maintenance (BCM) actions in the fleet and saving Flying Hour program dollars.

Footprint Reduction: H-46/H-53 APU PBL contract has significantly improved the supply chain through streamlined engineering and supportability change incorporation, and the application of

commercial support efficiencies and practices. This higher level of support results in lower Fleet maintenance costs because of improved reliability with less on-station support required. Significantly improved logistics response times and RTATs through the PBL have reduced wholesale inventory footprint.

Obsolescence Management: Proactive obsolescence management is a key tenet of the H-46/H-53 APU PBL program. HSPS is responsible for ensuring piece parts and WRA availability through timely parts procurement or technical enhancements, accomplished through Class II Engineering Change Proposals (ECPs). Under the PBL, HSPS has implemented numerous obsolescence mitigation strategies. Several repairable components and consumable piece parts were re-designed or re-sourced to resolve non-supportability issues. HSPS re-designed the thermocouple relay, 5 digit counters for the junction box, and air inlet housing; upgraded the configuration of the fuel pumps and carrier assemblies; and established a new supplier for speed switch repair parts. Continued dedicated focus by the government/industry team on parts obsolescence and DMS management is key to continued viability of the H-46/H-53 APU product lines.

Reliability, Maintainability and Supportability Improvements: Reliability, maintainability, and supportability are a standard part of the H-46/H-53 APU PBL process. Reliability and maintainability data and repair trends are monitored, and corrective actions are taken to improve reliability. Engineering activities include replacement of key repair parts and elimination/improvement of repair procedures that were driving early APU failures. Redesign of the H-53 thermocouple relay and air inlet housing, coupled with configuration upgrade of the turbine assembly rotor, fuel control assemblies, carrier assembly and junction box have contributed to substantial increases in time on wing for both H-46 and H-53 APUs.

Figure 1: H-46/H-53 PBL Partnership Performance Summary to Date

H-46/H-53 APU Delivery Performance Metrics Report (through 10 May 2010)				
Phase	Shipped	Delivered	Met	Performance % - Goal 90%
1 – Transition period	27	27	27	100%
2 – GFY 04 (Jul-Sep 04)	70	70	64	91.4%
2 – GFY 05 (Oct-Sep 05)	296	296	295	99.7%
2 – GFY 06 (Oct-Sep 06)	249	249	247	99.2%
2 – GFY 07 (Oct-Sep 07)	200	200	192	96%
2 – GFY 08 (Oct-Sep 08)	179	179	179	100%
2 – GFY 09 (Oct-Sep 09)	175	175	175	100%
2 – GFY 10(Oct-May 10)	100	98	87	88.8%
Program to Date	1,296	1,294	1,266	97.8%

Figure 2: H46/T-11 APU Reliability (12-Month MTBR Rolling Average)

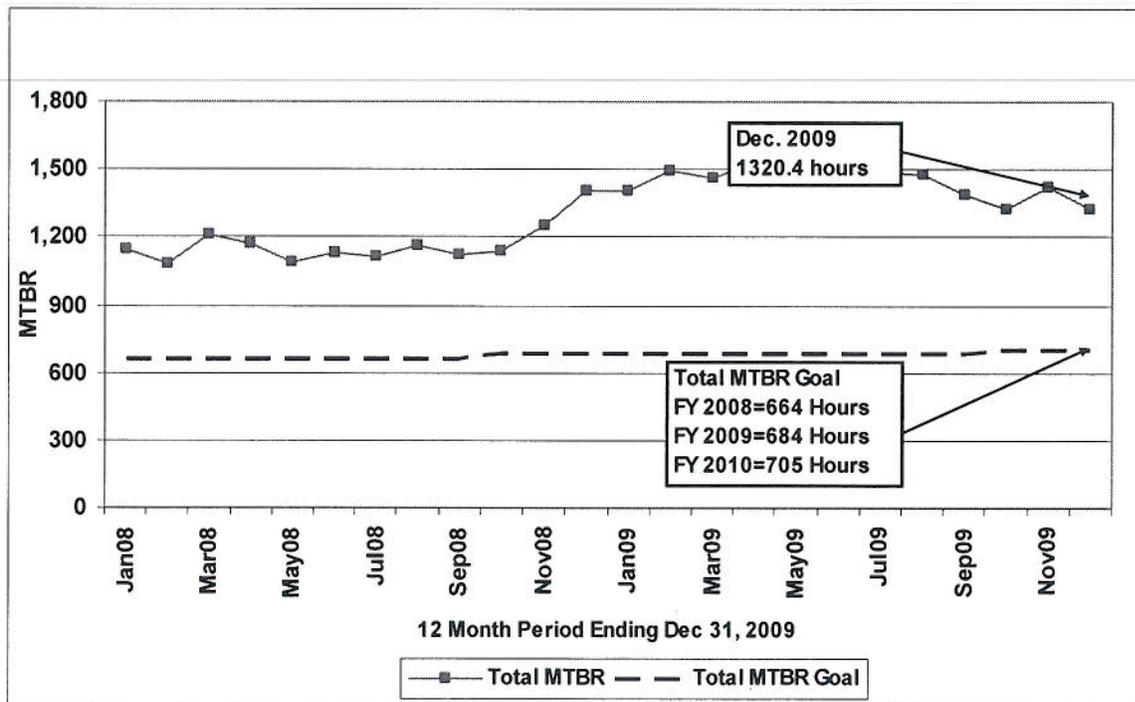


Figure 3: H53/T-27 APU Reliability (12-Month MTBR Rolling Average)

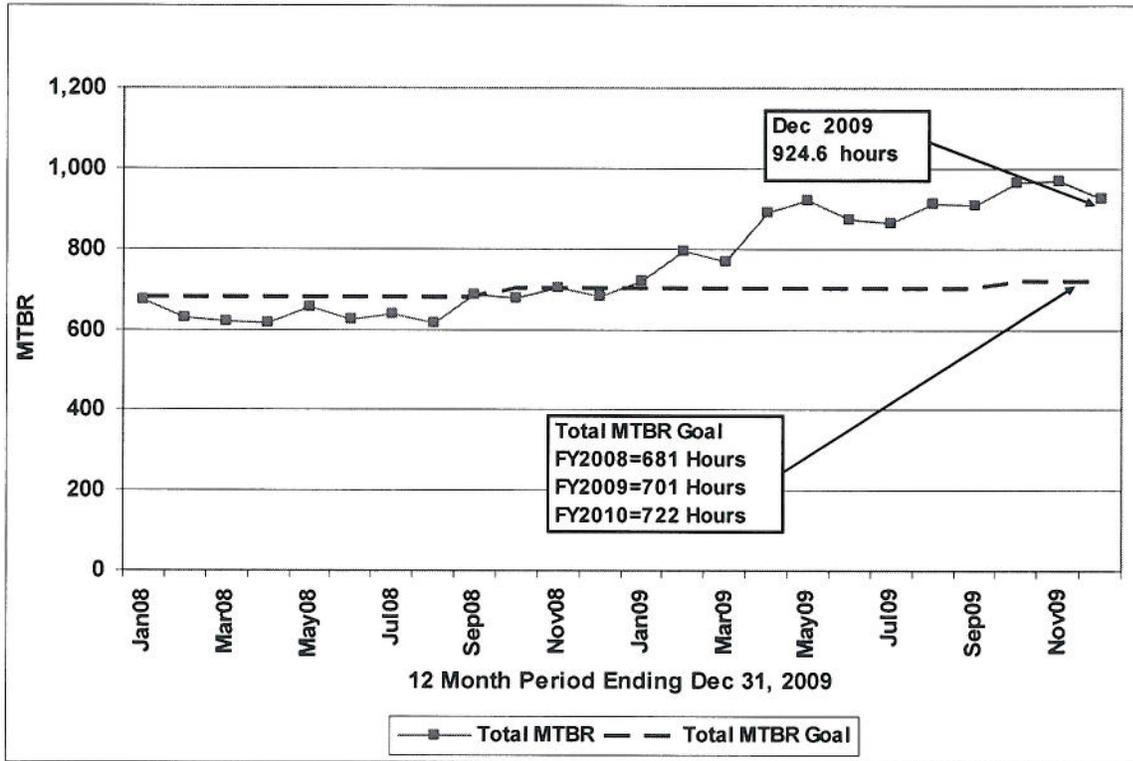
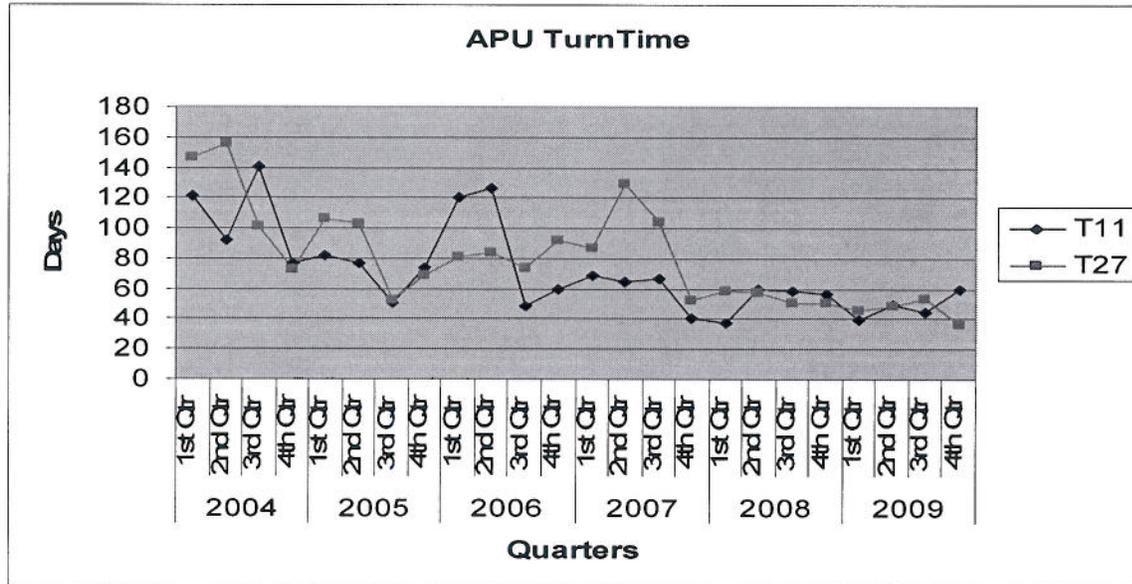


Figure 4: FRC-E Repair Turn Around Time



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**Section 4
Achievements**

The \$74.8M five-year Firm-Fixed Price H-46/H-53 APU Performance Based Logistics (PBL) contract was awarded to Hamilton Sundstrand Power Systems (HSPS), San Diego, CA, in October 2003. The PBL provides supports 16 line items. APUs provide pneumatics and hydraulic/electrical power for main engine start capability. HSPS's responsibilities under the PBL include inventory management, requirements determination, repair/overhaul/replace decisions, obsolescence management, technology insertion, warehousing and custody of wholesale inventory, requisition processing, and transportation to Fleet customers. HSPS is responsible to manage all facets of the supply chain and related Integrated Logistics Support (ILS) elements to ensure availability of spares to the warfighter.

The PBL has achieved a material availability of 97.8% and filled 1296 Fleet requisitions in accordance with metric timeframes over the first four years of the program. HSPS in partnership with the Fleet Readiness Center - East (FRC-E), brings its best practices and in-depth knowledge of the H-46/H-53 APUs to sustainment support. The PBL incentivizes HSPS to make investments and support decisions that pay off over the long-term through improved parts support, investments in reliability, optimized depot processes, and decreased depot returns. The PBL provides unprecedented cost-wise performance to the Fleet.