



# **COMPENDIUM OF DEPOT MAINTENANCE PUBLIC-PRIVATE PARTNERSHIPS**

March 2005

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# Compendium of Depot Maintenance Public-Private Partnerships

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## INTRODUCTION

Public-private partnerships for depot maintenance are an increasing source of capabilities and workloads for public sector (organic) depots. The initial depot maintenance partnerships were started in the early 1990s, and the concept continues to gain institutional support and legal authority as depot maintenance activities pursue a greater variety of partnership arrangements. As the number of partnerships grows, there is even greater opportunity to expand and improve partnering in the depot maintenance setting.

One way to highlight the growth and importance of depot maintenance partnerships is to emphasize key aspects of successful partnerships. Many partnerships have created “win-win-win” situations for the organic depots, commercial firms, and warfighters. These partnerships typically are built upon successful relationships and demonstrated business value for all participants.

The Assistant Deputy Under Secretary of Defense for Maintenance Policy, Programs and Resources (MPP&R) sponsored a Depot Maintenance Public-Private Practitioners Workshop in November 2004. The goal was to draw upon the extensive experience at individual organic depots and share lessons learned. In support of this objective, the workshop agenda focused attention on several effective depot maintenance partnerships. The partnerships were selected because they were successful in several dimensions, including

- ◆ involvement of a multiple-year business relationship,
- ◆ the use of the public-sector depot maintenance workforce,
- ◆ at least \$5 million in expected revenue, and
- ◆ significant non-monetary benefits

This is a compendium of the depot maintenance partnerships that were presented at the workshop. The presentations were made in the context of two broad thematic categories: entrepreneurial and performance-based partnerships. Each briefer was asked to focus on one distinguishing feature of the partnership they were presenting. This document is a compilation of written summaries of the briefings; the narratives are in free form.

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Basic background concepts about partnering were introduced in an earlier report<sup>1</sup> that is available on the MPP&R website:

[http://www.acq.osd.mil/log/logistics\\_materiel\\_readiness/organizations/mppr/html/dmp.htm](http://www.acq.osd.mil/log/logistics_materiel_readiness/organizations/mppr/html/dmp.htm)

Additional partnership-related documents are also on this website and may serve as useful resources for those involved in depot maintenance partnerships.

## OVERVIEW

The entrepreneurial depot maintenance partnerships that were presented at the Depot Maintenance Public-Private Practitioners Workshop exhibited innovation that fulfills a compelling business or customer need. These partnerships, and their specific noteworthy features, are as follows:

- ◆ AV-8B aircraft: Partnering as an equal part of a remanufacturing process
- ◆ M1 Abrams Tank: Multiple partnerships in support of the same weapon system
- ◆ B-2 Spirit Bomber: Partnering as a means to introduce advanced repair technologies

The partnerships with performance-based characteristics are as follows:

- ◆ F404 Engine: Partnering with public-sector depot labor as well as engineering support
- ◆ C-17 Globemaster III Airlifter: Partnering as part of a Total System Support Responsibility (TSSR) performance-based logistics (PBL) arrangement
- ◆ Common Ground Station: Partnering that features an organic product support integrator

Each partnership description that follows begins with a short narrative about the weapon system being supported by the particular partnership. This is followed by an account of the specific features of the actual partnership arrangements.

This compendium of examples illustrates the utility of public-private partnerships from DoD's perspective. Depot maintenance activities are beginning to make substantially better use of partnership authorities, as reflected in the growing forms and variants of partnering arrangement that are coming into force. By combining government capability, assets, and resources with corresponding contributions from the private sector, these arrangements leverage organic resources, increase the value of existing inventory, and generate sources of revenue. The arrangements also frequently provide a substantial improvement in operational capability.

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<sup>1</sup> LMI, *Public-Private Partnerships for Depot-Level Maintenance*, Steven R. Erickson, Report LG101L2 (Rev. 1), March 2002.

## AV-8B REMANUFACTURING (HARRIER II PLUS)



The Harrier II Plus is the latest and most advanced variant in the combat-proven Harrier family of short takeoff, vertical landing (STOVL) tactical aircraft.

To provide fleet marines with the most capable Harrier possible, the U.S. Marine Corps launched the Harrier II Plus remanufacture program in 1994. Seventy-four day-attack Harrier IIs were converted into the more capable Harrier II Plus aircraft with a renewed service life. The remanufacture cost the Marine Corps significantly less than purchasing all new aircraft.

The Boeing Company, BAE Systems, and Rolls Royce teamed to produce the AV-8B, Harrier II,

as a major upgrade to the AV-8A, Harrier I. The first production AV-8B aircraft was delivered in November 1983. Deliveries of night-attack Harrier IIs began in September 1989. The U.S. Marine Corps received its first new Harrier II Plus aircraft in July 1993 and its first remanufactured Harrier II Plus in January 1996.

**Partnership type:** Work share agreement

**Distinguishing feature:** Partnering as an equal part of a remanufacturing process

The United States Marine Corps (USMC) AV-8B Remanufacturing Program (REMAN) took place from June 1994 through October 2003. The partnership, a work share arrangement, was based upon a memorandum of understanding (MOU) among Boeing Aircraft and Missiles (A&M), Naval Air Systems Command (NAVAIR) Depot (NADEP) Cherry Point, and the Defense Contract Management Agency (DCMA). Through the course of the partnership, 74 aircraft were converted from day-attack to night-attack, radar configuration aircraft. NADEP Cherry Point produced 23 modification kits per aircraft, and returned 74 remanufactured AV-8Bs (Harrier II Plus) to the Fleet. The partnership also involved substantial rewiring of the aircraft and major depot rework on the entire wing, including all the composite structures. The REMAN Harrier II Plus features are illustrated in Figure 1.

A major benefit of the partnership was the more efficient remanufacture of components and work on the aircraft's composite structure. NADEP Cherry Point provided a significant portion of the skilled labor that increased efficiency. Cherry Point also contributed management talent that forged an effective teaming arrangement, which was a key feature of this partnership.

Figure 1. Features of the Remanufactured Harrier II

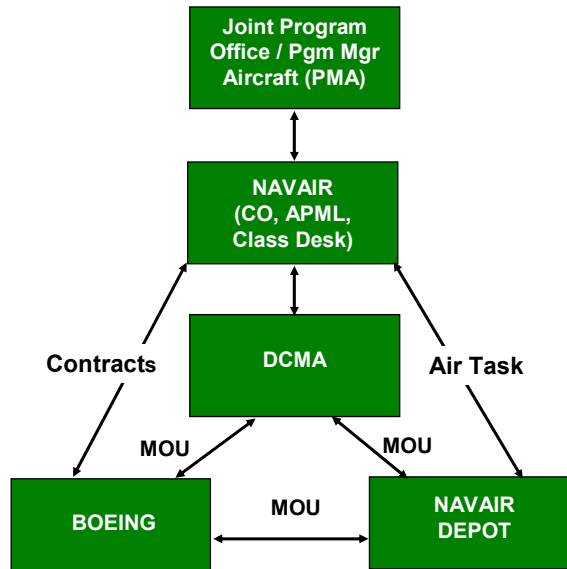


Notes: AMRAAM = advance medium-range air-to-air missile; KVA = kilo-volt-amp; LERX = leading edge root extension; NVG = night vision goggles.

The teaming arrangement was facilitated by a supportive organizational structure as depicted in Figure 2. NAVAIR established a contract with Boeing Aircraft and Missiles and an Air Task with NADEP Cherry Point. DCMA, NADEP Cherry Point and Boeing developed and worked with an MOU which defined the functions and responsibilities of each activity. This organizational structure required significant planning between private industry and the organic activities that were involved in the partnership. Plans were iterative and refined constantly.

Several organizational techniques were used to facilitate planning, including meetings and forums that focused upon specific production schedules, conditions of supply, and finite delivery schedules. These techniques fostered responsiveness among all players and keyed upon cost, schedule, and quality. Weekly status reviews kept the program on track, as did quarterly program reviews that included representatives from NADEP Cherry Point, the program office, all contractors involved in the partnership, and other government activities (such as Marine Corps Air Station Cherry Point supply activities).

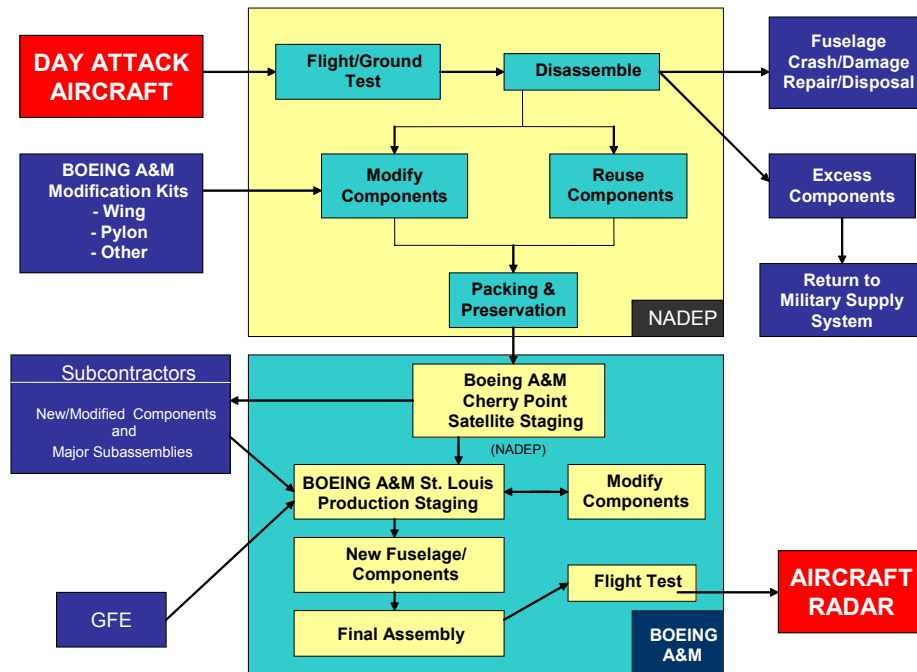
Figure 2. USMC AV-8B REMAN Program Organizational Structure



Notes: APML = Assistant Program Manager for Logistics; CO = contracting officer; DCMA = Defense Contract Management Agency; NAVAIR = Naval Air Systems Command.

The organizational structure supported a remanufacturing process that required close coordination among all organizational partners. To start the remanufacturing process, the depot inducted and disassembled Harrier II dayfighter aircraft. A total of 183 part numbers (for 205 components) were inspected and repaired if necessary and then transferred ready for use (RFU) to Boeing, which collocated a staging area at NADEP Cherry Point. An additional 43 part numbers represented 45 components that required modification (MOD) and 37 components that were made ready for issue (RFI). A total of 287 components were packaged into 23 “kits” for transfer from NADEP Cherry Point to a Boeing Aircraft and Missiles Systems (A&M) plant in St. Louis, Missouri. Each kit contained the wing assembly, horizontal stabilizer, main and nose landing gear, seat and canopy pins, radar components, and various other components. The work was performed under a multiple-year contract. Figure 3 is an overview of the remanufacture process.

Figure 3. USMC Harrier II Plus Remanufacture Process



Notes: A&M = Boeing Military Aircraft and Missile Systems Group; GFE = government-furnished equipment.

NADEP Cherry Point indicated the success of the partnership was the result of a co-equal teaming that evolved and included cooperation, planning, and process improvement. Everyone within the program played an important role, and success required input from all team members to support and improve the program. Several lessons were learned from the partnership and gleaned from the participants. These lessons may be relevant to follow-on remanufacture partnerships and include various recommendations that could help production shops maintain scheduled component deliveries:

- ◆ Monitor materiel that requires long lead-time procurement to ensure on-time receipt.
- ◆ Ensure components that are modified during remanufacture and will require government- and contractor-furnished piece parts are kitted and available for the production shop.
- ◆ Maintain bilateral communication with production shops to forestall potential problems.



# M1 ABRAMS



There are three variants of the Abrams tank in service: M1, M1A1, and M1A2.

The M1A1 modernization program increased armor protection; improved suspension; and added a nuclear, biological, and chemical (NBC) protection system that increases survivability in a contaminated environment. The M1A1D modification consists of an M1A1 with integrated “appliqué” computer and a far-target-designation capability.

The M1A2 modernization program includes a commander’s independent thermal viewer, an improved commander’s weapon station, position navigation equipment, a distributed data and power architecture, an embedded diagnostic system and improved fire control systems.

The M1A2 System Enhancement Program (SEP) adds second-generation thermal sensors and a thermal management system. The SEP upgrades current processors and memory to enable the M1A2 to use the Army’s common command and control software, enabling the rapid transfer of digital situational data and overlays.

**Partnership types:** Work share agreements, facility usage, and direct sales agreements

**Distinguishing feature:** Multiple partnerships in support of the same weapon system

The Anniston Army Depot (ANAD) employs six different partnership programs to support the M1 Abrams Tank. These partnerships exhibit examples of work share arrangements, facility usage, and direct sales agreements. The primary private-sector partners for the six arrangements are General Dynamics Land Systems (GDLS) and Honeywell. Memoranda of agreement (MOAs) and inter-service support agreements (ISSAs) or contracts frame each partnership. The program manager (PM) and the U.S. Army Tank-Automotive and Armaments Command (TACOM) directly manage the ISSAs and contracts, with TACOM directly financing the organic depot portion of the work share programs and ISSAs, and specific contractors paying on direct sales contracts.

The following summarizes the six partnerships that fall under the M1 Abrams umbrella:

1. *The M1A2 Upgrade* is a work share program. GDLS has a contract with the program manager; ANAD has been assigned a significant amount of maintenance work. ANAD disassembles the basic M1A2 vehicle and provides hulls and engines refurbished under the Partnership for Reduced Operations and Support Cost Engine (PROSE) to GDLS. GDLS converts the vehicle to the M1A2 SEP using its vendor base. The M1A2 upgrade revenue through FY04 was \$227 million to ANAD, with approximately 107 ANAD jobs attributed to the partnership.

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2. *The Gunner's Primary Sight (GPS)* partnership involves facility usage. In this arrangement, ANAD furnishes the facility through an ISSA with the program manager. GDLS manufactures the GPS for the M1A2 SEP in an ANAD-furnished facility. The manufacturing facility will convert to a maintenance facility over time, with the workforce evolving from primarily GDLS to primarily ANAD employees.
  3. *The AIM XXI* (Abrams Integrated Management for the 21st century) is a rebuild process that functions as a work share program to support sustainment of the M1A1. First year production of 45 tanks was completed in June 2000. Production is continuing at a rate of 125 tanks per year. ANAD disassembles the vehicles and overhauls their structures and components. GDLS provides material to ANAD's overhaul process and assembles and tests the vehicles. This partnership has generated \$221 million in revenue for ANAD through FY04 and supports 214 jobs at the depot. AIM XXI is a partnership that leverages the organic capability to overhaul components with the OEM's expertise in vehicle assembly.
  4. *The Recuperator* partnership arrangement is a direct sales and facility use partnership in which ANAD furnishes the facility through a contract with Honeywell. The recuperator is a heat exchanger for the Abrams tank used for warming inlet air for the engine. Honeywell manufactures plates for recuperators to support the AGT1500 engine production at ANAD. The depot also provides distribution and base operating and support (BOS) services. On-site production eliminates the need for a parts manager at ANAD, and removes the requirement for the Defense Logistics Agency (DLA) to stock and issue recuperators. The arrangement also minimizes the need for raw materiel and finished goods inventory.
  5. *The Partnership for Reduced Operating and Support Costs, Engine, (PROSE)* partnership, now known as the Total Integrated Engine Revitalization (TIGER) program, is an engine upgrade program. ANAD provides a maintenance facility through an ISSA with the program manager, and Honeywell provides parts and engineering services to support the AGT1500 engine production at ANAD. The partnership is using Lean and Six Sigma tools to develop a performance-oriented agreement with Honeywell that includes such objectives as improvement in materiel support to the ANAD overhaul line. This improvement could essentially eliminate schedule deviations caused by the unavailability of parts.
  6. *The M1A2 SEP Retrofit* partnership is a work share program. ANAD disassembles the vehicle and overhauls structures and components. GDLS provides new components and overhaul of SEP unique items; provides materiel to ANAD's overhaul process; and assembles and tests the vehicles.

The Army has seen several benefits from these partnerships, including responsive product support in the form of more reliable tanks for soldiers that cost

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less to operate. Improved business processes have also been introduced that leverage the best the public and private partners have to offer. The Army also has improved facility utilization and reduced operating and support costs as a result of these partnerships.

## B-2 ADVANCED COMPOSITES MANUFACTURE AND REPAIR



The B-2 Spirit is a multiple role bomber capable of delivering both conventional and nuclear munitions. A dramatic leap forward in technology, the bomber represents a major milestone in the U.S. bomber modernization program. Its low-observable, or “stealth,” characteristics give it the unique ability to penetrate an enemy’s most sophisticated defenses and threaten its most valued and heavily defended targets.

The revolutionary blend of low-observable technologies with high aerodynamic efficiency and large payload gives the B-2 important advantages over existing bombers. The B-2’s low observability is derived from a combination of

reduced infrared, acoustic, electromagnetic, visual, and radar signatures. These signatures make it difficult for sophisticated defensive systems to detect, track, and engage the B-2. Many aspects of the low-observability process remain classified; however, the B-2’s composite materials, special coatings, and flying-wing design all contribute to its stealth.

**Partnership type:** Partnering agreement under 10 USC 2474 authority

**Distinguishing feature:** Introduction of advanced repair technologies into the organic depot

The B-2 partnership introduced advanced repair technologies into the organic repair infrastructure and is an innovative way to acquire advanced technologies to meet future Air Force needs. The partners are Northrop Grumman Systems Corporation (NGSC) and Ogden Air Logistics Center (OO-ALC). The scope of the project includes the application of new coatings as part of the overhaul of flight control surfaces, doors and panels, as well as the manufacture of composite parts. OO-ALC has received more than \$11 million in revenue from the partnership. Total expected revenue over the life of the partnership agreement should exceed \$32 million. According to OO-ALC, the partnership has created or sustained 54 federal jobs at the depot.

The partnering agreement covers organic depot maintenance and repair for 11 different flight control surfaces and 2 radomes as well as the manufacture and repair of 413 different panels, doors, and surfaces. The depot provides process engineering and all touch labor. NGSC provides engineering services and technical assistance. The trigger event for the partnership arrangement was an investment decision. Northrop Grumman decided not to invest in its facility in Pico Rivera, California, but to partner with OO-ALC. In January 2000, Northrop Grumman’s Integrated Systems and Aerostructures (ISA) Sector and OO-ALC dedicated a newly refurbished facility to serve as the composite manufacturing and repair center for the B-2 Stealth Bomber. The broker for the partnership was the Composite Division of the Air Force Research Laboratory (AFRL).

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It took approximately one year to establish the partnership, which was initiated with a MOU between OO-ALC and NGSC, and a partnering agreement was signed in June 2003. To accommodate the B-2 work, mezzanines were built in an existing facility to maximize the available work area. Additional shifts were also added to meet the production requirements. Figure 4 shows OO-ALC artisans using the B-2 composite lay-up tooling.

*Figure 4. B-2 Composite Lay-Up Tooling*

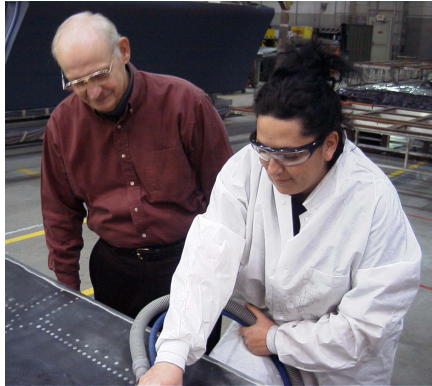


Implementation agreements are used for specific work requirements. The System Program Office (SPO) and Oklahoma City ALC are also indirectly involved in some aspects of the arrangement. The private-sector partner is paid quarterly. If disputes arise, mediation is the responsibility of the executive director of Ogden Air Logistic Center (OO-ALC/CD) and a corresponding representative from Northrop Grumman.

The partnership resulted in several specific benefits. The first involves an innovative link between process engineers and production technicians. In advanced composites, it is very useful to have the engineering support directly involved with the technicians. Six composite engineers are collocated and support all composite workloads (Figure 5). This consolidated capability is generating new business opportunities as OO-ALC is asked to support work on other weapon systems. The partnership is also realizing cost avoidance for the government by having the original manufacturer of the weapon system on-site monitoring and suggesting improvements as government employees perform the highly technical work.

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*Figure 5. On-Site Original Equipment Manufacturer Engineering Support*



The OO-ALC and NGSC team also has implemented a formal review of all B-2 composite repair processes to identify and resolve problems systemically. This approach to formal process identification, problem documentation, and resolution documentation has also provided a mechanism to link maintenance process changes to specific areas of cost avoidance.

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## F404 ENGINE COMPONENT PBL



The F404 is in service around the world, powering multiple aircraft such as the F/A- 18 Hornets of the U.S. Navy and Marine Corps and the F-117 Nighthawk fighters of the U.S. Air Force.

The performance and reliability of F404 engines have set the standard for modern fighter engines. The combat-proven F404 has accumulated millions of engine flight hours serving the U.S. Navy, Marine Corps, and Air Force, as well as allied military forces.

**Partnership type:** Partnering agreement under 10 USC 2474 authority

**Distinguishing feature:** Organic depot labor provision and engineering support

This F404 engine partnership features a public-sector depot labor provision within a performance-based logistics (PBL) arrangement. The partners in the Fleet Exchange (F/E) component availability-based project are Naval Air Systems Command (NAVAIR) Depot (NADEP) Jacksonville, General Electric Aircraft Engines (GEAE), and Naval Inventory Control Point, Philadelphia (NAVICP-P). They work within a government-industry teaming arrangement under the authority of 10 USC 2474. The estimated multiple-year value of the prime contract is greater than \$500 million. The scope of the partnership is substantial. It covers 33 critical gas path aviation repairable components associated with the F404-GE-400/402 engines that power the F/A-18 Hornet.

NADEP Jacksonville provides all program management, supervision, labor, facilities, and equipment for depot overhaul and repair of components for which the depot is the Designated Repair Point. This includes appropriate management activities from both the depot's production program management office and the business office. These groups ensure timely and economical execution of the responsibilities under a commercial services agreement (CSA) supported by a task description document.

GEAE manages the F404-GE-400/402 component PBL program with assistance from NADEP Jacksonville. The aim of the PBL program is to improve the availability and reliability of the components that comprise the engine. GEAE manages wholesale stock, transportation, and delivery of assets between a GEAE central distribution facility (CDF) and the depot. GEAE also supports efforts to continuously improve industrial operations efficiency at the depot. Additional efforts associated with this program are Lean and Six Sigma training of personnel and a fully engaged team that works closely with the depot's Air Speed initiatives.

The partnership arrangement's genesis was in 2001, when an F404 Time-On-Wing integrated product team evaluated various methods of increasing reliability and availability of certain engine products to the warfighter. The IPT considered an availability-based PBL as one alternative. The foundation document was a business plan that GEAE and NADEP Jacksonville had developed over 6 months in the late 1990s. Once all parties focused on the F404 components, the mechanics of

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the agreement took about 12 months to put in place. From the perspective of the depot and GEAE, a previous business plan for the F414 actually helped form the relationship. NAVICP, as the prime contractor, justified the arrangement and identified the metrics for all parties through a business case analysis.

A proprietary information agreement was put in place as a critical tool to allow both parties to exchange information and develop their respective business cases. A commercial services agreement, with an attached task description document, serves as the foundation of the GEAE–NADEP Jacksonville relationship for each workload. The basic business plan, while unsigned, remains the cornerstone of all operations of this type between the two partners.

In the arrangement, GEAE pays the depot for the labor associated with the agreement. Labor funding is provided quarterly in accordance with Defense Finance and Accounting Service (DFAS) “third-party” financial rules and regulations. Incremental funding is allowed and is part of the funding mechanism. Both General Electric and NADEP Jacksonville are committed to preventing disputes during the performance of this agreement. Both parties agree it is best to settle all controversies through direct negotiations between representatives acting for each party. However, the CSA contains specific alternatives each partner may pursue in the event mediation might be required. After more than one year into execution, there have been no disputes that have not been handled in-house.

Reported benefits of the partnership include responsive product support and materiel delivery from the contractor and improved NADEP Jacksonville business processes. Partnerships of this type, which are associated with a PBL arrangement, are improving workload forecasts because they often map to various business processes (financial, production control, workload scheduling, etc.) that were part of the development of the supporting agreement.

In this case, these business improvements have contributed to other business elements, including improved facility utilization and the reduction of fleet backorders. For example, when the partnership was initiated (July 2003), there were more than 700 backorders. Today, the number of backorders is negligible, and vital shelf stock at the intermediate levels is increasing. Also, greatly improved forecasting, scheduling, and material availability for shops dedicated to the Lean methodology have reduced turn-around time and significantly improved war-fighter support for the engine.

Perhaps the greatest benefit of the partnership has been in cost avoidance. The estimated 5-year reduction in aviation depot-level reparable charges is approximately \$79 million. The FY05 reduction alone is greater than \$19 million. These savings to the type commanders are manifested in reduced Navy Working Capital fund recovery charges to the Fleet.

Additional innovation from this partnership has been identified. One example includes the development of the work order parts request (WOPR) process. As the



partnership matured, the partners recognized they needed an electronic notification sent to General Electric when material was required. Working closely with GEAE, the depot's information technology personnel developed a software interface, called the WOPR, within the depot's Materiel Requirements Planning System II (MRPII) system. The software alerts the GE CDF of a material requirement the moment an artisan enters requirements into the MRPII check sheet. It has been so successful, the depot now uses it for all its partnerships, with a wide variety of original equipment manufacturer partners. Figure 6 depicts the GEAE engine staging area for delivery to NADEP Jacksonville.

*Figure 6. F404 Staging Area for Delivery to Jacksonville*



The partners have identified other “spill over” effects that benefit workloads beyond the partnership. Because NADEP Jacksonville has similar workloads that are outside the bounds of this agreement but share resources such as machine shops, plating shops, cleaning, and nondestructive inspection shops, the improvements in throughput generated by this partnership have benefited other workloads. The depot reports a positive effect on workforce attitudes from the mechanics and engineers that come in contact with this partnership. Although not quantifiable, “success breeds success,” and the partnership has enhanced a “can do” attitude within the NADEP Jacksonville’s engine facility.

## C-17 DEPOT ACTIVATION



The C-17 Globemaster III is the newest, most flexible cargo aircraft to enter the airlift force. The C-17 is capable of rapid strategic delivery of troops and all types of cargo to main operating bases or directly to forward bases in the deployment area. The aircraft is also capable of performing tactical airlift and airdrop missions when required.

The inherent flexibility and performance of the C-17 force improves the ability of the total airlift system to fulfill the worldwide air mobility requirements of the United States.

High levels of reliability and maintainability are two outstanding characteristics of the C-17 system.

Operational requirements include an aircraft mission completion success probability rate of 92 percent, only 20 aircraft maintenance man-hours per flying hour, and full and partial mission availability rates of 74.7 and 82.5 percent, respectively. The Boeing warranty ensures these figures are met.

**Partnership types:** Direct sales partnering agreement and PBL arrangements

**Distinguishing feature:** Partnership is part of a total system support responsibility PBL arrangement

The C-17 weapon system originally was planned for organic sustainment. After the 1995 Base Closure and Realignment Commission (known as BRAC) decisions, the sustainment philosophy changed to contractor logistics support (CLS). Congress directed the U.S. Air Force to develop organic core logistics capabilities for the C-17 in accordance with 10 USC 2464. Long-term sustainment is now a mix of organic support and CLS. The Depot Maintenance Activation Working Group was chartered to develop and coordinate C-17 organic depot activation strategies, requirements, plans, and implementation of C-17 depot maintenance capability at the three U.S. Air Force air logistics centers (ALCs). Most of the C-17 partnering activities are contained within the \$4.9 billion Globemaster Sustainment Partnership (GSP) with Boeing. Some partnering activities are accomplished through direct relationships with subcontractors using Depot Maintenance Activity Group (DMAG) funds.

Under the GSP, several features of the Air Force–Boeing relationship leverage the strengths of the ALCs and use Boeing expertise. The ALCs are hired as subcontractors to Boeing under Direct Sales Partnering Agreements (DSPAs). Boeing and the ALCs execute agreements for each core workload upon certification of repair capability. The performance of each ALC is compared to other commercial vendors through performance-based metrics; and the ALCs must provide comparable performance to retain their workload.

The DSPAs are the primary partnering vehicles. Boeing has Total System Support Responsibility (TSSR) and the Air Force is responsible for operational safety, suitability, and effectiveness. Depots provide facilities and manpower, and Boeing

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provides investment funds, technical data, and training. The DSPA is referenced in a clause within the TSSR contract.

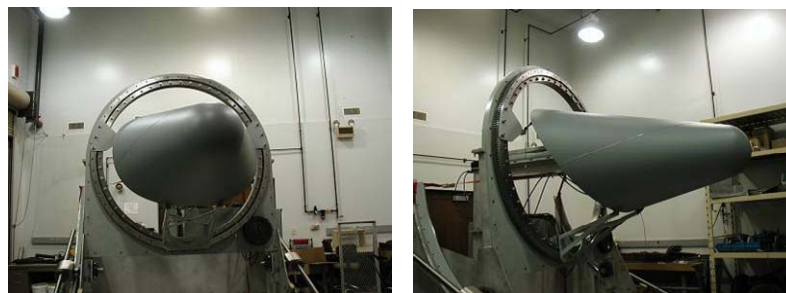
There is a single DSPA between Boeing and Air Force Materiel Command with separate agreements for each category of workload—each ALC will have an agreement under the DSPA for its particular workload. Each major workload package (e.g., landing gear) has an individual agreement under the blanket DSPA. These agreements guarantee a certain price and delivery for each particular workload. Boeing relies upon this price-delivery guarantee (as the TSSR prime) to meet its performance metrics.

Each partnership uses a variety of relationships to forge a single team of repair facilities that support Boeing’s delivery of sustainment capability. The ALCs are qualified by Boeing as sources of repair, and each ALC competes for work with other sources of repair. Boeing retains the TSSR role, and the roles of the ALCs are similar to those of commercial sources of repair. Work is inspected and approved by Boeing before it is returned to service because Boeing is contractually accountable to the program manager, without regard to subcontractor or ALC relationship.

Each ALC has made progress in C-17 depot support activation.

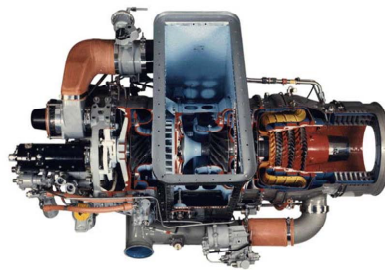
- ◆ Oklahoma City is developing five instrument test program sets (TPSs) and a fuel accessory testing project, which will support 11 line replaceable units (LRUs). OC-ALC also has established an integrated drive generator project that includes an LRU and 13 shop replaceable units (SRUs) for which Boeing and Oklahoma City provide a full maintenance capability.
- ◆ Warner Robins has been qualified as the repair facility for main landing gear doors, and has been granted Boeing’s Gold Level Preferred Supplier Certification (PSC) as a source of repair. The ALC is also developing repair capability for the forward and aft radomes in which repair tooling will be designed and manufactured at Warner Robins. Figure 7 shows the C-17 forward and aft radomes that are supported by Warner Robins.

*Figure 7. C-17 Forward and Aft Radomes*



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- ◆ Ogden has worked to establish depot repair capability for instruments and displays. It employs an extensive array of automatic test equipment and is pursuing either optics bench or test program set development for a low voltage power supply and four circuit card assemblies that are part of the of heads up display for the aircraft. Ogden also has been qualified as a repair facility for the C-17's onboard inert gas generating system heat exchanger and is undergoing prototype verifications. Figure 8 is a picture of the C-17 auxiliary power unit, one of the items repaired at Ogden under the partnership arrangement.

*Figure 8. C-17 Auxiliary Power Unit  
GTCP331-250G P/N 381354-1*



The C-17 Depot Maintenance Activation Working Group began evaluating the merits of direct relationships with vendors and subcontractors for recurring C-17 organic workload as a solution to proprietary data problems. Some vendors were unwilling to share data with Boeing but were willing to share it with the government. In FY04, the working group actively pursued PBL relationships with subcontractors. The ALCs and vendors are currently exploring PBL relationships, and Boeing has entered into three long-term PBL contracts with its vendors (four additional PBLs are being evaluated). The ALCs are targeting their involvement in PBL relationships at the subsystem level (including brakes, instruments, and APUs) rather than at the system level.

# COMMON GROUND STATION PRODUCT SUPPORT INTEGRATION



The Common Ground Station (CGS) is a real-time, multiple-sensor command, control, communications, computers, and intelligence (C4I) system that represents one of the most advanced C4I systems ever developed. The CGS provides operator-friendly capabilities to support

- ◆ real-time surveillance,
- ◆ reconnaissance,
- ◆ situation awareness,
- ◆ target development,
- ◆ theater missile defense, and
- ◆ battlefield visualization.

**Partnership type:** Work share agreement

**Distinguishing feature:** Organic product support integrator

This partnership features an organic product support integrator. The integrator's role is in its early stages of development. The partners are the Tobyhanna Army Depot (TYAD) Program Management Office, the U.S. Army Communications–Electronics Life Cycle Management Command's (CE-LCMC's) Logistics Readiness Center and Software Engineering Center, the Defense Logistics Agency, and General Dynamics Decision Systems, the original equipment manufacturer (OEM). All the projects involve weapon system sustainment. A teaming agreement between TYAD and the OEM is a modification project, which is part of an overall sustainment effort. The authority for the partnership is 10 USC 2208j for the teaming agreement.

The partnership generates approximately \$42 million annually and is defined by product support integration and product support provider agreements.

Other systems, including the Common Ground Station (CGS), Joint Tactical Terminal, Commander's Tactical Terminal, Ground Data Terminal, and Joint Services Workstation are all supported by the partnership.

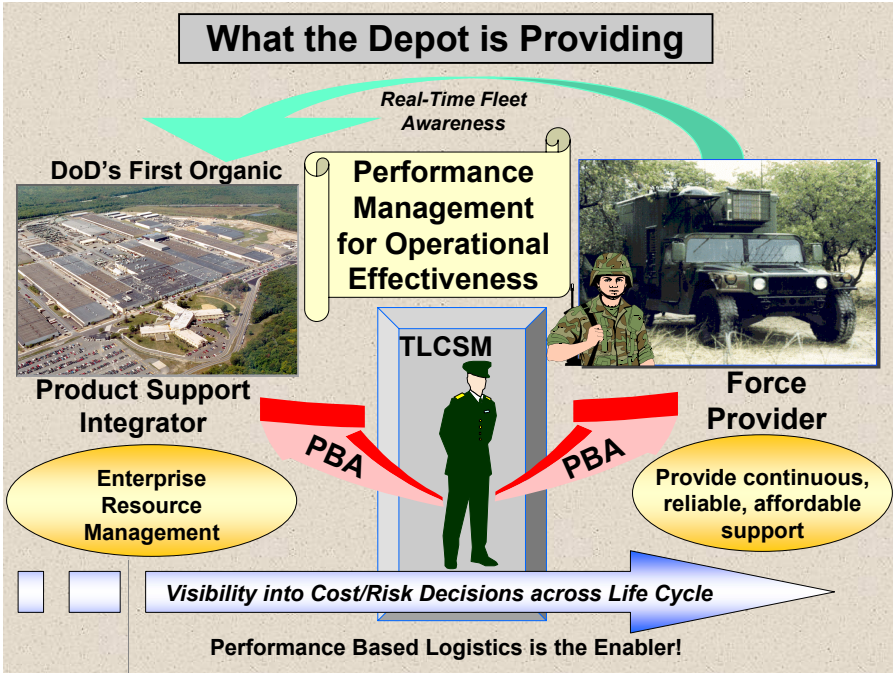
- ◆ The TYAD CGS Program Management Office has overall program responsibility for the sustainment of the CGS fleet.
- ◆ TYAD provides depot support (starting in FY06).
- ◆ TYAD provides ongoing system modifications (in partnership with the OEM) as well as forward support world-wide.



General Dynamics Decision Systems is providing non-recurring engineering, system modification, and project management. The triggering event for the partnership was a best value analysis that compared contract logistics support (CLS) to organic support. The broker for the partnership is the Product Manager of Common Ground Station and Data Links at CE-LCMC. It took more than one year to put the partnership in place. The CGS program is one of the first organic product support integration efforts within DOD. Performance-based agreements define the partnership's operation.

The C4ISR Program Executive Officer (PEO), who also serves as Commander of CE-LCMC, is directly involved with the PBA. Program Office funds are budgeted through existing Army funding lines. The OEM pays TYAD for modification projects. Dispute management and modifications are handled through the Product Manager (he holds the contract with the OEM). Figure 9 provides an overview of the Common Ground Station support concept, with a focus upon the organic depot's contribution.

Figure 9. Overview of the Common Ground Station Support Concept



Note: PBA = Performance-Based Agreement.

An article from *Inside the Army* during Operation Iraqi Freedom (OIF) noted that CGS achieved a 99 percent operational availability. The success of the processes used in support of this program resulted in the CGS program being one of six programs noted in the DoD Product Support Guide as a performance based logistics (PBL) success. Based upon historical data associated with the management of the program, recent TYAD program management costs are well below what the acquisition product manager had been spending on the system (Table 1).

Table 1. Cost Comparison

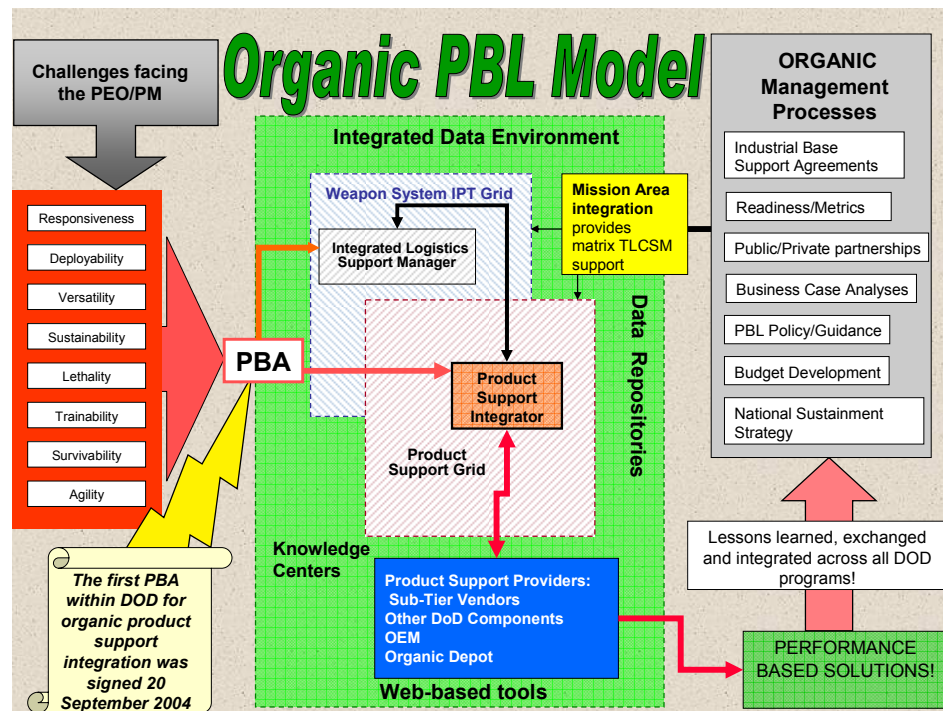
	PM Office Budget	TYAD PMO Office Budget
FY03	\$2,566,958	\$394,383
FY04	\$2,084,931	\$685,050
FY05	\$668,433	\$699,584
FY06	\$0	\$734,563
Average per year	\$1,773,441	\$628,395

Note: Cost substantiation is based on program management (PM) costs and man-power taken from CGS Termination Plan, 6 April 2004, approved 13 April 04.

Lessons learned from the partnership include the importance of giving control of system implementation changes to those responsible for performance and improvement and designing systems to measure program performance. The program also has used measurements to promote improvement, not to identify or penalize poor performers. In addition, it is important to train managers in quantitative methods to acquaint them with how they relate to customer requirements.

While this partnership is in the first stages of development, the Army is beginning to build a notional model for organic PBL management (Figure 10).

Figure 10. Organic PBL Model for the Common Ground Station



Note: TLCSM = Total Life Cycle systems Management.