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FOREIGN MILITARY SALES (FMS)

PRODUCT SUPPORT

MANUAL (PSM)

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PREFACE

The purpose of the Foreign Military Sales (FMS) Product Support Manual (PSM) is to provide a reference document for international customers that are planning to purchase an “off-the-shelf” weapon system under either an FMS case or Direct Commercial Sales (DCS). The title, “Product Support Manual”, was chosen in lieu of the previous title (Integrated Logistics Support Acquisition Manual (ILSAM)) because Department of Defense (DoD) 5000.2 Series, no longer specifically refers to the term "Integrated Logistics Support (ILS)." The change in terminology from ILS to Product Support (PS) was intentional. While the "integration of logistics support" is still the ultimate objective of PS activities, the terminology is not used partly as a signal that this is not "business as usual". In the past, programs tended to treat ILS activities in parallel to the system design activities rather than as an integral part. PS is intentionally included as a sub-element of Systems Engineering to convey the message that PS activities are design related. In other words, designing the system for support and designing the support system is where the biggest life-cycle cost savings can be achieved[1].

While the PSM was developed for customers that are purchasing U.S. Navy (USN) aviation weapon systems, the principals apply to the purchase of ship systems as well as the other Service-managed systems. The PSM was tailored primarily for use by foreign logistics managers but it’s considered an excellent tool for any DoD Program Manager (PM) assigned as a life-cycle manager and responsible for cost effective and responsive acquisition of weapon systems for an international customer. Moreover, as discussed later in the PSM, DoD PMs may significantly impact FMS customer follow-on support because they are now also are now tasked by DoD as the primary manager and single point of accountability for sustainment of the weapon system throughout its life-cycle and as such, they may opt for commercial follow-on support under a performance-based contract. A PM acting as the as the life-cycle manager is designated by DoD as the Total Life-Cycle System Manager (TLSCM)[2]. The impact on the FMS customer would be a dramatic departure from traditional FMS follow-on support that relied primarily on the DoD logistics system.

The PSM discusses two concepts under which the USN would provide life-cycle logistics support to FMS customers. Both would be offered under an FMS case structure. They are:

- **Traditional FMS Logistics Concepts** - Acquisition and fielding of organizational level (O) and intermediate levels (I) of maintenance capabilities are offered to the FMS customer through the initial support FMS case managed by the PM; sustainment provided by the DoD supply system through follow-on supply support FMS cases that are managed by Naval Inventory Control Point (NAVICP) (e.g. Direct Requisitioning Procedures (DRP), Repairable Item Replacement Option (RIRO) and Repair of Repairables (ROR)) and technical support FMS cases managed by the PM
- **TLSCM Program Management** - Acquisition and fielding of O/I-levels of maintenance capabilities are offered to the FMS customer by the PM through the aforementioned traditional FMS support concepts; but an interim support structure - similar to NAVAIR’s

[1] NAVAIR FMS APML Handbook, dated January, 2003

[2] DoD Guide titled Designing and Assessing Supportability in DoD Weapon Systems, February, 2003

domestic interim support system - would function for 5-7 years after aircraft begin operations in-country under a hybrid support concept consisting of:

1. The DoD supply system as discussed above for: O/I-level piece part support, RIRO as requested by the FMS customer, and ROR management for repairables not included in the performance-based contract discussed below.

2. A commercial network of in-country and U.S.-based vendors working under a performance-based contract between the Government and a product support integrator (PSI) focused on selective repairables that historically cause management problems for new customers. Services would include: inventory management via an in-country bond room, supply chain management, repair contracting, and augmentation of DoD support to the O/I-level support if required.

3. Traditional technical support services would be offered through the initial FMS case managed by the PM.

The PSM encompasses "off-the-shelf" weapon system procurements regardless of whether the weapon system is delivered new from production or purchased from excess U.S. Government (USG) inventories. Logistics support of weapon systems that are phasing out or have phased out of the active USN inventory is contained in Section 9.

At critical points in the PSM, a character - ☑ - is inserted to highlight a particular area where emphasis is needed.

The PSM does not address all aspects of procuring/executing PS. Rather, it focuses on selected logistics processes that impact Operation and Support (O&S) costs which are estimated to comprise above 75 % of a weapon system Life Cycle Cost (LCC) if the weapons system is purchased "Off-the-Shelf". O&S costs consists of all costs incurred by a user to field and sustain a weapon system including personnel, spare and repair parts, fuel, transportation and maintenance. O&S costs are a sub-set of a weapon system's overall LCC that begins with the Research and Development (R&D) phase of a weapon system's development and ends with the disposal phase. For example, the document assists a life-cycle manager to do the following:

- Develop a logistics strategic plan
- Develop cost and readiness goals that flow from an overall logistics strategy
- Independently validate a potential supplier's offer and forecast O&S cost
- Develop procurement strategy to reduce cost and mandate desired configuration
- Monitor the status of a supplier's procurement and delivery system on a sub-system basis
- Streamline supply chain management
- Establish performance metrics keyed to warfighter requirements
- Adopt alternatives to poor supply system/supplier performance
- Solve obsolescence problems through participation in cooperative programs and the sharing of common information through user organizations

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BACKGROUND

1.0 BACKGROUND

Total Life Cycle Systems Management

"As to government expenditures, those due to broken-down chariots, worn-out horses, armor and helmets, arrows and crossbows, lances, hand and body shields, draft animals and supply wagons will amount to 60 percent of the total."

Sun Tzu, *The Art of War* (6TH Century B.C.)

1.1 LIFE CYCLE COST (LCC)

Management responsibility for the full life cycle of a weapon system is important because of the historic cost of sustainment (see above) and the influence of system design upon the LCC. Over 80% of the LCC of a weapon system are determined during the early development of the system concept and design. Figure 1-1 below provides a graphic representation of this concept as it relates to United States Navy surface combatants, but the data applies to aviation weapon systems as well.

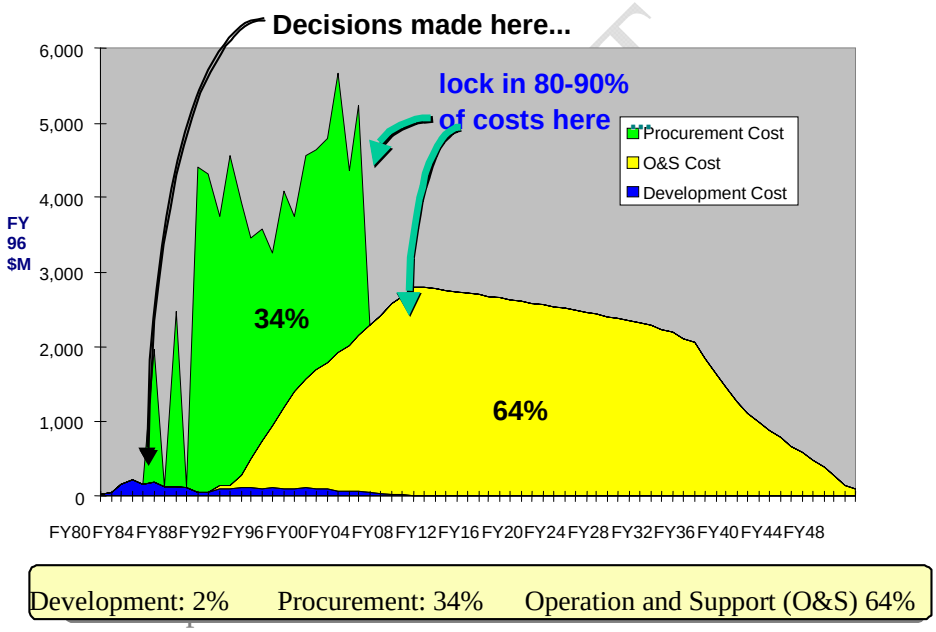


Figure 1-1 U.S. Navy Surface Combatant Life Cycle Costs

1.2 TOTAL LIFE CYCLE SYSTEM MANAGEMENT (TLSCM)

Until relatively recently, the United States DoD only held their weapon system PMs responsible for acquisition costs and schedule. Since the program manager's incentive system was predicated on these two parameters, they had little incentive to make the investments that would reduce the systems full life cycle costs. DoD policy now states: "The PM [Program Manager] shall be the single point of accountability for accomplishing program objectives for total life-cycle systems management, including sustainment. … PMs shall consider supportability, life cycle costs, performance, and schedule comparable in making program decisions. Planning for Operation and Support and the estimation of total ownership costs shall begin as early as possible. Supportability, a key component of

performance, shall be considered throughout the system life cycle." (DoD Directive (DoDD) 5000.1, *The Defense Acquisition System*, May 12, 2003, para. E1.1.29.) Under TLCSM, the PM is responsible for the development and documentation of an acquisition strategy to guide program execution from program initiation through reprocurement of systems, subsystems, components, spares, and services beyond the initial production contract award, during post-production support, and through retirement. PMs pursue two primary objectives. First, the weapons system should be designed, maintained, and modified to continuously reduce the demand for logistics. Second, logistics support must be effective and efficient. The resources required to provide product support must be minimized while meeting warfighter needs. As a product support strategy, PBL serves to balance and integrate the support activities necessary to meet these two objectives[3].

This new approach is depicted below in the following DUSD Logistics and Material Readiness (LM&R) graphic (Figure 1-2)

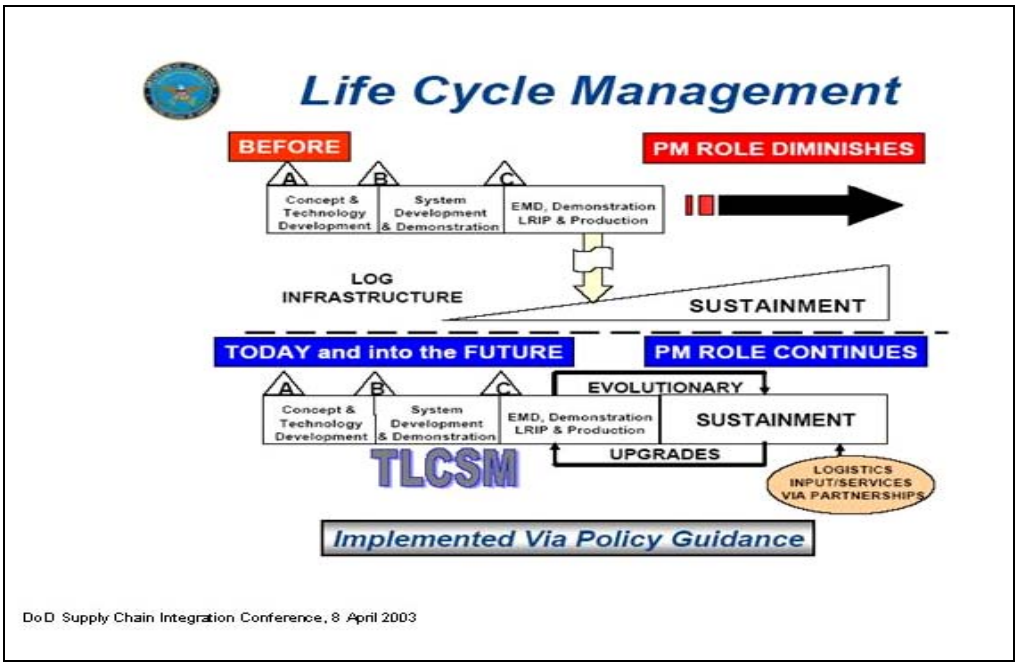


Figure 1-2 Total Life Cycle Systems Management (TLSCM)

1.2.1 IMPACT OF TLSCM ON FMS CUSTOMERS

Both current and future FMS customers will experience changes in USG support stemming from the new DoD System Acquisition/Life Cycle Model. The impact on current and future FMS customers is discussed separately below:

1.2.1.1 IMPACT OF TLSCM ON EXISTING FMS CUSTOMERS

As stated above, performance-based strategies apply to new procurements, major modifications, upgrades, and reprocurement. Thus, PMs will review on-going programs and compare current DoD sustainment strategy to available commercial alternatives (including Government/industry partnerships) and select the most responsive and cost effective alternative. This could mean shifting to a commercial

[3] Performance Based Logistics, A Program Manager's Guide to Product Support, dated March 2005

Depot Level (D) maintenance strategy and abandonment of an existing USN organic maintenance capability depending on each program's requirements. FMS customers would be encouraged to align their maintenance strategy to the new USN paradigm. However, provisions are being developed by the USN to continue supporting those USN FMS customers that desire to retain existing in-country maintenance capability provided under traditional FMS case support and discussed under Section 4.6.1.3.2.

1.2.1.2 IMPACT OF TLSCM ON NEW FMS CUSTOMERS

A performance-based USN sustainment strategy would be envisioned/in-place and working when a Price and Availability (P&A) is offered to a potential new FMS customer. As a result, international customers that are considering the purchase of a USN aviation weapon system should have the benefit of the full array of USN maintenance planning documentation and sustainment strategy when considering the purchase of the new weapon system.

1.2.1.3 TAILORED MAINTENANCE STRATEGY

International customers often want to deviate from the USN maintenance strategy to achieve in-country self sufficiency goals. With a few exceptions keyed to technology transfer issues, FMS policy normally permits the USN to offer the applicable USN maintenance capability (i.e., spares, SE, technical manuals) to an FMS customer at the O/I/D-levels of maintenance. However, under TLSCM, the PM may elect not to procure USN I-level maintenance capability and rely instead solely on depot maintenance that would be delivered under a long-term, performance-based contract[4]. ☑ Should the latter be the case, international customers would be required to buy I/D-level maintenance capability on a "stand alone" basis that would be costly and very difficult to sustain.

There are opportunities during the procurement process of an "off the shelf" weapon system for the international customer PM to apply their own TLSCM-like principles by selecting an alternative configuration for their new weapon system that better fits their life-cycle model. For example, faced with a decision between two UHF radios, full life cycle considerations may sway an international PM to procure the more expensive radio if it could be shown that its full life-cycle cost was lower than the alternative based upon greater reliability and/or maintainability after the weapon system has been initially fielded. Also, there are smart business decisions that will impact the O&S cost segment of LCC. Examples of initial and follow-on support options that might lower O&S cost include the following:

- Adopting a phased, in-country self-sufficiency strategy, during the introduction of a weapon system that minimizes the investment in initial spare and repair parts (S&RP), support equipment, training, etc.
- Adopting supply chain management solutions that streamline the logistics pipeline and reduce repair turnaround time and customer wait time
- Using an existing DoD or commercially available optimization model to tradeoff readiness versus cost when selecting spare and repair parts for initial support of a new weapon system

1.3 NEW DIRECTION IN USN PRODUCT SUPPORT

1.3.1 PRODUCT SUPPORT DEFINED

[4] Paragraph 3.9 in OSD "Designing and Assessing Supportability in DoD Weapon Systems", dated Oct_93

The following definition is paraphrased from the Introduction to the document footnoted below[5] ”Product support is a package of logistics support functions necessary to maintain the readiness and operational capability of a system. Supportability factors are integral elements of program performance specifications. However, Product support requirements are not to be stated as distinct logistics elements, but instead as performance requirements that relate to a system's operational effectiveness, operational suitability, and life-cycle cost reduction. Product Support acquisition activities normally encompass functions such as maintenance planning, supply support, support equipment, technical manuals) that were previously addressed as ILS Elements, Logistics Elements, etc.

1.3.1.1 PRODUCT SUPPORT CHARACTERISTICS

The product support environment envisioned in the DoD 5000-series regulations is characterized by the following attributes:

- *Warfighter relationships that are based on performance outcomes (such as flying hours or the mission availability of equipment)*
- *Integrated supply chains across government and industry that focus on system readiness and warfighter support and are responsive to the unique requirements of the military services*
- *Best-value providers selected from government, industry, or government/ industry partnerships*
- *A support environment that maintains long-term competitive pressures on government and industry providers*
- *Secure, integrated information systems across industry and government that enable comprehensive supply chain integration and full asset visibility*
- *Continuous improvement of weapon system supportability and reduction in operating costs by dedicated investments*
- *Effective integration of weapon system support that is transparent to the warfighter and provides total combat logistics capability*
- *An overarching approach to delivering the attributes above is to select a product support integrator. An integrator serves to manage the product support of a weapon system or subsystem. DoD 5000.2-R states… The PM may select a product support integrator from the DoD or private sector. Activities coordinated by support integrators can include, as appropriate, functions provided by organic organizations, private sector providers, or a partnership between organic and private sector providers.*

1.3.2 PRODUCT SUPPORT—DELIVERING A CAPABILITY TO THE WARFIGHTER

“The DoD 5000 series of acquisition policy regulations calls for the integration of acquisition and logistics to form a product support process that gives warfighter the capability to carry out their mission. DoD has elevated priority on the performance for weapon system life cycle support to bring higher levels of system readiness through integrated system management and direct accountability.

To achieve logistics excellence, DoD is streamlining the infrastructure. It is reducing customer wait times by integrating weapon system supply chains internally in the Department and externally with commercial logistics systems. The emphasis is shifting from the performance of individual stovepipe

[5] NAVAIR FMS APML Handbook, dated January, 2003

functions (e.g., procurement; supply; transportation) to harmonizing the functions to improve weapon system readiness. Competitive sourcing is being applied to select the best-value providers from government, industry, or public-private partnerships. Product support is the major acquisition logistics strategy for delivering a performance capability to the joint warfighter."

Paragraph 4.6.2 describes a Product Support Strategy that would bring about more contractor and/or Government logistician interface with the FMS customer warfighter than currently happens under the traditional FMS system. The increased interface could lead to a performance-based product support strategy that would be more responsive to the FMS customer warfighter and ultimately assist the FMS customer in lowering life-cycle cost.

1.3.2.1 PRODUCT SUPPORT BOUNDARIES (PSB)[6]

The PSB consolidates into a single document recommended approaches to sustainment with associated policy and standards for key support areas. It was developed to guide PMs and their sustainment staffs in pursuit of more effective ways to support new and current weapon systems.

[6] DUSD AT&L Memo dated 23 September 2004, "Product Support Boundaries (PSB)"

LOGISTICS STRATEGIC PLANNING

2.0 LOGISTICS STRATEGIC PLANNING

2.1 WHY LOGISTICS STRATEGIC PLANNING IS IMPORTANT

Before embarking on a new weapon system procurement it is important for an international customer to develop a well-considered logistics strategic plan that frames the ultimate ILS system envisioned. Changes or new initiatives undertaken without the coordinated frame of reference provided by a logistics strategic plan can result in wasted resources and efforts, conflicting priorities and a lack of coordination among customer and supplier logistics planners. For example, an industrial strategy would flow from logistics strategic planning. Without a published industrial strategy, international customer working level logistics planners are not empowered to deviate from the USN maintenance plan. Thus, resources may be invested in a strategy that could ultimately increase life cycle costs and undermine the national industrial strategy.

A good example of such a top-level plan is the US DoD Logistics Strategic Plan titled *21st Century Logistics.* This plan, which had its origins in *Joint Vision 2010* and its concept of "Focused Logistics", is a natural complement to the United States National Security Strategy and National Military Strategy. It builds upon the initiatives and concepts promulgated by the *Defense Reform Initiative* and *Quadrennial Defense Review*. This strategic plan provides DoD's vision of an information based logistics system that provides efficient and effective support to the "Warfighter" in the 21st century. The critical success indicators of this system are logistics objectives and performance measures. The individual Services are tasked with developing "corresponding implementation strategies." The objective of this plan and its supporting Service logistics plans is to provide clear guidance to all involved in the planning and implementation of logistics plans and processes.

Once a logistics strategic plan is clearly developed, published and distributed to all levels, it will effectively cause enterprise-wide change and consolidation, or improvement in logistics infrastructure, organization and processes. It also enables program managers responsible for major acquisitions to develop an ILS strategy that will fit into the overall country logistics strategy and permit potential suppliers to tailor their offer to a realistic support scenario. Equally important, it will flow down to logistics managers responsible for fielding new weapon systems and empower them to develop and approve at the working level, a logistics support strategy consistent with national policy.

2.2 LESSONS LEARNED FROM DOD PLANNING EFFORTS

- The following are some lessons learned from strategic planning efforts conducted by US DoD and industry:
- Success can only be achieved if there is a commitment from senior leadership for change, and resources and empowerment of the designated Strategic Planner and staff. The Strategic Planner and team must be a "top notch" team that has the ability to work with leadership and is empowered by leadership.
- The logistics process owner should be at the top level of the organization (Senior Logistics official). Clear, consistent, and visible involvement of the senior leadership in the creation of the strategic plan is a hallmark of the best organizations.
- The planning process needs to be top down, led by senior officials and pushed down until it flows through the entire organization. Implementation is bottom up. Units at the business level are responsible for carrying out the plans and achieving the desired goals.

- Effective internal communication is key to successful strategic planning. Internal communication is the linkage between planning and practice. Leadership's strategy must be clearly understood at all levels of the organization.
- Planning is a continuous process. While plans are developed on a regular basis, it is the process of planning that is most important. New information from all sources is continually factored into the process. The logistics strategic plan is less a product of a particular point in time and more an operationally useful document.
- Logistics strategic planning membership is addressed in a number of ways: a centralized or core group in the headquarters decentralized planning at the business unit level, and occasionally outside consultants to assist in development and execution of the organization's strategic plan.
- Strategic planning horizons vary: three years on the short end and up to 20 years for some far-reaching plans. Since the accuracy of the forecast deteriorates rapidly with time, a return on investment for long range planning is small except in the case of large organizations with complex processes and very-long term programs. Regardless of the strategic planning horizon, business plans are generally developed for one to two-year periods.
- The process of logistic planning drives the budget process for new weapon systems.
- The critical success factor for any logistics strategic plan is that the plan must be relevant to the operation of the enterprise; it must have utility for the managers and leaders responsible for daily operations. The logistics strategic plan and planning process must be used to drive agency operations and align support functions. Everything else is of secondary importance.

2.3 KEY LOGISTICS PLANNING ISSUES

- Key logistics planning issues and questions that must be addressed in logistics strategic plan and included in documentation provided to potential suppliers of new weapon systems:
- What is more important – self-sufficiency, readiness, or efficiency (cost reduction)?
- Should selected sub- systems within a weapon system be logistically supported to a greater degree to meet operational requirements? If so, what are the systems and to what degree should they be supported (i.e. additional funding).
- How will forces be deployed, employed, and supported?
- What logistics metrics (e.g. readiness goals, customer wait time) will be used to measure the effectiveness of the logistics system?
- Describe the logistics planning process to include any strategic plans, performance management systems, and metrics for management of the acquisition and logistics process.
- What organic or commercial depot maintenance capability should be planned for when facilitizing in-country self-sufficiency?
- What is the schedule for achieving in-country self-sufficiency?
- What is the long-range vision for logistics? For example, joint or unitary?
- Describe your methodology for computing initial support. For example:
- What assumptions underlie spare parts calculations, for example, order/ship time, repair turnaround time (intermediate level/depot level), operating hours?
- To what extent do you validate contractor or USG recommendations?

- Is a model used to compute initial support levels? Do you use optimization in calculating initial support levels? Does the model have the capability to trade-off expedited transportation and parts lay in versus reduced spares pipeline?
- Are operating units provided an initial outfitting? How many months of support does this level represent?

PLANNING FOR THE ACQUISITION OF LOGISTICS

3.0 PLANNING FOR THE ACQUISITION OF LOGISTICS

3.1.1 AUTHORITY AND METHODOLOGY

International customers typically buy "off-the-shelf USN weapon systems. However, the international customer PM requires an understanding of the USG acquisition decision process so that he/she may field the many questions posed by his/her chain of command during their decision making process. DoD Directives 5000.1 and 5000.2 series documents are the current overarching directives for DoD weapon system acquisition. An excellent source of information on the evolving DoD acquisition system is available at the following web-site: http://dod5000.dau.mil/index.htm . It provides the latest documentation and a summary of changes to DoD Acquisition System Policy.

While the DoD acquisition roadmap is changing, many of the tools traditionally used by DoD managers to develop supportability concepts will remain a part of the acquisition process. We therefore highlight selected traditional concepts in this section that will assist the potential FMS customer understand the origin of logistics data and maintenance planning documentation that they will be exposed to when dealing with USN logistics managers. ☑ A detailed discussion of DoD acquisition process from a logistician's perspective is contained in the NAVAIR "Assistant Program Manger for Logistics (APML) Handbook", that is currently available in CD-ROM format or at the following web-site: http://logistics.navair.navy.mil/training/library/webhandbook/apmlwelcome.htm

3.1.2 ACQUISTION LOGISTICS IN LIEU OF ILS

DoD acquisition policy directives no longer specifically refer to the term ILS. "The change in terminology from ILS to Acquisition Logistics is intentional. While the "integration of logistics support" is still the ultimate objective of Acquisition Logistics activities, the terminology is no longer used partly as a signal that this is not "business as usual". In the past, programs tended to treat ILS activities in parallel to the system design activities rather than as an integral part. Acquisition Logistics is intentionally included as a sub-element of Systems Engineering to convey the message that 2/3 of the Acquisition Logistics activities are design related, i.e., designing the system for support and designing the support system is where the biggest life-cycle cost savings can be achieved."[7]

3.1.3 DoD 5000.2-R

Section 3.9.2.6 of DoD 5000.2-R discusses sustainment as follows:

3.9.2.1. *Sustainment includes supply, maintenance, transportation, sustaining engineering, data management, configuration management, manpower, personnel, training, habitability, survivability, environment, safety (including explosives safety), occupational health, protection of critical program information, anti-tamper provisions, and information technology (IT), including National Security Systems (NSS), supportability and interoperability functions.*

3.9.2.2. *Effective sustainment of weapon systems begins with the design and development of reliable and maintainable systems through the continuous application of a robust systems engineering methodology. As a part of this process, the PM shall employ human factors engineering to design systems that require minimal manpower; provide effective training; can be operated and maintained by users; and are suitable (habitable and safe with minimal environmental and occupational health hazards) and survivable (for both the crew and equipment).*

3.9.2.3. *The PM shall work with the users to document performance and support requirements in performance agreements specifying objective outcomes, measures, resource commitments, and*

[7] NAVAIR FMS APML Handbook, dated January, 2003

stakeholder responsibilities. The Military Services shall document sustainment procedures that ensure integrated combat support.

***3.9.2.4.** The DoD Components shall initiate system modifications, as necessary, to improve performance and reduce ownership costs.*

***3.9.2.4.1.** PMs shall optimize operational readiness through affordable, integrated, embedded diagnostics and prognostics, and embedded training and testing; serialized item management; automatic identification technology (AIT); and iterative technology refreshment.*

***3.9.2.4.2.** PMs shall ensure that data syntax and semantics for high capacity AIT devices conform to International Organization for Standardization (ISO) 15434 and ISO 15418, references (j) and (k).*

***3.9.2.5.** The Services, in conjunction with users, shall conduct continuing reviews of sustainment strategies, utilizing comparisons of performance expectation as defined in performance agreements against actual performance measures. PMs shall revise, correct, and improve sustainment strategies as necessary to meet performance requirements*

***3.9.2.6.** Sustainment strategies shall evolve and be refined throughout the life cycle, particularly during development of subsequent increments of an evolutionary strategy, modifications, upgrades, and reprocurement. The PM shall ensure that a flexible, performance-oriented strategy to sustain systems is developed and executed."*

3.1.3.1 LOGISTICS DOCUMENTATION

Besides the NAVAIR APML Handbook cited in paragraph 3.1.1, additional PS logistics documentation that is available on the web is cited below along with a web-reference where the document can be found.

Performance Based Logistics: A Program Managers Product Support Guide	http://www.findarticles.com/p/articles/mi_m0QMG/is_2_34/ai_n13794962	A PBL strategy for product support of weapon systems. A tool for program managers designing product support strategies for new programs, major modifications, or reengineering product support strategies for legacy weapon systems.
Joint Service Guide for Aviation Post Production Support Planning (PPSP)	http://logistics.navair.navy.mil/ppspg/index.cfm	Assists program and logistics managers in the understanding and application of post production support for all "aviation" weapon system and subsystem programs.
DoD 5000 Series Resource Center	http://dod5000.dau.mil/index.htm	Provides logisticians with the latest DoD policy on the Defense Acquisition System
Product Support Boundaries	http://www.redstone.army.mil/amrdec/sepd/tdmd/Streamliner/April%2005.pdf	It consolidates into a single document recommended approaches to sustainment with associated policy and standards for key support areas.
NAVAIR Contracting for Supportability Guide (CFSG)	http://logistics.navair.navy.mil/cfsg/index.cfm	Discusses conversion of MIL-STD-1388-1A and MIL-STD-1388-2B to performance

		specifications and non-government standards
The Naval Aviation Maintenance Program (NAMP)	http://logistics.navair.navy.mil/4790/index.cfm	The basic document and authority governing the management of all naval aviation maintenance.
NAVAIR Instructions and Notices	http://logistics.navair.navy.mil/	Provides access to all NAVAIR instructions and notices
Acquisition Logistics Support Plan (ALSP)	http://logistics.navair.navy.mil/alsp/library/alspguide03.doc	NAVAIR's Life Cycle document that establishes and identifies all logistics planning efforts to meet the requirements of the Product Support Management Plan (PSMP).
Work Unit Code (WUC) Guide for Aeronautical	http://logistics.navair.navy.mil/wuc/library/gde0211.doc	Provides policy and guidance for development and editing of WUCs and provide for policies for integration of WUCs into existing Naval Aviation logistics systems and Maintenance and Material Management (AV3M) systems.

3.1.4 The "Open Systems Approach" to Designing in Supportability

3.1.4.1 Why Open Systems?

The intent of DoD's open systems approach for the acquisition of weapons systems is the use of a widely accepted consensus of de facto standards to define critical system interfaces. In addition, if the architecture is defined by consensus specifications and standards used in the private sector, the DoD can be one of many customers to leverage the benefits of the commercial marketplace, taking advantage of the competitive pressures, which motivate commercial companies to reduce prices, and introduce new products developed with internal resources.

The open systems approach can have a profound effect on the life-cycle cost of a system. Program managers can have access to alternative sources for the key subsystems and components to construct DoD systems. DoD investment early in the life-cycle is reduced since at least some of the required subsystems or components are likely to already be available, or being developed without direct DoD investment. Production sources can be competitively selected from multiple competitors.

The system design flexibility inherent in the open system approach, and the more widespread availability of conforming commercial products, mitigates potential problems associated with a diminishing defense-dependent manufacturing base. Finally, life-cycle costs are reduced by long-lived, standards based architecture that facilitates upgrades by incremental technology insertion, rather than by large scale system redesign. Because it promotes a seamless evolution, it should dramatically reduce O&S cost.

3.1.4.2 PERFORMANCE SPECIFICATION

A performance specification (MIL-PRF-49506) has replaced MILSTD-1388-2B as the document cited weapon system development contracts. Figure 3-1 addresses in broad terms the changes from MILSTD-1388-2B to MIL-PRF-49506. Additional information is available from the Open Systems Joint Task Force (OSJTF) web site (http://www.acq.osd.mil/osjtf/).

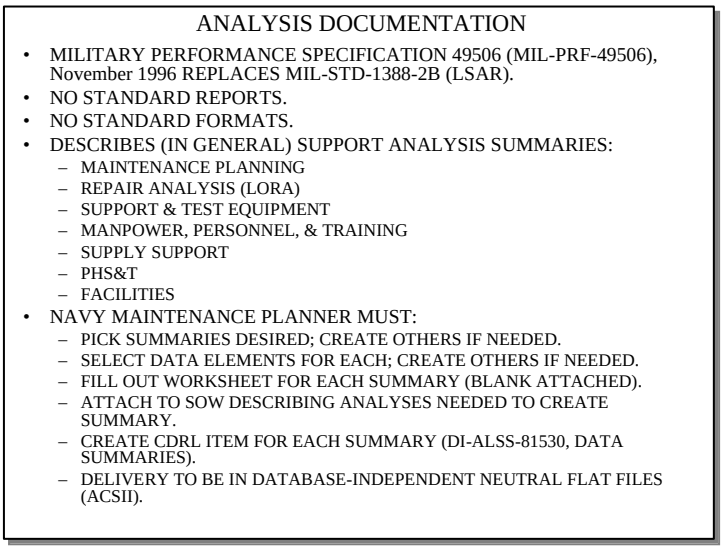


Figure 3-1 Shifting From MILSTD-1388-2B to MIL-PRF-49506

MAINTENANCE PLANNING PROCESS

4.0 MAINTENANCE PLANNING PROCESS

4.1 MAINTENANCE PLANNING PROCESS – OVERVIEW

Maintenance planning in an open system environment is as important as it was under the legacy systems that relied on the structure of the MILSTD 1388-2B specification. While the open system approach carries with it some substantial differences in the way that systems will be managed and supported, it does not necessarily render obsolete the government legacy system of supportability documentation such as maintenance plans, provisioning documentation, and configuration tracking, albeit they may be delivered to the Government at a higher level of detail.

☑ Under TLSCM, the PM may elect to rely on contractor-maintained databases with the Government given electronic access to contractor databases when needed. Required Government documentation must still be described in the performance specification. Traditional maintenance planning documentation similar to that prescribed in MILSTD1388-2B can be described if that's what the government requires from the contractor. Moreover, the government may provide software tools (e.g. an approved optimization model) to a contractor and request that they deliver supportability data to the government using the government provided software. Additionally, many of the systems that will be purchased by international customers in the future were developed using MILSTD 1388-2B. For these reasons, highlights of the traditional maintenance planning process are discussed below.

Maintenance planning is the process conducted to evolve and establish maintenance concepts and requirements for the lifetime of a material system. Maintenance planning translates the maintenance approach stated in the system or equipment operational requirements into maintenance task requirements that will ensure the ongoing availability of the system or equipment. Maintenance planning is critical to subsequent system and logistics development. **It is the key to all other ILS element planning and requirements**. Understanding the USN maintenance planning process will provide the FMS customer logisticians with insight into the origin of the failure and provisioning data they are provided by USN or other suppliers and prepare them to better participate in the process of tailoring support to their own support scenario. ☑ NAVAIR offers a series of formal training courses that teach the USN maintenance planning processes in detail. Additional information on course offerings is available from AIR-6.9.

4.2 SYSTEM READINESS

Achievement of operational readiness is a prime objective of the acquisition process. Readiness is achieved by incorporating features in the design of a system to make it supportable and by originating and continuing an effective PS program.

4.2.1 READINESS THRESHOLDS

The Chief of Navy Operations (CNO) staff assigns readiness thresholds for naval aviation aircraft, subsystems, and equipment that are essential for the primary missions in which they are installed. All thresholds are established for operations in a wartime environment. Readiness thresholds for aircraft are stated as Fully Mission Capable (FMC) and Mission Capable (MC) performance rates. Readiness thresholds for systems, subsystems, and equipment installed in platforms and essential to the platform primary and secondary missions are stated as Operational Availability (Ao) rates (see Section 4.2.1.1 for explanation); these rates are used and manipulated during the development process to build platform level rates. The purposes of platform readiness measures shown in Figure 4-1 are to provide a means of predicting the ability of a platform to carry out its wartime missions and to permit the allocation of availability thresholds to mission essential systems, subsystems, and equipment on the platform. Platform readiness measures are based on:

1. Specific operational scenario
2. Assumptions as to operating tempos, duty cycles, timelines of use for Mission Essential subsystems
3. Force mix studies
4. Historical analysis
5. War games and simulations

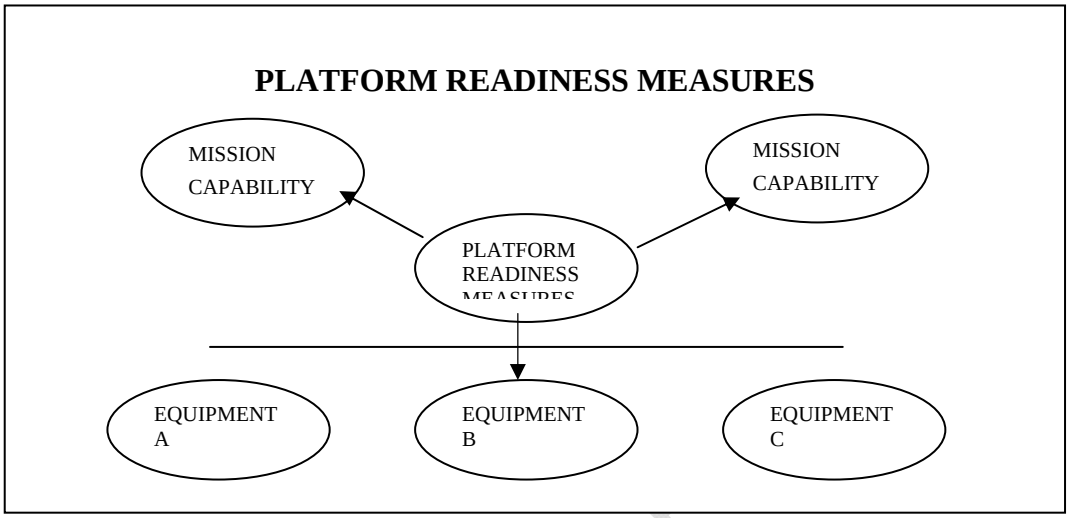


Figure 4-1 Platform Readiness Measures

4.2.1.1 OPERATIONAL AVAILABILITY (Ao)

Chief of Naval Operations Instruction (OPNAVINST) 3000.12A[8] establishes Ao as the primary measure of material readiness for Navy weapon systems and equipment. As such, Ao can be thought of as a vehicle for consolidating the combined and interdependent effects of reliability, maintainability, and supportability (Figure 4-2). Reliability and maintainability are two principal availability design parameters. That is, they determine how easy or difficult it is to maintain a weapon system in terms of how often it fails and how many man-hours are needed to repair failures.

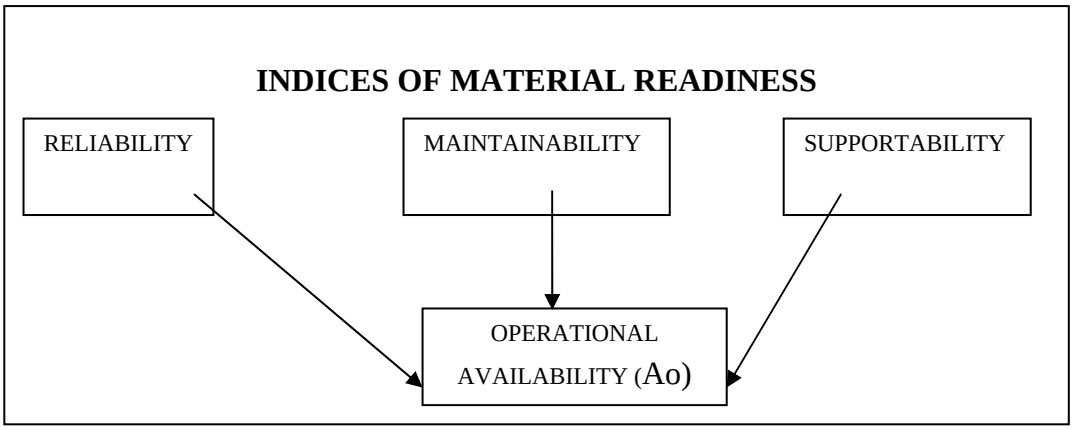


Figure 4-2 Indices of Material Readiness

[8] Available on the Internet at http://dodssp.daps.dla.mil/ or via a Google query

4.2.1.1.1 RELIABILITY (R)

Reliability is the probability that an item can perform its intended function for a specified interval, (e.g., Operating Hours, Flight Hours, Rounds Fired, Miles Driven), under stated conditions. Mean Time Between Maintenance Actions (MTBMA) is an example of the first form. **Note that the need for a maintenance action does not necessarily make the weapon system incapable of performing its mission**. Mean Time Between Failure (MTBF) is the second form and marks the average interval between losses of mission capability.

In both cases, Time (T) is a measure of operational usage, such as flying hours, operating hours, number of landings, miles driven, and rounds fired. MTBF is further refined to reflect those failures that require the replacement of a component by the supply system and the repair of the removed component. These actions are known as Mean Time Between Removal (MTBR) and are used extensively for calculating spare parts. A typical MTBF for an aviation system might be expressed as follows: Flight Hours/Failures = 10,000/2,000 = 50 Flight Hours. Navy policy for establishing MTBF/ MTBR (s) and other expressions of failure rates are contained in OPNAVINST 3000.12A.

4.2.1.1.2 MAINTAINABILITY (M)

Maintainability may be expressed as Mean Time to Repair (MTTR). T now refers to elapsed time, normally in hours or a decimal portion of an hour. It includes time for diagnosis and repair when performed by personnel having specified skill levels, using prescribed procedures and resources at each authorized level of maintenance.

4.2.1.1.3 SUPPORTABILITY (S)

Supportability as employed in Figure 4-2 denotes the adequacy of logistics support resources (supply support, support equipment, etc.). Supportability performance may be expressed as the Mean Logistics Delay Time (MLDT). This term includes all causes of delay before actual maintenance can be performed.

4.2.1.1.4 PREDICTING Ao

The Ao of a system is the probability that the system is capable of performing its specified function when called for at a random point in time. The truest measure of Ao is expressed in the formula:

$$Ao = \frac{\text{Uptime}}{\text{Uptime} + \text{Downtime}}$$

This formula suggests that for the purpose of measuring/calculating Ao an interval of time has been specified, and that uptime is the portion of that interval over which the item is either functioning or in standby and capable of functioning as intended. If the item is not capable of functioning, it must be down either for maintenance or logistics-related delays. The above formula is entirely satisfactory as a definition of Ao and for observing (measuring) an existing item's Ao during test and after user operation. **It is not, however, useful for predicting the availability of not-yet-existing system, nor for analyzing (and conceivably optimizing) essential parts of an Ao.**

4.2.1.1.5 PREDICTING Ao FOR CONTINUOUS-USE SYSTEMS

Predicting Ao for continuous-use systems is defined in paragraph 3.3 of OPNAVINST 3000.12A as follows: "For continuous-use systems, mean calendar time between failures is identical to mean operating time between failures, and use of MTBF in the Ao formula is consistent with the notion of

measuring uptime in terms of calendar time. This notion is critical since all downtime is measured in calendar time. Therefore, the following equation provides an acceptable approximation of Ao in terms of reliability, maintainability, and supportability.

$$Ao = \frac{MTBF}{MTBF + MTTR + MLDT}$$

4.2.1.1.6 PREDICTING AO FOR INTERMITTENT-USE SYSTEMS

Predicting Ao for Intermittent-Use Systems is defined in OPNAVINST 3000.12A as follows: "For intermittent-use systems, mean operating time between failure is not equivalent to mean calendar time between failure. Thus, MTBF must be adjusted. The following equation applies to aircraft:

$$Ao = \frac{K'' (MTBF)}{K'' (MTBF) + (MTTR) + (MLDT)}$$

Where K' is defined as total calendar time over total operating time. It's the inverse of the proposed utilization rate"

Example: K' = Month/Flight Hours = 720/72 = 10
MTBF = 50 Hours
MTTR = 3 Hours
MLDT = 10 Hours

Ao = [10 x 50] / [(10 x 50) + 3 + 10] = 500/513 = 97.5%

4.3 BASIS FOR MAINTENANCE CONCEPT

The maintenance concept expresses the strategy for maintaining the weapon system at a defined level of readiness in support of the operational scenario. Every major, designated non-major, and modified system with an operational concept must have a maintenance concept. As the concept matures, it more specifically defines the performance factors, needs, considerations, and constraints for the proposed new system or modification. The maintenance concept provides guidance for the formulation of maintenance design characteristics needed to achieve the optimum balance of operational effectiveness and life cycle costs. The basis for the maintenance concept is the selection of a support system, which promotes the highest possible weapon system and equipment availability and assures its sustainability at the lowest life-cycle cost. PMs must consider alternative maintenance concepts when conducting LCC analyses and design trade-offs. This becomes the framework upon which systems engineering and logistics planning are developed.

4.4 MAINTENANCE PLANNING

Maintenance planning information is the foundation for ensuring supportability and affordability of fielded systems. The USN Maintenance Plan (MP) Program[9] ensures required maintenance planning information is available and accessible to all acquisition logistics team members. Minimum maintenance planning information must be provided to address the fielded baseline design configuration. data, which reflects an approved, stable design, is a requirement of reference (c) [SECNAVINST 5000.22A], and will enable the performance of accurate trade-offs, to determine the most affordable overall support solution. Because of the impacts on systems design and the long term operations and support cost implications, a cost effective maintenance concept needs to be established early in the program after careful consideration of all viable alternatives and refined concurrently with the design effort into detailed MPs. The maintenance concept is based on the following considerations:

- Mission duration, criticality, and environment
- Maintenance concepts for existing like and similar systems
- Hardware/software technology sophistication
- Personnel capabilities
- Postulated threat
- Maintenance strategies (see Section 0)

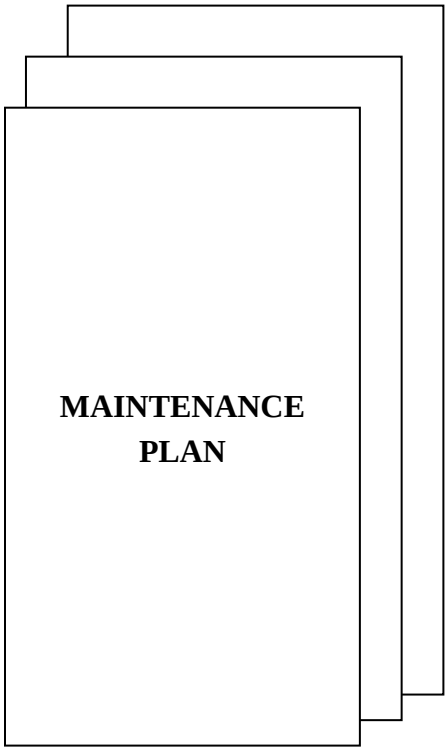
4.4.1 MAINTENANCE PLAN

The MP describes the requirements and tasks to be accomplished for achieving, restoring, or maintaining the operational capability of a system, equipment, or facility. A MP should be used throughout the support infrastructure, as well as, by all operational activities, including the FMS customer. It identifies repairable components and maintenance significant consumables. It describes the maintenance requirements and tasks to be accomplished for restoring or maintaining the operational capability of a system or equipment. MPs include information for preventive and corrective maintenance requirements, including calibration. Details relating to preventive and corrective maintenance requirements include task description, frequency, duration, and level of maintenance, and support resources including support equipment requirements. Details that are required for repairable components and maintenance significant consumables include Source Maintenance and Recoverability (SM&R) codes (see paragraph 4.4.2.7), as well as maintenance replacement factor and maintenance replacement rate for such "P" series source code items. Maintenance plans are used to translate the maintenance approach, delineated in the maintenance concept, into a minimum set of task requirements. It contains the following information:

- Short narrative equipment description
- Concise summary of the maintenance actions required for equipment support
- Top-Down List of Repairables and Maintenance Significant Consumables (MSC)
- SM&R codes for repairables
- Projected or current parts usage data (i.e. technical replacement factors)
- Lists of general purpose (common) and special purpose (peculiar) support equipment
- Other support items, e.g., Maintenance Assist Modules (MAMs)

[9] NAVAIR INSTRUCTION 4790.22A, dated 26 May 1999, The Maintenance Plan Program, http://logistics.navair.navy.mil/library.cfm

The general contents of a MP are shown in Figure 4-3.



PART 1: GENERAL CONSIDERATIONS

- DESCRIBES SUBJECT HARDWARE
- SUMMARIZES MAINTENANCE REQUIREMENTS
- JUSTIFIES MAINTENANCE REQUIREMENTS

PART 11: REPAIR CAPABILITY

- PROVISIONING DOCUMENTATION
  - SM&R CODES
  - TECHNICAL FACTORS (E.G. FAILURE RATES)

PART 111: MAINTENANCE REQUIREMENTS

Figure 4-3 Aircraft System/Equipment Maintenance Plan

☑ Maintenance Plans are critical planning documents for FMS customers and they should be made available as requested. However, as with other items of technical data, Maintenance Plans must be sanitized before delivery to an FMS customer. During the screening, references to items that were not included in the FMS customer weapon system configuration would be removed.

4.4.2 MAINTENANCE PLANNING

Maintenance planning is an elaboration of the maintenance concept into a detailed maintenance plan. Figure 4-4 identifies a potential end result of maintenance planning – dependent upon task tailoring by the ILS manager.

MAINTENANCE PLANNING TASKS

- IDENTIFIES EACH MAINTENANCE TASK
- FOR EACH TASK, DETERMINE:
  - TASK FREQUENCY
  - TASK DURATION
  - SUPPORT EQUIPMENT
  - SPARE PARTS
  - MAINTENANCE LEVEL
  - PERFORMER
  - FACILITIES
  - TRAINING
  - MAINTENANCE PROCEDURES

Figure 4-4 End Result of Maintenance Planning

- Identify all maintenance tasks - both Preventative Maintenance (PM) and Corrective Maintenance (CM). PM tasks are scheduled tasks, intended to prevent failure during system operation. CM tasks respond to failures that have occurred and restore the system to operational condition by using techniques such as access, adjust, align, and calibrate.
- For each task, identify:
  - Task frequency in terms of annual occurrences
  - Task duration and maintenance burden
  - Support equipment required
  - Spare parts likely to be replaced during a repair task
  - Performing personnel and level of maintenance
  - Training requirements
  - Packaging, handling, storage and transportation requirements
  - Facility requirements, if needed
  - Procedural steps

4.4.2.1 MAINTENANCE PLANNING ACTIVITIES

Maintenance planning for a weapon system is carried out as an integral part of the Supportability Analysis. The key activities are diagrammed in Figure 4-5. All of these tasks were specifically defined in MILSTD 1388-2B which is now cancelled. However, the functions must be described in the Statement of Work (SOW) as defined in MIL-PRF-49506 to arrive at an MP.

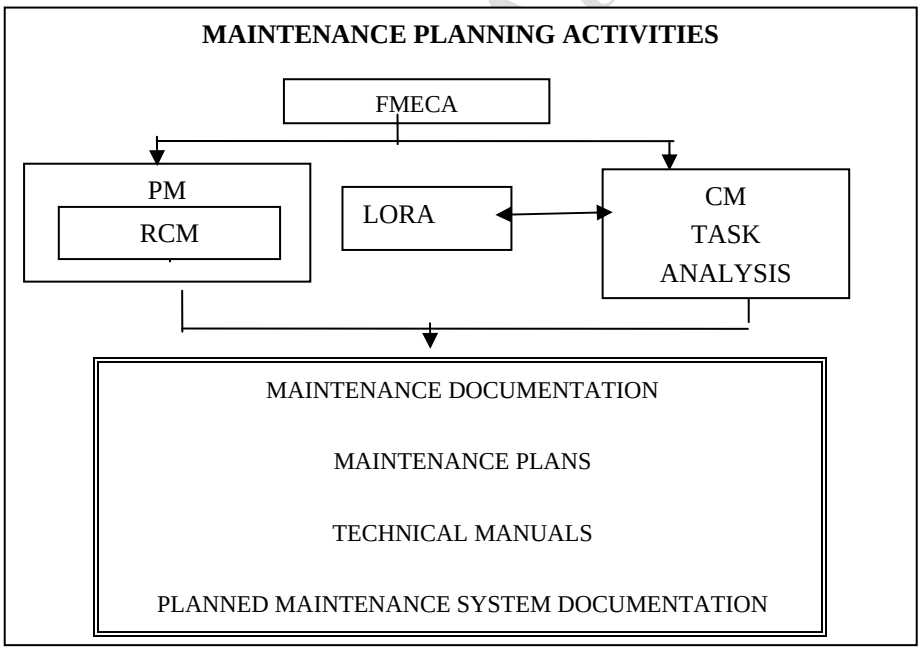


Figure 4-5 Maintenance Planning Activities

4.4.2.2 FAILURE MODE, EFFECTS, AND CRITICALITY ANALYSIS (FMECA)

FEMCA is the first step in the maintenance planning process. FMECA is a reliability tool performed as an integral part of the system design process. The objective of the FMECA is to identify and rank, in a logical and structured manner, expected failures within a system design. Reliability and survivability engineers employ FMECA to assess the adequacy of system design with respect to safety, reliability,

and survivability. FMECA provides essential input to the Functional Requirements Identification (FRI) (e.g. failure mode input) and to the Task Analysis (e.g. failure rate input). The results of FMECA are also used to support Reliability-Centered Maintenance (RCM) Figure 4-6 describes the basic definition of FMECA definition

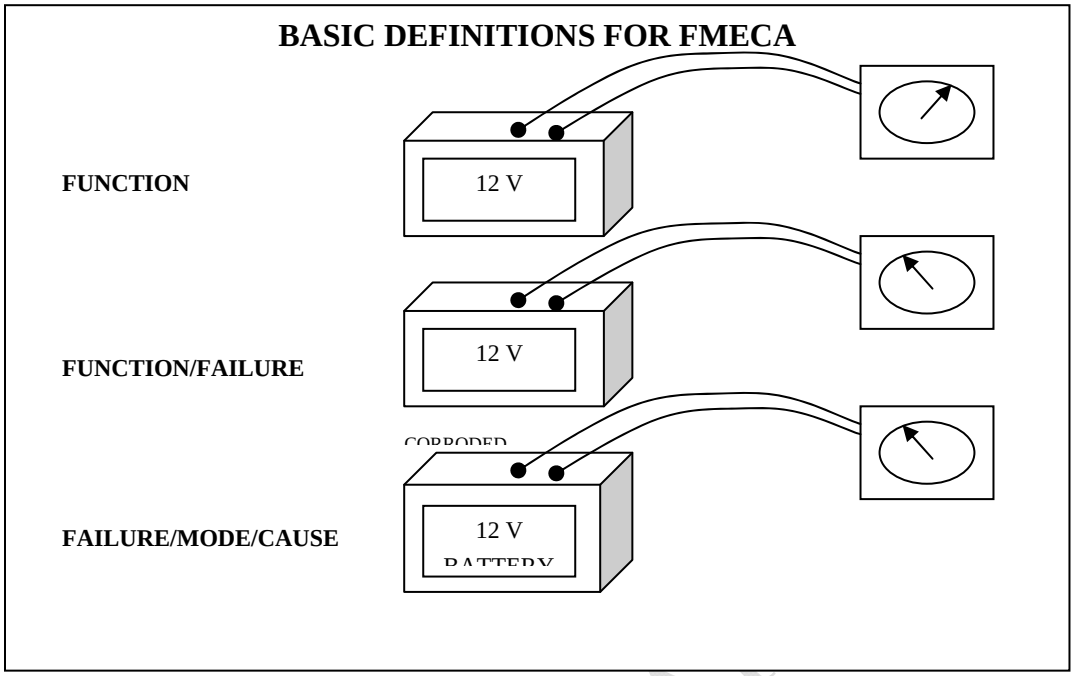


Figure 4-6 Basic FMECA Definitions

Function	Characteristics of an item, defined in terms of performance capabilities
Functional Failure	Specific manner of failure
Failure Cause	The mechanism of failure
Inherent Reliability	A measure of reliability that includes only the effects of item design and installation, and assumes an ideal operating and support environment
Operational Reliability	A measure of reliability including the combined effects of item design, quality, installation, environment, operation, maintenance and repair
Survivability	The degree to which a system is able to avoid or withstand a man-made hostile environment without suffering an impairment of its ability to accomplish its designated mission

FMECA serves as the basis for accomplishing the goals shown in Figure 4-7

FMECA GOALS

- ELIMINATE OR REDUCE POTENTIAL FOR FAILURES
- REDUCE THE SEVERITY OF FAILURES BY DESIGN FEATURES
- DEVELOP MAINTENANCE TASKS TO COPE WITH POTENTIAL

Figure 4-7 FMECA Goals

These may be restated as follows:

- Redesign to improve system/component reliability
- Redesign to reduce the impact of failure on system safety and/or reliability [e.g., through redundancy, buffers, failure alarms, or slowly deteriorating (fail-safe) components]
- Develop preventative maintenance tasks (via RCM) to prevent system failures during mission performance

The order of listing of solutions is important. FMECA analysts refer the first two requirements to the system developer's design group for a design solution. If a design solution is not available or feasible, FMECA analysts pass the failure mode to the contractor's logistics group to develop a maintenance task.

Examples of designs that reduce the impact of component failure include

- Redundant computer systems in aircraft flight control stations
- Built in aircraft engine chip detectors with associated panel warning light
- Helicopter transmissions that function effectively for one-half hour after complete loss of transmission fluid

4.4.2.3 FAILURE CHARACTERISTICS

Characterizing failure is the focus of FMECA and a primary consideration in maintenance planning. Figure 4-8 lists failure characteristics.

FAILURE CHARACTERISTICS

CAUSES

RELIABILITY (RANDOM & WEAROUT)

DAMAGE (ACCIDENT & COMBAT

INDUCED (SECONDARY & PERSONNEL

CONSEQUENCES

SEVERITY CLASSIFICATION

FREQUENCY

PROBABILITY OF OCCURRENCE

Figure 4-8 Failure Characteristics

4.4.2.3.1 CAUSES OF COMPONENT FAILURES

Causes of component failure fall into three basic categories discussed below:

4.4.2.3.2 RELIABILITY FAILURES

Reliability failures are caused by inherent design. These, in turn, may be divided into random failures and wear out failures.

- **Random failure** of a specific component is not predictable. Its probability of failure during the next mission period does not increase with usage--given that it has operated to that point. Random failure items are described as constant failure rate items. Solid state modules normally exhibit this characteristic
- **Wear out failure** components have a dominant failure mode with a predictable life expectancy. Something is literally wearing away or undergoing structural deterioration. At some point in their life, their probability of failing will increase with continued usage. Tires and gun barrels are wear-out components.

4.4.2.3.3 DAMAGE

Damage may be accidental or combat related. Accidental damage occurs in peacetime and wartime. Combat damage is caused by wartime enemy action. Combat damage is the dominant cause of wartime failures for systems involved in direct combat operations.

4.4.2.3.4 INDUCED FAILURE

Induced failures are divided into secondary and personnel failures.

- **Secondary failures** in components are induced by primary failures in interfacing components. For example, a short circuit (primary failure) in an electronic module can cause an overload (secondary failure) in an interconnected electronic module
- **Personnel failures** are caused by operators and maintainers doing something that they should not do; not doing something that they should do; or doing it improperly. Using improper fuel is an example of the first category. Failure to lubricate on schedule is an example of the second category.

☑ No-defect in maintenance is a related issue. No-defect maintenance is performed unintentionally on good components. Inadequate maintainer skills, training, or limited test capability causes no-defect maintenance. No-defect is documented in the USN maintenance data collection system.

4.4.2.3.5 CONSEQUENCES

What end effect does component failure produce on the system and its operators? FMECA analysts assign severity classifications to failure modes as depicted in Figure 4-9.

FAILURE SEVERITY CLASSIFICATIONS

CATEGORY	CLASSIFICATION
I	CATASTRPOPHIC
II	CRITICAL
III	MARGINAL
IV	MINOR

Figure 4-9 Failure Severity Classifications

- Category I (Catastrophic): A failure that may cause death or system loss (i.e. aircraft, tank, missile, ship)
- Category II (Critical): A failure that may cause severe injury, major property damage, or major system damage that will result in mission loss
- Category III (Marginal): A failure that may cause minor injury, minor property damage, or minor system loss that will delay or loss of availability or mission degradation
- Category IV (Minor): A failure not serious enough to cause injury, property damage, or system damage, but will result in unscheduled maintenance or repair

4.4.2.3.6 FREQUENCY/PROBABILITY OF OCCURRENCE

How often does failure occur in a year? How likely is failure during the mission period or over the system's lifetime? Criticality analysis determines these outcomes.

4.4.2.3.7 CRITICALITY ANALYSIS (CA)

The purpose of the CA is to rank each potential failure mode according to the combined effects of the various FMECA tasks. Figure 4-10 displays an example of failure rate and failure mode ratios on a simplified CA worksheet. Two failure modes are listed for a truck tire. Punctures occur during driving and tread wear-out is detected during a Planned Maintenance System (PMS) scheduled inspection. The estimated failure rate – for each tire – is 40 per million miles. Half of the failures are attributed to punctures and half to tread wear-out. Thus, the failure rate attributed to tread wear-out is 20 million miles. Assuming each puncture would be repaired and the tire would be discarded at tread wear-out, the mean life of the tire is 50,000 miles (40M/20=50,000).

CRITICALITY ANALYSIS SIMPLIFIED FORM

ITEM	FUNCTION	FAILURE MODE CAUSE	SEVERITY CLASS	FAILURE RATE (PER MILLION	FAILURE MODE RATIO	MISSION TIME (MILES)
TRUCK TIRE	GRIP SURFACE	FLAT/ PUNCTURE	IV	20	.5	400

Figure 4-10 Criticality Analysis Simplified Form

Failure rates and failure mode ratios developed in a FMECA are valuable inputs to task analysis. However, FMECA failure rates generally represent inherent reliability of components. Analysts must convert these values into operational reliability values representing expected failure rates in a realistic environment with military operators and maintainers.

4.4.2.4 RCM

RCM is an analytical process that determines optimum preventive maintenance requirements for physical assets. The RCM philosophy is based on preserving the functions of physical assets using knowledge of the failure characteristics of that asset in a particular operating environment. The results of RCM are used to develop a cost effective and efficient maintenance program for any physical asset.

RCM was originally conceived and developed as a means to develop scheduled maintenance programs for commercial aircraft. Over the past three decades, the original concept has been updated and refined, and applied in virtually all industrial fields from aviation to power generation to manufacturing.

4.4.2.4.1 BENEFITS OF RCM

The purpose of RCM is to provide the optimum maintenance program for a given piece of equipment operating in a given environment by maintaining the functionality of that equipment. In general an optimum maintenance program is one that satisfies three main objectives:

- Required safety and environmental protection levels are met or exceeded
- Equipment availability is maximized
- Cost is minimized (including the cost of maintenance and repair and the cost of lost operations due to scheduled and unscheduled down time)

4.4.2.4.1.1 ADDITIONAL BENEFITS OF RCM

- RCM creates a documentation trail of decisions made in the development of a maintenance program. This documentation is useful for updating maintenance requirements as additional operating experience is gained, or for defending those requirements at a later date, such as in litigation arising from equipment failure
- RCM may also be used to evaluate the need for and prioritize other improvements, such as replacement of obsolete equipment with newer and more reliable equipment, or for adding new technology such as condition monitoring equipment, by providing a baseline for Return-On-Investment (ROI) analyses.

4.4.2.4.1.2 NAVAL AVIATION RCM PROCESS GUIDELINES [10]

The "Guidelines for Naval Aviation RCM Process" describes the process used to develop all PM requirements for NAVAIR aircraft, engines, aircrew escape systems, weapon systems, aircraft launch and recovery equipment, and support equipment. It's the primary guidance document for anyone tasked with performing an RCM analysis. It covers the following subjects:

- RCM Program Management
- RCM Analysis Process
- Implementation of Analysis Results
- RCM Program Sustainment

The "Guidelines for Naval Aviation RCM Process" is available on the following webpage http://www.raytheoneagle.com/asent/downloads/NAVAIR-00-25-403.pdf

4.4.2.5 LEVEL OF REPAIR ANALYSIS (LORA)

LORA is a process used to determine if a corrective maintenance item should be repaired or discarded and at which maintenance level that should occur"[11]. LORA is usually performed by Prime Contractor or Original Equipment Manufacturer (OEM) logisticians using an automated optimization model to determine whether replaceable assemblies should be repaired and, if so, at what level of maintenance

[10] NAVAIR 00-25-403

repair actions should be performed. The APML reviews and approves the input data and provides the operational scenario. The LORA models sums logistics costs into cost categories that vary as maintenance options are compared in the model. When the model recommends repair versus discard for a replaceable assembly, a level of repair recommendation is made based on cost. A discard recommendation is made when the costs associated with repairing the item exceed the costs of throwing it away, and procuring a new one. Generally speaking, an item with a relatively low unit cost and a high MTBF, or high repair costs, may be a discard item. When logistics costs are not known, default costs are established based on like and similar systems.

☑ LORA determines least-cost options for repair versus discard and the level of maintenance for repair actions. It should be noted that the LORA might recommend an alternative maintenance strategy had an FMS customer support scenario (e.g. one I-level) been used in the model vice the domestic USN/USMC multiple I-level support scenario. Thus - subject to technology transfer restrictions - logistics recommendation to an FMS customer between I and D-level of maintenance repair/site should be an economic decision based on a formal LORA analysis tempered by the experience of USN maintenance technicians.

4.4.2.6 USN/USMC LEVELS OF MAINTENANCE

Before discussing LORA further, it is helpful if one reviews the typical USN/USMC three levels of maintenance. Figure 4-11 depicts a typical USN/USMC operational maintenance scenario.

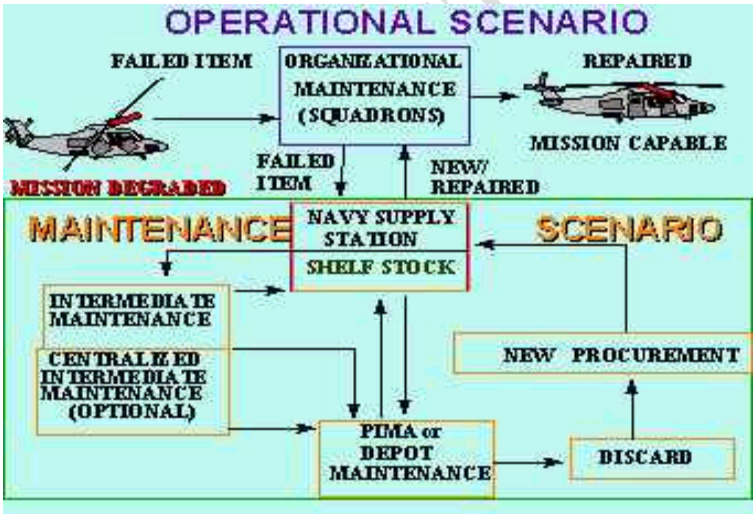


Figure 4-11 Typical USN Operational Maintenance Structure

The following definitions were extracted from the DoD Directive 4151.18 dated 31 March 2004, Maintenance of Military Material.

4.4.2.6.1 ORGANIZATIONAL MAINTENANCE (O-LEVEL)

Maintenance normally performed by an operating unit on a day-to-day basis in support of its own operations. The organizational-level maintenance mission is to maintain assigned equipment in a full mission-capable status while continually improving the process. Organizational-level maintenance can be grouped under categories of "inspections," "servicing," "handling," and "preventive maintenance."

4.4.2.6.2 INTERMEDIATE MAINTENANCE (I-LEVEL)

That materiel maintenance that is the responsibility of, and performed by, designated maintenance activities in support of using organizations. The intermediate-level maintenance mission is to enhance and sustain the combat readiness and mission capability of supported activities by providing quality and timely materiel support at the nearest location with the 1owest practical resource expenditure. Intermediate-level maintenance includes limited repair of commodity-orientated components and end items, job shop, bay, and production line operations for special mission requirements; repair of printed circuit boards, software maintenance, and fabrication or manufacture of repair parts, assemblies, components, and jigs and fixtures, when approved by higher levels.

4.4.2.6.3 DEPOT LEVEL MAINTENANCE (D-LEVEL)

That materiel maintenance requiring major overhaul or a complete rebuilding of parts, assemblies, subassemblies, and end items, including the manufacture of parts, modifications, testing, and reclamation as required. Depot maintenance serves to support lower categories of maintenance by providing technical assistance and performing that maintenance beyond their responsibility. Depot maintenance provides stocks of serviceable equipment because it has available more extensive facilities for repair than are available in lower maintenance activities. Depot maintenance includes all aspects of software maintenance

4.4.2.6.3.1 INTEGRATED MAINTENANCE CONCEPT (IMC)

IMC was developed to transition the aircraft from the traditional standard depot maintenance process to one based on RCM principles. The RCM process emphasizes the importance of closely monitoring performance, reliability, and degradation characteristics of key aircraft systems and addresses unfavorable trends that affect safety or require costly repairs. As a result of RCM, only justified preventative maintenance is performed and aircraft achieve their inherent reliability at lower cost. IMC packages RCM tasks for execution at the O-level by D-level artisans. The FMS Deputy Assistant Manager for Logistics (DAPML) should be conversant in IMC as it applies to their aircraft and develop a briefing that educates the FMS customer on the differences between SDLM and IMC. USN depots are prepared to teach an FMS customer the application of IMC under an FMS case.

4.4.2.6.3.2 SPECIALIZED INTERMEDIATE MAINTENANCE ACTIVITY (SIMA)

SIMA is an activity with a specialized repair capability (e.g. engine compressor and turbine repair).

☑ PIMA – which is now known as a SIMA - in Figure 4-11 stands for Prime Intermediate Maintenance Activity. It refers to an intermediate maintenance activity that has developed specialized repair capability such as repair of engine compressor and turbine rotors. FMS customers may want to consider adopting this added intermediate maintenance capability to increase their self-sufficiency

4.4.2.6.4 LORA BASED ON ECONOMIC FACTORS

LORA determines least-cost options for repair versus discard and the level of maintenance for repair actions. For example, changes in summed cost categories would vary as indicated in Figure 4-12 when comparing an intermediate-level maintenance option to a depot-level maintenance option. It should be noted that the LORA might recommend an alternative maintenance strategy had an FMS customer support scenario been used in the model vice the domestic USN/USMC support scenario. How a LORA model might assess an FMS customer repair scenario is provided as Notes to Figure 4-12. Refer to Section 6.2 for an expanded discussion of maintenance alternatives. An extract from a typical LORA report is found at Figure 4-13.

LORA COST CATEGORIES

COST IMPACT OF SHIFTING FROM I-LEVEL TO D-LEVEL REPAIR

COST CATEGORY	COST IMPACT ON USN($)
SUPPORT EQUIPMENT (SE)	DOWN
SUPPORT OF SUPPORT EQUIPMENT	DOWN
SUPPLY INVENTORY	UP
INVENTORY ADMIN	UP
SUPPORT EQUIPMENT SPACE	DOWN
INVENTORY STORAGE	UP
REPAIR SPACE	DOWN
LABOR	VARIES
MATERIAL	NC (NO CHANGE)
TRANSPORTATION	UP
REPAIR SCRAP	NC
TRAINING	DOWN
DOCUMENTATION	DOWN

COST CATEGORY DESCRIPTION	COST IMPACT ON USN	COST IMPACT ON FOREIGN CUSTOMER
SE consists of costs to develop and procure peculiar support equipment (PSE) and common (general purpose) support equipment (CSE).	Because the USN has multiple intermediate-level maintenance sites, the SE cost category generally would be lower for a depot option with no I-level The USN would purchase depot manuals/tooling/parts only if it's determined that depot maintenance will be done at an organic depot.	Note (1): USN Relies on Commercial Depot – A foreign customer that opts for in-country depot-maintenance in lieu of reliance on the ROR would incur increased depot SE costs because they would have to purchase the depot support equipment and related ILS on a stand alone basis from the OEM. This problem would be avoided when the foreign customer's organic or commercial depot infrastructure could be adapted (e.g. hydraulic, fuel components) to perform depot maintenance. This issue should be explored during the Site Survey.
Support of support equipment consists of an estimate of the cost of maintaining support equipment over its life cycle.	ILS SE cost would be down because there is less SE to maintain	Refer to Note (1)
The supply inventory consists of the costs to establish and replenish spares at all levels of maintenance over the weapon system life cycle.	The increased Repair Cycle Time (RCT) for the depot option generally will require a higher pipeline spares inventory. RCT is the elapsed time from failure of the part until the part is repaired and returned to the operational site. The LORA assumes that if the user does not repair a component they will obtain a replacement component from the supply system **on an exchange basis.**	Note (2): Foreign customers typically obtain replacement components from the DoD supply system or commercial market **on an ROR basis**. The RCT of an ROR program is significantly higher than the RCT under a direct exchange basis and will require significantly more spares to support readiness objectives. Relying on in-country repair would reduce the need for increased pipeline spares because the RCT for in-country repair should be lower.

	Under a traditional support strategy inventory costs would normally rise if intermediate-level maintenance were eliminated. As weapon system reliability increases (e.g. reliability incentivized contracts), the cost impact of eliminating intermediate-level maintenance lessens.	Should foreign customers participate in USN programs to increase reliability they would benefit from reduced inventory costs.
Inventory administration consists of estimated one-time item entry costs and recurring inventory management costs.	Costs for this category would increase for the organic depot option because of a higher inventory of piece parts. This category is not a major factor in the LORA model.	Note (3) Inventory administration costs would increase if the foreign customer relied on organic in-country depot repair, but could be minimized if they relied on the USG cataloging system
Costs for support equipment space are based on estimated square footage requirements and costs per square foot provided by the USN.	This cost would generally decrease due to a reduction in SE inventory	Note (4) Foreign customer costs would differ depending on the customer country. As with Note (1), the cost impact will vary depending on organic of commercial repair
Costs of inventory storage are based on storage space requirements and costs per square foot at each location.	The sum of these costs will increase the depot option due to higher quantities.	Refer to Note (1)
Costs for repair space are based on workspace requirements (exclusive of support equipment space) and costs per square foot at all repair locations.	The sum of these costs would decrease due to centralization of repair at a more limited number of activities	Refer to Note (4)
Labor costs include costs of repair at all authorized levels for each component studied in the LORA analysis. Computations are based on anticipated component failure rates, estimated maintenance man-hours for each repair and discard action at each maintenance level, and labor rates at each maintenance level	The total labor hours should be expected to decrease for the depot option due to the narrower division of labor (greater specialization), a steeper learning curve at depots, and lower attrition rates. However, labor rates at depots are higher.	Refer to Note (4)
The material cost (i.e. piece parts) accounts for the costs of parts required per repair action.	No significant change is expected by shifting to the depot option.	Same as USN
The transportation category accounts for the costs of packaging, handling, and transporting components for the purpose of repair and replenishing inventory.	This cost category will increase for the depot option because of the greater distances for retrograde of defective stock and return of the repaired material	Note (5) The transportation problem can be compounded if foreign customer relies on an independent agency to manage the ROR program and that agency does not adequately fund it.
The repair scrap rate category consists of costs to replace items scrapped during the repair process.	No significant change is expected for the depot option.	Same as USN
The training category consists of costs to train maintenance personnel at all levels of maintenance, including the effects of attrition.	This cost category should decrease for the depot option due to higher skill levels and lower attrition rates.	Same as the USN
Documentation costs are related primarily to preparation of technical manuals.	Technical manual preparation costs for the depot option should decrease since no intermediate level manuals need be written.	Same as the USN

Figure 4-12 Changes in LORA Cost

4.4.2.6.5 LORA BASED ON NON-ECONOMIC FACTORS

LORA is also based on non-economic factors such as safety, human factors, or mission success (e.g. repair aboard ship to ensure self-sufficiency). An international customer might request that a potential supplier re-run the LORA model – using updated failure rates and costs – for selected sub-systems to reflect the customer desire to achieve self-sufficiency in-country on selected components. The model can then provide the international customer with the differential cost of achieving intermediate-level self-sufficiency in-country versus relying on overseas depot maintenance. ☑ A potential international customer would be required to fund LORA re-runs.

4.4.2.6.6 LORA REPAIR COSTS COMPARISON REPORT

A Sample LORA Repair Costs Comparison Report is provided at Figure 4-13. It includes a partial list of WRA/SRAs, cost of various repair options with varying Turnaround Time (TAT) and Order and Ship Time (O&ST), and a recommended repair level.

	TOTAL ANNUAL COSTS ($)				RECM'D REPAIR LEVEL
			D-LEVEL SENSITIVITIES		
CANDIDATE WRA/SRAs	I-LEVEL 10-DAY TAT	D-LEVEL 3-DAY OST	30-DAY TAT (OEM REPAIR)	90-DAY TAT (OEM REPAIR)	
Processor, IMU	$18,945	$19,259	$19,665	$20,213	I
CPU, Navigation Processor	53,794	56,879	58,258	60,670	I
CPU, I/O Processor	54,177	57,258	58,649	61,083	I
AMP, Synchro	31,380	33,750	34,413	35,459	I
Converter Assy Synchro	223,581	227,969	231,453	237,751	I
PCB, Accelerometer	12,376	11,730	12,268	13,032	D
Memory Assy	11,776	11,585	11,875	12,314	D

Figure 4-13 Sample LORA Repair Cost Comparison

4.4.2.6.7 SENSITIVITY ANALYSIS

Sensitivity analysis capabilities are built into the LORA computer models. Figure 4-14 lists examples of LORA input data that can be varied over operator set ranges. The purpose is to determine the impact of uncertainty on the least-cost maintenance option selected by the economic analysis model.

SENSITIVITY ANALYSIS CANDIDATE EXAMPLES

- TURNAROUND TIME
- MTBF
- DEGRADATION FACTOR
- OPERATING TEMPO
- UNIT COST

Figure 4-14 Sensitivity Analysis Candidate Examples

An example of MTBF follows:

> It's determined that the MTBF estimate is accurate to within ±20 percent. Sensitivity analysis then varies the value of MTBF until the designated least-cost option changes to a different repair/discard option. These switches occur when the MTBF increases 100 percent and decreases 60 percent.

In this hypothetical example, the economic analysis is relatively insensitive to variations in MTBF, and the MTBF estimate is sufficiently accurate. However, if the model changes its selected maintenance option when MTBF was reduced five percent or raised ten percent, there would be a problem. It would then be necessary to acquire a more precise MTBF estimate. This process is repeated for each selected sensitivity analysis candidate.

4.4.2.6.7.1 DEGRADATION FACTOR

The Degradation Factor is used as a multiplier to convert an inherent MTBF to an operational MTBF. For example: An Army "Evaluation of the Abrams (tank) and Black Hawk (helicopter) Overhaul Requirements" allocated power train degradation factors of .5 to secondary failures, .8 to personnel errors, and .85 to no-defect removals. ☑ Degradation factor is a multiplier of the MTBF. Thus a degradation factor of .8 degrades reliability by 20 percent. FMS customers may operate in a much less severe environment than the USN (e.g. ashore versus at sea operations) and not require the same degradation factor as used by the USN. Also, adopting a policy of buying a "go-no-go" tester for their one operating site may lessen the no-defect rate. For these reasons and others, it's important for FMS customer logisticians to query the USN or other suppliers about the degradation factors that were applied in arriving at the operational MTBF and adjust the MTBF as required.

4.4.2.7 SOURCE, MAINTENANCE, AND RECOVERABILITY CODE

The LORA results serve as one basis for the technical decisions made in the supply support provisioning process. These decisions include the designation of SM&R codes, shown in Figure 4-15, for repairable items and parts. SM&R codes are used to communicate maintenance and supply instructions to the various logistic support levels and using commands for the logistic support of system, equipment and end-items. The governing source for SM&R codes is the NAVICP Master Item

File (MIF). SM&R codes are made available to their intended users by means of technical publications such as allowance lists, illustrated parts breakdown manuals, maintenance manuals and supply documents. These codes are assigned to each support item based on the logistic support planned for the end-item and its components. ☑ SM&R codes are an important concept for all logistics managers to understand since they are the basis for discussion between the FMS customer and the USN during the Site Survey and at the provisioning conference. SM&R code policies are as follows[12]

1. SM&R codes will be used to identify the source of spares, repair parts and end-items of support equipment and the levels of maintenance authorized to use, maintain, overhaul, rework or condemn them. The initial assignment and subsequent changes to SM&R codes significantly impact funding appropriations, requirements determination and impact all of the integrated logistics support elements
2. SM&R codes will be assigned to support items during the initial acquisition phase of end-items of material. These codes may also be applied to support items already in the supply system or to support items entering the supply system after initial acquisition of the end-item.
3. The SM&R code assigned to each support item is a record of a technical decision reflecting adequate consideration of the design, manufacture, application, maintenance and supply practices and capabilities as related to each support item and the operational missions of the end-item.
4. Uniform SM&R codes will be assigned per the progressive maintenance concept. Progressive repair is the SM&R coding philosophy that uses the fourth and fifth position of the uniform SM&R code to indicate that an item can have some repair performed at one level but total repair is authorized at a higher maintenance level. Maintenance and/or repair performed at lower levels will restore the item to service condition Ready for Issue (e.g., for 7 out of 10 failure modes). In effect, the activity will have performed a complete repair for that item. The item should be coded for complete repair at that level of maintenance to ensure the logistics support needed is available for the specific failure modes identified for repair at that level. Items are assigned authorized maintenance functions at progressively higher maintenance levels (for the remaining three failure modes) based upon level of repair analysis. The use of this philosophy when coding items will provide the maintenance and logistics activities with the information to know what specific level of maintenance is authorized to accomplish some, but not necessarily all, repair. Logistics support should be provided to those levels to accomplish all authorized repairs.

[12] NAVSUPINST 4423.29 dated 28 June 1999

UNIFORM SM&R CODE FORMAT				
SOURCE CODE	**MAINTENANCE CODE**		**RECOVERABILITY CODE**	**SERVICE OPTION CODE**
Positions (1) and (2)	Position (3) USE CODE	Position (4) REPAIR CODE	Position (5)	Position 6
Means of acquiring support items	Indicates the lowest level of maintenance authorized to use, remove and replace the items	Indicates whether the item is to be repaired and identifies the lowest level of maintenance authorized to perform a complete repair action	Indicates whether the item is to be recovered and the lowest level of maintenance authorized to dispose of the item. If the item is repairable, it also indicates repair as applicable under progressive maintenance concept	Modifies or clarifies the SM&R code as required by the individual Service. Used to convey Service specific information to the logistics community and/or the operating forces

Figure 4-15 SM&R Coding Format

4.4.2.7.1 SM&R CODING

The source code consists of the first two positions of the SM&R code. The source code indicates how the item is to be obtained by users. Specifically, this code indicates whether the part is to be procured and carried in the supply system; not to be carried in the supply system, but to be procured on demand; to be manufactured, to be assembled using component parts; or not to be replaced because installation of the next-higher assembly is more practicable. Known or predicted usage is the primary factor in the assignment of source codes. P-Series source coded items are centrally procured; K-Series source codes are items contained in kits; M-Series source codes are items that are manufactured at some level of maintenance; A-Series source codes are items that are assembled, and X-Series source codes are items for which no demand is anticipated.

The **maintenance codes** (replace/repair) are the third and fourth-position of the SM&R code. The first position indicates the lowest maintenance level authorized to remove and replace the item. The second position indicates the lowest maintenance level authorized to return the item to serviceable condition from some or all failure modes.

The **recoverability code** is the sixth position of the SM&R code. It indicates the lowest maintenance level authorized to throw away an unserviceable item that is not economically repaired.

SM&R code examples are provided in Figure 4-16

SM&R CODE EXAMPLE					
		TRANSLATION			
NAME OF PART	SM&R ASSIGNED	2-POSITIONS SOURCE	1-POSTION REPLACE	1-POSTION REPAIR	1-POSITION DISPOSE
PUMP	PAOOD	STOCKED	ORGANIZATION	ORGANIZATION	DEPOT
ROTOR	PAOGG	STOCKED	ORGANIZATION	INTERMEDIATE	DEPOT
SHAFT	MGGZZ	MANUFACTURE INTERMEDIATE	INTERMEDIATE	NO	INTERMEDIATE
IMPELLER	PAGZZ	STOCKED	INTERMEDIATE	NO	INTERMEDIATE
BEARING	PAOZZ	STOCKED	ORGANIZATION	NO	ORGANIZATION
CASING	XBGDD	NOT STOCKED	INTERMEDIATE	DEPOT	DEPOT

Figure 4-16 Sample SM&R Codes

4.5 MAINTENANCE CONFIGURATION

4.5.1 TOP-DOWN BREAKDOWN STRUCTURE

Maintenance planning and related efforts (e.g., reliability and maintainability program efforts) are based on a logically structured breakdown of each system, subsystem, and equipment to be evaluated. The partitioning of systems and equipment into a top-down breakdown of items must be accomplished in a way that satisfies the needs of many different users. The level of detail must at the minimum, be sufficient to develop specifications, define systems, and conduct system level analyses (i.e., reliability, maintainability, and availability assessment and allocation). The level of detail also must be precise enough to support the application of RCM decision logic and supply support planning for every repairable item within equipment. The construction of the partitioning system must be hierarchical so that summaries of items at any desired level can be used to quantify costs or maintenance burdens or identify readiness drivers. To ensure that maintenance planning addresses systems, subsystems, equipment, and components, a structured identification/indexing system must be established.

4.5.1.1 WORK UNIT CODE (WUC)

The WUC structure is used principally for aviation systems. The WUC is a three-through seven-character alphanumeric code, structured in a top-down breakdown manner. The first two digits of each WUC identify the major systems of the aircraft (Figure 4-17), while the remaining digits (up to a maximum of five) identify respectively the subsystems, Weapons Replaceable Assemblies (WRAs) – same as LRU – and the Shop Replaceable Assemblies (SRAs) – same as SRUs (Figure 4-18). ☑ The WUC structure, linked to the applicable part numbers/National Stock Number (NSN), permits the USN to identify the parts that comprise major system(s) including WRAs, SRAs, and maintenance significant piece parts. It also provides a hierarchical structure that can be used in conjunction with computational models. The NAVAIR WUC Guidebook is found at the following web-site http://logistics.navair.navy.mil/wuc/index.cfm.

MAJOR SYSTEM WUC DESIGNATIONS			
WUC	MAJOR SYSTEM	WUC	MAJOR SYSTEM
11	AIRFRAME	58	INFLIGHT TEST EQUIPMENT
12	FUSELAGE COMPARTMENT	61	HF COMMUNICATIONS
13	LANDING GEAR	62	VHF COMMUNICATIONS
14	FLIGHT CONTROLS	63	UHF COMMUNICATIONS
22	TURBOSHAFT ENGINE	64	INTERNPHONE SYSTEM
32	HYDRAULIC PROPELLER	65	IFF SYSTEM
41	AIR CONDITIONING/PRESS CTRL	66	EMERGENCY RADIO
42	ELECTRICAL SYSTEM	71	RADIO NAVIGATION
44	LIGHTING SYSTEM	72	RADAR BOMBING
45	HYDRAULIC-PNEU POWER	73	BOMBING NAVIGATION
46	FUEL SYSTEM	74	WEAPON CONTROL
47	OXYGEN SYSTEM	76	ELECTRONIC COUNTER MEASURES
49	MISCELLANEOUS UTILITIES	91	EMERGENCY EQUIPMENT
51	INSTRUMENTS	94	METROLOGICAL EQUIPMENT
56	FLIGHT REFERENCE	96	PERSONNEL EQUIPMENT
57	INTEGRATED GUIDANCE/FLIGHT CTRL	97	EXPLOSIVE DEVICES

Figure 4-17 Major System WUC Designations

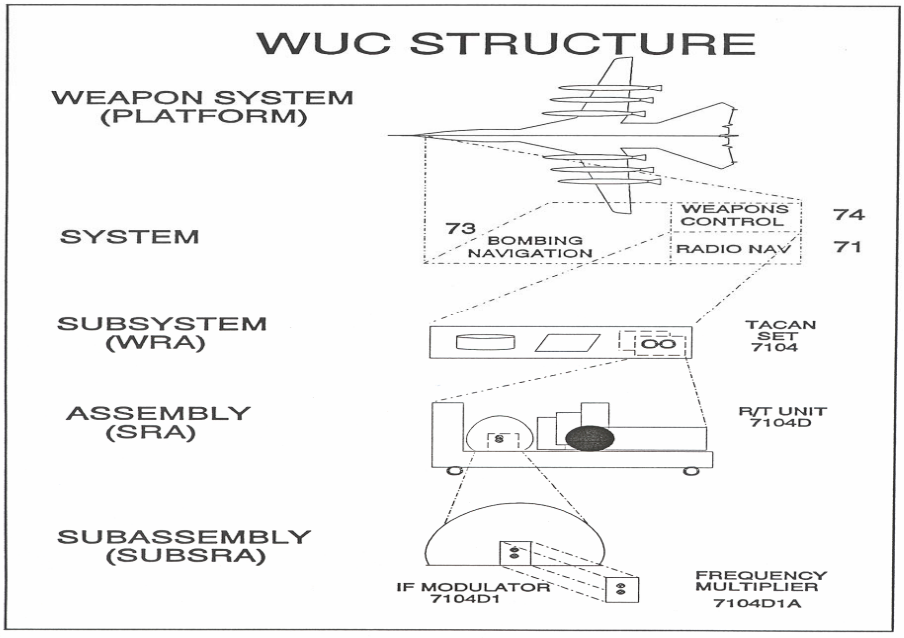


Figure 4-18 WUC Structure

4.6 MAINTENANCE STRATEGIES

Maintenance strategies support development of the maintenance concept and detailed maintenance planning and respond to maintenance drivers and operational and readiness requirements. As stated earlier, they are developed and refined during performance of trade-off studies early in the development of a weapon system. Examples of maintenance strategies are listed in Figure 4-19.

MAINTENANCE STRATEGIES

(EXAMPLES)

- MINIATURE/MICROMINIATURE (2M) REPAIR
- BUILT-IN TEST (BIT) BUILT-IN TEST EQUIPMENT (BITE)
- MAINTENANCE ASSIST MODULES (MAMs)
- PROGRESSIVE REPAIR
- ORGAINIZATIONAL TO DEPOT (O TO D)

Figure 4-19 Maintenance Strategies

- Miniature/Microminiature (2M) repair kits may be provided to selected I/D-level maintenance activities to repair printed circuit boards and miniature electronic components.
- Built-In Test (BIT) is comprised of logic functions, primarily software that is integral to the weapon system. Built-In Test Equipment (BITE) is functionally separate from, but permanently connected to, the weapon system. **BIT/BITE fault detection and fault isolation capabilities have a direct impact on manpower, personnel, training, and support equipment requirements of the new system.**
- MAMs are replaceable assemblies (modules) that identify failed assemblies through progressive replacement – i.e., the source of the failure is identified when the replacement corrects the problem.
- Progressive repair authorizes limited maintenance at one maintenance level with more extensive maintenance authorized at a higher level or levels. The USN/USMC might adopt progressive repair at a single intermediate maintenance activity because the cost of facilitizing all I-levels would be prohibitive.
- An organizational to depot maintenance strategy is indicated when the aircraft has a highly effective BIT/BITE or sub-systems that are forecasted to be highly reliable. In this concept, defective components identified by organizational maintenance personnel are sent directly to a depot for repair/overhaul. ☑ An O to D maintenance strategy is increasingly being adopted within the USN under a Performance Based Logistics (PBL) concept. See PBL below.

4.6.1 PERFORMANCE BASED LOGISTICS (PBL)

Performance Based Logistics (PBL) is the preferred Department of Defense (DoD) product support strategy to improve weapons system readiness by procuring performance, which capitalizes on integrated logistics chains and public/private partnerships[13]. The following are selected passages from the DoD Product Support Guide Executive Summary that highlight key PBL concepts:

- The cornerstone of PBL is the purchase of weapons system sustainment as an affordable, integrated package based on output measures such as weapons system availability, rather than input measures, such as parts and technical services.

[13] Performance Based Logistics: A Program Manager's Guide to Product Support, 2005

- PBL delineates outcome performance goals of systems, ensures that responsibilities are assigned, provides incentives for attaining these goals, and facilitates the overall life cycle management of system reliability, supportability, and total ownership costs. It is an integrated acquisition and logistics process for providing weapons system capability.
- The PM and the user then document these support requirements in a Performance Based Agreement. Continuous assessment of in-service system performance will identify needs for system improvements to enhance safety, reliability, maintainability, affordability, obsolescence, corrosion, and other Life Cycle Logistics (LCL) attributes.
-

Page 7 of the NAVAIR PBL guidebook states the following under the definition of the PBL Goal: "NAVAIR is looking for best value product support by empowering contractors to support NAVAIR systems, subsystems and equipments and directly linking their performance to their profit. The end goal of PBL is improving product support to the fleet at similar or reduced costs….Providers are encouraged to partner with government depots and repair facilities and utilize these resources whenever possible…..FMS support is listed as one of the functions (as applicable)"

The application of PBL takes many forms as depicted in Figure 4 -20. PMs might implement PBL arrangements directly with a Prime Contractor, but typically rely on NAVICP to execute a PBL arrangement using the flexibility of the Navy Working Capital Fund (NWFC). Critical Item management under PBL is discussed in Section 8.4.7.

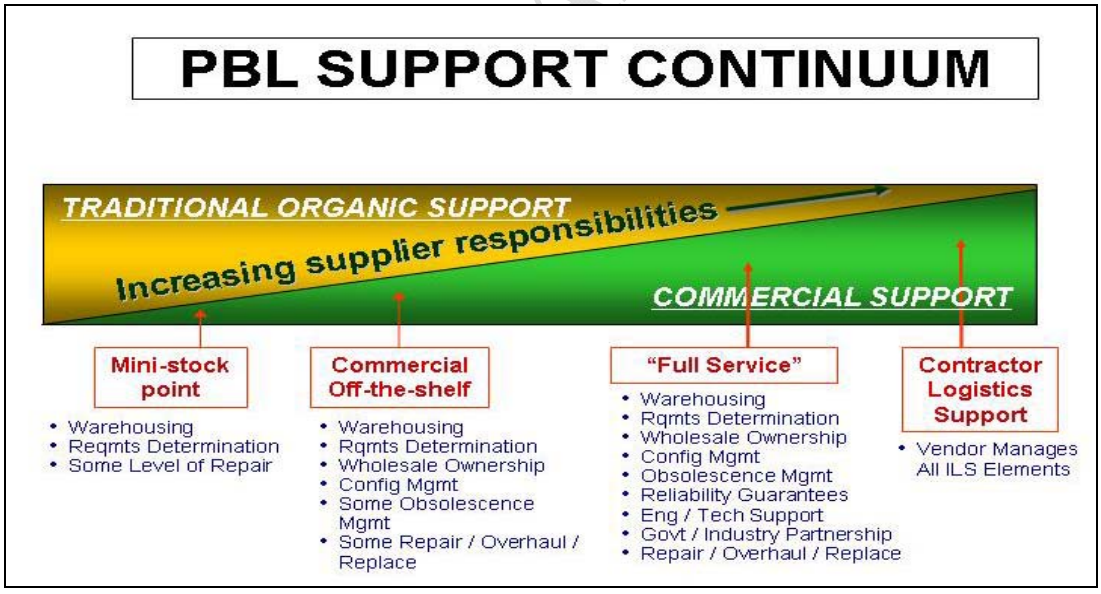


Figure 4-20 PBL Support Continuum

4.6.1.1 WHY PBL WORKS

Following data in Figure 4-21 was extracted from an AIR-6.9 presentation at the 2005 Hornet International Logistics Conference

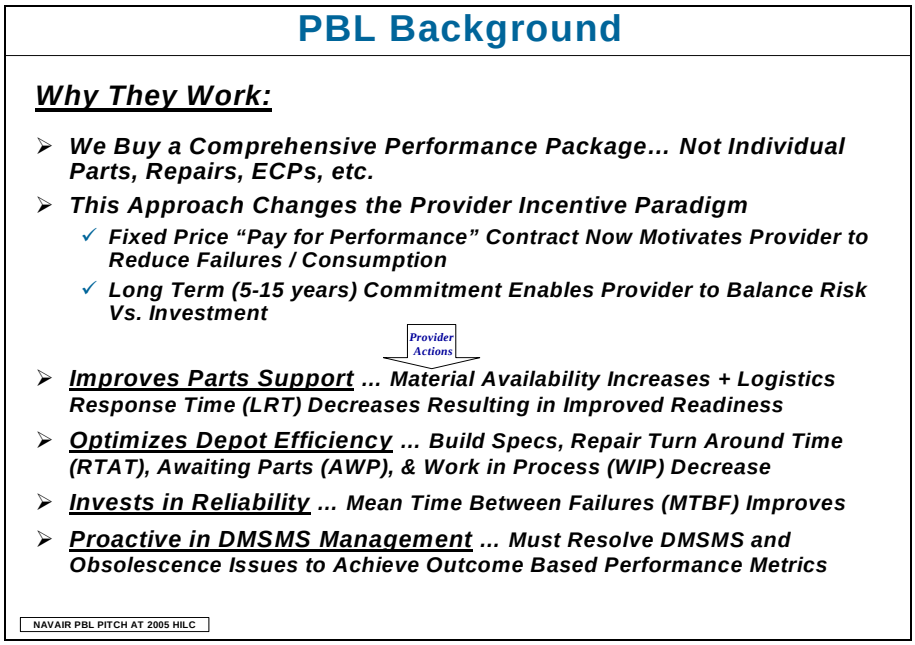


Figure 4-21 Why PBL Works

4.6.1.2 PBL INCENTIVES

The strength of a performance based system is the incentives established to motivate PBL execution. Figures 4-22 provides the impact of incentives on PBL contractor performance and Figure 4-23 provides a PBL success story.

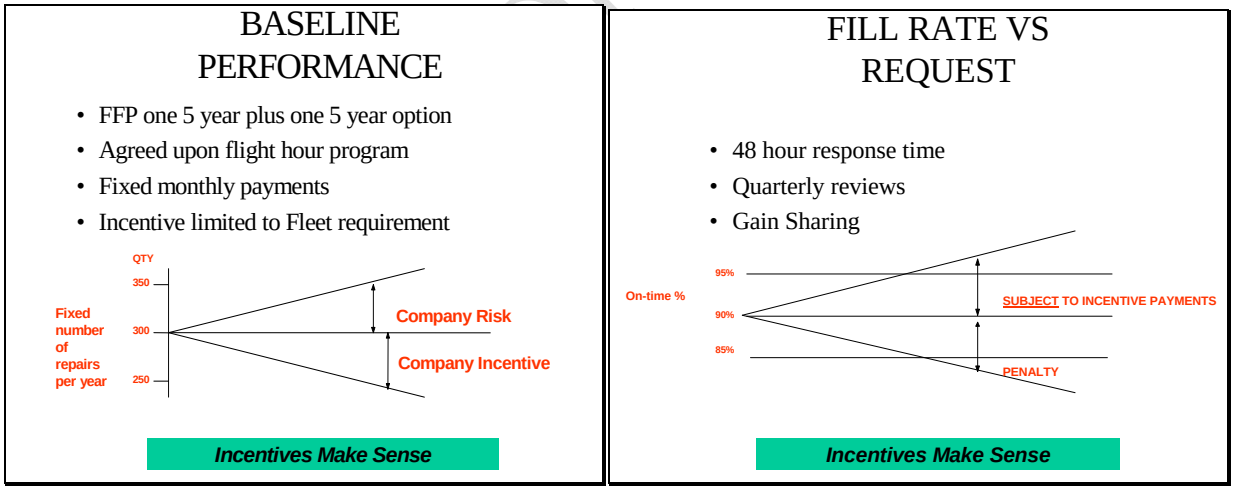


Figure 4-22 Impact of Incentives on Contractor (X) Performance

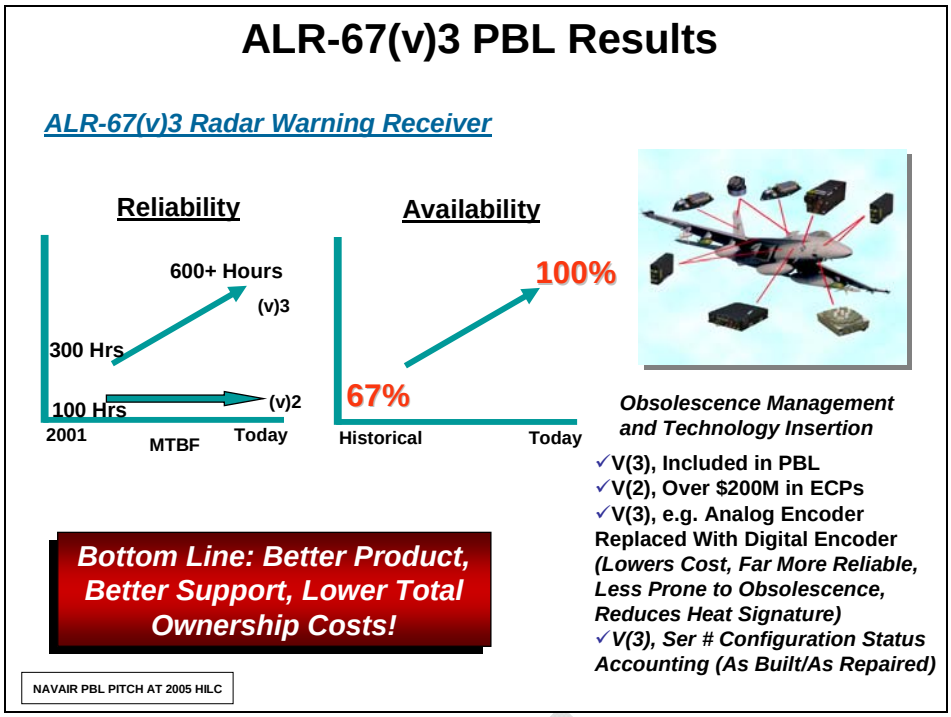


Figure 4-23 PBL Sample Success Story

4.6.1.3 FMS WEAPON SYSTEM SUPPORT IN A PBL ENVIRONMENT

For the most part, platform level (e.g. airframe, engine, and avionics) are not currently supported under an all inclusive PBL contract. Moreover, DoD concurred in a recent GAO report on PBL enhancement within DoD[14] that "the Services [should] reflect industry practice of using performance-based logistics as a tool to achieve economies at the subsystem or component level, rather than at the platform level." While platform level PBLs may become commonplace in the future – more than likely under a commercial contract – the following discussion predominantly focuses on two scenarios: (1) PBL contracts for new sub-systems and/or support equipment that would typically result from the incorporation of an ECP into an existing weapon system and (2) PBL contracts for legacy systems as discussed in Section 4.6.1.3.2. Also provided in Section 4.6.1.3.2 is a hybrid approach that uses PBL-like concepts – albeit not currently used by NAVAIR PMs - when introducing a new weapon system to an FMS customer to assist the FMS customer to more efficiently operate and maintain a new weapon system over time.

4.6.1.3.1 PBL SUPPORT OF A NEW WEAPON SUB-SYSTEM AND SE

Under this scenario, the FMS customer would decide whether to participate in the PBL contract as a full partner with the USN based on a business case analysis and their own country policy on issues such as performance contracting and national goals for self-sufficiency. Savings attributed to the PBL approach (e.g. streamlined supply chain) would be realized at the outset of a new program and factored into an FMS customer's decision whether to participate in a USN PBL contract. Initial and sustainment support is discussed separately below:

[14] GAO-04-715 dated August 2004

4.6.1.3.1.1 INITIAL SUPPORT

Direct Requisition Processing (DRP) procedures are typically used to supply initial support material (See Section 9.2.5.1 for additional DRP information). Material would be purchased new from a PBL contractor regardless of whether the FMS customer participates in the PBL contract

4.6.1.3.1.2 SUSTAINMENT

Sustainment through existing PBL contracts is operationally transparent for FMS customers that have the following in place when they purchase a new weapon system:

- A Cooperative Logistics Supply Support Arrangement (CLSSA) (see Section 9.2.5.2.2 for additional information)
- FMS demand patterns are anticipated to remain relatively constant from year to year of the PBL period of performance. NAVICP (OF) should be consulted if demand patterns are expected to increase over time.
- ROR – Should an FMS customer opt out of a PBL contract they can still have their Not Ready for Issue (NRFI) components repaired/upgraded under an ROR program. Whether ROR is done under a separate line in the PBL contract or under a separate ROR contract with the PBL contractor is subject to negotiation and FMS customer preference. ☑ As indicated below, NAVICP has developed a set of clauses that provide, among other things, an FMS customer the opportunity to order modification and upgrades under their ROR program that are consistent with component upgrades and modifications to Navy PBL components.

4.6.1.3.2 PBL SUPPORT OF LEGACY SYSTEMS

Many FMS customers have a problem when the USN shifts product support for legacy systems to a PBL concept because:

- They receive a replacement item – albeit serviceable – from the DoD supply system on an exchange basis rather than receiving the same item back
- The contractor is authorized to make Class 2 engineering changes (no change to form/fit/function) to the pool of exchange items (i.e. DoD-owned stock) to solve anticipated supportability problems
- Adopting the PBL solution – PBL contractor in the U.S - would impact an already established investment in an in-country maintenance infrastructure
- Support for the FMS customer's existing I/D-level maintenance capability erodes (i.e. the Defense Logistics Agency (DLA) would no longer stock piece parts)

NAVAIR/NAVICP recognized these problems and developed provisions for PBL contracts that accommodate FMS customer concerns and ensure that there is no degradation of FMS customer existing support when the Navy elects to shift to a PBL arrangement. For example:

- The PBL contractor would be authorized to repair or overhaul an FMS customer-owned component under an ROR arrangement by replacement of parts as authorized by the FMS customer to achieve the level of reliability and overcome obsolescence problems as promised under the Statement of Work (SOW) for the domestic PBL customers. A report of replacement parts by component serial number will be affixed to the documentation accompanying the component repaired under ROR.
- A Contract Data Requirements List (CDRL) item would be specified in the PBL contract – applicable to FMS only – wherein the contractor would provide to FMS DAPMLs identification of any configuration changes to USN-owned stock including a brief

description of what is being changed and the reason for the change (this is particularly important in cases where the Navy does not plan on receiving delivery of a Design Change Notice (DCN) with related drawings and technical data). The FMS customer would pay for the CDRL item on an as occurring basis and upgrade their components via the ROR contract if desired.

- The PBL contract would also contain separate provisions so that the FMS customers could order sustaining engineering and/or parts in support of their in country I/D-level effort related to the Navy equipment under PBL management.

4.6.1.3.2.1 UNRESOLVED FMS PBL ISSUES

Several FMS customers have raised complex issues that they say prevents them from participating fully in USN PBL contracts. The two major unresolved issues are as follows:

- FMS customers face political pressure to ensure a segment of weapon system depot maintenance is done by their in-country commercial industry much the same as "Core" depot maintenance requirements are congressionally mandated for U.S. organic depots. As a result, some FMS customer are seeking that selected in-country contractors be designated as a PBL vendor by the PBL contractor for FMS customer PBL depot workload. U.S. weapon system suppliers will be less competitive overseas unless they cope with the reality of this commercial requirement. To the extent practicable, the USG needs to assist US industry in coping with this requirement
- USN PBL contracts have exit strategies when an OEM is no longer committed to perform under a PBL contract. But for FMS customers to be a participant in a USN-managed PBL contracts, there needs to be an exit strategy covering when FMS customers continue to operate a PBL-system after the USN phases it out.

4.6.2 HYBRID FMS LOGISTICS SUPPORT

A hybrid application of TLSCM based on a combination of government and contractor support may be more suitable to a potential FMS customer than the traditional FMS approach. For example, expanding the FMS initial support period for a limited time beyond the typical 2-years would provide a new international customer the opportunity to phase in initial support through the expanded use of local commercial contractor support and a streamlined, performance-based supply chain. This approach is named Expanded Contractor Initial Support (ECIS) and is discussed below.

4.6.2.1 EXPANDED CONTRACTOR INITIAL SUPPORT (ECIS) OVERVIEW

The intent of ECIS is to provide tailored assistance to an international customer as they integrate a new weapon system into their military maintenance and logistics systems. It complements traditional FMS follow-on support, not replaces it. Fundamentally, ECIS prolongs and enhances the initial support period - with contractor assistance - until the FMS customer's in-country maintenance infrastructure is robust enough to ensure readiness goals are routinely met. Most aspects of the traditional USN approach to fielding and sustaining a new weapon system continue unchanged. ECIS allows the Government to address weaknesses of the traditional FMS follow-on support logistics system – e.g. supply chain management that's passive at times, in-country retrograde processing delays, irrelevant metrics, and bureaucratic delays. Acceptance of ECIS will vary according to various factors such as the availability of organic FMS customer resources (e.g. military technicians) and the desire for FMS customer to establish self-sufficiency (i.e. in-country maintenance capability).

The FMS customer would be offered full organizational (O) and selected intermediate (I) level maintenance capability (e.g. electrical, navigation, wheels/brakes) based on decisions made at the in-

country Site Survey. Residual maintenance would be performed by either the ECIS contractor supporting selected sub-systems using in-country and US-based commercial companies and traditional FMS logistics supporting the remainder. The selection of sub-systems for ECIS support would be based on historical USN data that reflected potential problem items. The ECIS contractor tasks would include: management of an in-country bondroom, management of a streamlined supply chain – including repair contracting and parts lay in to support a required repair turnaround time (RTAT) - for assigned sub-systems, and fulfillment of meaningful metrics. The ECIS contractor would interface daily with the FMS customer maintenance activity and perform intervention management when needed to assist the FMS customer O/I-level maintenance effort (e.g. parts procurement) achieve their goals. With assurances that ECIS will provide efficient follow-on support, the USG, in collaboration with the Prime Contractor, can safely recommend to the FMS customer a reduced initial support spares package and the acquisition of in-country maintenance capability on a phased basis over time. The reduction in spares would free up funding to cover a portion of the ECIS management effort

4.6.2.1.1 HOW ECIS WOULD WORK

There would be one overarching FMS case that would cover production (modification/upgrade for older weapon systems) as well as delivery of ECIS services. However, to simplify FMS administration over the life of the overarching FMS case, there would be two contracts between the USG and the Prime Contractor: (1) the traditional weapon system production contract under which the weapon system would be fielded, and (2) a long-term follow-on support ECIS contract for the delivery of related engineering and logistics products and services once the FMS customer-owned weapon system begins operations in-country. To ensure ECIS costs are fully understood by the FMS customer they would be separately identified as a line in the Letter of Offer and Acceptance (LOA) and embellished with appropriate notes to the LOA. Figure 4-24 depicts an overview of a notional FMS Case with a Production Contract and an ECIS Contract. Options for the international customer to sustain support beyond the ECIS contract are also depicted.

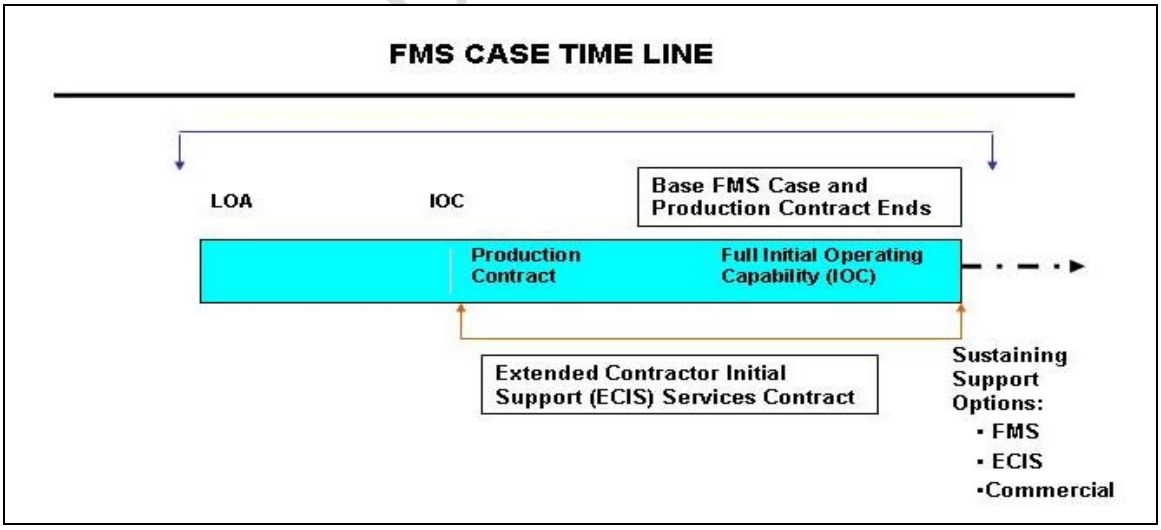


Figure 4-24 Notional FMS Case with a Production and ECIS Contracts

4.6.2.1.2 BASE FMS Case

Scope of the FMS case would include a mix of the traditional products and services found in an FMS weapon system case (e.g. weapon system, engines, program management, etc.) plus modified Product

Support and In-Service Engineering (ISE) that would be tailored to the FMS customer requirements and delivered under the ECIS contract. Both contracts are discussed below:

4.6.2.1.2.1 WEAPONS SYSTEM PRODUCTION CONTRACT

The Weapon System Production Contract would be similar to traditional production contracts used to purchase FMS weapon systems (i.e. option on the USN production contract). It would therefore include the weapon system, ILS for FMS customer O/I-level maintenance (i.e. initial spares, SE, pubs, etc.), weapons, production engineering/logistics, program management, etc

4.6.2.1.2.1.1 S&RP:

- Traditional FMS Support – A 2-year support package would be developed for S&RP supported under the traditional FMS logistics system. An RBS computational method would be used to calculate the requirement coupled with the FMS customer anticipated flying hour program, the forecasted I-level RTAT, and the order and ship time for either RIRO or ROR as applicable. Repairable and maintenance significant consumable requirements would be initially determined during the Site Survey.

- ECIS Support - In lieu of the traditional two year S&RP support package, options for various levels of initial (e.g. 60 days) S&RP support would be linked to performance metrics (e.g. assured delivery timeframes) in the ECIS contract and provided to the FMS customer for decision and funding under the FMS case. Requirements will be jointly computed by the Government and Prime Contractor using a readiness based approach and parameters (e.g. support period, estimated flying hours, ECIS performance metrics) detailed in LOA logistics notes[15]. The Prime Contractor would focus on unprovisioned systems and selected sub-systems that would historically benefit from enhanced supply chain management under the performance-based execution strategy (See Category 4 in Figure 4-25 below). Repairable and maintenance significant consumable requirements would be initially determined during the Site Survey. However, the final range and depth of initial support repairables that would be managed under the ECIS contract will be negotiated by the Government and the Prime Contractor considering the performance metrics cited in the LOA notes.

[15] Paragraph C5.4.8.9 of Reference (a)

	Category of Material	Example	Approach	Remarks
1.	Readily available in DoD Supply System	Any component that fit this category	RIRO	ROR or in-country repair if country rejects RIRO.
2.	In-country maintenance if infrastructure available	Aerospace-related components with infrastructure typically available in foreign countries….e.g. electrical, fuel, hydraulic, instruments, gyro	ECIS	ECIS contractor would license commercial companies and provide tech data/parts under commercial license agreement
3.	Existing Navy O to D-level maintenance plan	Avionics, weapon systems and other subsystems where the USG has not purchased I/D-level test equipment, tech data, bit/piece parts, training	ROR	ROR would be managed by USG using traditional procedures. Negotiate ECIS contractor assist in streamlining supply chain
4.	Items that would benefit from performance-based approach (see examples)	High cost, potential readiness degrader, obsolescence potential, bit part availability problems, reliability improvement candidate	ECIS	ECIS contractor would process end-to-end repair under performance metric

Figure 4-25 ECIS Initial Support Options

4.6.2.1.2.1.2 INITIAL MAINTENANCE CAPABILITY

The FMS customer would be offered full O and selected I-levels of maintenance capability. O/I-level interfaces with the ECIS contractor would be prescribed in the LOA. Maintenance capability would be finalized jointly at an in-country Site Survey using the options cited in Figure 4-25. Applicable S&RP, SE, publications, and training would be offered in conjunction with fielding in-country organic O/I-level maintenance capability. Residual maintenance (i.e. any non in-country organic maintenance) would be performed under traditional FMS sustainment programs or via the ECIS contract for selected items by a combination of in-country and U.S.-based commercial companies'. As discussed below, the ECIS contractor would be responsible to ensure commercial contractors providing residual maintenance have the wherewithal (e.g. publications, parts, SE, etc.) to do so

4.6.2.1.2.2 ECIS Contract

Management of the ECIS contract would be delegated by the PM to NAVICP who would function as the Product Support Integrator (PSI) for the PM. The PSI manages strategies and integrates sources of support - public and private - [for the PM] in meeting the negotiated performance outcomes prescribed [in the contract][16]. The ECIS contract would replace the traditional follow-on support concepts beginning during aircrew training and continuing for a defined period (e.g. 5-7 years after delivery of the last aircraft). The scope of the ECIS contract would include the "unique features" described below as proposed by the USG with FMS customer concurrence. There would be an exit strategy should the FMS customer choose to terminate contractor support prior to contract termination. There should also be provisions for surge requirements should they become necessary. The contractor would recover costs based on a scheduled fee negotiated in the ECIS contract. The fee would be tied to the FMS customer forecasted flying hour program (i.e. Power-by-the-Hour (PBH)) and the contractor would recover upfront costs (e.g. depot parts "lay-in", capital, facilities, etc.) over the life of the ECIS contract. The fee would also include recurring costs typically found in repair contracts (e.g. labor, material) keyed to metrics, as well as factors for ISE labor, program management, etc. Note: Funds to cover ECIS services must be included in the basic FMS case. However, the cost avoidance in initial

[16] DoD PMs Guide to Buying Performance, dated November 2004

support costs (e.g. spares/SE) should cover a large portion of ECIS costs so that the net FMS case logistics cost for initial support + ECIS will be less than what would have been the cost under traditional FMS cases for initial and follow-on support.

4.6.2.1.2.2.1 Unique Features of ECIS Include

- A contractor-managed dedicated supply chain with incentives, warranties and contractor up-front funding (discussed below) to assure performance. For example, services would include: (1) End-to-End inventory management of FMS customer-owned ECIS initial spares (Note), (2) a contractor managed in-country warehouse that would interface directly with the FMS customer maintenance organization, and (3) a guaranteed mutually defined Customer Wait Time (CWT) metric (see ECIS Metrics below), measured in hours, from the time the requirement is received from the FMS customer.

Note: Warehousing and retrograde management for non ECIS-components would be subject to negotiation if requested by the FMS customer. Retrograde management for non-ECIS-components would aid both the USG and FMS customer in the tracking and reporting of components managed under the RIRO and ROR programs.

- Contractor reliance on a web-based Management Information System / Integrated Data Environment (MIS/IDE) to manage the supply chain and interface with the FMS customer maintenance/supply organization. The MIS/IDE would be based on an open architecture using standard industry protocols and password protection. The FMS customer would input to the MIS/IDE. Both the FMS customer and USG logisticians would have access to these systems. Data in the MIS/IDE would be a deliverable under the ECIS contract and available as required to the FMS customer.

- Repairable components will be supported on an exchange basis through a pool of FMS customer-owned initial spares stored in the aforementioned in-country warehouse. Performance metrics and contractor-funded depot piece part lay in will be used to maintain a consistent flow of material and ensure CWT is achieved. Depot maintenance will be managed by the contractor through a combination of in-country and U.S-based depot resources – including public-private arrangements where applicable

- There would be provisions to expand FMS customer self-sufficiency (i.e. added I/D-level in-country maintenance) during the ECIS contract period subject to the traditional technology transfer considerations

- The contractor would propose an In-Service Engineering (ISE) level of effort to cover workload such as obsolescence management, Quality Deficiency Report (QDR) investigations, maintenance task reviews

- Contractor Up-Front Funding – In addition to the overhead costs of managing the supply chain, the contractor will be expected to "front" the cost (conditioned on reimbursement from FMS case funds) of expedited transportation/depot parts "lay in" as required in meeting performance metrics

- Contract Options:

1. Proximity to the FMS customer O-level provides the ECIS contractor early visibility of problems and to proactively manage workarounds. Thus, when ordered by the FMS DAPML, the ECIS contractor will be capable of buying spare and repair parts associated with non ECIS component repair under the ECIS contract that are routinely not available from the DoD logistics system supporting the FMS customer O/I-level maintenance effort. FMS case funds will be used for this purpose

2. The contractor will be authorized to insert technology while units undergo repair to overcome obsolescence and sustain reliability as planned subject to FMS customer concurrence regarding chain of approval.

- **ECIS Metrics**

1. **Customer Wait Time (CWT)**: A mutually-defined CWT requisition fill rate metric (e.g. hours/days) would be prescribed in LOA notes and flowed down to the ECIS contractor via the ECIS contract. Once the NRFI ECIS component is delivered to the bond room by the FMS customer, the ECIS contractor would be responsible for all subsequent action (packaging, shipping, repair contracting, etc.) required to meet the CWT metric. FMS customers would turn in NRFI components to the contractor bond room according to a target (e.g. hours after removal from aircraft) established in the LOA logistics notes and reiterated in the P&SP. FMS customer failure to meet the NRFI turn-in target would cause adjustment in the CWT fill rate metric. Contractor's failure to meet the CWT metric would result in a reduction of the contractor fixed fee. Exceeding the CWT metric would result in a negotiated award fee.

2. **Reliability Baseline:** The ECIS contractor will track reliability of all FMS customer repairable components compared to USN reliability data throughout the life of the contract. The Contractor will have access to the Navy and FMS customer Maintenance Data Collection Systems (MDCS) to perform this task. A first year baseline will be established for each component based upon Government supplied data. The reliability baseline metric would consist of the ECIS Contractor maintaining the selected ECIS-components at least to the same level of reliability as defined by the first year baseline. The contractor's fixed fee would be contingent on meeting the reliability baseline metric. Non ECIS components could be added to the ECIS component list on a negotiated basis or be subject to RTAT or reliability improvement through FMS customer exercising maintenance improvement options in the ECIS contract

3. **Option: Procurement Administrative Lead Time (PALT):** As discussed above, the ECIS contractor will be capable of buying spare and repair parts – when ordered. Average PALT in days (TBD) will be the performance metric for buying these parts. PALT begins when the Contractor receives a funded requirement from the Government at the contractor buying activity, suspends when the requirement is placed on a firm fixed contract, and continues when the material is shipped from the supplier enroute the freight forwarder. Failure of the contractor to achieve the PALT metric will negatively impact the contractor's potential award fee

NAVAL AVIATION ACQUISITION LOGISTICS
FMS ORGANIZATION

5.0 NAVAL AVIATION ACQUISITION LOGISTICS FMS ORGANIZATION

5.1 SECURITY ASSISTANCE

The USG provides defense articles, military training, and other defense related services, by grant loan, credit or cash sales in the furtherance of national policies and objectives. This is accomplished through a series of Security Assistance (SA) programs. One such program is the FMS Program.

"FMS is a non-appropriated program through which eligible foreign governments purchase defense articles, services, and training from the U.S. Government. The purchasing government pays all costs that may be associated with a sale. In essence, there is a signed government-to-government agreement (normally documented on a Letter of Offer and Acceptance (LOA) between the U.S. Government and a foreign government). Each LOA is commonly referred to as a "case" and is assigned a unique case identifier for accounting purposes. Under FMS, military articles and services, including training, may be provided from DoD stocks or from new procurement. If the source of supply is new procurement, on the basis of having a LOA which has been accepted by the foreign government, the U.S. Government agency or military department assigned cognizance for this "case" is authorized to enter into a subsequent contractual arrangement with U.S. industry in order to provide the article or service requested"

5.2 WHO MANAGES THE FMS PROGRAM?

The following statement was taken from the Defense Security Cooperation Agency (DSCA) web page (http://www.dsca.osd.mil/), "The U.S. Congress establishes the laws, authorizes programs, appropriates funds, and has an oversight role in SA. Within the Executive Branch, Department of State (DoS), National Security Council, Office of Management and Budget, Department of Treasury, Department of Commerce, and others have responsibilities concerning SA. Aside from the President, the principal legislated responsibilities fall to the DoS and DoD. The Secretary of State provides continuous supervision and general direction for SA, including determining whether there will be a program for a country and, if so, its scope and whether, and when, a particular sale will be made. The Secretary of Defense (SecDef) implements programs to transfer defense articles and services. DSCA is the principal DoD organization through which the SecDef carries out responsibilities for SA. Within DoD, the Military Departments (MILDEPs) and defense agencies manage individual country programs, including development of LOAs, and supply of articles and services. Financial management of accepted LOAs is the primary responsibility of the Defense Finance and Accounting Service (DFAS).

Each SA-recipient country has U.S. representation, usually a Security Assistance Organization (SAO), under the direction of the chief of the U.S. diplomatic mission, for in-country management of the SA program. In addition to in-country management assistance, the SAO provides oversight for the SA program within its assigned country in conjunction with country counterparts, the country team within the diplomatic mission, the regional Unified Command, Office of the Joint Chiefs of Staff (JCS), DSCA, and the MILDEPs."

The DSCA provides direction of the FMS program through DoD 5105.38-M, Security Assistance Management Manual (SAMM). A copy of the SAMM is available on the DSCA web page. DSCA offers training courses covering various FMS topics through the Defense Institute of Security Assistance Management (DISAM). A description of their course offerings – including logistics – is contained on their web page (http://disam.osd.mil/).

5.3 DOD LOGISTICS ORGANIZATION

The DoD does not have a separate logistics system to support foreign military requirements. Rather, each Service relies primarily on its domestic infrastructure – Government resources with varying levels

of contractor support – to develop initial support logistics requirements and sustain the support over a weapon system's life cycle. Figure 5-1depicts the DoD Logistics System with the Services International Logistics Control Offices (ILCO) – see next paragraph - interwoven within each service organization. Except for sub-systems that are common to multi platforms, the DoD logistics system's capability to support weapon systems erodes significantly as the Services phase a weapon system out of their active inventory.

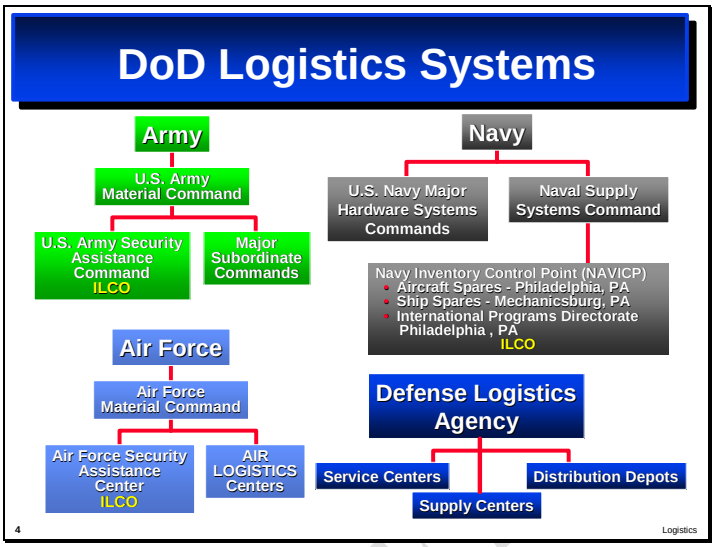


Figure 5-1 DoD Logistics System

5.3.1 INTERNATIONAL LOGISTICS CONTROL OFFICE (ILCO)

Regardless of whether an FMS sale is for a new production or OOI weapon system, Navy Program Managers at NAVAIR Headquarters maintain management oversight and control of the FMS case for acquisition, modification, and fielding the weapon system. (USA and USAF are organized somewhat differently). However, as depicted in Figure 5-1, each Service has an ILCO which is responsible for tracking financial and logistics documentation for all FMS cases. The Navy ILCO is a department of the NAVICP, located in Philadelphia, Pennsylvania. The Navy ILCO manager is known as the Integrated Country Program Manager (ICPM). Responsibilities of the ICPM include the following:

- Function as FMS case managers for follow-on support logistics cases.
- Maintain effective case management control of all FMS cases/programs for assigned countries through shipment and case/program line closure.
- Coordinate and implement country program management directives for support requirements for assigned country's programs.
- Serve as the central point of contact for matters relating to country programs, acting as the country's U.S. representative within the U.S. supply system to insure responsive and timely service.
- Audit FMS cases to insure that the material requirements of the LOA have been satisfied.
- Resolve problems relative to materiel delivery services, special relationships between customer country armed forces, and U.S. requirements for transportation or documentation.

In effect, ICPMs serve as the interface (or focal point) between the foreign country's requirements and the DoD acquisition, logistics, and training systems. They insure (through requisition monitoring and

follow-up, as well as other actions) that the tasks indicated on the LOA are accomplished[17]. It should be noted that the Defense Logistics Agency (DLA) does not have an ILCO, relying instead on Service ILCOs to interface directly with FMS customers.

5.3.2 USN FMS LOGISTICS ORGANIZATION FOR AVIATION WEAPON SYSTEMS - OVERVIEW

- In Production - The NAVAIR Program Management Office acquisition logistics and engineering organization, coupled with the corresponding Prime Contractor organization is complex and well-resourced, while an aircraft is in production. Typically, the PM will establish an IPT to manage the weapon system production acquisition and delivery of all aspects of the logistics program needed to field the weapon system and sustain it for 2-years after operations begin in country. Thereafter, follow-on support for parts and repair is provided mostly by the Navy logistics system under FMS cases managed by NAVICP and technical support (e.g. change management) is provided by FMS cases managed by NAVAIR.

- Out of Production - The in-production organization retains its basic structure – albeit somewhat reduced in size – once an aircraft is out-of-production, but still operational within the USN. Follow-on support continues as discussed above.

- Out-of- Inventory - As a weapon system begins phasing-out of the USN inventory, the Government logistics infrastructure begins shifting resources to newer workload and disposing of excess material. To provide for continuing logistics and engineering support for existing and future FMS operators of a phased-out weapon system, PMs must undertake to protect critical material from disposal and establish an FMS surrogate support infrastructure. Toward this end, PMs typically collaborate with industry to establish a weapon-unique support infrastructure. As discussed in Section 10.0, AIR-6.9/1.4, NAVICP Code (OF) and DLA complement the PM effort by protecting critical material, equipment, technical data, etc. from disposal - under the FMS Reserve Program - that would be required for current and future support of OOI weapon systems.

5.3.3 NAVY INTERNATIONAL PROGRAMS OFFICE (NAVY IPO)

Navy IPO provides the interface between international allies, friends and coalition partners and the U.S. Department of the Navy's Hardware Systems Commands (HSCs) – e.g. NAVAIR - Logistics Managers – e.g. NAVICP - and Security Assistance and International Training Agencies. As such, it provides oversight over all aspects of Navy FMS case development. Also, as Navy's "Face to the Customer", Navy IPO provides an ombudsmen role when logistics problems require intervention to achieve resolution. Further information on Navy IPO is available on their webpage at: (https://www.nipo.navy.mil/Index.cfm) Government Only.

5.3.4 NAVAL AIR SYSTEMS COMMAND (NAVAIR)

NAVAIR is the Navy HSC that, in partnership with industry and members of the Naval Aviation Systems Team (NAST), develops acquires, and supports naval aeronautical and related technology systems. NAVAIR participates in the FMS Program and provides a wide spectrum of weapon systems, services and data to foreign countries. The NAVAIR organization for the fielding FMS programs, including logistics support is provided below. The NAVAIR command web page is www.navair.navy.mil .

[17] Chapter Eight of the DISAM Green Book

5.3.4.1 PROGRAM MANAGER, AIR (PMA)

The PM for the weapon system is responsible for representing the NAVAIR to potential international customers and for overall management and financial accountability of the FMS cases for specific weapon systems. The PM, or a designated deputy for FMS (if assigned), performs the following primary FMS tasks:

- Market the weapon systems in collaboration with Navy IPO
- Develop P&A statements and LOAs
- Establish the weapon system configuration at the system level
- Act as the PM once a weapon system is sold
- Act as FMS case manager for initial support and selected follow-on support FMS cases
- Technology transfer oversight

5.3.4.2 INTEGRATED PROGRAM TEAM (IPT)

Once the weapon system is sold, the PM will establish an IPT to manage the weapon system production acquisition and delivery of all aspects of the ILS program. Figure 5-2 illustrates the NAVAIR IPT concept. The PM may retain leadership of the IPT or delegate it to IPT leader (i.e. PM) as dictated by the size and complexity of the weapon system acquisition. Besides the PM, the IPT leadership team includes members from the various competency areas such as, Assistant Program Manager, Systems Engineering (APM), (SE) (Class Desk), DAPML, contracting officer, counsel, etc., plus selected members from the various NAVAIR competencies as required. Thus, the IPT has the responsibility and wherewithal to deliver all phases of an FMS acquisition from the program inception to delivery of the initial support package. Functions of selected IPT members are discussed below.

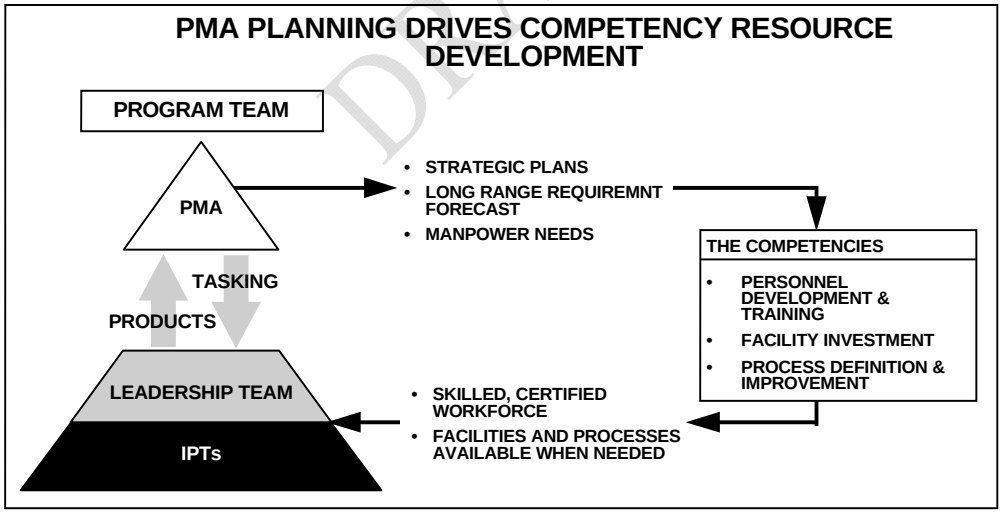


Figure 5-2 NAVAIR IPT Concept

5.3.4.2.1 CLASS DESK

The Class Desk is responsible for configuration planning, planning and implementing an integration and system checkout program, sustaining engineering, modification, design and test, software development and modification liaison engineering. The Class Desk provides configuration planning to the FMS customers if they request it via their participation in a particular modification program. The Class Desk also provides routine engineering support for technical directives and software modifications.

5.3.4.2.2 FMS DAPML

The FMS DAPML is the acquisition manager for FMS ILS and holds the primary responsibility for the acquisition planning and integration of the FMS logistics program. Unless the FMS DAPML has the requisite experience, the FMS DAPML does not assume full FMS DAPML responsibilities until after completion of the Site Survey, which is typically managed by the more experienced, FMS Product Support Team Leader (PSTL) – See Section 5.3.4.4.1. Whenever possible, it's beneficial to have the FMS DAPML designee assist the PSTL during the Site Survey. Once appointed, an FMS DAPML becomes responsible for establishing and sustaining maintenance capability and product support sufficient to meet the foreign country's operational requirements. The FMS DAPML represents the PM for all FMS logistics matters. The FMS logistics program is planned and implemented by the FMS DAPML for the PM primarily using the DoD logistics system in collaboration with the Prime Contractor. This process ensures that all support elements are properly planned, acquired and sustained, thus providing maintenance capability and material support for the foreign customer that is measurable against USN standards (i.e. readiness goals) for the introduction of a domestic weapon system. Tasks include configuration planning, pricing logistics elements of the P&A and LOA, assisting or managing the in-country Logistics Conference and Program Definition (LCPD) – commonly referred to as the Site Survey – and tracking the acquisition and delivery of all ILS elements. The FMS DAPML also plans the logistics program by developing and publishing the Program and Support Plan (P&SP), the Phased Support Program Plan (if required), Integrated Maintenance Transition Work Packages (IMTWP) and the Depot Maintenance Capability Program Plan. The FMS DAPML and the government Logistics Element Manager (LEMs) that support the FMS DAPML use a combination of government personnel and support contractors to plan, acquire, and deliver ILS services. ILS services typically delivered by the LEMs include the acquisition of ROR, supply support, support equipment, training, technical publications, and technical assistance. As determined by the FMS customer, some product support services – e.g. ROR as a line on the initial support FMS case – are managed directly by the FMS DAPML. ☑ Reliance on the DoD logistics system may change under a TLSCM approach where the PM selects a commercially-based product support strategy that delivers sustaining support under a long-term commercial contract (see paragraph 1.2).

5.3.4.2.2.1 LOGISTICS TEAMWORK

The FMS APML accomplishes his/her tasks through IPT multidisciplinary teamwork. Membership in these teams includes representatives from government and industry IPTs and FMS customer parallel organizations. For example, the composition of the maintenance transition team that reviews progress towards customer maintenance self-sufficiency includes the following personnel:

- Government and contractor supply and support equipment LEMs
- Customer logistics managers
- Maintenance training managers
- Customer maintenance personnel as required

5.3.4.2.2.1.1 PRIME CONTRACTOR IPT

The Prime Contractor establishes a parallel IPT organization to interface with the Government and FMS customer. Using the top-level configuration approved by the Government, the Prime Contractor provides detailed configuration and production logistics planning for the installed airborne systems and the support assets. Major OEMs, such as the engine and weapon system OEMs, work closely with the Prime Contractor and may be a part of the prime IPT. Additionally, the Prime Contractor works closely with the FMS DPML to portray the foreign customer's maintenance concept, tailor it as required,

identify the logistics support requirements and plan the transition of maintenance capability and material support to the FMS customer. The Prime Contractor team plays a key role in assisting the FMS DAPML in responding to the myriad of action items generated by potential and existing FMS customers. As with the introduction of new weapon systems to the USN fleet, the Prime Contractor often provides supply and repair services to the foreign customer during the training phase of the initial support period and during the early stages of aircraft introduction. The Prime Contractor is the primary source of sustaining engineering services while a weapon system is in production. That role continues to a lesser extent when production stops and ISE, Basic Design Engineering (BDE), Integrated Logistics Support (ILS), and Configuration Management (CM) shifts primarily to a Fleet Support Team (FST) located at the applicable Navy depot. Although the Prime Contractor's role is diminished somewhat after production stops, they remain a vital participant in post production support which is discussed in paragraph 9.3.4.4 of the PSM.

5.3.4.2.2.1.2 NAVAL AVIATION SYSTEM TEAM (NAST)

The **NAST** is a group of NAVAIR-managed commands located at various places within the U.S. that provide logistics and engineering services to an FMS program. One exception is the NAVICP, which is a member of the NAST for technical purposes (i.e. supply support), but is attached to the Naval Supply Systems Command (NAVSUP) for resource allocation and supply policy. The NAST consists of the below listed major organizations. Figure 5-3 provides the major components of the NAST. A more detailed description of their responsibilities is contained later in this document. Access to some of the following websites requires Public Key Infrastructure (PKI) certification.

NAME	LOCATION	FUNCTION	WEB-SITE
Naval Air Warfare Center, Aircraft Division (NAWCAD)	Lakehurst, New Jersey	Requirements determination, acquisition, and tracking the delivery of SE & ILS for SE	www.lakehurst.navy.mil
Naval Inventory Control Point (NAVICP)	Philadelphia, Pennsylvania	Requirements determination (including repairable and consumable spares and repair parts), acquisition, and tracking the delivery of airborne spare and repair parts. ROR management.	www.navicp.navy.mil
Naval Air Technical Data and Engineering Service Command (NATEC)	San Diego, California	Requirements determination, acquisition, and tracking the delivery of technical data. Provides field engineering technical assistance (i.e. TECHREPS)	https://www.natec.navy.mil
NAVAIR (PMA-205)	Patuxent River, Maryland	Requirements determination and the planning of aircrew and maintenance training	PM205.navair.navy.mil
NAVAIR (PMA-201)	Patuxent River, Maryland	Requirements determination and the acquisition of Cartridge Actuated Device (CAD) and Propellant Actuated Device (PAD)	Tel 301-757-7477
NAVAIR (AIR-6.0)	Patuxent River, Maryland	Organic depot maintenance policy	www.navair.navy.mil
Naval Air Depot (NAD)	Cherry Point, North Carolina North Island, California Jacksonville, Florida	Aircraft, engine, and component depot repair services (i.e. ROR)	www.nadepcp.navy.mil www.nadepni.navy.mil www.nadepjx.navy.mil

Naval Air Warfare Center, Weapons Division (NAWCWD)	China Lake, California Point Mugu, California	Provides integrated warfare systems and life-cycle support for aircraft weapon systems	http://techtransferpm.nawcwd.navy.mil/
Defense Logistics Agency (DLA) Note: 1	Ft. Belvoir, Virginia	Acquisition of consumable repair parts as determined and passed to DLA by NAVICP	www.dla.mil

Note: 1 DLA is not a member of the NAST. However, DLA plays a major role in the fielding of a new weapon system through the acquisition of most consumable repair parts.

Figure 5-3 Major Components of the NAST

5.3.4.3 NAVAIR INTERNATIONAL PROGRAMS DEPARTMENT (AIR-1.4)

Although not a member of an IPT, AIR-1.4 facilitates NAVAIR-managed FMS and cooperative programs within the NAST. As such, AIR-1.4 is the principle interface between the logistics organization and the weapon system program offices for management of the FMS program. The AIR-1.4 web-site is https://www.fms.navair.navy.mil (Government only).

5.3.4.4 DIRECTOR OF LOGISTICS FOR NAVAIR FMS PROGRAMS (AIR-6.9)

As the Director of Logistics for International Programs (DOL-IP), AIR-6.9 is responsible for FMS logistics policy and process within NAVAIR and providing trained AIR-6.0 competency FMS logisticians to various program offices. Specific duties include the following:

- Serves as the principal logistics advisor to the Director of International Programs within PEO / AIR-1.0 programs
- Coordinates and assist in the NAVAIR wide FMS strategy development to include Logistics support for new business efforts with AIR-1.4
- Maintains a customer liaison with the International community that provides periodic contact with the FMS customers, establishes communication links, and encourages feedback
- Provides overall leadership and guidance with the FMS PSTL and FMS APML in performance of their management duties and assigning additional duties for process or new business development as deemed necessary
- Budgets for, allocates, and manages FMS administrative funds required by Competency personnel to perform pre-program, generic case management, and administrative support. Monitors civilian personnel and contractor administrative expenditures and re-allocates as necessary to optimize execution.

AIR-6.9 also interfaces within the NAST and other Navy FMS organizations to develop common FMS logistics policy and represents NAVAIR on FMS logistics matters at senior level DoD/Navy IPO intra service meetings on current and future FMS logistics policy issues and transformation. Toward this end, AIR-6.9 commissioned publication of the PSM and manages the LPIT discussed in Paragraph 5.3.4.4.2. AIR-6.9 provides ongoing contractor technical and logistics services to the IPTs through an existing Omnibus Contract for Services (OCS). The OCS provides contractor logistics services to PMs, FMS DAPMLs, and various LEMs. Services from the OCS are ordered when they are cost effective compared to Government or prime contractor-provided services and to when the services of experienced acquisition logisticians are needed on a temporary basis to handle surge requirements. The following is a partial list of the logistics services provided by the OCS during the acquisition and follow-on support phases of an FMS program:

- Assessing FMS customer requirements as submitted by Government LEMs and prime/OEM contractors
- Developing Life Cycle Cost (LCC), Operating and Support (O&S) Cost, and P&A and LOA estimates
- Reviewing planned changes to USN weapon systems and identifying the impact to the potential FMS customer support program
- Maintenance planning
- Developing a phased maintenance transition program and monitoring the progress of establishing maintenance capability and material support
- Maintaining a configuration control database
- Assessing in-country commercial and organic depot capability
- Monitoring the ROR program

5.3.4.4.1 FMS PRODUCT SUPPORT TEAM LEADER (PSTL)

The position is designed to provide assigned FMS DAPMLs, the applicable program Director of Logistics (DOL), the DOL-IP and the FMS PMs with a focal point for coordination of program FMS Logistic issues. This position is responsible for assisting in the planning, analysis, policy and execution of an effective ILS Program for both current and potential FMS customers. The FMS PSTL duties are as follows:

- FMS POLICY ADVISOR - Serves as the principal logistics advisor for the Program Office as it relates to FMS logistics issues and will facilitate and participate in the development of policy as a NAVAIR FMS representative.
- INTERNATIONAL LOGISTICS INTEGRATION MANAGEMENT - Provides overall leadership and guidance for the FMS APML in performance of their management duties and assigns additional duties as deemed necessary in support of NAVAIR, the Program Office, IPT and International Programs. Ensures the FMS APMLs strive to balance current and future readiness. Provides analysis with the potential of reducing the cost of doing business; improves agility; ensure the teams are properly aligned; and will be the central point for FMS fleet driven metrics.
- RESOURCE MANAGEMENT - Budgets and manages the manpower required by Competency personnel to perform pre-program, generic case management, and administrative support. Monitors civilian personnel and contractor support services administrative expenditures and re-allocates as necessary to optimize execution.
- FMS BUSINESS DEVELOPMENT- Coordinates and assists in the NAVAIR-wide FMS strategy and development to include logistics support for new business efforts with NAVAIR's DOL-IP.
- LIAISON - Maintains a customer liaison with the International community that provides periodic contact with the FMS customers, establishes communication links, and encourages feedback. Establishes and maintains liaison with the Program Manager Staff, Integrated Product Team, Competency Leaders, Element Managers, and Industry in matters related to in-service operations and maintenance of the aircraft weapon system.

5.3.4.4.2 FMS LOGISTICS PROCESS IMPROVEMENT TEAM (LPIT)

AIR-6.9 and the Naval Supply Systems Command (NAVSUP, Code 07) who is "double hatted" as NAVICP (OF), co-chair the Naval Aviation FMS Logistics Process Improvement Team (LPIT) that was

created to "integrate and streamline the FMS process". Specifically, the charter, which was co-signed by Commanders, NAVAIR/NAVSUP, created the FMS LPIT to

> *"Integrate and streamline the processes that logistically support Naval Aviation FMS programs to enhance the Navy's competitive position in the worldwide marketplace."*

The LPIT consists of USG logistics managers, FMS customers, and industry representatives that are actively involved in delivery of products and services to FMS customers. The LPIT has a limited access, password protected, Program Management Database (PMD) designed to facilitate information sharing and FMS process improvement by LPIT members. It is strongly encouraged that all FMS customers assign a minimum of two logisticians to either participate in the LPIT process directly or interactively via the PMD. ☑ AIR-6.9 organizes an annual FMS logistics conference that is attended by Government, FMS customers, and industry representatives. Information is passed to assembled attendees, but the primary purpose of the conference is for the FMS customers to collaborate amongst themselves to nominate the most pressing FMS logistics problems for the LPIT to solve during the next twelve months. It's a highly acclaimed conference and all FMS customers are invited to send representatives. Additional information on participating in the conference and in the PMD is available by contacting jwinn@anteon.com via email.

5.4 FUNDING OF NAVAL AVIATION FMS PROGRAMS

Naval Aviation FMS programs involve the following two types of unique FMS funds, administrative and case:

5.4.1 PRE-LOA FUNDING

The tasks that are done before signing the LOA are typically funded with FMS admin funds. These tasks include: in-country briefings, efforts by the FMS APML to tailor existing domestic USN/USMC maintenance strategy and related costs to potential customer's needs, and responding to potential customer queries on a myriad of logistics issues. Should a potential FMS customer desire an in-country Site Survey prior to the signing of an LOA, the FMS customer may be required to specifically fund that effort with FMS case funds. A specific LOA is the desired method of funding the Site Survey, but a funded Letter of Intent (LOI) is an acceptable alternative.

5.4.2 POST-LOA FUNDING

FMS case funds are used to fund all efforts that are in direct support of the FMS customer. Tasks that are in support of multiple customers are FMS admin funded. For example, procurement services at the NAVICP, Philadelphia are FMS admin funded by NAVSUP since the buyers are not dedicated to a specific FMS case. Dedicated NAVICP buying services that specifically expedite an FMS customer procurement effort would be funded by FMS case funds. LPIT functions are also FMS admin funded as FMS logistics process improvements benefit multiple FMS customers. Another funding source that indirectly supports FMS programs are the Navy and DLA Working Capital Fund (WCF). The WCF pays for services such as supply system and depot maintenance overhead. These costs are recovered through the application of a surcharge. Thus all customers (i.e., domestic and FMS) pay for these services on a prorated basis when buying material and services from the DoD logistics system.

5.4.3 POST PRODUCTION SUPPORT (PPS) ORGANIZATION

The objective of post production support is to maintain the weapon system in a ready condition within planned O&S cost levels after the in-production phase is completed. The international operator often develops their own PPS strategy based on LCC models that are tailored to their operational and support scenario requirements and costs. This might mean, sustaining original infrastructure investments made by their organic and commercial depots regardless of cost effectiveness. However, because of the high

cost of “going it alone”, they typically rely on many aspects of the USN post production plan. For example, FMS customers typically participate in the following USN post production efforts:

- Formal component improvement programs
- Exchange of data on fleet wide problems
- Parts and depot repair support
- Planned USN upgrades as required
- Engineering studies
- Safety bulletins
- Technical manual changes

The extent of FMS customer participation in USN postproduction support can significantly reduce USN non-recurring costs. Thus, USN logistics managers should make FMS customers aware of the USN post production support efforts and promote FMS customer participation.

5.4.4 AIRCRAFT OUT-OF-PRODUCTION (OOP) - ACTIVE IN THE USN

Once production stops, the **Class Desk** continues to be responsible for configuration planning as it applies to the domestic program and to the FMS customers if they request it via their participation in a particular modification program. The Class Desk also provides routine engineering support for technical directives and software modifications. The **FMS DAPML** is the major point of contact within the IPT for logistics matters and remains responsible for sustaining maintenance capability and material support sufficient to meet the foreign country's operational requirements. This is accomplished through an active action item tracking system as well as briefs to the FMS customer through regularly scheduled program reviews. Each PM establishes its own PPSP considering the peculiar conditions (i.e. upgraded new production, continuing FMS production, no follow-on production) that apply to their program. The PPSP encompasses support for the domestic fleet customer, with consideration for FMS requirements. PPSPs rely on traditional organizational elements to provide the range of sustaining logistics and engineering services. These organizational elements consist of the following: the IPT Post-Production Support (PPS) team, LEMs such as NAVICP, NATEC, and NAWCAD LKE, the applicable NAD and FST, and the Prime Contractor and its major sub-contractors. The USN PPS program as it relates to FMS PPS is discussed in Section 9.3.4.4 for aircraft that are still active in the USN inventory and in Section 10.0 for aircraft that are no longer active in the USN inventory.

5.4.4.1.1 PRIME CONTRACTOR/OEM PPS ROLE

The Prime Contractor and major sub-contractors continue to play an important role in sustaining logistics and engineering as the government transitions a weapon system to an OOP status. This is particularly true until the production tooling is shifted from Prime Contractor/OEM storage to Government storage (see Section 9.4.2.3) for contingency purposes. Prime Contractors remain actively involved with the configuration management of "common systems" that transcend new production and OOP aircraft, as well as originating many of the major ECPs on OOP aircraft. The extent of Prime Contractor involvement in day-to-day sustaining logistics and engineering is a function of complexity of the problem and available funding. Many FMS customers would prefer that the Prime Contractor remain preeminent as the source for engineering studies and analysis throughout the weapon system life cycle. However, due to cost and other considerations, the Navy relies heavily on the FST to coordinate engineering workload amongst a mix of government and Prime Contractor logistics and engineering resources.

5.5 SECURITY ASSISTANCE OFFICE (SAO)

The SAO plays a prominent role in the weapon system acquisition process. The SAO's, in coordination with the USN fleet commanders, identify and clarify international customer requirements for USN PM's and Prime Contractor representatives. It's of particular importance that suppliers understand the potential customer's strategic logistics plan for supporting a new weapon system so that they can tailor the existing support strategy to the customers' needs during the exploratory phase of the acquisition process. Queries from potential FMS customers to the Navy should be sent to the NAVAIR program office via Navy IPO, with information copies to the SAO and fleet commander as requested by the SAO.

PRE-ACQUISITION TASKS

6.0 PRE-ACQUISITION TASKS

6.1 CRITICAL ISSUES REQUIRING ATTENTION DURING ACQUISITION

This section discusses the various actions that take place before the LOA is signed and the acquisition process begins. It suggests questions that the potential FMS customer might raise to better understand the logistics support that is being proposed by either a Government or commercial supplier. They include the following:

6.1.1 PRODUCT DEFINITION

A potential FMS customer's configuration is initially defined in the LOA and then flowed down to the FMS customer as an option on the USN production or repair/modification contract. It typically mirror's the latest configuration less any equipment removed for technology transfer considerations. ☑ A discussion of acquisition logistics for OOI weapon systems can be found at Section 9. For an in-production acquisition, most deviations from the current configuration would not be cost effective, as they would drive significant and costly changes to the production line. Configuration deviations driven by technology transfer issues, would most likely involve selected equipment and/or software only, thus minimizing disruption of the production line. Potential customers may also opt to substitute their own equipment in lieu of USN equipment (e.g. VOR vice TACAN) for life cycle cost or self-sufficiency reasons. A number of operational factors (e.g. mission requirements) affect the product definition, but they are not discussed in the PSM. It's important that the configuration of the weapon system be finalized as early in the acquisition process to provide logistics managers with the configuration information that they must have to begin the product support planning process. Deviations for Out of Production/Out of Inventory weapon systems are primarily driven by supportability issues. Selected product support issues that impact product definition include the following:

6.1.1.1 TECHNOLOGY TRANSFER

Many potential international customers buy USN weapon systems to upgrade their aerospace industry capability. Thus, a key question that may arise during discussions with the USN is the breadth of technology that will be offered in conjunction with the FMS sale. Technology transfer policy decisions are country specific and based on USG National Disclosure Policy Committee (NDPC) Records of Action (RAS), or other State Department and DoD agency technology transfer and Security Assistance formal decision memoranda. However, the following general technology transfer policy statement would normally apply to all countries buying weapon systems from the USN under an FMS case. "An FMS customer will be offered, for the USN-approved weapon system configuration, the capability to operate and maintain the weapon system in a safe condition for flight and at a performance level consistent with the manufacturer's specifications for installed equipment. Toward this end, the USN will offer the FMS customer the opportunity to achieve self-sufficiency through the establishment of in-country organizational, intermediate and selected depot repair capability. In conjunction with performing the aforementioned maintenance, the necessary tools, parts and materials, as well as drawings, plans, specifications, sequences, outlines, process specifications, unclassified design study reports and technical directives pertaining to the foreign customer's configuration, and other printed documentation will be offered to the FMS customer. It is the FMS customer's choice whether to select in-country organic or commercial facilities to perform intermediate or depot maintenance. However, should they select a commercial depot, the FMS customer is not authorized to transfer logistics products (e.g. spares, SE, publications) received under an FMS case to the commercial contractor without specific approval of the USG under 3rd Party Transfer

Regulations". ☑ This statement is a composite of policies that pertain to previous FMS acquisitions. It's to be construed as a guideline for planning purposes only as there could be more restrictive policy applied to any particular FMS acquisition based on future political and foreign policy considerations.

6.1.1.2 FALSE IMPRESSIONS

"Problems can occur when foreign purchasers expect to obtain certain articles and services from the USG but conditions prevent these sales. USG personnel must consider releasability, disclosure, and all required coordination before indicating to a potential purchaser that a sale from the USG is possible"[18] .

6.1.2 INDUSTRIAL STRATEGY

Establishing the right mix of organic, interservice, and commercial depot maintenance can be defined as "industrial basing." The plan, that outlines the tasks, methods, and policy in establishing and then maintaining the industrial base, would be the "industrial strategy." As discussed in Section 2.0 of the PSM, without a published industrial strategy, international customer working level logistics planners are not empowered to deviate from the USN maintenance plan. Thus, resources may be invested in a strategy that could ultimately increase life cycle costs and undermine the national industrial strategy. For example, USG intermediate maintenance typically only repairs 30-40% of failed electrical components (e.g. starters, generators) removed from an aircraft. The remaining components are forwarded to the USG depot for more extensive repair (e.g., armature rewind). Adjusting the maintenance plan to take advantage of in-country depot capability could significantly reduce repair turnaround time and shrink the requirement for pipeline spares. ☑ AIR-6.9 has access to people with experience assisting international customers in developing an industrial strategy.

6.1.2.1 DEPOT MAINTENANCE STRATEGY

As discussed in Section 4.4.2.5 of the PSM, the USN decision to adopt an intermediate or depot maintenance strategy for their domestic fleet is based on an economic LORA model considering factors such as equipment reliability, cost of the equipment itself, the cost of achieving maintenance capability at various afloat/ashore sites, etc. Potential FMS customers must conduct a similar economic analysis – using their own data and operational scenario - to decide whether they should acquire intermediate or depot maintenance capability. Because of factors such as lower labor cost, less space constraints on repair infrastructure, co-location of the I/D-levels of maintenance, etc., FMS customers may often derive a different answer when they run their LORA-type model. For this reason, the USN offers, as indicated in Section 6.2.1, a flexible depot maintenance policy for FMS customers as part of the initial FMS case. Namely, with some exceptions for specific critical technologies, international customers buying weapon systems from the USN under an FMS case will be offered depot maintenance capability on basic airframe items – including structure and components – that adversely affect safety of flight. Navy IPO must approve requests for depot capability from FMS customers on avionics and weapon system components on a case-by-case basis. Supporting these requests to Navy IPO with LORA-type data and existing "like and similar" in-country depot capability (e.g. other Service or commercial depots) will strengthen the request. Negotiating USN approval of a specific depot repair plan prior to signing an LOA provides USN and potential FMS customer logisticians with planning data that could significantly reduce the initial support investment and

[18] SAMM Paragraph C4.5.5

minimize problems in acquiring the technical data needed to do the depot repair. A suggested depot strategy that might be cited in an LOA is found at Figure 6-1. Section 6.1.2.2 provides additional discussion of depot maintenance planning issues.

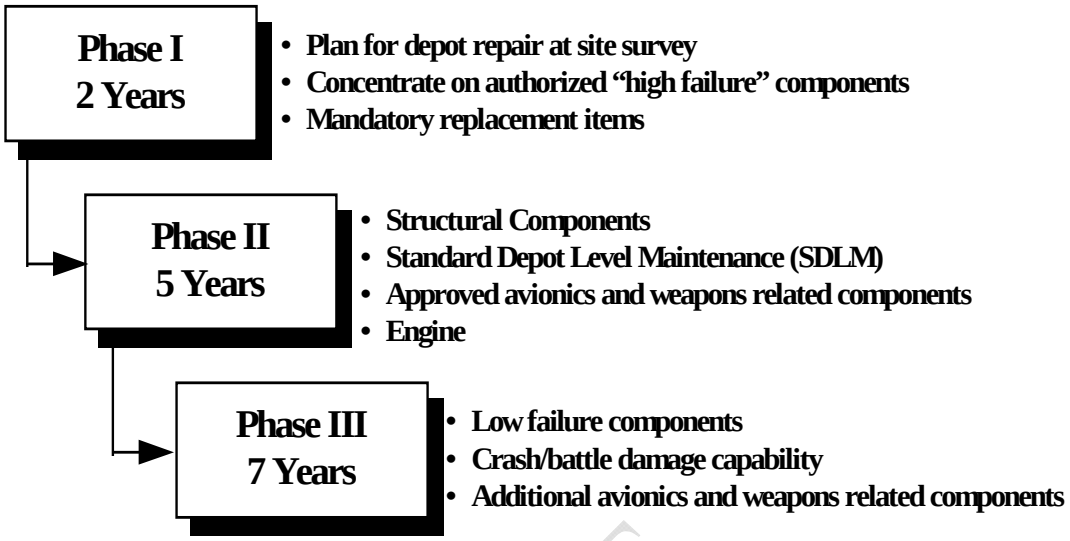


Figure 6-1Establish Depot Capability with the Initial FMS Case

6.1.2.2 IN-COUNTRY COMMERCIAL DEPOT MAINTENANCE

The USG may approve providing depot maintenance capability to an FMS customer. The FMS customer is not authorized in the LOA to sub-custody necessary logistics material and technical data (i.e. technical manuals and necessary drawings) to the commercial contractor unless they follow USG 3rd Party Transfer Regulations (See Section 4.6.1). An alternative to this requirement is described in Section 4.6.1 wherein a U.S. commercial contractor, under contract to the USG to provide sustaining support to an FMS customer, establishes a commercial license agreement with a foreign contractor and provides the required technical and logistics data under commercial licensing regulations.

6.1.3 AVAILABILITY OF USN TRAINING RESOURCES

Many potential FMS customers prefer to receive their aircrew and maintenance training (other than depot) at organic USN/ USMC facilities rather than contractor facilities. With the downsizing of USN facilities and manpower, the ability to offer organic training has diminished. This issue is of such importance, that if not solved, can be the reason for canceling the acquisition of a USN weapon system. The issue must be raised early in the acquisition process so that satisfactory workarounds can be proposed. ☑ At times, USN or USMC air stations are asked to provide I-Level support to FMS customer-owned aircraft that are being used for the foreign aircrew training. This effort requires significant coordination within the USG and should be discussed prior to signing the LOA.

6.1.4 THE "OFFSET" ISSUE

An "offset" is a financial arrangements stemming from a sale of U.S. equipment to an international customer in which the U.S. manufacturer commits to reinvest a portion of the revenue received in the country that purchased the equipment. The offset agreement is between an international customer and the equipment manufacturer only. ☑ The USG does not participate

in the negotiation of offset agreements. The Department of Defense is not a party to any offset agreements or arrangement which may be required by the Purchaser in relation to the sales made in this LOA and assumes no obligation to administer or satisfy any offset requirements or bear any of the associated costs. To the extent that the Purchaser requires offsets in conjunction with an FMS sale, offset costs may be included in the price of contracts negotiated under this LOA. If the Purchaser desires visibility into these costs, this should be discussed with the contractor at the time the offset agreement is signed. The contracting officer will ensure that the offset costs priced into the FMS contract are reasonable and consistent with the offset agreement[19]. However, many of the offset agreements result in new or upgraded commercial aerospace capabilities in the country buying the new weapon system. Once this new capability is fully established the USN can use it for the following requirements**:**

1. Periodic reliance on competitively priced/qualified overseas repair facilities in conjunction with deployed fleet needs. Note: See discussion on NAMSA below
2. NAVICP routinely seeks competitive sources worldwide for USN-wide parts and repair requirements (e.g. one of their UHF/VHF radio depots is currently located in Singapore)

It is therefore recommended that the FMS customer request that the USN brief the potential for the USN using overseas depot maintenance facilities during their pre-acquisition briefings.

6.1.5 WARRANTIES

International customers place a great deal of importance on the value of warranties, therefore it is important that FMS DAPMLs understand USN warranty policy/administration and be able to articulate this policy during pre-sale discussions. It is particularly important to understand the difference between a weapon system warranty and a spares warranty since a weapon system warranty (i.e. airplane warranty) does not extend to a warranty for replacement parts provided from the DoD supply system. Weapon system warranties are Prime Contractor specific and the details should be discussed with the Contractor as part of the pre-sale meetings. Administration of a warranty program is another important topic that potential FMS customers will pose to a FMS DAPML.

6.1.5.1 WARRANTY DEFINED

Section 1.3 of NAVAIR document footnoted below[20] defines a warranty as "a promise or affirmation by a contractor to the government regarding the nature, usefulness, or condition of the supplies or the performance of services furnished under the contract". The document goes on to say that "the principal purposes of a warranty in a government contract are:

- To delineate the rights and obligations of the contractor and the government for defective items and services
- To foster quality performance

6.1.5.2 NAVAIR WARRANTY POLICY

6.1.5.2.1 WARRANTY PLAN

In accordance with paragraph 5 of footnote 3 below, PMs shall "obtain approval from the chief of the contracting office for the use of warranties in acquisitions involving new weapons systems programs regardless of the type of proposed contract. Documentation specifying that a warranty

[19] SAMM, Note 9 in Paragraph C5.F2 (Sample LOA)

[20] NAVAIR Warranty Guide dated June, 2002

is appropriate for a specific program shall be in the form of a warranty plan. The warranty plan must contain the following information:

- Introduction material
- Acquisition background
- Weapon system warranty terms
- Warranty administration
- Cost benefit analysis

Guidance for development of the initial warranty plan and its associated warranty administration plan is contained in reference document footnoted below which can be found on the Internet at http://logistics.navair.navy.mil. ☑ An FMS customer-directed weapon system warranty does not require a plan unless specifically requested.

6.1.5.2.2 NAVAIR WARRANTY PRINCIPLES

It is NAVAIR policy to pursue cost effective warranties on all procurements. The NAVAIR PMs are responsible for the development and inclusion of appropriate warranty provisions in solicitations. The PM should include the expertise of the integrated product team when determining warranty requirements. Additionally, warranty periods must be clearly stated in the solicitation. Warranty clauses should explain what benefit would be derived by the Government; for example, explain how the warranty would improve fleet readiness and mission effectiveness. Because most business considerations are metric driven, a cost/benefit analysis is required to support the specific business case for use of a warranty. If a warranty can not be supported by a cost/benefit analysis, then the PM should not invoke warranty clauses. This means the warranty clause should only be invoked to support a smart business decision. The warranty is the exception rather than a legal requirement[21]. The NAVAIR warranty policy will apply to FMS customers buying production aircraft unless the FMS customer requests a more explicit warranty.

6.1.5.2.3 NAVAIR FMS WARRANTY

Pursue the use of warranties when appropriate and cost effective, for FMS, when directed to do so by the FMS customer[22]. The FMS DAPML should refer a FMS customer considering more explicit warranties to the NAVAIR Warranty Guide as an excellent resource in structuring warranties. For example, paragraph 1.4.3 of the NAVAIR Warranty Guide states the following with regard to administration and enforcement of any warranty program: "The Government's ability to enforce the warranty is essential to the effectiveness of any warranty. There must be some assurance that an adequate administrative system for reporting defects exists or can be established. The adequacy of a reporting system may depend upon such factors as the:

- Nature and complexity of the item
- Location and proposed use of the item
- Storage time of the item
- Distance of the using activity from the source of the item
- Difficulty in establishing existence of defects, and

[21] SAMM Note 9 in Paragraph C5.F2 (Sample LOA)

[22] NAVAIR Instruction 13070.7A, Policy Guidance for Warranty Application of Naval Aviation Systems Team Weapon Systems, dated 9 August 1999

- Difficulty in tracing responsibility for defects"
- The SAMM[23] states that an explanatory note should be included in the LOA if a more inclusive warranty will be negotiated with the contractor as requested by the FMS customer.

6.2 ALTERNATIVE SUPPORT CONCEPTS

Traditional FMS logistics support offered by the USN parallel's the USN maintenance philosophy. Typically, that includes

- Full O/I-level maintenance
- Selected depot maintenance capability
- A 2-year spares package based on FMS customer flying hours and a 180-day U.S-based depot repair turnaround time
- Training, publications, and technical assistance as required operating and maintaining the aircraft for as long as required

However the USN is shifting away from this traditional support strategy to alternative support concepts for both new and legacy weapon systems. It's therefore important for the FMS customer to understand alternative support concepts early in program development and decide what's best for them.

6.2.1 PHASED INITIAL SUPPORT

Some international customers that buy new or used weapon systems do not have the funding to buy all of the associated training and logistics support to achieve their desired level of self-sufficiency when the aircraft begin operating in-country. However, if the customer will accept a phased approach to developing their own logistics support, a strategy could be proposed with funding from the initial FMS case that would permit buying the aircraft, conducting a robust aircrew training/familiarization program, and building a selective in-country logistics infrastructure over time. The strategy would include the following components:

- A commitment from the USN in the LOA to offering specific in-country capability (refer to Figure 6-1 for a potential depot phase in plan) over time
- Funding the procurement of full organizational support and selected I-level capability (e.g. communications and navigation equipment)
- Heavy reliance on the DoD system (both organic and commercial repair sources) for a period of 5-7 years to fulfill readiness goals that support the aircrew training effort
- Funding in the initial FMS case for extraordinary measures to achieve an ambitious depot RTAT such as expedited transportation, in- country USN logistics representation, and selective depot parts lay-in
- An aggressive ROR program that includes direct shipment of unserviceable assets to the pre-designated depot facilities as depicted in the NAVICP slide in Figure 6-2
- Figure 6-3 depicts a recommended ROR program for supporting a phased support program

[23] SAMM, Paragraph C6.3.8

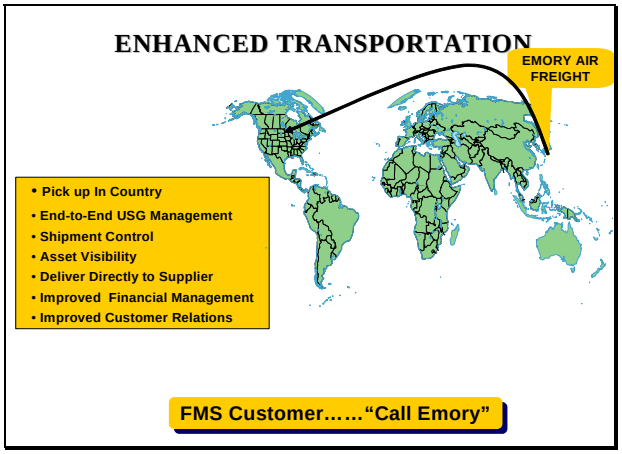


Figure 6-2 Expedited Transportation System

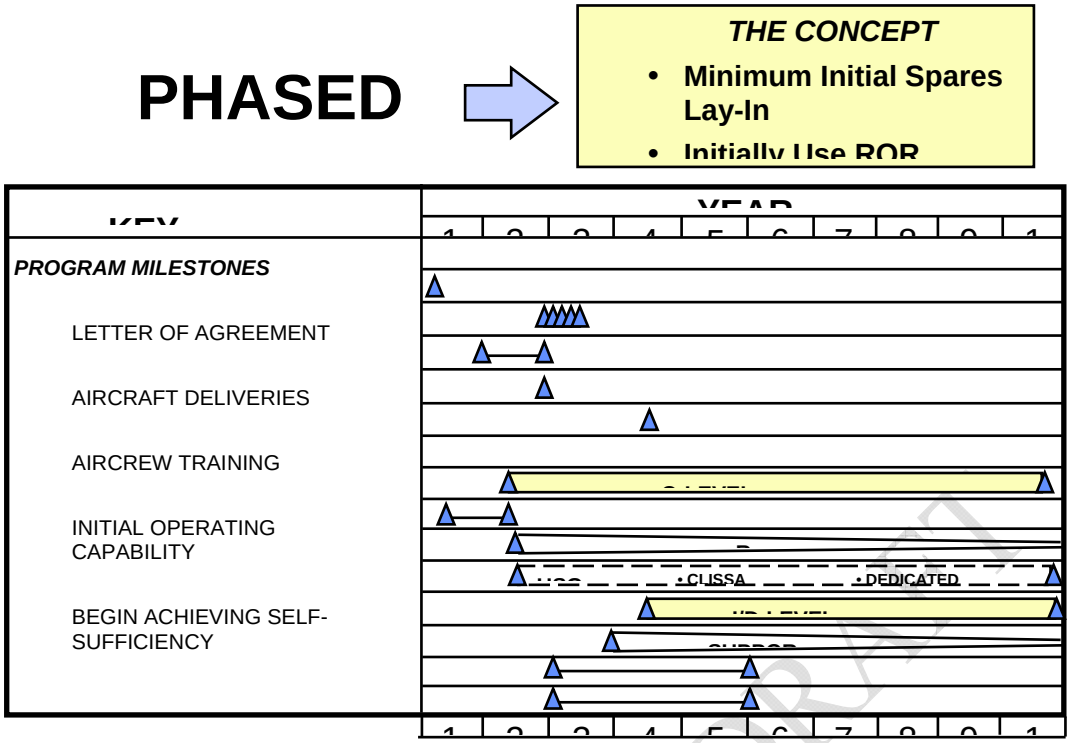


Figure 6-3 Potential Phased Support

6.2.2 EXTENDED CONTRACTOR INITIAL SUPPORT (ECIS)

Refer to Section 4.6.2.1 for a discussion of ECIS.

6.3 ESTIMATING LIFE CYCLE COSTS (LCC)

Many potential foreign customers are now relying on LCC when selecting a new weapon system. Often, sophisticated models are used in their decision process, in which case the foreign customer requests data from suppliers to input to their LCC model. If an LCC model is not available to the foreign customer, the USN or Prime Contractor have LCC models that can quickly provide answers to "what if" questions posed by foreign customers. ☑ However, any significant deviations from existing USN or Prime Contractor models would require dedicated FMS customer funding.

6.3.1 LOA LOGISTICS NOTES

Notes should be included in LOAs to provide more detailed information concerning items or services being offered. Table C5.T5 of the SAMM lists the notes that should be included in LOAs as indicated[24]. It's suggested that additional notes may be required to clarify logistics issues. The following Logistics Paragraph from the SAMM is quoted for information in preparation of logistics notes. Additional information is available in the AIR-1.4 LOA/P&A Desktop Guidebook.

C.5.1.1.1 Logistics Information. LOAs show the configuration of equipment being sold, but furnish detailed equipment specifications only if required. Variations from standard USG configurations will be noted, together with risks that might be assumed as a result of the variance. The notes highlight any purchase of a configuration contrary to that recommended by the USG.

C.5.1.1.1.1 LOAs will include any requirement for, and scheduling of, logistics conferences or other program management actions for the purpose of definitization. The costs of such conferences, which occur prior to acceptance of the LOA, can be funded from the Administrative Budget Account Allocation of the Implementing Agency, with reimbursement from the LOA after it is accepted. These actions pertain to approved programs and are distinguished from AECA, Paragraph 26 survey teams.

C.5.1.1.1.2 The Implementing Agency assures that at least a one-year supply of concurrent (initial) spare parts, through fourth echelon, at U.S. peacetime usage rates, is included on the LOA with equipment being offered. Such spare parts packages should be identified on the LOA by category and total value (blanket order line) rather than by article.

C5.1.1.1.3 For offers of MDE items, the purchaser will be advised of the estimated period that USG repair parts support will be available.

C5.1.1.1.4 If the purchaser has requested that procurement of a particular item is to be provided from a single source, and the Implementing Agency has approved this request, the sole source designation will be included in the notes.

C5.1.1.1.5 Any USG intent to develop logistics or maintenance support plans will be specified.

C5.1.1.1.6 The basis for logistics support costs will be specified. These should include the period of support of the initial spares package, operational deployment of equipment, level of maintenance to be accomplished by the purchaser, number of maintenance sites, or other basis as applicable.

[24] SAMM Paragraph C.5.4.8.9

C5.1.1.1.7 To ensure logistics support of weapons systems, the LOA should identify critical long-lead time items, which must be procured in advance of total program definitization

C5.1.1.1.8 Known limitations in condition must be shown using codes in Figure C5.F4 or in unique case notes. The LOA should specify that the cost of any rehabilitation is not included in the "as-is" price. The purchaser should normally be invited to inspect, in advance of receipt of the LOA if possible, major items and substantial quantities of excess equipment being sold in "as-is" condition.

6.3.2 MASTER INDEX OF REPAIRABLES (MIR)

USN PMs utilize a variety of databases to respond to foreign customer budgetary "what if" questions. The Master Index of Repairables (MIR) is one such database for spare parts estimating and it is described below for purposes of illustrating the range of information that can be provided to a potential foreign customer by the USN or from Prime Contractors that are part of the IPT. The MIR contains a top-down breakdown, indentured structure listing, of WRAs that are SM&R coded for procurement (i.e., "PA__D", "PA__G", and "PA__O"). For purposes of budgetary analysis it is not necessary to include all "PA" source coded repairable items. Historical USN/USMC data sustains database currency for failure rates and repairability at USN/USMC fleet repair intermediate level repair sites. Data from the MIR would be tailored (e.g. shore based data only) using the configuration of a potential FMS customer. Unprovisioned (i.e., full logistics data is not yet available) systems would be included in the MIR using "like and similar" data from a representative system. The database need not contain SRAs or consumable items. Budgetary estimates for SRAs and consumable items would be derived parametrically as the repairable scenarios vary using the following parameters[25]:

- SRA Not Repairable at I-level – 65% of the applicable WRA cost estimate.
- SRA Repairable at the I-level – 35% of applicable WRA cost estimate.
- Piece Parts – 15% of the WRA cost estimate

6.3.2.1 ESTIMATING SE COST

The cost and identification of major items of SE (> $1,000), linked to the applicable system supported using the WUC, is another LCC data element that would be available for inclusion in a "what if" scenario. For example, if an analysis of in-country repair versus ROR was being done for the UHF/VHF radio, the potential savings in the cost of pipeline spare parts and ROR could be computed, then compared to the one-time cost of establishing in-country I-level capability.

LCC Data Elements: Figure 6-4 provides a list of linked, LCC data elements that should be available from a PM in a hierarchical structure for use in a foreign customer LCC model. Other LCC cost data such as training, technical data, etc., should also be available, but not linked to the applicable sub-system.

[25] Based on parameters used by the NAVAIR for developing "interim support" domestic budgets

DATA ELEMENTS	REMARKS
System (e.g., Airframe, Hydraulic, Rotor, etc.)	WRA
Work Unit Code	WRA
Part Number	WRA and major item of SE
Nomenclature	WRA and major item of SE
NSN	WRA and major item of SE (if available)
SM&R Code	WRA
Current Procurement Price	WRA and major item of SE
Current Repair Price	WRA
Flying Hours (Note)	
Removals Causing a Supply Demand (Note)	The Mean Time Between supply Demand (MTBD) would be computed by dividing the Flying Hours by the removals causing a supply demand (e.g. 50,000/200 = 250)
Removals Repaired at the I-level (Note)	

Note: The selected period is normally 2-years of USN or USMC flight operations

Figure 6-4 Life Cycle Cost Data Elements

6.3.2.2 EVALUATING ALTERNATIVES

The PM and FMS DAPML will work with a potential foreign customer country to define an operational scenario, maintenance alternatives, and readiness/cost estimates. The final scenario is arrived at through an iterative process that consists of pricing out numerous options. The baseline for beginning the process is a traditional USN maintenance concept as reflected in USN/USMC data during a selected support period (e.g. typically 2-years). Although it is often appropriate for the foreign customer to initially adopt the USN maintenance concept, some foreign customers operate very differently from that of the USN, and want to vary the maintenance concept considerably to meet their maintenance scenario. For example, a foreign customer may have one main shore-based operating site containing extensive intermediate and depot repair infrastructure. Versus the USN shipboard scenario wherein weapon systems operate from multiple ships, long distances from resupply and depot repair, with heavy reliance on a space-constrained intermediate maintenance facility. USN maintenance planners typically, because of space constraints and the cost to replicate the infrastructure, adopt a depot repair philosophy for components requiring an extensive maintenance infrastructure; and they would sustain readiness at sea with added spares. Whereas the international customer, who is not space constrained and is seeking maintenance self-sufficiency, might choose to enhance the existing repair infrastructure at their single maintenance base with selected depot maintenance capability. They could then use the cost savings in pipeline spares and transportation to offset the one time cost for added depot support equipment and training. Figure 6-5 illustrates the magnitude of savings from in-country repair a major sub-system from a P-3C proposal to an FMS customer. Figure 6-6 represents possible variations from the USN concept and the characteristics of each.

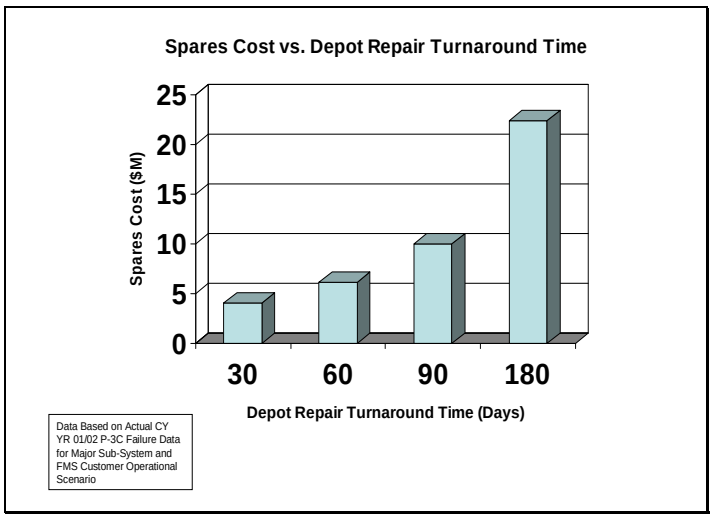


Figure 6-5 Savings by Optimizing Repair Turnaround Time

Maintenance Concept		Characteristics	Basing Assumptions
Initial Support	Follow-on Support		
O/I-Level Organic USN ROR	O/I-Level Organic Commitment to selective D-Level if requested USN ROR	Minimal in-country repair capability (mostly remove and replace components and servicing) and no in-country depot level support	Shore-based, single site operation
O/I-Level Organic Selected D-Level USN ROR	O/I Organic Selective D-Level Partial USN ROR Moderate self sufficiency	Moderate in-country repair (e.g., selective circuit card repair, plus overhaul typical aerospace items such as starters, generators, hydraulic components, etc.) capability phased in during follow-on support period	Shore-based, single site operation
O/I-Level Organic Selective D-Level Minimal USN ROR	O/I-Level Organic Extensive D-Level Minimal USN ROR Extensive self-sufficiency	Extensive in-country self-sufficiency (e.g., aircraft, engine and component overhaul) using organic and/or commercial repair	Shore-based, single site operation

Figure 6-6 Variations of the USN Maintenance Concept

6.3.3 DECISION SUPPORT AND BUDGETING MODEL (DSBM)

AIR-6.9 has developed a DSBM model that allows the FMS APML to quickly assess various maintenance alternatives using cost and readiness. The DSBM works in conjunction with the Navy-developed Aviation Retail Requirements Oriented to Weapon Replaceable Assemblies (ARROWS) optimization model that relates dollars spent to weapon system readiness – DoD refers to spares optimization as Readiness Based Sparing (RBS). For purposes of modeling it is not necessary to include all repairable items in the DSBM. The logistician focuses on repairable assemblies with

demonstrated historical failure data (i.e. low failure items are not included in the DSBM analysis as they do not appreciably impact the cost of a spares allowance relative to the total cost of a spares allowance) and then creates a candidate list for input to the model. Creating the candidate list is resource intensive because the ARROWS model is sensitive to data accuracy. Supportability at the organizational and intermediate levels of maintenance is also captured from the historical data and validated (e.g. data for interchangeable items is combined to create an overall removal rate) for the candidate items. Unprovisioned (i.e., full logistics data is not yet available) systems can be included in the candidate item list using engineering forecasted failure data. Finally, turnaround times and flying hours are varied inputs to the model as required. If required, a budgetary estimate for consumable items is derived based on 15% of the WRA cost estimate (refer to paragraph 6.3.2). Thus, with minimal training, USG FMS logistics planners can access a robust optimized, decision support model without having to rely on computer technicians to write queries and manipulate data[26]. The following quote from an article on DSBM (see footnote 15) provides insight into the power of RBS:

"Early in 1993, NAVICP, Philadelphia (formerly known as ASO) in conjunction with the fleet commander, tested the RBS concept with the deployment of the USS America (CV-66). Post cruise analysis of the RBS exercise concluded that the RBS Aviation Consolidated Allowance List (AVCAL) supported America's airwing with no loss in readiness. In addition, the RBS AVCAL was approximately $33 million less than the traditional demand based AVCAL. This was accomplished by increasing the range of less expensive Weapons Replaceable Units (WRAs) by 24% while decreasing depth of high cost WRAs by only .01%…. Since this initial RBS test, all afloat aviation allowances have been computed under RBS with an average net savings of approximately $32 million per CV. Implementation of RBS at shore stations is now continuing with equally favorable results". The following compares the fixed (i.e. traditional) protection level (i.e. 85% item availability from stock) and optimized sparing strategies:

Optimized	Traditional
User specified readiness target or cost	Constant protection level for each item
Permits readiness or cost tradeoffs	No readiness or cost tradeoffs
"Biggest bang for the buck"	

☑ FMS customers without an optimization capability should consider acquiring a DoD-approved optimization model (including training how to operate the model) such as ARROWS under an FMS case.

6.3.3.1 PRACTICAL APPLICATION OF DSBM

The following "Lessons Learned" from the application of the DSBM further demonstrates the power of relying on a practical logistics model that was tailored for use by logistics managers:

6.3.3.1.1 FLEXIBLE SPARING STRATEGY

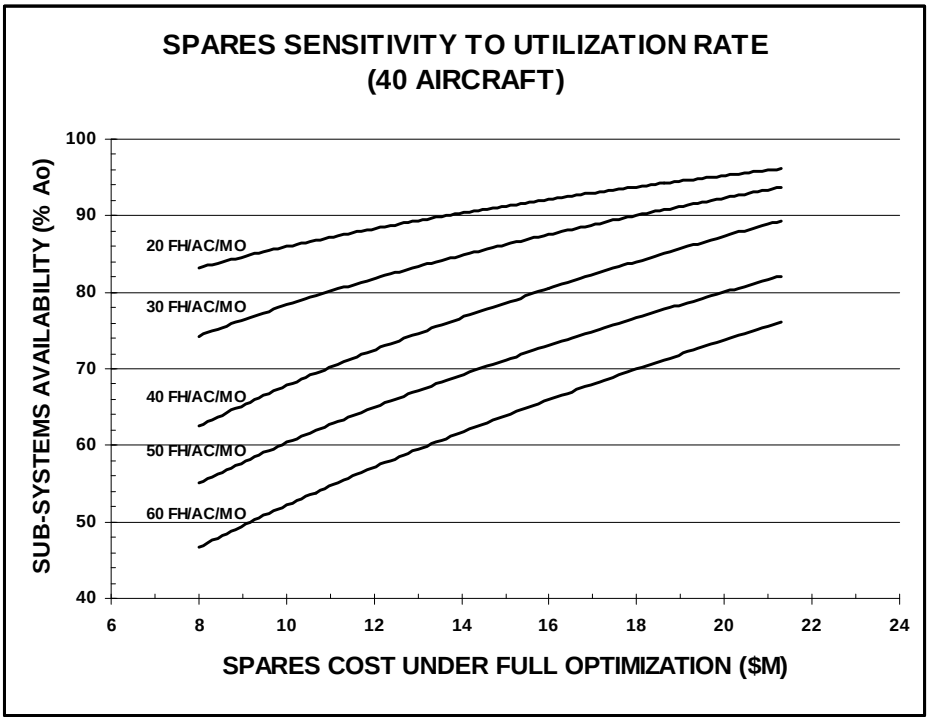
The following tables were provided to an FMS customer (table 1) and a USN budget officer (table 2) comparing optimized versus traditional sparing strategies:

[26] A extensive article on the NAVAIR DSBM can be found in the summer, 2000 DISAM Journal. A copy of the article is available on the DISAM web-page, www.disam.osd.mil

Table 1

Spares Method	% FMC	Cost ($M)	Range	Depth
Demand Based	60%	19.8	417	1140
Optimized	60%	15.7	506	1318

Table 2



☑ FH/AC/MO = Flying hours/aircraft/month

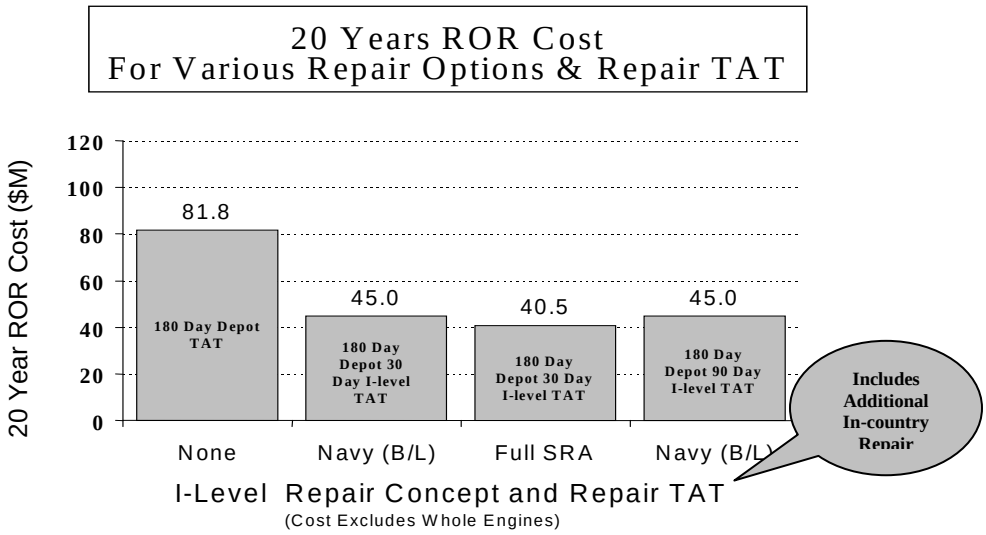
6.3.3.1.2 ASSESSING SUPPORT SCENARIOS

The following table was developed using the DSBM capability for an FMS customer who was evaluating various support strategies while holding the readiness constant. With a larger fleet of aircraft the dollar variances would be much higher. This data was developed quickly by the logistics manager at a program review as the FMS customer provided changes in the support scenario:

I-Level Maintenance Repair Capability and Operating Assumptions		Support Assumptions	FMC Target	Spares Cost ($M)		
Afloat	**Ashore**		**(%)**	**Afloat**	**Ashore**	**Total**
Baseline I-Level 4 A/C – 40 FH/AC/MO	Baseline I-Level 3 A/C – 12 FH/AC/MO	I-TAT = 10 days Resupply/D-TAT = 90 days	60%	15.8	6.1	21.9
Partial I-Level 4 A/C – 40 FH/AC/MO	Baseline I-Level 3 A/C – 12 FH/AC/MO	I-TAT = 10 days Resupply/D-TAT = 90 days	60%	17	6.1	23.1
No I-Level 4 A/C – 40 FH/AC/MO	Baseline I-Level 7 A/C – 17 FH/AC/MO	I-TAT = 10 days Ashore/D-TAT = 90 days Afloat Resupply = 30 days	60%	19.6	10.3	29.9
Partial I-Level 4 A/C – 40 FH/AC/MO	Baseline I-Level 7 A/C – 17 FH/AC/MO	I-TAT = 10 days Ashore/D-TAT = 90 days Afloat Resupply = 30 days	60%	11.7	10.3	22.0

6.3.3.1.3 ROR COST PROJECTION

Once the optimization candidate item list is developed it can be used for projecting ROR costs. The following ROR projection was provided to an FMS customer from their DSBM effort:



6.3.3.1.3.1 ASSESSING ALTERNATIVE MAINTENANCE STRATEGY

The DSBM capability provides the logistics manager with various reports that reflect the impact of various alternative maintenance strategies. These reports (i.e. queries) can be designed to emphasize high cost repairables or analysis by weapon sub-system (e.g. electrical, hydraulic). The following tables depict several reports from a DSBM analysis that were used by USN logistics mangers for actual FMS program reviews:

Spares Levels for High Cost Repairables

PART NUMBER	WUC	NOMENCLATURE	UNIT COST ($)	SPARES REQUIREMENTS			
				WITHOUT I-LEVEL REPAIR		WITH FULL I-LEVEL REPAIR	
				# OF SPARES	SPARES COST	# OF SPARES	SPARES COST
5002T83P02	2246100	PUMP,ROTARY	7,310	6	$ 43,860	3	$ 21,930
6000T12P22	2246200	FUEL CONTROL,MAIN,T	30,790	12	$ 369,480	4	$ 123,160
28B135163A	4221S00	GENERATOR,ALTERNATI	3,910	10	$ 39,100	5	$ 19,550
20069010	29E2G10	STARTER,ENGINE,ELEC	5,640	14	$ 78,960	7	$ 39,480
4004T63G08	2246300	ACTUATOR ASSEMBLY	2,170	6	$ 13,020	3	$ 6,510
6008T32G03	2246400	VALVE,PILOT	2,170	9	$ 19,530	4	$ 8,680
4005T01P03	2246500	PURIFIER ASSEMBLY,C	2,770	7	$ 19,390	3	$ 8,310
4067T04G02	2246B00	VALVE,LINEAR,DIRECT	1,830	10	$ 18,300	4	$ 7,320
4000T98P02	2247100	PUMP,ROTARY	3,320	5	$ 16,600	2	$ 6,640
U5203174	2247200	COOLER,OIL	4,360	2	$ 8,720	1	$ 4,360
37D400347P101	2249100	VIBRATOR,IGNITION C	2,780	10	$ 27,800	4	$ 11,120
3014T56P01	224A100	VALVE,SOLENOID	1,700	10	$ 17,000	5	$ 8,500
1423480102	56X1200	GYROSCOPE,DISPLACEM	32,870	17	$ 558,790	6	$ 197,220
S25KAW3	51R1500	INDICATOR,AIR SPEED	1,430	5	$ 7,150	3	$ 4,290
MS280751	51R1A00	INDICATOR,VERTICAL	3,000	4	$ 12,000	2	$ 6,000
A1620	51R1C00	INDICATOR,TURN AND	1,830	4	$ 7,320	4	$ 7,320
32520101101	51X1600	ALTIMETER,PRESSURE	3,680	7	$ 25,760	4	$ 14,720
400240	51X1Z00	CLOCK,PANEL	760	13	$ 9,880	7	$ 5,320
TOTAL				151	$ 1,292,660	71	$ 500,430

Depot Repair Actions For Selected Sub-Systems

PART NUMBER	WUC	NOMENCLATURE	UNIT COST ($)	DEPOT REPAIR ACTIONS PER YEAR	
				WITHOUT I-LEVEL REPAIR	WITH I-LEVEL REPAIR
5002T83P02	2246100	PUMP,ROTARY	7,310	5	0
6000T12P22	2246200	FUEL CONTROL,MAIN,T	30,790	15	2
28B135163A	4221S00	GENERATOR,ALTERNATI	3,910	8	1
20069010	29E2G10	STARTER,ENGINE,ELEC	5,640	13	2
4004T63G08	2246300	ACTUATOR ASSEMBLY	2,170	4	0
6008T32G03	2246400	VALVE,PILOT	2,170	7	1
4005T01P03	2246500	PURIFIER ASSEMBLY,C	2,770	4	0
4067T04G02	2246B00	VALVE,LINEAR,DIRECT	1,830	8	1
4000T98P02	2247100	PUMP,ROTARY	3,320	3	0
U5203174	2247200	COOLER,OIL	4,360	1	0
37D400347P101	2249100	VIBRATOR,IGNITION C	2,780	8	1
3014T56P01	224A100	VALVE,SOLENOID	1,700	7	1
1423480102	56X1200	GYROSCOPE,DISPLACEM	32,870	24	2
S25KAW3	51R1500	INDICATOR,AIR SPEED	1,430	3	0
MS280751	51R1A00	INDICATOR,VERTICAL	3,000	2	0
A1620	51R1C00	INDICATOR,TURN AND	1,830	0	0
32520101101	51X1600	ALTIMETER,PRESSURE	3,680	4	1
400240	51X1Z00	CLOCK,PANEL	760	10	2
TOTAL				126	14

6.3.4 ANCILLARY P&A ISSUES

The following ancillary issues should be addressed in the Price Out of the P&A:

6.3.4.1 GOVERNMENT FURNISHED EQUIPMENT (GFE) VERSUS CONTRACTOR FURNISHED EQUIPMENT (CFE)

The foreign customer must decide whether the USG or the Prime Contractor shall buy the initial spares and SE. The decision can dramatically affect the cost of the initial spares and support equipment because, if the Prime Contractor buys spares and support equipment they typically add a markup to the cost of material or equipment they buy from their vendors. Whereas, the USG often bypasses the Prime Contractor and buys the initial spares and support equipment directly from second tier vendors for direct shipment to the FMS customer and avoidance of the Prime Contractor markup.

Some would argue that the DoD supply system's application of a Cost Recovery Rate (CRR) – i.e. surcharge – to requisitions equates to the Prime Contractor markup. However, that argument does not apply to DoD agencies that do not apply a CRR to FMS requisitions. For example,

Inventory Manager	CRR Applied
• USN Managed Material	
o Purchased Directly from Vendor	No
o Issued from Stock	Yes
• DLA Managed Material	
o Purchased Directly from Vendor (not DVD)	Yes*
o Purchased Directly from Vendor (DVD)	Yes (reduced)
o Issued from Stock	Yes

*DVD – Direct Vendor Delivery/Prime Vendor type contracts

Also, the magnitude of DoD procurements (compared to Prime Contractor buys) and combining FMS procurements with domestic procurements when possible, tends to reduce the item cost due to economies of scale. Delivery performance is another issue to consider when comparing GFE versus CFE buying policy. However, with an effective IPT in place, the DoD delivery performance of initial spares and SE equals that of the Prime Contractor.

It's important that a potential foreign customer understand the nuances of DoD GFE pricing/delivery so that they make an informed GFE versus CFE decision in conjunction with requesting P&A data. This issue should be raised jointly with the PM and the Prime Contractor early in the acquisition process to ensure that smart business decisions can be made. Figure 6-7 depicts the GFE/CFE issue using actual data from a program review.

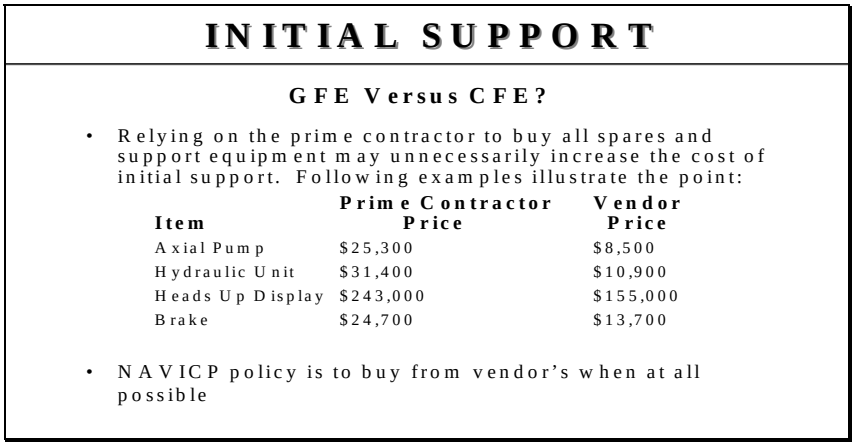


Figure 6-7 GFE Versus CFE

6.3.4.1.1 PRODUCTION CONTRACT PLANNING PRIOR TO LOA SIGNING

NAVAIR procures a new weapon system for an FMS customer using USN contract procedures. The Prime Contractor manufactures the aircraft to the configuration specified in the contract which should be linked to the original configuration that was specified by the LOA. The Prime Contractor assembles the weapon system ensuring sub-vendors ship correctly-configured equipment in a timely manner to meet the production schedule. ☑ That may mean that the Prime Contractor "procurement window" for installed equipment with long procurement lead times (i.e. "long lead") occurs shortly after the signing of the production contract.

6.3.4.2 SPARES ACQUISITION IN-PRODUCTION (SAIP)

To achieve the lowest price for both production installs and spares, the FMS DAPML should coordinate the procurement of spares concurrent with the production buys (i.e. SAIP). The same issues discussed in Paragraph 6.3.4.1 apply to SAIP, i.e., should the FMS DAPML purchase S&RP and SE via the production contract, or should the LEM purchase them directly from the vendors on LEM contracts? Regardless, if SAIP-items are also long lead items, requirements must be determined by the LEMs and approved by the FMS customer prior to signing the LOA, and then funded by the FMS customer shortly after LOA signing (See Section 6.3.4.1.1). Additional savings can be achieved when ordering selected SRAs and unique bit/piece requirements concurrent with long lead WRAs.

☑ Separate requisition numbers should be assigned to each S&RP and SE item bought on the production contract to provide for supply/financial tracking within the MISIL and this requirement should be specified in the FMS ILS SOW.

6.3.4.2.1 SPARES TO INSTALL RATIO

What are the spares to install ratio of weapons and Electronic Countermeasures (ECM) equipment? This is an operational decision that has a major impact on the cost of initial spares. Typically, the USN adopts a "two spares for three installs" ratio.

6.3.4.3 IOC DATE

The IOC date should be clearly defined by the foreign customer, as it will play an important role in logistics planning. For example, if USN logistics planners know that the actual need date for spares extends over a period of time, they are better able to plan for the combining of FMS with domestic procurements and thus reduce item cost.

6.3.4.4 READINESS GOALS

Readiness goals are an important factor when calculating spares and should be made known to logistics planners as early as possible in the planning process. The DSBM discussed in Section 6.3.3 has the capability to calculate spares to meet pre-determined readiness goals.

6.3.4.5 SINGLE VENDOR INTEGRITY (SVI)

A requirement to impose SVI should be included "when the country has established a history of procurement for articles or services from a particular source and needs to continue procurement from that source to continue standardization of equipment with consequent benefits of logistics support. This could include spares for support equipment or other SVI subcontracted items[27].

6.3.4.6 SOLE SOURCE

"Sole Source" requirements must be requested in writing by the FMS customer and cited in the LOA[28].

6.3.4.7 AIRCREW AND FLIGHT TEST SUPPORT CONCEPT

The aircrew and flight test support concept should be discussed prior to signing the LOA. This is particularly important if the following is needed: (1) logistics support will be required from USN facilities or (2) if early delivery of foreign customer-owned spares will be required.

6.3.4.8 MATERIAL STAGING

MILDEP Commercial Buying Service data indicates that 5-7% of shipments from both commercial and Government shippers are subject to administrative error (e.g. wrong count, wrong item). Staging material allows the USG to identify and quickly correct these errors while access to shipper documentation is readily available. Also, staging initial support material provides an FMS customer with the opportunity to pre-stock "binnable" (i.e. small) items and then ship them in-country in dedicated storage containers. The cost avoidance from staging would easily pay for itself due to reduced processing of Supply Discrepancy Reports (SDRs). ☑ NAVICP, Philadelphia has a staging facility located in Mechanicsburg, PA that provides staging services to international customers at relatively low cost.

6.4 LOGISTICS SUPPORT PLANNING INFORMATION

The following represents additional data the supplier should have available for presentation to a potential international customer. Much of the following data will be further refined during the site survey. However, both the potential foreign customer and the supplier require a minimum level of logistics data and/or estimates of O&S cost to ensure that P&A estimates are as accurate as possible.

6.4.1 OVERVIEW OF THE CURRENT USN MAINTENANCE CONCEPT

This information enables a potential international customer to tailor the current USN maintenance plan to meet their needs. A typical USN/USMC maintenance organization is found in Section 4.5.

6.4.2 O&S COST

The FMS DAPML should have various O&S costs available as a cost per operating hour. The information should be displayed in the standardized categories used by DoD. The USN Visibility and Management of Operating and Support Cost (VAMOSC) report is a source for Navy O&S cost. With this information, the foreign country can compare the USN O&S cost to that of other weapons systems. It should be emphasized that foreign country O&S costs are dependent on the unique characteristics their country's operating environment and the composition of their follow-on support process. O&S

[27] SAMM, Section 80102-B

[28] SAMM, Table C6.T2

cost includes all the costs of a direct and indirect nature required to operate and maintain the weapon system at a level of readiness commensurate with the customer needs. The standardized categories in which the O&S cost are reported from the USN to DoD are as follows.

- Personnel costs including the O and I-level maintenance personnel, the pilot other aircrewmen as applicable
- Fuel cost including the cost of jet engine fuel, oil and lubricants
- Consumable parts required by O/I-levels of maintenance
- Depot level labor and consumable cost for repairable components that were unrepairable at the I-level of maintenance and purchased from the USN supply system
- Engine repair costs at all levels of maintenance
- Miscellaneous cost category including the cost of updating technical manuals, software support, Contractor Engineering Technical Services (CETS), etc.

6.4.2.1 TAILORING O&S COST

The FMS DAPML will analyze the cost per flying hour cost elements and identify factors that drive cost and how a potential customer might adjust O&S cost estimates to reflect in-country operations. For example:

- Personnel costs should reflect customer manning profiles and yearly salaries
- Petroleum, Oil, and Lubricants (POL) cost is largely driven by the specific fuel consumption of the engines, which in turn is driven by customer mission profiles and flying hours. ☑ The USN spares calculation model is highly sensitive to flying hours. A recent FMS customer estimated flying hours to be 25 hours per month, but executed the flying hour program at 12 hours per month. The result dramatically overstated the initial support spares requirement and created a perception that the USG sold the FMS customer excess material.
- An increased desire for in-country self-sufficiency may drive up depot repair cost
- USN maintenance man-hour per/flight hour (MMH/FH) data accumulated while aircraft operate onboard ships is typically higher than aircraft operated ashore, and must be rationalized accordingly

6.4.3 KEY SUPPORTING PERFORMANCE FACTORS

The potential foreign customer must understand USN performance factors when comparing offers from various suppliers. Key factors of domestic fleet support performance include the following:

- I/D level RTAT for high removal items
- Readiness rates for deployed and non-deployed squadrons
- Cannibalization rates for deployed and non-deployed squadrons
- Man-hours required for various phase maintenance tasks
- MMH/FH by system, e.g., airframe, landing gear, etc.

6.4.4 DETAILED LISTING OF THE NUMBERS AND TYPES OF PERSONNEL

It is important for the potential foreign customer to determine if they possess or can obtain the requisite skills at each level of maintenance to sustain the weapon system in-country. The FMS DAPML should provide an overview of how the USN uses the work center concept at the O and I-levels of maintenance. The work centers are created by weapon systems hardware breakdown and each work center must have specially trained individuals to perform the maintenance and repair. Consequently,

the FMS DAPML should provide the numbers and types of personnel by level of maintenance and work center. For example the following typifies the format and level of detail that should be provided to the potential foreign customer for a notional weapon system:

Intermediate Level Work Centers

Personnel Requirements

Airframe Work Center	Quantity
Electrical Systems Technician	2
Environmental Systems Technician	1
Pneumatic/Hydraulic Systems Technician	2
Airframe Repair Technician	3
TOTAL	8
Avionics Work Center	**Quantity**
Attack Control Systems Specialist	1
Instrument/Flight Control Systems Specialist	2
CNI Penetration Aids System Specialist	1
TOTAL	4

The FMS APML must provide an overview of the qualifications for each specialty in a work center. For example, an overview might be worded as follows: the Attack Control Systems Specialist is "responsible for maintenance, calibration, alignment and functional testing of the Radar, Heads-Up Display, Inertial Navigation System, Mission Computer and the Digital Displays."

6.4.5 DETAILED SUMMARY OF THE FACILITIES REQUIREMENTS

Typical facility information includes the facility name, the total square meters, and a statement as to the need for the facility. See Attachment B.

6.4.5.1 LISTINGS OF THE TOP 50 WRAS AND RELATED SE

- List, by acquisition cost (highest to lowest breakdown) and a current removal rate for each of the top 50 WRAs. ☑ The USN should be requested to validate the current acquisition cost so that it will be accurately reflected in the allowance computations. The Prime Contractor may be a ready source for this information.
- List by repair costs (labor and material) in descending frequency (highest to lowest). Include the number of repair generations per flight hour and the MTBD for each item
- A listing of the WRAs with the following provided for each: MTBF and the MTBD
- Identification of each item of I-level SE required to support the top 50 WRAs
    - Identification of each item of D-level SE required to support the WRA and its SRAs
    - Identification of the calibration requirements for each item of SE needed to repair each WRA
    - An O, I, and D-Level SE "picture book" containing drawing and technical descriptions of the major pieces of SE (peculiar and common).
- A separate listing of O, I, and D-Level SE costing more than $10,000

6.4.5.2 SE DATA PICTURE BOOK

An O, I, and D-Level **SE "picture book"** containing a picture or drawing and technical descriptions of the major items of SE (peculiar and common) should be requested.

6.4.6 MINIMIZING THE CONSUMABLE SPARES INVESTMENT

6.4.6.1 ADJUSTED QUANTITY

Typically, less than 20% of consumable items in the initial spare parts package are consumed during the initial 3-5 years of weapon systems operation. Lack of demand is attributed somewhat to slow development of full I-level repair activity early in a new program. However, much of the slow demand is caused by either incorrect or overly pessimistic original failure rates that are not adjusted by the ICP over time. ☑ NAVICP FMS logistics managers are now using the NAVICP Combined Rate Computational System (CRCS) to compute consumable requirements. CRCS adjusts failure rates using current AV3M data which significantly reduces an FMS customer's consumable allowance.
Alternatives are available to reduce the range and depth of the initial consumable spares for older weapon systems (e.g. A-4/A-7). An effective method used by one customer (34 aircraft buy) to limit the depth of initial stock was to apply the following table (Figure 6-8) when ordering DLA material. This same FMS customer also obtained the last three years of domestic USN/USMC usage data and compared it to the recommended USN spares allowance for possible deletions in the range of stock. The cost savings from these two actions are reflected at the bottom of Figure 6-8. As familiarity with the weapon system increases, an FMS customer, in conjunction with the USN, can focus on the need to add additional depth of consumable items

4-digit Federal Supply Class (FSC)	Quantity Per Aircraft/Adjusted Count									Cost/Item U.S. $
	1	2	≤5	≤10	≤100	≤500	≤1000	≤5000	>5000	
5905, 5910, 5915, 5935, 5940, 5950, 5970, 5975, 5999	Note	Note	Note	10	15	20	20	20	20	NA
5920, 5925, 5930 5945, 5955, 5961 5962, 5990, 6105	Note	Note	Note	15	20	30	40	40	40	NA
5305, 5307, 5310, 5315, 5330, 5340, 5355, 5360, 5365	Note	Note	Note	30 10	100 60 20	200 100 30	400 200 50	600 300 100	1000 500 200	≤ 2 > 2....≤ 10 > 10
4710, 4730	2 1	2 1	2 1	Note	Note	Note	Note	Note	Note	≤ 100 > 100
5306	Note	Note	10 5 2	20 10 4	30 15 6	50 20 8	50 20 8	50 20 8	100 30 8	≤ 20 > 2...≤ 10 > 10
5320, 5325				100 50 30	500 100 60	1000 200 100	1000 200 100	1000 200 100	1000 200 100	≤ 2 > 2...≤ 10 > 10

USAGE DATA COMPARISON

Compared recommended initial allowance with:

1. Organizational and I-level Maintenance Usage Data and DLA usage data….then,
2. Eliminated items from allowance with no demand

COST STUDY COMPARISON

• Original initial allowance data base	$31.7M
• After applying matrix shown above	$19.7M
• After applying usage data shown left	$14.9M
Total Savings	$16.8M

Note: Must be provisioned manually

Figure 6-8 Consumable Item Adjustment Matrix

6.4.6.2 ROUNDING RULE

Another initiative is to alter the rounding rule (e.g. constant factor such as 0.50) used in the spare parts allowance calculation. It determines whether to stock an item when the allowance computes a quantity of less than one spare. Figure 6-9 refers:

RANGE FACTOR	DEPTH FACTOR	LINE ITEMS RECOMMENDED	VALUE OF SPARES
.10	.50	12,279	2.74M
.10	.90	12,097	2.73M
.50	.50	10,926	.65M
.50	.90	10,744	.64M
.90	.50	10,664	.35M
.90	.90	10,482	.34M

Figure 6-9 Rounding Rule Table

6.5 COMPLEX LOGISTICS ISSUES TO BE ADDRESSED IN THE LOA

There are logistics issues that based on historical information may be controversial when addressed by the USN and the foreign customer. For this reason it's suggested that they be discussed prior to signing an LOA and addressed specifically in the LOA if specificity is required. They include the following issues:

6.5.1 ROR

Typically, the FMS case for ROR is negotiated after the initial support case as part of follow-on support. Delaying the ROR case until after the aircraft begin in-country operations precludes repair of FMS customer-owned components that fail during aircrew training. Also, if implementation of the follow-on support ROR case is delayed, unserviceable components – not subject to warranty – that fail early in the initial support program cannot be shipped to the U.S. for depot repair. For these reasons it's recommended that a modest ROR line is included in the initial support FMS case.

6.5.1.1 ENHANCE ROR TURNAROUND TIME

The USN typically assumes a 180-day TAT when computing spare repairable allowances for the initial FMS case. The 180 days includes in-country processing time, shipment time to/from the repair source in the U.S., freight forwarder processing time, administrative processing time within the U.S. system, and the RTAT (i.e. actual repair time). Savings in any of the aforementioned pipeline segments reduce the need for an investment in pipeline spares. The following concepts will reduce the 180-day TAT, although some of them require an investment in the initial LOA:

- Enhance RTAT by:
    - Laying-in piece parts at a contractor depot bond room. These piece parts would be segregated and available only for FMS customer ROR requirements. Any residual parts would migrate to the in-country depot when in-country depot capability was established
    - Developing a micro-miniature repair capability to repair the SRAs in-country rather then sending them to a depot in the U.S. as envisioned in the U.S. maintenance plan
- Utilize a regional repair facility (e.g. Asia (Singapore) or Europe (see Section 9.2.2))
- Authorize U.S. depots to use overtime to complete repairs
- Rely on the expedited transportation concept discussed in Section 6.2.1
- Using the USN Repairable Item Replacement Option (RIRO) - i.e. Direct Exchange – concept for selected components. This will require the establishment of a CLSSA FMS case to be in place and functioning (i.e. Foreign Military Sales Order (FMSO) II) when aircraft begin operating in-country.

6.5.2 MDC ANOMALIES

Every military Service has a requirement to record and report maintenance data. The maintenance data collection services of the USA/USN/USAF were developed independent of each other and are inherently different. International customers familiar with USAF system may misinterpret USN data. Terms may be the same, but the methods used to derive them are different. For example, USMC F/A-18 maintenance data accumulated ashore is more meaningful to a potential FMS customer than USN F/A-18 maintenance data accumulated onboard a ship. Differences in maintenance concepts also account for data anomalies. For example, the USAF is pursuing two-level maintenance whereas the USN relies heavily on intermediate level repair of both WRAs and SRAs. The result is more

maintenance hours recorded at the USN intermediate level, thus elevating the USN Mean Time Between Maintenance Actions (MTBMA) and the MMH/FH.

6.5.3 TEST PROGRAM SET (TPS) DEVELOPMENT

TPS development is a major cost component of newer avionics' SE. Many international customers have extensive experience with TPS development and already have Automatic Test Equipment (ATE) in their existing organic or commercial depots. Also, they often use engineers to do SRA repair and that engineer is often the same engineer that developed the TPS. With this level of expertise repairing SRAs, many foreign customers can successfully "rehost" non-complex TPSs on to their existing ATE, thus reducing the cost of developing the TPS. It is therefore recommended that prior to P&A development, USG engineers meet with the foreign customer engineers to review non-complex wiring diagrams for selected TPSs and determine the feasibility of either "re-hosting" TPS requirements themselves or developing selected TPSs using their own engineers and ATE. Once the approach has been determined, the SE should be priced out accordingly.

6.5.4 CALIBRATION STANDARDS

Calibration standard costs can exceed $5M for a sophisticated new weapon system. Many foreign countries that have previously purchased USG weapon systems or have sophisticated aerospace industries that have access to calibration standards that are the equivalent of the standards needed to support a new weapon system. It's therefore recommended that prior to P&A development, USG engineers meet with the foreign customer engineers to review calibration standard requirements and reduce the requirement when existing in-country equivalent standards are available

6.5.5 CONFIGURATION DATABASE

While the aircraft is being assembled and subsequent to delivery in-country, numerous changes to the weapon system take place that affect weapon system configuration. Engineering changes, SM&R code changes and certification of additional and replacement spare parts vendors are examples of configuration changes. As a result of these changes, outstanding spare parts procurements must be adjusted and technical manuals changed as appropriate. It is difficult for an FMS customer to track these changes without a baseline configuration database that contains the original configuration of provisioned items (e.g. SM&R code of "PA---"). The results are misidentified receipts and lost material. For this reason several major international customers have requested that the FMS APML create a unique configuration database covering procurable material for their weapon system. Building such a configuration database must begin early in the initial support planning cycle and continue until all initial spares and SE are delivered. Linking material in the configuration database to its applicable sub system is an important feature of the database as discussed in Section 5.6.1

6.5.6 LOGISTICS SUPPORT WHILE TRAINING AT A USN NAVAL AIR STATION

I-Level Support to FMS Customers usually consists of support for FMS customer-owned aircraft that are being used for the foreign aircrew at USN/USMC air stations. Also, a few USN I-level activities have provided ROR support under an FMS case.

6.5.7 EARLY DEPOT MAINTENANCE PLANNING

Depot maintenance planning – especially for the airframe and engines – normally requires more data and expertise than are available at the Site Survey. Typically, follow-on meetings are held several years later to plan the phase-in of in-country depot maintenance for airframe and engines. However, there are numerous components that are repairable at many overseas depot facilities – commercial or military – with a like and similar repair infrastructure to U.S. industry. They include typical aerospace components such as electrical, hydraulic, fuel, gyros, etc. With minimal or no specialized

training, a technical manual, and parts, experienced overseas depot facilities could do depot maintenance on these components. Delaying the depot maintenance decision for this group of components forces the FMS customer to increase the depth of spares to fill a 180-ROR pipeline to the U.S. Figure 6-5 illustrates the magnitude of savings from early, in-country depot maintenance. A decision to establish in-country depot capability requires extensive staffing and approvals by an FMS customer. For this reason it is suggested that the FMS customer request that the USN recommend a list of candidate depot repair items in the proposed LOA for staffing by the FMS customer. Figure 6-10 provides the FMS customer and FMS APML a common decision process for selecting candidates for early depot level repair.

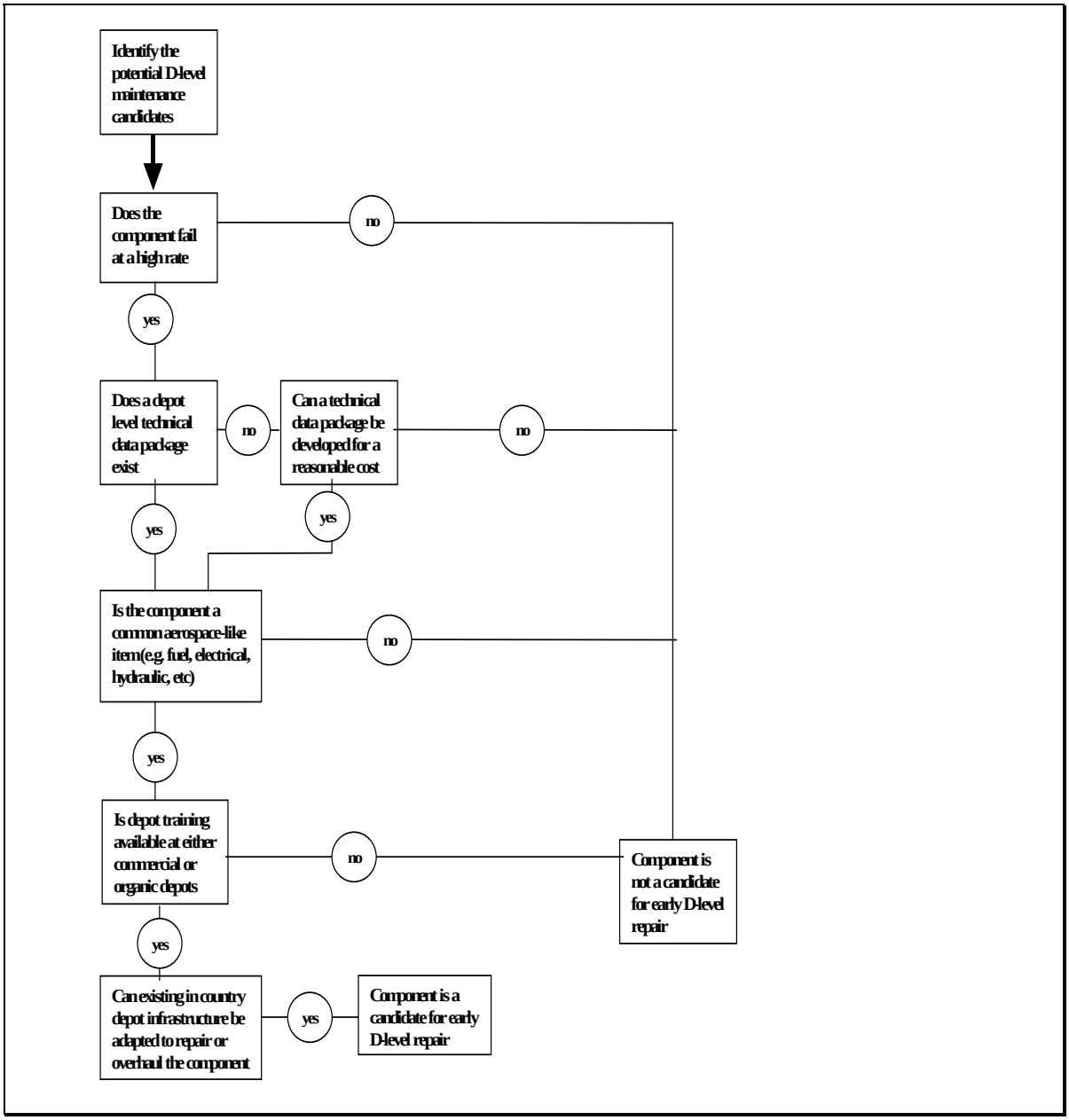


Figure 6-10 Early Depot Decision Logic

WEAPON SYSTEM ACQUISITION

7.0 WEAPON SYSTEM ACQUISITION

7.1 BACKGROUND

The weapon system acquisition phase begins on receipt of the signed LOA by USG. It ends with the delivery of the aircraft to the foreign customer and the establishment of the in-country initial maintenance capability and material support.

7.2 CONTRACT PLANNING

A significant amount of product support material and services are bought on the weapon system production contract. Material will be discussed later in this Section. A DoD memorandum dated 29 March 1999 directed that "DoD acquisition officials should be responsive to the special needs of FMS customers. FMS customers should be encouraged to participate in discussions between DoD and the potential contractor including LOA development, definition of technical specifications, delivery schedules, special warranty provisions and other requirements unique to the FMS customer". The production contract performance specification covering the ILS SOW – previously known as the ILS Detail Specification (ILSDS) – describes the responsibilities of the Prime Contractor IPT and details the Prime Contractor ILS deliverables. It is recommended that the FMS customer participate in the development of the ILS SOW to ensure any unique FMS customer requirements are included. Aspects of the ILS SOW are discussed below.

7.2.1 OBJECTIVES OF THE PRODUCT SUPPORT SOW

PS objectives of the SOW include the following:

- Define the administrative tools required to procure and track the necessary systems, equipment and services
- Provide the FMS customer a cost-effective PS Program
- Use existing data and knowledge developed under the USN domestic PS Program to establish PS measures
- For unique FMS systems, Influence the aircraft design process to enhance life cycle support.

7.2.2 CONTRACTOR PS MANAGER

Management of the Contractor's PS Program will be vested in the contractor Country (x) PS Manager. The contractor Country (x) PS Manager will serve as the focal point for relations between the USN and Country (x) as follows: in matters concerning management and documentation of the contractor's PS Program, technical performance, scheduling and timely definition of valid PS resource requirements for the Country (x) PS Program. The contractor Country (x) PS Program Manager will be assisted by the Contractor Support Teams (CST) which are responsible for the various PS elements such as: Maintenance Engineering, Supply, Support Equipment, Publications, etc.

7.2.3 CONTRACTOR ROLE IN MAINTENANCE TRANSITION

A major PS function in the SOW is the requirement to deliver updated spares, support equipment and training data necessary to transition organizational, intermediate and depot maintenance capability to Country (x). Both the USN and Country (x) must take significant action before maintenance capability is completed. Toward this end, regularly scheduled review meetings are necessary to ensure maintenance transition occurs on time. The Prime Contractor is a major player in this process and requirements in support of the transition effort must be completely outlined in the PS SOW. Additional discussion of maintenance transition is contained in Section

8.4.9.1. ☑ The importance of a formal maintenance transition process cannot be over emphasized. Those FMS customers that resourced this requirement in the LOA made their transition process much easier than it would have been otherwise.

7.2.4 CONTRACT DELIVERABLES

Numerous specific Contract Deliverables are cited in the PS SOW. The contractor Integrated Support Plan (ISP) is one of the more important deliverables because it outlines the contractor's plan to meet the requirements of the PS SOW. A spares/SE delivery report is also emphasized as it provides for electronic reporting to the government – and to the FMS customer if requested – of spares/SE shipments. Other important deliverables include the contractor's recommended maintenance transition work package format and reports covering Engineering Change Proposal (ECP) processing.

7.3 LOGISTICS SUPPORT PLANNING PROCESS OVERVIEW

The logistics support planning process begins with modifying the overall USN maintenance concept based on the LOA. This effort is done in collaboration with the Prime Contractor PS manager and the applicable government LEMs. The planning process continues with the FMS DAPML conducting an initial logistics-planning meeting with the FMS customer followed later by a complete Site Survey in collaboration with the FMS customers' representatives. It is at the Site Survey where a tailored maintenance strategy is adopted for all repairables and maintenance significant consumables that considers the FMS customer's maintenance infrastructure and operational scenario. The P&SP is a report that represents a mutual understanding of the actions and responsibilities agreed to at the Site Survey that will be required to successfully field and sustain the country (x) program. It's the baseline document underlying PS for a new weapon system. A draft P&SP is signed by the USN and FMS customer at the completion of the Site Survey. The USN refines the P&SP data (e.g. latest part numbers) and publishes the formal document within sixty days after the Site Survey. ☑ The importance of conducting a comprehensive Site Survey cannot be overemphasized. The process establishes a rapport between the FMS customer and USN/Prime Contractor ILS IPT members that will extend throughout the initial support period that can last for 5-7 years. Also, it's typically the first exposure of the new weapon system to the working level in-country logisticians and, as such, an invaluable tool towards their understanding of the infrastructure improvements that must be budgeted and constructed in conjunction with achieving in-country maintenance self sufficiency. Other significant logistics planning events include regularly scheduled program reviews, a Provisioning Conference, and regularly scheduled maintenance transition meetings.

7.3.1 UPDATE USN MAINTENANCE CONCEPT

The FMS DAPMLs first PS action after the LOA is signed is to update the USN maintenance concept as adjusted by the FMS customer in the signed LOA. This action is taken in collaboration with the Prime Contractor PS manager and the applicable government LEMs. The updated maintenance concept is provided to the team that conducts the pre-Site Survey evaluation (see below) as their working document. The intent is to ensure the overall maintenance planning concept and aircraft configuration flows down consistently to the working level USN and FMS customer PS planners.

7.3.2 INITIAL LOGISTICS PLANNING MEETING (I.E. PRE-SITE SURVEY)

Shortly after the LOA is approved and funding becomes available, the FMS DAPML should visit the FMS customer to conduct the initial logistics planning meeting. The major objectives of this meeting are as follows:

- Begin the dialog between the USN and FMS customer personnel who will be working together on the new program
- Begin Site Survey Planning
    - Purpose
    - Schedule
    - Team composition and counterpart requirements
    - Process
- Identify requirements from customer (e.g. major support equipment listing)
- Familiarize the FMS customer with the USN logistics system
- Present alternatives for reducing FMS customer initial investment and sustainment (e.g. expedited transportation/depot piece part lay in)
- Finalize the preliminary maintenance concept and weapon system configuration at the system level (e.g. AN/ARC-210)
- Validate the FMS customer's industrial capability at all levels of maintenance (O/I/D)
- Familiarize the team with the FMS customer's existing logistics infrastructure

7.3.2.1 PRE-SITE SURVEY TEAM COMPOSITION

Team composition would consist of a small group (estimate 4-6 personnel) of experienced DoD and/or contractor personnel knowledgeable in all levels of maintenance and PS on the weapon system requested in the LOA. They should bring enough detail with them (e.g., preliminary maintenance plan, facilities "footprint", etc.) to answer questions about USN PS policy, identify high cost drivers and major pieces of SE, and provide overall facility requirements. Members of the team would also participate in the formal Site Survey that follows.

7.3.2.2 SUBJECTS COVERED AT THE PRE-SITE SURVEY

Figure 7-1 identifies the subjects that should be covered during the initial logistics meeting:

Subjects Covered During Pre-Site Survey		
Subject	**Country**	**USN**
Organization, Points of Contact, Address/Telephone/Fax/E-mail of Major Players	X	X
Logistics Policies, i.e., Stocking Policy, Staging, Requisition Flow	X	X
Logistics Performance Statistics: - Typical Material Lead Time From Overseas Sources - Expected Repair Time From Overseas Depots	X	
Maintenance Concept; e.g., Levels of Maintenance, Scope of Repair (see Section 8.3.3.2 below)	X	X
Facilities Briefing, Visit, Drawings: - Warehouses - Base Where Aircraft Will Operate - Runways - Taxiways - Apron - Maintenance Facilities – Both Organic and Commercial - Power - Hangers - Shops, e.g., - Avionics/Electrical - Hydraulic - Airframe - Engine - Armament - Paint	X	
Automation/ Maintenance Data Collection – Current/Planned	X	
Availability of Major Support Equipment From Other Programs	X	
Personnel, i.e., Extent of Training, English Skill Level, Military/Civilian	X	

Figure 7-1 Subjects Covered During the Initial Logistics Meeting

7.3.2.2.1 BRIEFING ALTERNATIVE LOGISTICS AT PRE-SITE SURVEY

Some FMS customers that purchase USN weapon systems have limited resources and must make resource-driven sacrifices when fielding a new weapon system. The USN, in partnership with industry, might offer alternative PS solutions to reduce initial support and/or life cycle costs.

Increased reliance on commercial contractors to deliver PS to an FMS customer, albeit under a FMS case, would be a new USN approach to sustaining an FMS program. As such, innovative PS may require "buy in" at key levels within a FMS customer Chain of Command to ensure "working level" logisticians and engineers feel empowered to accept the innovations. ☑ Thus, the following alternatives for reducing initial and life cycle support costs should be presented as options to the FMS customer at the initial logistics meeting to allow a FMS customer to understand the concepts and authorize their acceptance within the FMS customer Chain of Command during the Site Survey.

1. Including a level of follow-on support managed by the PM as a line item in the initial support case. ☑ See Section 4.6.2.1
2. When Purchasing Excess USN Aircraft:
    a. Repairable Item Replacement Option (See Section 6.5.1.1)
    b. Purchase excess whole aircraft/engines in lieu of buying insurance spares. But retain one aircraft stored in the U.S. for cannibalization by a NAVAIR-sponsored contractor in conjunction with remanufacturing parts that are unavailable through normal procurement channels.
3. Participate in NAVAIR obsolescence prediction/abatement program on a fee basis as required

7.3.3 ACTION AFTER PRE-SITE SURVEY MEETING

7.3.3.1 DRAFT PROGRAM AND SUPPORT PLAN

After the preliminary team returns to the U.S., the FMS DAPML, using the data collected during the in-country visit and USN logistics planning data develops a draft P&SP with input from the various LEMs. Much of what is contained in all P&SPs is general information describing the FMS logistics system in terms of each ILS element. A sample draft P&SP contains the sections listed below.

Executive Summary
Acknowledgment
Table of Contents
Section I – Site Survey
    A. Purpose
    B. Team Composition
Section II - Program Summary
    A. Description
    B. USN Operational Concept
    C. Foreign Country Concept of Operations
Section III - Program Management
    A Program Management
    B. Program Planning/Schedule
    C. Configuration Management
Section IV - Logistics Support Elements
    A - Overview

B. Maintenance
C. Aircraft Maintenance Functional Analysis
D. Support Equipment
E. Supply Support Plan
F. Facilities
G. Personnel and Training
H. Technical Data and Publications
I. Contractor Engineering Technical Services
J. Transportation Plan
J. Concept for Follow-on Support

Section V - Action Items

Appendix A Maintenance Functional Analysis Work Sheets
Appendix B Advance System for SE Tracking (ASSET)
Appendix C Preliminary Technical Publications Listing
Appendix D Preliminary Spares Allowance (Repairables/Maintenance Significant Consumables)
Appendix E Aircraft Detachment Packup List
Appendix F ECP Requirements for Aircraft
Appendix G Glossary

Figure 7-2 reflects a notional Site Survey team composition which should be included in the draft P&SP. The MFA section is highlighted because, as explained below in Section 7.3.3.2, the MFA analysis is the heart of the Site Survey and the results of the MFA review drive the various PS requirements. Conducting the Site Survey is discussed in Section 7.4.6.

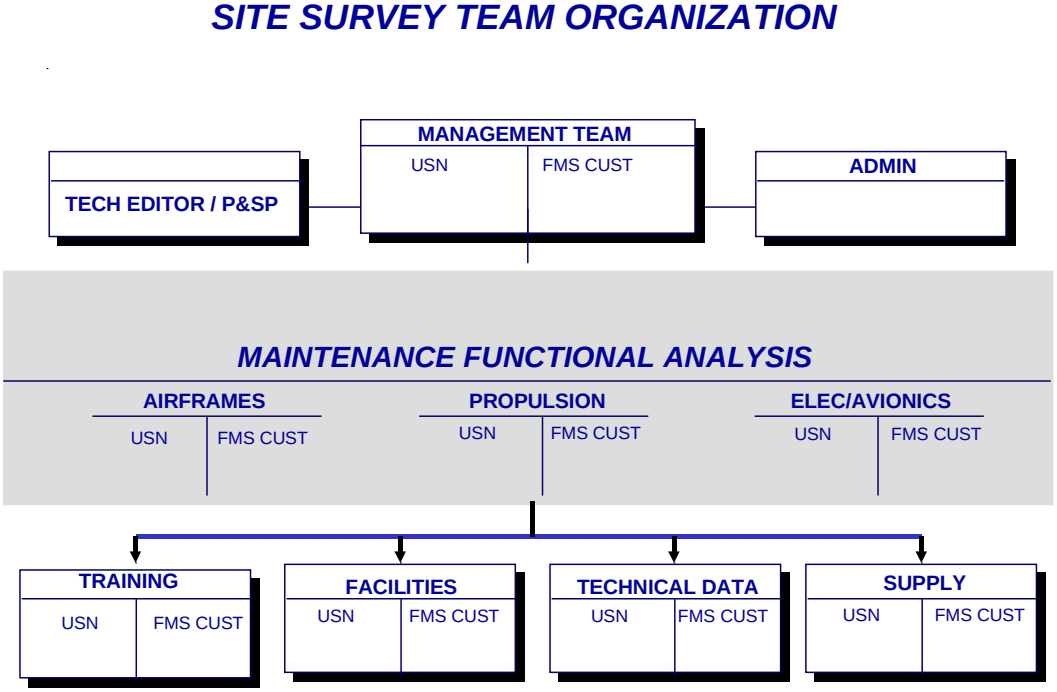


Figure 7-2 Notional Site Survey Team

7.3.3.2 PREPARE THE MAINTENANCE FUNCTIONAL ANALYSIS (MFA)

The FMS DAPML develops the MFA. The MFA provides a compilation of the maintenance requirements for each aircraft system that will be analyzed and documented through the use of maintenance functional analysis worksheets. The MFA encompasses all repairables and maintenance significant consumables for the airframe, engine and avionics. The MFA provides a direct correlation between the FMS customer's maintenance concepts and the logistics resources required achieving them. ☑ The MFA process is the heart of the logistics requirement determination and forms the basis for the selection of all support requirements. It includes as a minimum, the data displayed in WUC sequence segregated into subsections as depicted in the latest WUC manual. The dynamic nature of the MFA dictates that the FMS customer selects the database format (e.g. Microsoft Access) so that it can be easily updated in the future as changes take place. MFA data elements include:

- WUC
- Part Number
- National Stock Number
- Nomenclature
- USN SM&R Code
- Tailored SM&R Code
- Recommended spares

- Recommended additive spares such as packup kit and Test Bench Installs (TBI)
- Latest USN standard price

7.3.3.2.1 ACCURATE MFA DATABASE

Building an accurate MFA database is critical to planning the support for a new weapon system. It is resource intensive because it compiles data from several disparate databases. For example, during the process of constructing the MFA, the NAVICP top-down-breakdown and the Naval Aviation Logistics Data Analysis (NALDA) (See Section 9.3.4.2.1 for further information) database are compared to the applicable individual maintenance plans. Discrepancies are researched and resolved through discussion with USN/USMC fleet personnel, OEMs, and depot personnel. The MFA should include the latest part number/NSN from NAVICP for the customers' configuration to ensure spares, SE, and maintenance decisions are properly matched. Figure 7-3 contains a methodology for constructing the MFA.

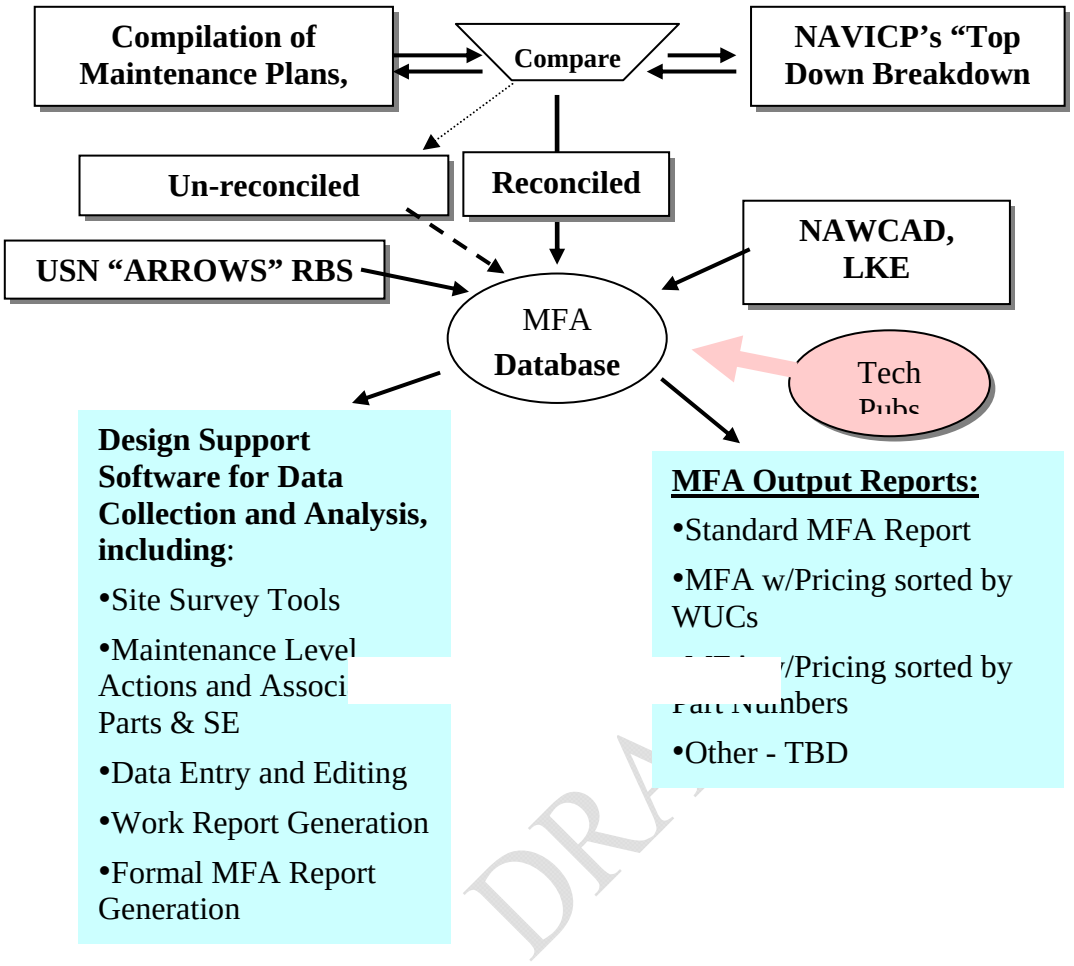


Figure 7-3 Constructing an MFA

7.3.3.2.1.1 VALIDATE GROSS REMOVAL FACTOR (GRF)

The GRF is a data element of the provisioning process and major determinant in the NAVICP formula that forecasts initial spare parts requirements for FMS customers. The GRF is the demand rate of an item per maintenance cycle. The USN considers 100 hours as a maintenance cycle. Knowing the MTBF, one can compute the GRF. For example, where the MTBF failure rate is every 5,000 hours, and assuming that all failures require a component removal/supply action to complete the repair, the equivalent GRF would be .02 per 100 flight hours (100/MTBF = (100/5,000=.02)). The GRF consists of the following two factors:

7.3.3.2.1.2 MAINTENANCE REPLACEMENT FACTOR (MRF)

MRF is the expected rate at which an item is found to be Beyond the Capability of Maintenance (BCM) at the I-level and is shipped to the depot for processing.

7.3.3.2.1.3 ROTABLE POOL FACTOR (RPF)

RPF is the predicted number of times in one maintenance cycle that an item is removed from its next higher assembly at O/I-level of maintenance, repaired at the I-level and returned to RFI stock (i.e. FMS customer-owned stock).

7.3.3.2.1.4 MRF/RPF IN MAINTENANCE PLAN

Repairable MRF/RPFs are cited in USN maintenance plans initially provided by the OEM as part of the initial provisioning process. They are the best source of information for computing initial allowance requirements when the aircraft began its production run and maintenance history had not yet developed. They may be the only source of information for unprovisioned systems. After a designated demand development period, it is Navy policy to revise MRF/RPFs for repairable items using supply system demand history. This is electronically done for items that are ordered from the supply system. But revising original RPFs for items repaired at the I-level is difficult for the NAVICP. That's because aviation maintenance failure data – commonly known as aviation 3M data – is not easily transferable to the NAVICP database and used to electronically recompute RPFs. NAVICP periodically refreshes selected RPFs using 3M data and the FMS customer should liaison with the FMS APML to ensure that spares allowances are computed using refreshed data. The FMS customer should also ensure that spares allowances recommended in the MFA were computed using the most appropriate configuration. For example, most F/A-18s sold to international customers are operated by their air forces. By focusing on USMC aviation 3M failure data vice USN (aircraft carrier based) data, more accurate repair part allowances can be developed for the FMS customer shore based operation.

7.3.3.2.1.5 CONSUMABLE ITEM

Consumable item failure rates are also expressed as an MRF/100 hours. MRFs for maintenance significant consumable items are also contained in the initial maintenance plans delivered to the Government. Using demand history to revise MRFs on DLA managed consumable items (approximately 90% of the stock-listed items) is now routinely done by NAVICP using CRCS (See Paragraph 6.4.6.1). Data retrieval techniques within CRCS would allow the supply LEM to focus on I-level piece parts and increase allowances as appropriate to enhance I-level repair

7.3.3.2.1.5.1 MAINTENANCE SIGNIFICANT CONSUMABLE (MSC) ITEMS

MSC's are those items which are not authorized for repair, but due to some unique characteristic or maintenance impact, are listed in part II of the maintenance plan. Examples of items considered to be maintenance significant include the following:

- Items identified during the LSA process as a potential repairable item
- Scheduled maintenance items identified in part III of the maintenance plan
- Items which can be refurbished (i.e. fourth position of the SM&R code is B)
- Insurance items
- Maintenance kit items

7.3.3.2.1.5.2 HIGH TIME REMOVAL/RETIREMENT CONSUMABLES

There are a significant number of ancillary consumable items (e.g. bolts, brackets, shafts, and mounts) that are replaced on an event driven basis (e.g. depot overhaul, high time) basis. Provisioning failure rates may not adequately forecast high time consumable requirements. If not, they would not be adequately reflected in the GRL and not available in sufficient quantity when a future requirement arises. FMS customers should request that high time

removal/retirement consumable requirements be included in the MFA as MSC items so that the Site Survey team will recommend the spares allowance quantity. Data sources for high time consumables include the SDLM specification and the Periodic Maintenance Information Card (PMIC) deck.

7.3.3.2.2 LONG LEAD ITEM LIST

A list of high failure items must be developed by the Site Survey team so that the Prime Contractor and NAVICP identify which high failure items are "long lead time" to acquire. Support equipment that is "long lead" must also be identified early. These items will require early procurement (e.g., on the production contract) to ensure they are available to meet the FMS customer need dates.

7.4 SITE SURVEY

Think of the FMS Case as construction of a building. Without a proper foundation the building will not stand. Without a Site Survey, there is no foundation to the logistics support provided to the FMS customer.

7.4.1 SITE SURVEY PROCESS

The Site Survey process consists of four phases. They are:

1. Developmental work that is done by government and contractor logistics personnel prior to the Site Survey to draft an MFA and a preliminary P&SP
2. The Site Survey itself to populate the MFA and add breadth to the P&SP
3. The post-Site Survey effort to finalize the formal P&SP (including the completed MFA)
4. Updating the MFA database on an ongoing basis to reflect configuration changes

7.4.2 OBJECTIVE OF THE SITE SURVEY

Site Surveys are associated with weapon system sales. They are typically held in-country with FMS DAPML, selected LEMs, FMS customer logisticians/engineers, and selected contractor representatives. The objective of the Site Survey is to tailor the USN maintenance strategy for supporting the weapon system to the unique requirements of the FMS customer. The objective is also to prepare a report summarizing the results of the Site Survey signed by senior USN and FMS customer representative attendees.

7.4.3 MAJOR GOALS OF A SITE SURVEY

The major goals of the Site Survey are as follows:

- Acquaint the FMS customer with the USN/USMC maintenance plan and tailor it by sub-system to the customer country's requirements based on its operational scenario and organic and commercial maintenance infrastructure
- Acquaint the FMS customer with the USN team that will support them during the initial support period
- Acquaint the FMS customer with the USN processes used to acquire/deliver the initial support program.
- Negotiate in-country maintenance action and initial spare parts allowances for all repairables and maintenance significant consumables
- Negotiate initial allowances for major items of SE and obtain FMS customer decision on sources of supply, quantity, and designated procurement responsibility, and generate preliminary ASSET as an attachment to the P&SP

7.4.4 JOINT AGREEMENTS MADE DURING THE SITE SURVEY

The following are examples of joint agreements made during the Site Survey:

- Confirmation of the foreign country's operational and maintenance scenario.
- Maintenance capability that will be functional in-country at IOC and an overall plan to phase-in the remainder of the maintenance capability as provided in the initial LOA.
- Planned maintenance action (e.g., repair, test, etc.) for all repairable components at I-level and selected components at the D-level by foreign country personnel.
- The range and depth of logistics resources (including long lead items) required for supporting the remove/replace/repair scenarios. ☑ All spares and SE requirements should eventually be presented to the FMS customer for in-country screening and approval prior to ordering.
- A milestone chart for the following: (1) delivery of PS material and services, (2) a schedule of in-country maintenance transition
- General concepts for follow-on logistics support

7.4.5 SEND DOCUMENTATION AHEAD OF SITE SURVEY

The draft P&SP/MFA, a copy of selected maintenance plans, a copy of O/I and selected D level technical manuals, and the Naval Air Training and Operating Procedures Standardization (NATOPS) Manual are shipped to the in-country USG representative to arrive in-country a minimum of 21 days before the Site Survey. The preliminary P&SP/MFA are given to the FMS customer in advance of the Site Survey team arrival. This, plus a copy of the Implementation Plan discussed below, allows the FMS customer to become familiar with the format of these documents, staff them throughout its organization, and select appropriate counterparts who will meet with USN representatives during the Site Survey. It also permits the introduction of new PS concepts such as the FMS Reserve that are critical to fielding and sustaining the OOI weapon system. Thus the FMS customer will be better prepared to participate in a more meaningful dialog while the USN experts are in-country.

7.4.5.1 IMPLEMENTATION PLAN

In preparation for the Site Survey, the FMS DAPML publishes an implementation plan that provides participants with planning information concerning the Site Survey process. The implementation plan is forwarded to all participants – including the FMS customer - approximately two prior to the start of the Site Survey. The Implementation Plan includes the following subjects:

- Brief description of the planned USN maintenance and support strategy
- Purpose of the Site Survey
- USN Site Survey team composition
- Requested FMS customer counterpart team composition and requested skill level
- MFA analysis process
- Desired FMS customer briefings and site visits
- Description of the P&SP

7.4.6 CONDUCTING A SITE SURVEY

The major goal of the Site Survey is technical analysis leading to the establishment of a tailored maintenance plan for the FMS customer. It also provides an opportunity for the working level USN and FMS customer logisticians who will be involved in delivering/receiving initial support to dialog on the support plan and adjust it accordingly, as well as brief each others logistics processes and infrastructure. An overview of the Site Survey process is provided in Figure 7-4.

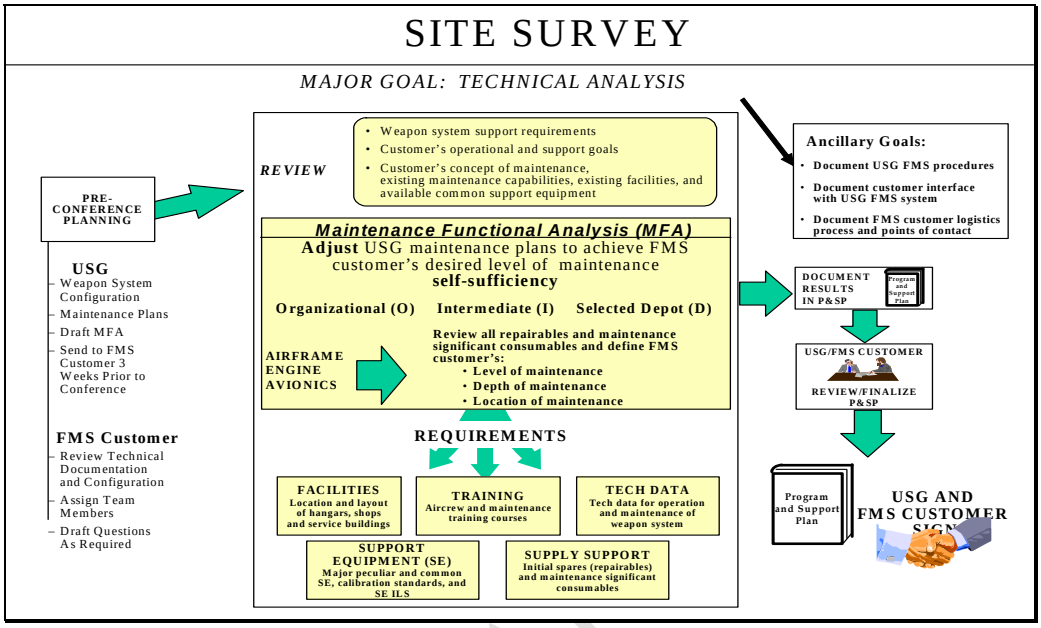


Figure 7-4 Site Survey Overview

7.4.6.1 STRUCTURE OF THE SITE SURVEY

The structure of the Site Survey varies according to the size of the new weapon system program and the familiarity of the FMS customer with the USN logistics system. For example, a more complex weapon system may require a large contingent of USN/contractor personnel to travel to the foreign country and spend approximately 4-6 weeks. Conversely, a simple weapon system, or a sale to a customer experienced in doing business with the USN, may only require a small contingent of USN/contractor personnel to visit the foreign country for a short period (e.g., one-week). Decisions made by the customer/USN team determine the requirements for all support elements and ensure operational requirements are met on schedule with maximum economy. Whatever the size of the Site Survey, it must be a collaborative effort between the FMS customer and the USN.

7.4.6.1.1 SITE SURVEY WORKING LEVEL PROCESS

Typically, the process consists of dedicated teams of USN experts and their FMS customer counterparts, meeting and discussing in detail specific systems (e.g., airframes, engines, etc.) and/or subjects (e.g., supply, facilities, etc.). With the expertise of USN/USMC fleet representatives on the site survey team, SM&R codes for all repairable and maintenance significant consumables (i.e., 4000+ items for the F/A-18) are reviewed for currency and adjusted for customer country maintenance action at the O/I/D-level of maintenance. ☑ The FMS DAPML plays a critical role in suggesting alternative maintenance strategies to the FMS customer. Working papers are annotated and returned to a central processing point on a daily basis. They are then entered into a database that night and returned to the working groups the

next morning for review and modification as appropriate. The format in Figure 7-5 is typical of the Site Survey documentation that describes a tailored FMS customer maintenance plan:

MAINTENANCE FUNCTIONAL ANALYSIS

					ORG	INT	DEPOT		MTBF	GRL	SEL	MAMs TBI	SE CODE	TOT $
							OC	I						
SM&R	**WUC 56X**	**PART NBR**	**NIIN**	**NOMEN**										
PAOOD	2800	4031000-920	013339511	COMPUTER	T		X			3	4	0	44172	
PAOOD	2830	4031003-920	013343042	PWR SUPPL	R		X			1	2	0	4412	
PAOOD	2840	4031004-906	011428998	CCA ASSY	R		X			1	2	0	2333	
PAODD	2870	4031007-906	011429000	CCA ASSY			X			1	1	0	2657	
PAOOD	2890	4031009-902	011429001	CCA ASSY	R		X			1	2	0	7444	
PAOOD	28A0	4031010-913	012268602	CCA ASSY	R		X			1	2	0	3204	
PAOOD	2880	4031011-912	011520918	CCA ASSY	R		X			1	2	0	4067	
PAOOD	2A00	SLZ7305	012423760	SENS UNIT	R		X			1	1	0	7414	
PAODD	2B00	501-1243-01	011232274	INVERTER			X			1	1	0	3714	
PADDD	2B10	556-1900-01	011232174	FILTER, RA			X			0	1	0	283	
PADDD	2B20	542-1367-01	011232292	CCA ASSY			X			0	1	0	691	
PADDD	2B30	542-1366-01	011232291	CCA ASSY			X			0	1	0	847	
PAOOD	2C00	74A800797-1	013177793	PANEL ASY	R		X			1	1	0	1376	
													SUB TOTAL	

Definitions:
Org – Organizational Maintenance
Int – Intermediate Maintenance
OC – Out of Country
I - In-Country
MTBF – Mean Time Between Failure
GRL – Gross Requirements List (i.e. the GRL details the recommended spares)
SEL – Selected Spares
MAMs – Refer to Section 4.4.1.11
TBI – Refer to Section 4.4.1.11
SE Code – Support Equipment List Code (i.e. List Codes identify the required support equipment)
T – Test
R – Remove and Replace

Figure 7-5 Maintenance Analysis Documentation

The initial USN spares recommendation is adjusted as required and the support equipment is selected based on USN data and FMS customer input (i.e. equipment already on hand). Training is also based on the MFA documentation.

7.4.6.2 MAJOR TOPICS DISCUSSED AT A SITE SURVEY

7.4.6.3 SUPPLY

7.4.6.3.1 GROSS REQUIREMENTS LIST (GRL)

Using the MFA configuration, the supply LEM, generates a draft GRL. The GRL is a comprehensive allowance of spares and repair parts required for the initial outfitting of specific requirements cited in the LOA. The draft GRL is used by NAVICP as the basis for the original P&A price estimate. The GRL calculation considers factors such as the following:

- FMS customer planned flying hour forecast

- Number of aircraft
- Number of operating sites
- Estimated I-level RTAT
- Estimated order and ship time (O&ST) from the DoD supply system (RIRO)
- Estimated Depot RTAT (ROR)

The recommended allowances in the draft GRL should be available at the Site Survey on a notebook computer so that the supply LEM can recompute spare parts allowances as required (e.g., SM&R code changes). Sample GRL calculations should be included as part of the supply support section of the draft P&SP and briefed to the international customer during the Site Survey. Alternative allowance calculation approaches such as RBS and the application of assurance factors should also be included in the draft P&SP with sample calculations for each sparing approach.

7.4.6.3.2 SUPPLY LEM BRIEFINGS

The supply LEM should also brief the following:

- Initial and follow-on supply support plan
- DoD logistics system and points of contact for inclusion in the P&SP
- Sending FMS customer personnel to NAVSUP-sponsored supply training courses in the U.S. to build a cadre of personnel familiar with the USN supply system and how it interfaces with the FMS logistics system. Maintenance administration training is also available upon request.
- The FMS Initial Support Tracker (FIST) is the NAVICP/NAVAIR – FMS admin funded - system for tracking initial support material. A description of the FIST is contained in Section 8.4.3.1and should be included in the P&SP
- NAVSUP has expertise available to recommend in-country warehousing and inventory management upgrades that are typically associated with fielding a new weapon system and the managing of complex and expensive repairables. NAVSUP can also provide fully developed sophisticated inventory management systems such as Computerized Provisioning, Allowance and Supply System (COMPASS), or a less complex and inexpensive system such as Supply Information Processing System (SIPS) that currently automates shipboard supply department material and financial management for 12-countries. NAVAIR is prepared to recommend integrated supply/maintenance COTS software that was selected competitively by the USN and USAF for domestic supply/maintenance data management.
- The Transportation Plan to move logistics elements to in-county locations as required to field the new weapon system

7.4.6.3.3 SUPPLY CHAIN MANAGEMENT INITIATIVES

The USG, in partnership with industry, continues the development of numerous supply chain management initiatives that benefit FMS customers. For example:

- NAVICP permits FMS customers to initiate requisitions and obtain status via the NAVICP web-site. They also provide for electronic submission and tracking of SDRs as well as QDRs.

- DLA provides all customers better in-transit visibility (ITV) via a web-based system and will soon give its FMS customer visibility of ITV. DSCA is currently evaluating the funding of bar code scanning devices at FMS customer freight forwarders to scan all shipments as they transit through a freight forwarder. Also, several FMS customers have found that using the NAVICP staging facility in Mechanicsburg Pennsylvania was a cost effective way to ship initial support material in an orderly and controlled way as well as dramatically reduce the occurrences of FMS customer- generated SDRs[29].
- The USG is developing policy and procedures that will ensure that repair parts shipped under an FMS case with a shelf life coding will arrive at an FMS customer warehouse with 12-months of shelf life remaining. FMS customers that want more shelf life remaining should request that the USG propose a program in the P&SP to make that happen.
- NAVICP has developed a web-based system to track the shipment of discrepant material that is being returned to the Government depot or commercial contractor because of an SDR. This system, which is entitled "Enhanced Transportation", provides for material pick-up in country, shipment via air, and delivery directly to the appropriate depot (bypassing the freight forwarder) under signature service (see Paragraph 6.2.1). Typical shipment times average 2.8 days. Because of its success, Power Track is also being considered for tracking ROR material
- See paragraph 9.3.3 for additional Supply Chain initiatives

7.4.6.3.4 NEW AND UNUSED MATERIAL

Most FMS customers specify in the LOA that they want only "new and unused" material (not applicable when buying used aircraft). When the USN fills an FMS requisition for repairable material from the supply system (i.e., the material may not be available from new procurement in time to meet the customers IOC date), the material may be serviceable, but not "new and unused." This eventuality should be discussed in the P&SP and a process established to gain the customer's approval before the USN fills FMS requisitions with other than "new and unused" material.

7.4.6.4 SUPPORT EQUIPMENT

Advanced System for SE Tracking (ASSET) is the database used by the support equipment LEM to identify, manage, and track support equipment. Initially, the support equipment LEM prepares a draft listing of required support equipment using applicable Support Equipment Recommendation Data (SERDs) as depicted in the NACWLKE domestic "AUTOSERD" System, and other information as appropriate including airborne/engine maintenance plans, line drawings, specifications and recommended levels of maintenance for SE. The salient requirements for entering AUTOSERD are similar to those requirements needed to build a GRL. They include the following:

- Identification of the weapon system configuration
- Number of aircraft to be supported
- Maintenance levels (such as organizational, intermediate, depot, and detachments)

[29] NAVICP FAST-LINE data indicates that 5-7% of all shipments contain errors (e.g. wrong quantity/wrong count) that can be corrected quickly if identified early in the shipment process

- Applicable system list codes (defines airborne systems e.g. airframe, hydraulic)

Eventually, this list is incorporated into the ASSET database for the case as the ASSET Master Support Equipment Requirement List (AMSERL). The initial ASSET database that is provided for use at the Site Survey identifies all USG required CSE and PSE. Figure 7-6 identifies the range of SE that might be considered at a Site Survey. At the Site Survey, the customer makes acquisition decisions for each recommended item of support equipment, and identifies, for example, those items for which a substitute is on-hand, and those the customer prefers to manufacture in-country. It's possible for an FMS customer to use SERD data in combination with the applicable technical manual to highlight special tools and adapters that might be manufactured in-country vice purchasing from the USG. It's suggested that FMS customers explore this concept with the support equipment LEM at the Site Survey.

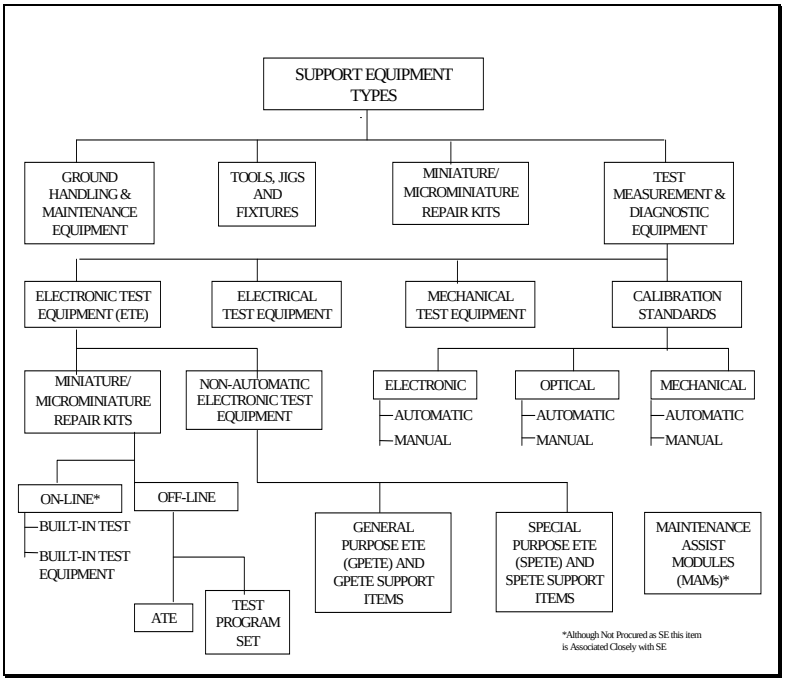


Figure 7-6 Types of Support Equipment

7.4.6.4.1 PRODUCT SUPPORT FOR SUPPORT EQUIPMENT

The SE LEM identifies the logistics support concepts for support of support equipment. Specific PS for support equipment will be definitized during the provisioning conference after final selection of specific support equipment. ☑ Many of the spare parts recommended for support of support equipment are common electronics that may already be stocked by an FMS customer.

7.4.6.4.2 CALIBRATION SUPPORT FOR SUPPORT EQUIPMENT

The USN calibration program has been developed with the concept that calibration support is performed at the lowest possible level, but it will be traceable to the highest level of accurate measurement, the National Institute of Standards and Technology (NIST). USN calibration support for SE is provided by a Field Calibration Activity (FCA) whenever possible. SE that exceeds the limitations of the FCA and calibration standards from the FCA are calibrated at a Navy Calibration Laboratory (NCL). The process continues upward to ensure traceability as

discussed above. How the FMS customer will meet specific calibration requirements and ensure traceability is a major topic at the Site Survey. The answer varies with the availability of in-country calibration facilities (organic or commercial) and specific Instrument Calibration Procedures (ICPs). These issues are discussed during the Site Survey and an overall strategy is published in the P&SP. The USN finalizes specific calibration support requirements in the Calibration Support Plan (CSP). The CSP is keyed to the ASSET. The FMS DAPML normally relies on the Naval Warfare Assessment Center, Corona to identify and procure calibration standards. ☑ The CSP should be reviewed with the FMS customer to identify equivalent calibration standards available in-country that may not be required in the initial support package.

7.4.6.5 TECHNICAL DATA (E.G. TECH MANUALS/ENGINEERING DRAWINGS)

7.4.6.5.1 TAILORED INITIAL OUTFITTING LIST (TIOL)

The PM determines the aircraft configuration. Based on that configuration, NATEC develops the preliminary TIOL. The preliminary TIOL and selected hard copy technical manuals are shipped in-country for use by the joint Site Survey team in their deliberations. Refinement of the TIOL continues after the site survey as the aircraft configuration changes. The final TIOL is provided to the FMS customer for approval before publications are shipped.

7.4.6.5.1.1 COMMON PUBLICATIONS

USN common technical manuals are those currently used by the USN to operate, maintain, repair, and support aircraft or support equipment at the organizational, intermediate, and depot maintenance level. Subsequent changes/revisions to these initially supplied manuals will be delivered under the NAVAIRSYSCOM automatic distribution system through delivery of the first aircraft and normally for two (2) additional years thereafter. FMS customers will be required to establish a follow-on support FMS case to receive automatic distribution of changes to common publications. ☑ The USN is required to review common publications in accordance with applicable security regulations and delete sections that do not apply to an FMS customer based on configuration. FMS case funding is used for this effort.

7.4.6.5.1.2 UNIQUE FMS PUBLICATIONS

Should an FMS customer elect to install unique equipment (i.e. not common to USN configuration) on its aircraft, the FMS customer will be required to purchase peculiar publications. These peculiar publications may require a new manual or supplements/differences date added to existing USN publications. These new technical manuals, technical manual supplements, or difference data sheets for technical manuals will be procured directly from contractors or USN activities by NAVAIRSYSCOM. Future changes/revision to unique publications should be procured under a follow-on FMS publication case.

7.4.6.5.2 HARD COPY OR DIGITAL TECHNICAL MANUALS

Technical manual deliverables (paper or CD-ROM) are shipped directly to the FMS customer or staged for a consolidated shipment. The USN is developing the capability (See Paragraph 7.4.6.5.4 below) to post technical data on commercial server so that an FMS customer can download the manuals as required. Much of the legacy technical manuals for older weapon systems are not currently in digitized format, thus preventing uploading to a commercial server. However, it may be cost effective for an FMS customer to use FMS case funds to digitize legacy technical manuals in lieu of receiving manuals in hard copy or CD-ROM format. ☑ FMS customers are encouraged to discuss the issues of digitized technical manuals with the USN representatives at the Site Survey to ensure all options are clearly understood and priced properly in the LOA.

7.4.6.5.3 ENGINEERING DRAWINGS

NAVAIR program managers typically buy Level II (drawings sufficient for maintenance and reprocurement action) when they contract for new weapon systems. However, the Level II drawings are not provided to users (i.e. USN/depot/FMS customer) at IOC. They are typically retained in a central repository in either digitized or aperture card format and requested by the user as needed for maintenance and/or reprocurement (not often applicable to FMS) purposes. New weapon system programs such as the F/A-18 E/F are now buying drawings in digitized format with a link to the applicable weapon system/sub-system part number as well as links to existing FMS customer configuration. Thus, those drawings should be retrievable quickly as required by an FMS customer when requested. However, there is no effort to establish those same links on the "millions" of legacy drawings and then digitize them for posting in a central repository in advance of user (including FMS customer) requirements. Legacy drawings for USN users are digitized by the Navy on an as requested basis and delivered to the Navy user via the JEDMICS (see Section 7.4.6.5.4 below). FMS customers can either receive drawings in digitized or aperture card format, but FMS customers must fund the digitization effort if not previously done by the USN. NATEC does have the capability to provide a top-down breakdown by weapon system/sub-system of all drawings purchased by NAVAIR program managers. Thus, if an FMS customer requests a set of drawings for a specific sub-system such as the SH-60 Main Gear Box and cites the applicable part number, NATEC can produce a listing of the drawings that are in JEDMICS and/or aperture card format. As with technical manuals, requests for drawings must be sanitized before release. The sanitization process must be funded from FMS case funds.

7.4.6.5.4 MANAGEMENT OF TECHNICAL DATA

The Navy has the following two systems for managing technical data

- **Joint Engineering Data Management Information and Control System (JEDMICS)** for managing the storage and distribution of drawings. JEDMICS is an automated data repository that provides engineering drawings to the customer at the desktop. PC JEDMICS is a software package designed to support remote JEDMICS users. The Navy is working on a system to overcome current problems for transferring technical data to an FMS customer via the Internet from a JEDMICS repository located in the U.S. However, FMS customers might adapt the JEDMICS system to the needs of their country by developing a local area network to distribute the engineering drawings to their own remote users (PC JEDMICS) from a JEDMICS-based central repository located within the customer country

- **Joint Aviation Technical Data Integration (JATDI)**, which is a web-based system that accesses digital knowledge from a variety of sources in seconds. Data accessible from JATDI includes technical manuals, engineering drawings and associated data, and other maintenance, supply, and readiness data. It is a highly flexible system designed around Commercial-Off-the-Shelf (COTS) hardware and software that provides the user with a flexible suite of tools to modify to individual specifications while retaining a common system. The intent is to add JATDI to hardcopy/CD-ROM media as a cost effective web-based option for the delivery of all technical data. However, as of this date, unresolved security issues prevent delivering technical data to FMS customers via JATDI.

☑ FMS customers may want to consider JATDI as a stand-alone system for the management and delivery of all weapon system technical data in country. JEDMICS and JATDI can be made available to FMS customers via an FMS case.

7.4.6.6 MAINTENANCE MANAGEMENT

7.4.6.6.1 MAINTENANCE STRATEGY

Section 4.6 discusses the various maintenance strategies that may be embedded in the USN maintenance plans. One strategy of particular note is the 2M repair strategy (see below) that is often adopted by the USN fleet I-level maintenance activities as a cost saving initiative (i.e. avoids depot maintenance costs) by fault isolation and repair of circuit boards that are designated in the LORA for repair at the depot or for discard. 2M repair has also been adopted by FMS customers for the same reasons, but equally important, to expand their self-sufficiency. ☑ USN representatives at a Site Survey may not be aware of the fleet-developed 2M repair capability because the required formal changes to the maintenance plan or SM&R codes may not have been done. It is therefore recommended that FMS customer's request that the FMS DAPML specifically query domestic APMLs for information on applicable 2M-repair capability.

7.4.6.6.1.1 ALTERNATIVE MAINTENANCE – ONE EXAMPLE

The Naval Undersea Warfare Center (NUWC), Virginia Beach, Virginia has developed the AN/USM-646 (V), which is a Module Test & Repair (MTR) system. The AN/USM-646 (V) is comprised of "Huntron 5100DS", a Personal Computer and scanner and/or printer as appropriate. This configuration is used to do static, power off circuit tracing of electronic circuit cards. These electronic signatures are stored on a floppy disk for comparison to identical, but faulty circuit cards. This comparison often helps identify the failed component on the faulty circuit card that is then repaired using 2M - repair (refer to figure 4-17) techniques. This is a very useful device for troubleshooting circuit boards for which no other support exists, such as circuit cards in the maintenance plan that are designated for discard. It also provides a capability to repair circuit boards that are designated in the USN maintenance plan for repair at an overseas depot. It is recommended that the FMS customer query the FMS DAPML on the use of the AN/USM-646 as an alternative maintenance strategy to the existing USN maintenance plan. ☑ Should an FMS customer adopt a 2M alternative maintenance strategy, NAVICP should be requested to add additional piece part support to the GRL. The best source for this data would be a USN maintenance activity that is performing 2M-repair on the applicable sub-system. The AN/USM-646 is fully provisioned and supported in the DoD supply system. The AN/USM-646 is not a replacement for USN Automatic Test Equipment (ATE), but a complement to ATE. Some of the funded AN/USM-646 aviation initiatives include the following[30]:

- 32 E-2C Circuit Card Assemblies (CCAs) funded in 2002
- 58 F/A-18 C/D CCAs funded in 2002
- 24 H-60 CCAs funded in 2002

☑ It's emphasized that alternative maintenance decisions such as expanded use of the AN/USM-646 are feasible and cost effective because the USN has already documented the repair documentation for repairing many circuit cards and as well as purchasing the ILS needed to support the necessary SE. Electing to do depot maintenance in-country in lieu of returning components to the U.S. under ROR may also be a feasible alternative because USN documentation and ILS have already been purchased by the USN. However, it would presumably be cost prohibitive for an FMS customer to acquire I-level repair capability on a

[30] AIR-4.8.1.3 Power Point Presentation

system for which the USN has not done so. Figure 7-7 provides sample alternative maintenance decisions that might fit into an FMS customer tailored maintenance strategy.

EQUIPMENT	MAINTENANCE LEVEL	USG MAINTENANCE PLAN	FMS CUSTOMER MAINTENANCE PLAN	CHANGE TO ILS SUPPORT
HYDRAULIC PUMP	O-LEVEL	FAULT ISOLATE, REMOVE/REPLACE PUMP	NO CHANGE	NONE
	I-LEVEL	NONE	NONE	NONE
	D-LEVEL	REPAIR PUMP AT U.S. DEPOT	REPAIR PUMP AT FMS CUSTOMER DEPOT	SPARES: (1) REDUCED PIPELINE SPARES BECAUSE ROR TAT REDUCED FROM 180 TO 30 DAYS DAYS (2) DEPOT PIECE PARTS SE NONE PUBS: DEPOT MANUAL TRAINING: NONE
STARTER OR GENERATOR	O-LEVEL	FAULT ISOLATE, REMOVE AND REPLACE STARTER OR GENERATOR	NO CHANGE	NONE
	I-LEVEL	REPLACE BRUSHES	NO CHANGE	NONE
	D-LEVEL	OVERHAUL INCLUDING REWIND ARMATURE AT U.S. DEPOT	OVERHAUL INCLUDING REWIND ARMATURE AT FMS CUSTOMER DEPOT	SPARES: (1) REDUCED PIPELINE SPARES BECAUSE ROR TAT REDUCED FROM 180 TO 30 DAYS DAYS (2) DEPOT PIECE PARTS SE: NONE PUBS: DEPOT MANUAL TRAINING: NONE
UHF/VHF RADIO	O-LEVEL	FAULT ISOLATE, REMOVE/REPLACE WRAs	NO CHANGE	NONE
	I-LEVEL	FAULT ISOLATE, REMOVER/REPLACE REPAIR SELECTED CIRCUIT CARDS USING "HUNTRON TRACKER"	REPAIR SELECTED CIRCUIT CARDS USING "HUNTRON TRACKER"	SPARES: (1) REDUCED PIPELINE SPARES BECAUSE ROR TAT REDUCED FROM 180 TO 30 DAYS DAYS (2) I-LEVEL PIECE PARTS SE: "HUNTRON TRACKER" SYSTEM PUBS: WIRING DIAGRAMS, AND "GOLD DISCS" TRAINING: "MICRO MINIATURE" REPAIR

D-LEVEL	FAULT ISOLATE, REMOVER/REPLACE/REPAIR CIRCUIT CARDS AT U.S. DEPOT	FAULT ISOLATE, REMOVER/REPLACE/REPAIR CIRCUIT CARDS AT FMS CUSTOMER DEPOT	SPARES: DAYS	(1) REDUCED PIPELINE SPARES BECAUSE ROR TAT REDUCED FROM 180 TO 30 DAYS (2) DEPOT PIECE PARTS
			SE:	SAME AS I-LEVEL
			PUBS:	SAME AS I-LEVEL
			TRAINING: NONE	

Figure 7-7 Alternative Maintenance Decisions

7.4.6.7 IN-COUNTRY WEAPON SYSTEM LIAISON OFFICE (WSLO)

FMS customers benefit significantly from the USN establishing a WSLO in-country that was responsible for monitoring and coordinating delivery of all ILS material, various aspects of USN ECP's as they relate to the FMS customer, querying the appropriate USN office should problems occur, and performing other duties as assigned. The WSLO could be either a government or contractor person as determined by the FMS customer. The WSLO would be FMS case funded.

7.4.6.8 AIRCRAFT FERRY

The FMS DAPML must be involved if the aircraft will be flown from the Prime Contractor's plant to the FMS customer. Enroute parts support, communications, and maintenance contingencies must be planned for in the aircraft ferry plan. Similar issues must be addressed if the aircraft will be flown from the Aerospace Maintenance and Regeneration Center (AMARC) at Davis Monthan AFB, Tucson, Arizona to a depot facility for overhaul.

7.4.6.9 TRAINING

Depending on the country and the weapons system, the Site Survey training team will consist of two to five personnel. The lead person on the team is the PM205 Assistant Program Manager for Training and Training Systems (APMTS). A primary assistant who writes and records the information as it is discussed or reviewed supplements the APMTS. In addition to these two primary personnel, the team may be expanded to include a pilot and aircrewmen and/or a maintenance person. These latter personnel are added either individually or in combination as required to ensure that all necessary information can be gathered in the time allotted.

The team will meet with their counterparts from the customer country to assess the abilities of customer country personnel for transition to the new weapons system. The team will first determine the country's ability to train personnel, and the customer's desire to train only a cadre of personnel who in turn will become trainers of the remaining students, or to have the U.S. Navy accomplish all training. The team will determine the intended mission, and the level of maintenance to be performed by the customer country. Using this information, the team will begin to develop a training program, laying out individual training tracks for both operators and maintenance personnel. To accomplish this task, the team must determine how many operators are required (pilots, co-pilots, crewmembers, etc.). They must also evaluate the level of maintenance to be performed and from that determine the number and skills of personnel required accomplishing the tasks. In so doing, the Team will review a sample of training records of personnel who may be designated for the transition training to determine the current level of training and experience versus that required at completion of transition training. The Team will visit shops and classrooms to observe the methods and skills of current personnel to gather the information required making recommendations for the training program.

Concurrently, with these actions the team will begin building the training section of the P&SP. The training section of the P&SP will become the foundation for the training program and ultimately the Training and Training Equipment Plan (TTEP). The Team in conjunction with their counterparts from the customer country will make recommendations as to training and training equipment required to introduce the new weapons system into the customer country's arsenal.

The training section of the P&SP, which will consist of 90-120 pages of information, will record all of the information developed by the training team during the Site Survey. It will contain general information such as an overview of the program, language requirements, training to be accomplished in the United States, training to be accomplished in-country and aircraft descriptive data. Additionally, it will address the scope of training for flight, maintenance, supply and administration training. The team will develop preliminary training time lines that will reflect the training to be accomplished, the skills to be acquired, as well as the duration of the training. The only thing not included will be the actual start and end dates for the training as they must be developed in conjunction with the training activities in the U.S. after determination of case implementation and funding.

The team will also include information on student administration such as security clearances, reporting instructions, housing, meals, medical, uniform requirements, and pay and allowances. If training equipment will be included in the FMS Case, the Training Team will work with the Facilities Team to ensure that adequate facilities are, or will be, available when the training equipment is delivered. Outlines of the training curricula will be included in the P&SP.

Upon return to the U.S., the training team will use the information developed at the Site Survey to schedule the training. The schedule will be developed is such a manner as to ensure that trained personnel are available as required upon delivery of the weapons system, equipment and parts. All of this will be published in a preliminary training plan, which will be discussed, revised and approved, by all parties, at the training plans conference. The final Training Plan will then be approved and published. The Training Plan is a dynamic document that changes over time to reflect the most recent class schedules and student assignments. Changes to the Training Plan will be issued on a regular basis, which will provide current information at all times.

7.4.6.10 CONTRACTOR ENGINEERING TECHNICAL SERVICES (CETS) REQUIREMENTS

Based on discussions with the FMS customer at the Site Survey, the FMS DAPML will identify the technical areas for which CETS personnel will be required to support the international customer during the initial in-country introduction of the weapon system. The high cost of in-country CETS dictates that these requirements be jointly scrutinized by the FMS DAPML and the FMS customer for consolidation and/or reduction from the initially determined requirement. Conversely, it's also recognized that CETS play a significant role in the success of the initial program and mandatory requirements should be defended vigorously during the Site Survey by comparing them to possible reductions in other ILS costs.

7.4.6.11 FACILITY REQUIREMENTS

Using the tailored maintenance plans, the FMS DAPML, working closely with the Prime Contractor, identifies the potential facility requirements. Line drawings are prepared for discussion with the FMS customer. Appendix B provides an example of the line drawings that are provided as well as dimensional data provided for major buildings and shops. It's

emphasized that logistics facilities must be in-place before in-country maintenance capability can be declared complete.

7.4.6.12 USN ROR PROCESS/GOALS

Success of the ROR program is vital to maintaining aircraft readiness throughout an aircraft life cycle. It is therefore important that a discussion of the USN ROR process and goals be included in the draft P&SP and discussed at length during the Site Survey. ☑ FMS customer in-country processing is included in the ROR TAT calculation. Particular emphasis should be placed on minimizing the time it takes for the FMS customer to: (1) internally process an unserviceable component for shipment to the depot, (2) actually ship the component to the depot, and (3) and fund for the shipment/repair of ROR components. Tracking repairables throughout the ROR cycle is a joint FMS customer/USN responsibility and critical to success of the ROR program. NAVICP (OF) has developed freight tracking software that tracks ROR shipments to/from the freight forwarder and interfaces with MISIL. It requires that the FMS customer fund its freight forwarder to report the receipt and shipment to NAVICP. Paragraph 6.2.1 describes the NAVICP "ENHANCED TRANSPORTATION" system that bypasses the freight forwarder, but significantly shortens ROR turnaround time thus reducing the depth of pipeline spares. Figure 6-9 provides a notional ROR process for planning the ROR program.

☑ FMS case management of ROR should typically follow traditional NAVAIR ROR FMS case management policy. That is: there is a modest ROR line in the initial support FMS case managed by the FMS DAPML and a follow-on support ROR FMS case managed by NAVICP. However, ultimately it's the FMS customer who must determine whether NAVICP, the FMS DAPML, or possibly a NADEP will be the FMS case manager for their follow-on support ROR program. The decision is multifaceted and should be based on a business case analysis that would be presented by all organizations. Regardless of which organization is selected, it's recommended that the FMS customer direct that the NAVICP central repository be used as the ROR tracking database for all ROR FMS case management.

7.4.6.13 SITE SURVEY IN THE U.S

Under this concept, the FMS customer would send representatives to a USN facility (most likely an operating air station) in the U.S. for detailed Site Survey discussions. This would allow the FMS customer to review the weapon system and potential SE in an operational setting. They could discuss the actual equipment with USN/contractor experts who could be made available on an as needed basis. Compared to holding the Site Survey in-country, they would gain a better understanding of the dynamic nature of the USN/USMC base support structure. A prerequisite for holding the Site Survey in the U.S. is for a small contingent of USN/contractor experts to visit with the FMS customer ahead of the Site Survey to familiarize themselves with their FMS customer operational and support scenario. They would also meet with their working level counterparts and answer questions about the Site Survey process. The initial planning meeting discussed in Section 7.3.2 may suffice as the requisite meeting prior to the Site Survey being held in the U.S. It is preferable, however, to hold a dedicated meeting in-country shortly before the Site Survey. After holding the Site Survey in the U.S., it still may be necessary for selected USN experts to visit the FMS country and render additional expertise (e.g., facilities and armament, etc.).

7.4.6.14 FOLLOW-ON SUPPORT CONCEPT

The FMS DAPML coordinates the follow-on support concept in collaboration with the LEMs and the FMS customer. It is included in the applicable section of the P&SP. Subjects for discussion include the following.

- LOAs for munitions and other explosives
- Ordering Cartridge Actuated Device (CAD), Propellant Actuated Device (PAD), and Aircrew Escape Propulsion System (AEPS)
- New LOAs for major end items (component and equipment)
- Technical and engineering services
- Automatic distribution of technical manuals
- Follow-on training
- Blanket order, CLSSA, RIRO, and CLSSA/RIRO FMS cases for spare parts

7.4.7 COMPLETION OF A SITE SURVEY

7.4.7.1 DRAFT P&SP

At the conclusion of the Site Survey a draft P&SP is presented to the FMS customer. Senior representatives from both the USN and the FMS customer country sign it. The major findings of the Site Survey are briefed to appropriate levels within the FMS customer's logistics/command infrastructure. A final P&SP should be completed and mailed within 60 days after the Site Survey team returns to the U.S.

7.5 LOGISTICS-RELATED ACTION SUBSEQUENT TO THE SITE SURVEY

During this phase, the primary functions performed are procurement, monitoring and tracking the delivery of material and services, and training. These functions are discussed in the following section.

PROCUREMENT OF INITIAL SUPPORT

8.0 PROCUREMENT OF INITIAL SUPPORT

8.1 WEAPON SYSTEM PROCUREMENT CONTRACT

NAVAIR procures a new weapon system for an FMS customer using USN contract procedures. The configuration is established in the LOA and flowed down to the Prime Contractor via the contract specifications. The Prime Contractor is responsible for vendor coordination to ensure CFE is delivered in time to meet the aircraft production schedule. AIR-1.5 has the same responsibility for GFE. That is, they coordinate their various GFE procurements such that the GFE is delivered to the Prime Contractor in time to meet the production schedule. The production installation is typically done at the WRA level only Supporting WRA/SRAs and piece parts are definitized as spares and bought by the NAVICP.

8.1.1 GOVERNMENT FURNISHED EQUIPMENT

To achieve the lowest price for both production installs and spares, the FMS DAPML should coordinate the procurement of spares concurrent with the production buys (i.e. SAIP). That means that initial requirements (i.e., GRL) for spare WRAs must be definitized in time to meet the "procurement window" for WRAs installed during production of the aircraft. If associated SRAs and unique bit/piece requirements are ordered concurrently with the WRA, normally additional savings can be achieved. The FMS DAPML must coordinate closely with the NAVICP (i.e., requirement determination) and the FMS customer (i.e., requirement approval/funding) such that the funded requirement for GFE spares is finalized in time to meet the AIR-1.5 "procurement window" for production installs. ☑ FMS customers should be aware that delaying approval of the requirement, and/or not funding SAIP procurement in a timely manner, will significantly increase the cost of GFE spares.

8.1.2 CONTRACTOR FURNISHED EQUIPMENT

As stated above, the Prime Contractor is responsible for procuring CFE production installs. As with GFE, savings can be achieved if CFE spares are bought concurrent with the production buys. The FMS customer must decide whether to buy spares directly from the Prime Contractor or from the government. Section 6.3.4.1 discusses the issue of a Prime Contractor versus the government buying CFE spares.

8.1.3 INTERIM SUPPORT/LONG LEAD BUYS

Selected spares and support equipment must be bought early if they are designated long "lead items", or are needed before IOC for various reasons such as flight test or training. The USN and the FMS customer must ensure that these requirements are agreed upon early – in the signed LOA - so that funding is made available by the FMS customer in time to meet the Prime Contractor production "procurement window".

8.1.4 CONFIGURATION CHANGES DURING PRODUCTION

During the production process, the PM considers numerous Engineering Change Proposals (ECPs) for adoption in the domestic aircraft fleet. USN approved ECPs are not automatically installed in FMS customer aircraft. The FMS customer must specifically approve them before installation takes place. Once approved, the USN will take action to modify the production contract and to cancel/modify existing spares/support equipment contracts.

8.2 CO-PRODUCTION PROGRAMS

When an FMS customer elects to co-produce a weapon system there are numerous logistics issues that arise which must be quickly resolved. For example, segregating and positioning the support equipment and spares needed for final inspection and ramp support is often a problem. Expediting material and equipment that has entered the transportation system and securing government approval of technical data requests are other examples of problems that need to be worked. To be responsive to these ever-changing requirements the PM establishes an overall IPT action item tracking system that the FMS DAPML requirement and controls all responses centrally. The action tracking process is documented in the ILSP and is provided by the Prime Contractor.

8.3 PROCUREMENT OF WEAPON SYSTEMS NO LONGER IN PRODUCTION

☑ Procurement of weapon systems no longer in production is discussed at this point because the process is unique compared to procurement of an in-production weapon system. However, the process for providing initial and follow-on support is similar to the process for providing initial and follow-on support for in-production weapon system. Any significant differences will be inserted as appropriate.

As with in-production weapon system procurement, the procurement of weapon systems no longer in production – including weapon systems already phased out of the USN inventory - begins with the PM funding and ordering the modification and overhaul of weapon systems designated in the LOA to the configuration baseline specified in the LOA. An FMS customer may request in the LOA that weapon systems be shipped in an "as is" condition. If so, the NAVICP, Philadelphia detachment at the Aerospace Maintenance and Regeneration Center (AMARC), Davis-Monthan AFB, AZ would, at the request of the PM, arrange any work accomplishment and preparation for shipment (AMARC normally does this work) as specified by the FMS customer in the LOA. At times, aircraft are transferred to an FMS customer before they are shipped to AMARC. ☑ The following discussion refers to weapon systems that will be modified and overhauled by a commercial contractor under an FMS case. Similar provisions would be required in the event that an OOI weapon system is overhauled and/or modified at an organic depot.

8.3.1 MODIFY/OVERHAUL WEAPON SYSTEM

Using FMS case funding, the AMARC custodian arranges to transport the weapon systems from the storage location to the commercial contractors overhaul facility via a ferry flight or ground transportation. The contractor overhauls and modifies the weapon system to the configuration required by the LOA, as confirmed in the SOW. Terms and conditions of the contract will dictate the fixed price scope of work, provide for engineering changes and establish procedures for approval of "over and above" work. Unless otherwise requested in writing by the FMS customer, the process and procedures for a depot overhaul will be according to the USN specifications as directed in the SOW. For example:

- Provide all the services, material, tooling, and facilities (including storage, handling, fueling, defueling, etc.).
- Perform all initial inspections and identifying all "over and above" work.
- Perform all work required by the specification and "over and above" work authorized by the USN.
- Strip and paint the aircraft using a paint scheme selected by the FMS customer

- Remove defective engines and components as identified. Provide replacement engines and components from either contractor repair sources or by procurement from the DoD supply system or commercial market. ☑ The contractor shall be given access to the DoD Supply System (including Sponsor Owned Material (SOM)) for the purchase of parts. However, the contractor typically remains contractually responsible to provide all parts even if they are not available in the DoD supply system.
- Provide weapon system modification and/or upgrade services.
- Provide material and services necessary in performance of airframe overhaul and modification/upgrade effort.
- Package (including preserving) and ship NRFI components to designated repair depots.
- Store and maintain the aircraft at the contractor's site if ordered
- Provide engineering support for all work requests/orders
- Correct all defects caused by the contractor
- Notify the contracting officer of changes to specifications and manuals
- Maintain and provide a qualified ground check and functional check flight crew in accordance with NAVAIRINST 3710.10.

8.3.1.1 MANAGEMENT OVERSIGHT OF OVERHAUL AND MODIFICATION

Engineering decisions that cannot be resolved by the Administrative Contracting Officer (ACO) will be referred to the FMS DAPML for a recommendation to the FMS customer who ultimately has final engineering decision authority. The FMS DAPML will monitor the contracting progress through regular reports and scheduled progress meetings. If agreed to in the LOA, the international customer may assign personnel to the contractor facility to monitor progress of the overhaul and/or modification. They will also be offered copies of reports sent to the FMS DAPML and be invited to participate in Government meetings concerning the contractor's progress.

8.3.1.2 CONFIGURATION MANAGEMENT DURING MODIFICATION

☑ The FMS DAPML should require that NAVICP have a process in place to ensure that all material ordered as spares are consistent with the installed configuration delivered to the FMS customer on completion of the depot overhaul and/or modification effort.

8.3.1.3 MODIFICATION OF FLIGHT CRITICAL COMPONENTS

The FMS DAPML should consider, in collaboration with the FMS customer, "zero timing" installed and/or spare life limited components concurrent with modification of the component. This will ensure the FMS customer configuration stability and increased reliability for the foreseeable future after the aircraft arrives in country.

8.4 INITIAL SUPPORT MATERIAL PROCUREMENT PROCESS OVERVIEW

NAVICP establishes a block of requisition numbers for use by the FMS DAPML/LEMs to procure initial support material and services for both in production and out-of-production weapon systems. Individual requisitions are used to track material and services through the ordering and delivery processes. S&RP, support equipment, and technical manuals are normally

"pushed" by the USN to the FMS customer using the block of requisitions provided by NAVICP.[31] The process is summarized below:

- NAVICP (P751), NAWCAD, LKE, and NATEC determine respective requirements with assistance of the Prime/Overhaul Contractor
- Detail listings are provided to the FMS customer for review and approval before ordering by the USN
- The FMS DAPML is the final approval authority after FMS customer approval
- After FMS DAPML final approval, NAVICP/NAWCAD LKE/NATEC forwards approved requirements to the ILCO, NAVICP (OF) for initial establishment in the FMS system
- NAVICP (OF) records all requisitions in MISIL and initiates their normal requisition and financial monitoring role
- NAVICP (OF) then forwards the requisitions to the appropriate inventory control point for issue from DoD stock or procurement

8.4.1 PROCUREMENT OF INITIAL SUPPORT MATERIAL

8.4.1.1 IN-PRODUCTION WEAPON SYSTEMS

8.4.1.1.1 SPARE AND REPAIR PARTS

Repairables are typically purchased new by NAVICP directly from the Prime Contractor (see Paragraph 6.3.4.2) or from the OEM. When it becomes apparent that delivery of repairable material will not be delivered in time to meet the FMS customer required delivery date, NAVICP, in collaboration with the FMS DAPML, may propose to the FMS customer that the requirement be filled from USN stock. ☑ Repairable material issued from USN stock may be in used, but serviceable condition. NAVICP typically refers requisitions for consumable material to the applicable inventory manger (90+ % of the requisitions go to DLA ICPs) for issue/procurement.

8.4.1.1.2 SUPPORT EQUIPMENT

Peculiar SE is purchased from the Prime Contractor (see Paragraph 6.3.4.2) or OEM by either NAWCAD LKE or NAVICP depending on whether the item is stocked in the USN supply system. Common SE is typically purchased by the applicable inventory manager (e.g. General Purpose Test Equipment (GPTE), NAVICP Mechanicsburg PA). Support of SE material requisitions are passed to the applicable inventory manager.

8.4.1.1.2.1 CALIBRATION REQUIREMENTS

The FMS DAPML normally relies on the NWAC Corona to identify and procure in calibration standards. Selected calibration standards are ordered from NAWCAD LKE or the USN supply system. See paragraph 6.5.4 for additional information on calibration standards.

8.4.1.1.3 TECHNICAL DATA

Sanitized peculiar technical manuals are ordered from the Prime Contractor. After the sanitization process is completed the manuals are forwarded to Defense Automated Printing Service (DAPS) via NATEC for printing and distribution. Common technical manuals are requisitioned from the USN supply system and then sanitized by the PM before shipment in

[31] NAVSUP P-526, Paragraph 020403

country[32]. Drawings are not normally provided as part of the initial support FMS case. Rather they are ordered by an FMS customer in conjunction with their in-country repair effort. Drawings are procured from NATEC (if Government owned) or purchased by NATEC directly from the Prime Contractor or OEM to fill an FMS requisition.

8.4.1.1.4 AIRCREW AND MAINTENANCE TRAINING

Training will be accomplished according to the plan developed at the Site Survey.

8.4.1.1.5 CONTRACTOR ENGINEERING TECHNICAL SERVICES

The FMS DAPML orders CETS on the production contract as requested in the in the LOA.

8.4.1.1.6 FACILITY PLANS

The FMS DAPML orders the facility plan as requested by the FMS customer.

8.4.2 ACTION ITEM TRACKING

Throughout the process of procuring the aircraft and ILS material and services, the FMS customer raises many issues that must be answered by an appropriate member of the IPT. Typically, the PM establishes the overall IPT action item tracking system requirement and the IPT controls all responses centrally. It is recommended that the FMS customers become familiar with the IPT action item tracking system and use it to formally task the USN as required.

8.4.3 TRACKING THE DELIVERY OF INITIAL SUPPORT MATERIAL

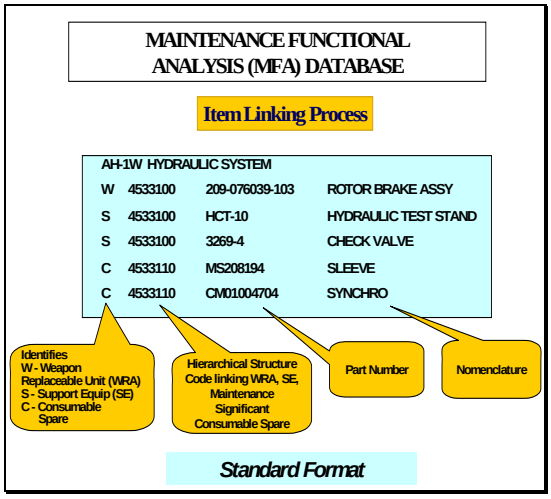
8.4.3.1 FMS INTIAL SUPPORT TRACKER (FIST)

Historically, FMS initial support tracking systems are unique and vary between program offices and FMS cases. An exception is the NAVAIR standardized FIST capability that is available to all Naval Aviation FMS case managers for tracking initial support requirements. FIST was developed and is maintained by NAVICP with FMS administrative funds. It was designed to provide the FMS DAPML, supporting LEMs, and participating FMS customers a tool for tracking the requirements needed to "stand up" in-country maintenance capability at IOC. The tracking effort is normally focused on the critical material needed (estimate 4,000 – 5,000 items) to initially field a weapon system such as all repairables, maintenance significant consumables and major items of support equipment. Publications may be added to FIST in the future.

All items in FIST are linked by their applicable 5-digit WUC. Because the FMS DAPML through FIST will have visibility of the procurement status on spares/SE by sub-system (i.e. electrical, radar), workarounds can be developed quickly to overcome delays that might adversely impact support at IOC.

The FIST tracking process begins at the Site Survey as the Navy and FMS customer select spares and major support equipment for all repairables and maintenance significant consumables. The FIST database is initialized by NAVICP using the MFA database created at the Site Survey (refer to Figure 8-1).

[32] Paragraph 7G of SECNAV Instruction 5510.34 dated 8 October 2004



This slide presents sample data from an actual AH-1W MFA. It represents the minimum configuration data required for tracking ILS data through the acquisition and delivery process. The database is a product of the Site Survey. The MFA is not a complete configuration file. It represents those items (all repairables, major support equipment and maintenance significant consumables) that would be needed for initial weapon system operation and transition to in-country maintenance. It's believed the traditional FMS system is adequate for tracking the many common items such as nuts, bolts, resistors, gaskets that are part of an initial allowance, but not critical for maintenance transition.

Figure 8-1 Maintenance Functional Analysis

8.4.3.1.1 FIST DATABASE

The initial FIST record is expanded by the FMS DAPML as they determine their desired "on contract" and requisition drop-dates (i.e. when the requisition must be released for issue or procurement) for requisitions in the FIST database. The FIST database is resident at NAVICP as a subset of the MISIL database. It's accessible via the NAVICP Information Warehouse via ad hoc queries or "canned" reports. Refer to Figure 8-2 for the FIST process diagram:

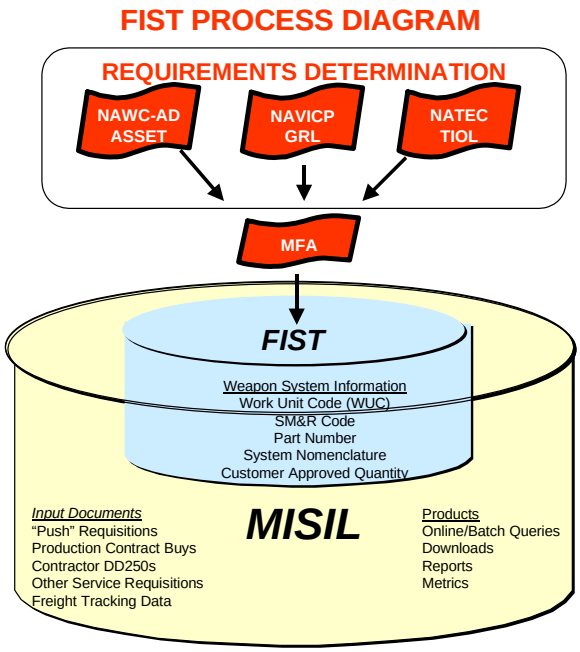


Figure 8-2 FIST Process Diagram

Subsequent changes to requirements agreed to at the Site Survey will be visible to the FIST users. For example, if an FMS customer enters FIST with a part number cited in the MFA

created at the Site Survey, they are referred to the new part number reflected in FIST. Once the procurement process begins, the FIST database will be uploaded from MISIL so that it can be used to track procurements through a contract award/requisition fill until delivery. The FIST database also contains reserved fields for the DAPML that for example, would be used to reflect more current data (e.g. shipping information) then are contained in MISIL. There is connectivity to the MISIL Freight Tracking System if the FMS customer subscribes to freight tracking. Should the FMS customer elect to stage material in the U.S. prior to shipment in-country, the staging facility will update FIST upon receipt and shipment of material

8.4.3.1.2 USING THE FIST TO UPDATE THE FMS CUSTOMER DATABASE

It is envisioned that the FIST database might electronically populate the configuration file of the FMS customer Maintenance Data Collection System (MDCS) and the receipt control and inventory record of the FMS customer supply database. Should an FMS customer be interested in this concept they should state so in the LOR or discuss it during the Site Survey. Figure 8-3 depicts the concept of linking the FIST to the FMS customer databases.

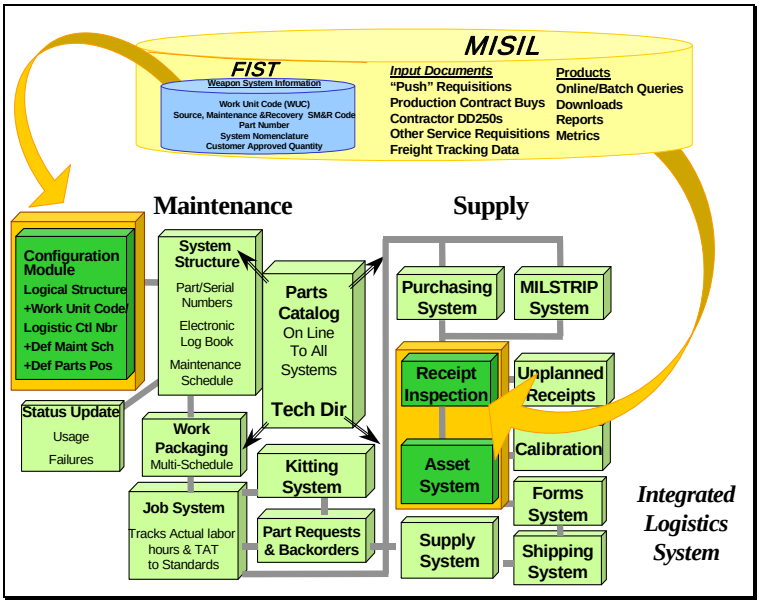


Figure 8-3 MFA Updating Customer Databases

8.4.4 METRICS FOR MONITORING OF PROCUREMENT PROCESS

Major functions of the FMS DAPML are to monitor the procurement of ILS material and services and develop effective workarounds to ensure delivery of material and services as agreed in the LOA. Using the FIST, the FMS customer can obtain metrics on the progress of the procurement process. Key procurement metrics are depicted in Figure 8-4

Procurements placed on time by:

- All requisitions
- Key items as agreed to by the FMS customer and the FMS DAPML
- Weapon subsystems (e.g., airframe, drive train, radar, etc.)

Requisition deliveries on time by:

- All requisitions
- Key items as agreed to by the FMS customer and the FMS DAPML
- Weapon subsystems (e.g., airframe, drive train, radar, etc.)

Cost of requisitions placed on order by:

- Each requisition
- Weapon subsystems (e.g., airframe, drive train, radar)

Figure 8-4 Metrics for Monitoring the FMS Procurement Process

8.4.5 FINALIZING SUPPLY SUPPORT REQUIREMENTS

After returning from the Site Survey, the various LEMs do a final review of the allowance recommendations made during the Site Survey. Part numbers are validated, sources of supply checked, and quantities reviewed. The final listing is forwarded to the FMS DAPML and FMS customer for approval before ordering. To determine the remaining consumable repair parts, support equipment and support of support equipment, a provisioning conference is normally held at the Prime Contractor facility. Holding a provisioning conference is important to the success of a new program. However, the need for a provisioning conference can be misunderstood by the FMS customer and become a contentious issue. The following discussion should assist the FMS customer in understanding the need for an FMS provisioning conference and justifying its funding through the customer's chain of command:

8.4.6 PROVISIONING

Provisioning is a "management process for determining and acquiring the range and quantity of support items necessary to operate and maintain an end-item of material for an initial period of service". The USN formal provisioning cycle is depicted in Figure 8-5. The provisioning process is essentially the same for FMS as it is for new systems procured for U.S. forces. However, the full provisioning cycle followed for the U.S. forces is expensive. Because most systems sold through FMS have already been provisioned for U.S. use, full provisioning for FMS is not normally done. Exceptions to this policy would be those systems unique to an FMS customer that are not provisioned by the USN and sub-systems that would be repaired by the FMS customer via I/D-level maintenance and require a validated piece part support package. For those systems, the FMS customer would conduct provisioning directly with the OEM on a direct commercial contract, or request assistance from the USN using FMS case funds.

THE PROVISIONING CYCLE

(Starts with award of a production contract and concludes with delivery of allowance documents and material outfittings to end-item user activities)

- Contractual citation of provisioning procedural and data requirements
- Provisioning screening to identify valid national stock numbers
- Contractor preparation and submission of Provisioning Technical Documentation (PTD)
- Requirements determination, including recording the decisions and updating supply and technical records
- Preparation and submission of repair parts orders and supply support requests to other agencies such as DLA
- Preparation of allowance documents
- Initial outfitting of user activities

Figure 8-5 PROVISIONING PROCESS

The FMS provisioning process involves tailoring the USN existing provisioning data. Under the FMS provisioning process, the NAVICP coordinates and the Prime Contractor hosts a provisioning conference to finalize spares procurements and select SE/support for SE not already identified during the Site Survey. Ready access to drawings and technical manuals is the primary reason for holding a provisioning conference at the Prime Contractor facility. Major vendors are invited to attend the provisioning conference and discuss support of their specific subsystems. In collaboration with the major vendors, the FMS DAPML and FMS customer should discuss alternatives for reducing the initial spare parts investment. For example: (1) shrinking the depot repair pipeline lowers the need for added spares (initiatives to reduce RTAT include laying in piece parts, authorizing premium time, and establishing FMS customer depot repair in-country); (2) identifying alternative maintenance strategies such as repair of circuit cards normally discarded by the USN; and, (3) reducing the range of consumables in the GRL as discussed in Section 6.4.6 should be examined. Initial spare parts support for SE may be reduced if the parts are readily available from the vendor or commercial marketplace (nuts, bolts, resistors, diodes, gaskets, etc.). The synergy of bringing the FMS DAPML, FMS customer, government inventory managers, contractors and fleet personnel together clearly results in cost savings; more than likely, the cost savings will exceed the cost of conducting the provisioning conference and therefore, holding an FMS provisioning should be strongly recommended by the FMS DAPML. Should the FMS customer not want to conduct a provisioning conference, there are two alternatives for selecting repair parts and related support equipment. They are as follows:

- Contractor recommendations may suffice if the equipment being obtained and its support are not complex or are COTS equipment.
- File extracts of USN data can be used to shortcut the full FMS provisioning process if there are no major changes in configuration or maintenance philosophy. Without a FMS provisioning, incorrect material will be ordered and correct material omitted.

8.4.7 NAVAIR AIR WORTHINESS PROGRAM FOR REPLENISHMENT ITEMS

☑ It's important that FMS and DAPMLs and FMS customers have a basic understanding of NAVAIR Airworthiness procedures for the management of critical aircraft replenishment items. Paragraphs 8.4.7.1 - 8.4.7.5 provide extracts from the applicable DoD and NAVAIR instructions governing the management of critical aircraft replenishment items. The topic of USN management of critical items should emphasized to FMS customers as it provides important safeguards for them when doing business under the FMS system.

8.4.7.1 APPLICABLE INSTRUCTIONS

NAVAIRINST 4200.25D, AIR-4.1C, "Management of Critical Items Including Critical Safety Items" dated 20 June 2002 is the current NAVAIR document that establishes policy, procedures, and assigns responsibilities for the life-cycle management of replenishment items that are critical to naval aviation safety. It also implements the DoD Flight Safety Critical Aircraft Part (FSCAP) program established by DoD 4140.1R, Section C6.5, Material Management, DoD FSCAP. The scope of NAVAIR 4200.25 includes NAVAIR, Program Offices, NAVICP, and commercial entities providing procurement or repairing/overhauling services to critical naval aviation material. The NAVAIR Critical Item Management Guidebook, dated April 2004 contains extensive documentation on how the critical item management is conducted on Naval Aviation Weapon Systems.

8.4.7.2 BACKGROUND

The term Critical Application Item (CAI) is used to describe items and equipment that have serious safety implications, can impact system performance or mission capability, can significantly reduce fleet readiness or increase maintenance actions, or can cause severe environmental damage. The term Critical Safety Item (CSI) is used to describe a subset of CAIs that, if they failed, have the potential for catastrophic or Critical consequences to personnel or equipment. NAVAIR performs research, design, engineering, test, evaluation, acquisition, training, repair/overhaul, and logistics support of naval aviation systems and equipment. The NAVAIR Research and Engineering Group (AIR-4.0) is responsible for providing the engineering policies, processes, and support necessary to ensure design integrity and airworthiness throughout the life cycle of naval aviation systems and equipment. As such, AIR-4.0 is responsible for policies governing CAIs (including CSIs) and is the Engineering Support Activity (ESA) for CAIs (including CSIs). AIR-4.0 has delegated selected engineering and technical responsibilities to NAVICP for items other than CSIs. NAVICP is responsible for flowing down critical naval aviation processes and procedures to DLA. For the purpose of complying with DoDINST 4140.1R that uses the terms "FSCAP" and "Aircraft Airworthiness Authority", AIR-4.0 is the "Aircraft Airworthiness Authority" for FSCAPs. NAVICP procures, manages, and contracts for the repair/overhaul of reparable replenishment naval aviation items, and procures and manages certain specific consumable items. NAVICP is the focal point for receiving and distributing all requests for engineering support and provides final resolution of selected engineering and technical concerns for naval aviation items.

DLA procures, manages, and disposes of consumable replenishment items for naval aviation systems and equipment. DLA uses DLA form 339 to request engineering support from the NAVICP. Examples of support requests from the DLA are:

- Reviewing and approving new sources for CSI
- Criticality determinations

- Processing waivers and deviations
- Supply support for obsolete items
- Evaluation of reverse engineering proposals
- Review of surplus offers and establishment of testing requirements

8.4.7.3 CRITICAL ITEM DEFINITION

The following definition and detailed management discussion of the aviation CAICSI/FSCAP were extracted from the footnote referenced below[33]. Definition: A CSI/FSCAP item is "An aviation-related part, assembly, installation or production system with one or more critical or critical safety characteristics that, if missing or not conforming to the design data, quality requirements or overhaul and maintenance documentation, would result in an unsafe condition that could cause loss or serious damage to the end item or major components, loss of control, uncommanded engine shutdown or serious injury or death to personnel. Unsafe conditions relate to hazard severity categories I and II of MIL-STD-882 and include items determined to be "life-limited," "fracture critical," "fatigue-sensitive," etc. The determining factor in Aviation CSI/FSCAP is the consequence of failure, not the probability that the failure or consequence would occur.

8.4.7.4 CRITICAL CHARACTERISTICS OF CSI/FSCAP ITEMS

Any feature throughout the life cycle of an aviation CSI/FSCAP, such as dimension, tolerance, finish, material or assembly, manufacturing or inspection process, operation, field maintenance, or depot overhaul requirement that if non-conforming, missing, or degraded may cause the failure or malfunction of the aviation CSI/FSCAP".

8.4.7.5 DOD MANAGEMENT OF CSI/FSCAP ITEMS

MILDEPs shall identify and control Aviation CSI/FSCAPs throughout their life cycle to ensure only safe parts are installed [i.e. issued to FMS customers]on military aircraft or are released to the civil aircraft market through disposal sales, exchanges or other authorized transfers of DoD parts.

The cognizant ESA shall establish the criticality determinations for each new item. Materiel Managers shall validate that the criticality determination has been accomplished during provisioning and/or during any design change that affects the item. For common use items, criticality determinations shall be coordinated with the other using ESAs to ensure the most critical application is properly reflected in the determination.

DoD shall develop a criticality code structure to identify Aviation CSI/FSCAP items to ensure proper life-cycle management of items critical to aviation safety and to ensure that used Aviation CSI/FSCAP items are mutilated if they are being disposed of without historical maintenance records.

8.4.7.5.1 DOD DETAILED PROCEDURES FOR MANAGING CSI/FSCAP ITEMS

1. Aviation CSI/FSCAPs shall be identified in the Federal Logistics Information Systems (FLIS) by an applicable criticality code.
2. Only the inventory control point (ICP) having management responsibility for an item may designate it as "Aviation CSI/FSCAP" in the FLIS.

[33] DoD 4140.1-R, Supply Chain Material Management Regulation, dated May 23 2003

3. If the Military Services desire to have an item they do not manage designated Aviation CSI/FSCAP, they shall coordinate the request with the managing ICP.
4. The DoD Components shall designate an aircraft airworthiness authority who has design and configuration cognizance. During the acquisition of a Aviation CSI/FSCAP, any change of design or configuration shall require the concurrence of the designated authority.
5. The acquisition specifications for Aviation CSI/FSCAP shall have this notification on the title page: "This specification is for an Aviation Critical Safety Item (CSI)/Flight Safety Critical Aircraft Part (FSCAP) and acquisition process must comply with the DoD Materiel Management Regulation - DoD 4140.1-R.
6. Where practical, reparable Aviation CSI/FSCAPs shall be managed and tracked throughout their life cycle by serial number.
7. The minimum documentation requirements for used Aviation CSI/FSCAPs are:
    a. Part identification-part number, NSN, and, for reparable Aviation CSI/FSCAPs, serial number.
    b. Manufacturer, CAGE code, and date of manufacture.
    c. Total time in service.
    d. Current status for life-limited parts.
    e. Time since the last overhaul of each part that is required to be overhauled on a specified time basis.
    f. Identification of current inspection status, including time since last required inspection or maintenance performed.
    g. Current status of applicable FAA airworthiness directive (AD) or DoD equivalent technical orders, including the date and method, and if the AD involves recurring action, time, and date when the next action is required
    h. A list of current major alterations, repairs or modifications for each part including date that work was done and work authentication.
    i. The minimum documentation requirements for new Aviation CSI/FSCAPs are:
        (1) Part identification-part number, NSN, and, for reparable Aviation CSI/FSCAPs, serial number [missing SRC card information may be obtained from the Aeronautical Time Cycle Management (ATCM) Central Repository at NAVAIR code AIR-3.6.2].
        (2) Manufacturer, CAGE code, and date of manufacture.
    j. All historical documentation shall go with individual Aviation CSI/FSCAP items when they are shipped to another user [i.e. FMS customer], to maintenance, or to a Defense Reutilization and Marketing Office (DRMO) for disposal.
    k. The DUSD(L&MR) shall establish and maintain Aviation CSI/FSCAP policy and ensure DoD Component compliance with that policy.
    l. The DoD Components shall:
        (1) Incorporate the standard DoD Aviation CSI/FSCAP definition in their DoD Regulations, Directives, and Instructions.

(2) Establish a process for identifying Aviation CSI/FSCAP consistent with the DoD definition.

(3) Identify and assign a criticality code to all Aviation CSI/FSCAP parts or components during the provisioning process.

(4) Ensure that drawings and associated technical data clearly identify the item as Aviation CSI/FSCAP. Drawings and technical data shall identify the critical and major characteristics, critical processes and inspection and other quality assurance requirements for all Aviation CSI/FSCAP.

(5) Identify approved/qualified sources of supply or repair/overhaul for each Aviation CSI/FSCAP at the time the criticality determination is made or as soon after as practical

(6) Identify and code parts and components meeting the Aviation CSI/FSCAP definition during the acquisition process and ensure that:

(7) They are acquired only from sources approved by the ESA and only to the technical requirements established by the ESA.

The following was extracted from the NAVICP website on doing business with NAVICP: The Defense Federal Acquisition Regulation Supplement (DFARS) Appendix E, entitled "DoD Spare Parts Breakout Program" prescribes uniform policy and procedures for replenishment parts breakout. This program provides for the initial assignment of an Acquisition Method Code (AMC) to centrally managed items and the periodic review of the contracting method decision based on the item's projected annual buy value. The AMC serves as a guide for contracting personnel. When the assigned AMC indicates that the purchase of the item is restricted to approved sources or a sole source, the reason for the restriction is identified by the acquisition method suffix code (AMSC). All AMCs other than those with a "G" suffix involve some restriction. A restrictive code does not prohibit award to other than the previously designated source(s) nor does it preclude approval of a potential new source for future contracts, so long as the new source can clearly demonstrate its ability to satisfy the Government's requirements. Specific requests from firms seeking approval as a potential manufacturing source for an item used on a Naval aviation weapons platform that has been

(8) Acquisition Method coding reflects criticality determination and that any change to a less restrictive code be approved by the applicable ESA.

(9) Update current cataloging data for existing NSNs to identify Aviation CSI/FSCAP items.

(10) Validate criticality determination during any subsequent design change that affects the item.

(11) Ensure that responses to engineering support requests with regard to Aviation CSI/FSCAP are accurate, timely, and completed with the concurrence of the designated air worthiness authority.

(12) Manage and track serialized Aviation CSI/FSCAP items throughout their life cycle within the Department of Defense.

(13) Ensure that information on critical (design and acquisition) characteristics are communicated to the ICP in an acquisition specification (technical data package) that summarizes the design, engineering management and acquisition requirements necessary for the successful acquisition of Aviation CSI/FSCAP items.

8.4.8 CRITICAL ITEM MANAGEMENT UNDER PBL

When DLA or NAVICP initiates a performance-based logistics or similar effort, contract language related to critical item management shall be coordinated by the Engineering POC in NAVICP 071. NAVICP 071 shall coordinate the appropriate SOW language with NAVICP 073, the cognizant Class Desk, BDE, and NAVAIR 4.1C. The contract language review shall include but not be limited to CI repair, CI product quality, and CI alternate source/vendor qualification. Upon completion of engineering review, the recommended language shall be presented to NAVICP 02 for inclusion into the new contract effort[34]

8.4.9 ESTABLISHING FMS CUSTOMER'S MAINTENANCE CAPABILITY

LEMs must order initial support material for delivery to an FMS customer's maintenance site so that maintenance capability can be declared no less than sixty days before IOC. Coordinating the various tasks that comprise establishing maintenance capability is a challenge for the FMS DAPML. It's therefore important that the FMS DAPML develop metrics to assist him/her in managing this process and commit to a briefing schedule and/or a formal series of maintenance transition conferences where all aspects of ILS are discussed at the system level (e.g. AN/ARC-210) and workarounds agreed to by all parties. FIST can provide assistance in identifying shortages by sub-system (e.g. radar) and trigger the APML that a problem can be expected.

8.4.9.1 MAINTENANCE TRANSITION WORKLOAD CONFERENCES

A system is considered transitioned to the FMS customer only after all ten of the required ILS elements (i.e., supply support, support equipment, publications, training, etc.) have been delivered to the FMS customer. To ensure the transition takes place before IOC, the FMS DAPML should regularly host scheduled maintenance transition conferences. It is strongly encouraged that the FMS customer participates in these conferences and several of the conferences be held in-country. To manage the transition process an Integrated Maintenance Transition Work Package (IMTWP) database should be established. The data fields detailed below are some samples from the range of databases that must be integrated into the IMTWP for it to be an effective tool. Either the Prime Contractor or support contractor would develop and sustain the IMTWP. Developing and sustaining a consolidated IMTWP would be customer funded.

	Data Field	Database
(1)	NIIN	MFA or FIST
(2)	Part NBR	MFA or FIST
(3)	Course	Training Database
(4)	Maintenance Plan	MFA
(5)	Publication	MFA or TIOL
(6)	SERD	ASSET

[34] NAVAIR Critical Item Management Guidebook, dated April, 2004

8.4.10 PROGRAM REVIEWS

Periodically, the PM will host a joint program review with the FMS customer. The FMS DAPML has the lead to brief ILS issues and progress of ILS procurement. The LEMs will assist the FMS DAPML as required and attend the meetings if requested. The aforementioned IPT action item tracking system is the basis for briefings at the Program Management Review (PMR).

PLANNING FOR FOLLOW-ON SUPPORT

9.0 PLANNING FOR FOLLOW-ON SUPPORT

9.1 BACKGROUND

Follow-on support planning of a weapon system's life cycle should begin when the FMS customer requests the weapon system. It ends when the FMS customer disposes of a weapon system. Follow-on support may cover in excess of 30 years. The USN must take an active role in planning for follow-on support of the FMS customer's weapon system. Follow-on logistics support provides for the myriad of services and material required to sustain a weapon system after flight operations begin. It includes, for example procurement of the following: replenishment of initial spare and repair parts, new spare and repair parts and equipment not provided for in the initial allowance, repair services, engineering services, CADS/PADS, etc. Also, contrary to the initial support phase when one FMS case, managed by the Program Manager, encompassed all equipment, material and services required to field a weapon system, the USN FMS process for follow-on support requires individual LOAs for specified follow-on support categories of equipment, material and/or services (e.g. ROR). As important, several agencies manage the various follow-on support FMS cases. It is therefore strongly emphasized that follow-on support planning should begin prior to the initial support phase so that the FMS customer can identify unique follow-on support requirements which must be understood and supported by the various agencies involved.

9.2 FOLLOW-ON SUPPORT OPTIONS

The FMS customer has five possible options (or combinations of options) when arranging for follow-on support. They are as follows:

9.2.1 IN-COUNTRY RESOURCES

The capability of a country to provide follow-on support from its own resources should not be overlooked by logistics planners as an effective choice for follow-on logistics support. The existing military and commercial maintenance infrastructure is often very experienced in all aspects of weapon systems maintenance. Primarily for cost or self-sufficiency reasons, a country may decide to rely on their existing in-country support or buy a new weapon system that enhances their in-country capability. See Section 4.6.2.1 for the ECIS program which provides an FMS-provided contractor alternative for follow-on support that emphasizes in-country commercial maintenance where practicable.

9.2.2 THIRD COUNTRY SUPPORT

The Arms Export and Control Act imposed definite restrictions on third country support; however, this method may be available on an exception basis because of cost effectiveness, convenience, and licensing agreements. For example, a depot level overhaul of Philippine Air Force C-130 aircraft was approved for accomplishment at commercial facilities in Korea and Singapore, albeit the USG administered the commercial contracts. Also, NAVICP Philadelphia uses several overseas commercial facilities to perform D-level repair of components generated from USN fleet units operating "in theater". These same contracts could be modified to accommodate regional depot repair for FMS customers.

9.2.2.1 NATO MAINTENANCE AND SUPPLY AGENCY (NAMSA)

For almost 40 years NAMSA has been the principal NATO logistics agency. Its charter calls for NAMSA, through its NATO Maintenance and Supply Organization (NAMSO), to work with the NATO nations to find areas where NAMSA's capabilities will achieve economies of scale, not possible by individual nations. Actions such as consolidation, centralization, flexibility and

competition will result in significant savings for NATO nations. NAMSA is a non-profit NATO organization.

9.2.2.1.1 FUNCTIONS OF NAMSA

- **Supply Management:** To collect and analyze spare parts resources and consumption data; to calculate future requirements, including "pipeline requirements"; to select and manage the stockage of those items that are too costly and so seldom required that individual national stocks are uneconomical; and to achieve an effective redistribution of unbalanced resources.
- **Maintenance Management:** To collect and analyze data on the accumulation of repairable materiel; to calculate future maintenance and overhaul requirements, including "pipeline" as above; to determine and to set up profitable joint repair, maintenance and overhaul arrangements.
- **Procurement:** To maintain continuing knowledge of procurement sources; to compute requirements for common procurement; to calculate economical volumes of production; and to perform appropriate procurement action.
- **Technical Assistance:** To arrange the exchange of technical information among states; to assist in the solution of problems of codification and identification; to provide logistics training as requested; and to provide advice or instructions, as appropriate, on qualification and quality control services.

9.2.2.1.2 DOD POLICY

DoD policy[35] states that "wherever the United States and one or more of the NATO Allies field the same weapon system, the United States shall join with those allies in a NAMSO weapon system partnership [WSP] agreement for combined logistics support in Europe for those functions that are practicable, unless doing so would be disadvantageous to the United States." There are currently 15 WSP agreements in place. Navy participation in WSPs includes HARM, STINGER, and the combined WSP for C-130/P-3 weapon systems. FMS DAPMLs supporting Navy weapon systems purchased by European countries should become familiar with NAMSA and determine whether NAMSA-provided services would reduce LCC for their FMS customer. Examples of services that NAMSA might provide include the following:

- Bondroom services for DoD stock to improve CWT[36] and depth of pipeline spares
- Manage regional repair to reduce FMS customer investment in I/D-level maintenance
- Source for common parts

9.2.3 DIRECT COMMERCIAL SUPPORT FROM A U.S. CONTRACTOR

For a variety of reasons, many FMS customers choose to contract directly with an OEM for the follow-on logistics support. Licensing and co-production agreements drive many of these decisions. It is USG policy that P&A data for support will not be offered while an FMS customer

[35] DoDD 2010.8 dated 12 November 1986

[36] OASD (L&MR) Performance Measures dated August, 2002. Customer Wait Time (CWT) is defined as the total elapsed time between issuance of a customer order and satisfaction of that order. Ideally, CWT will include all customer orders, regardless of commodity or source, immediate issues, and backorders (and) include issues from wholesale and retail stocks as well as various other arrangements.

is pursuing direct commercial support for the same services. However, as discussed below, the Government can adopt commercial-like logistics practices to streamline its supply chain.

9.2.4 ECIS-LIKE SUPPORT DELIVERED BY THE USN

Paragraph 4.6.1 discusses an FMS ECIS follow-on support concept that is primarily contractor driven, albeit under a long term contract with the USN. There are aspects of the aforementioned ECIS concept such as performance-based logistics, inventory rebates, and technology insertion that a USN FMS logistic manager would have difficulty matching. But there are aspects of the ECIS concept (e.g. in-country bondroom) that could be adopted by the USN as a way to streamline the FMS supply chain in general and improve the follow-on support interface with future FMS customers. This alternative would be available for those FMS customers that may not be comfortable with a contractor-run supply system, even under an FMS umbrella contract. Accordingly, the following concept for a proposed USN (NAVICP-managed) storefront is provided for consideration as an alternative for future FMS cases:

- USN establishes an in-country storefront that interfaces with the FMS customer O/I-level and performs the following tasks:
    - Takes delivery of NRFI repairable components generated by the O/I-level and ships NRFI repairable components to the U.S. under an ROR FMS case as appropriate. "**Enhanced Transportation**" (see Section 6.2.1) would be used to move NRFI and Ready for Issue (RFI) components to/from the U.S. respectively
    - Transmit advance information to the FMS ROR manager that material is enroute a specific depot
    - Take delivery of NRFI assets under RIRO program – if adopted – and ship to hub using "**Enhanced Transportation**"
    - Transmit FMS customer requisitions to NAVICP via e-business suite. Provide receipt confirmation to FMS customer
    - Investigate SDR/QDR issues and attest to the problems described as appropriate. Transmit SDR/QDR via e-business suite
- Provide on-site supply system expertise for local SAO/FMS customer
- Provide reports to the local supply system as required
- Reduce spares allowances based on shorter ROR pipelines… **a major new selling point to the FMS customer**
- Interface with local DCMC to qualify selective commercial contractors to perform FMS customer depot commercial repair under the ROR program…**a major new selling point to the FMS customer**
- Interface with the FMS customer O-level to develop accurate CWT statistics and use that data to adjust future GRLs as appropriate

9.2.5 TRADITIONAL FMS CASE SUPPORT

Countries that use the FMS system typically cite the established DoD procurement system and its committed logistics infrastructure as reasons for choosing FMS for their follow-on logistics support. An extensive procurement system is in place, metrics are monitored to ensure performance, services such as engineering support and repair are available and normal FMS requisition and financial tracking systems provide ease of administration. The FMS customer, however, must interface with more than one government agency when choosing FMS for their

follow-on support. There are three types of cases for ordering material or services under FMS. These are: Defined Order, Blanket Order, and CLSSA. Each of these programs should be examined individually to provide the optimum follow-on support system. The following provides an overview of the salient features of USG FMS follow-on support options.

9.2.5.1 DEFINED ORDER FMS CASE

A Defined Order Case is one in which the defense articles, services, or training requirements are specified in a definitive list of items by the purchaser. They are specific, one-time requirements. They normally require extensive study and are formalized in a P&A. This study can range from extensive efforts that require coordination with potential contractors, to determining the latest or most representative procurement price and applying an appropriate inflation factor. With ammunition and other explosives, typically the CNO staff or other service ammunition sponsors must approve issues from DoD stock.

9.2.5.2 BLANKET ORDER FMS CASE

Blanket Order cases are also known as Blanket Open-End cases and DRP FMS cases. A Blanket Order Case is an agreement between a purchaser and the USG for a specific category of items or services (including training) with no definitive listing of items or quantities. The LOA specifies a dollar ceiling against which the purchaser may place orders throughout the valid period.

The following blanket order cases are discussed for emphasis:

9.2.5.2.1 DRP

The LOA for a DRP does not list or describe specific material. This document prescribes a dollar limit. Customers then have the authority within the dollar limit to order those categories of material prescribed in the LOA. DRP requisitions are not limited to support for a specific weapon system (NAVSUP 526, Section 030102). The following material may be ordered under a DRP FMS case:

- Spare and repair parts
- Minor components
- Training films
- Publications

9.2.5.2.1.1 MATERIAL RELEASE POLICY FOR SPARE AND REPAIR PARTS UNDER DRP

Until recently, material was not released from stock to fill DRP requisitions unless the government stock on hand was above the reorder point. Recent DSCA and inventory manager policy changes has provided much more flexibility to inventory managers to fill requisitions submitted under a DRP FMS case from below the reorder point. In addition, DSCA has recently changed the SAMM, Section 80202B, as follows, to provide more flexibility to inventory managers when material is not available in inventory to fill DRP requisitions:

- The ICP head or his designee may authorize issuance below the reorder point if the item is readily procurable or assets are due in from contract and/or U.S. Forces support will not be jeopardized.
- The Item Manager (IM) may place the requirement on backorder for future contract award and item delivery as determined through the normal business practices. Once the procurement lead-time has elapsed, the backorder will be eligible for release, even if the stock level goes below the established reorder point, based on the priority designator

therein and processed under Uniform Material Movement and Issue Priority System (UMMIPS).

- The IM may initiate an immediate procurement action.
- If the requisition is for an item that is supported by direct vendor delivery/prime vendor/contractor custody inventory, the requirement may be passed for processing without delay, unless the contract specifically precludes Security Assistance customers and it does not jeopardize support to U.S. Forces.
- The ILCO is authorized to divert requisitions to a Commercial Buying Service (CBS), i.e. PROS/SNAP, if inventory manager action will not meet an FMS customer need date as defined by the FMS customer in either the requisition or separate communication.

9.2.5.2.2 CLSSA

CLSSA is normally the most effective means of replenishing spare and repair parts for weapons systems that were purchased from the United States or from a commercial company. These parts, despite the source, are widely used by the U.S. Navy. Under this arrangement, customers invest in the U.S. supply system. They become co-owners of a pro rata share of U.S. supply system's assets. As such, they receive access to the U.S. supply system for follow-on support similar to that available to U.S. military services.

CLSSAs are limited to the requisitioning of common use items (items currently used by U.S. forces) that are centrally stocked and centrally managed. FMS customers may **not** requisition the following kinds of items under a CLSSA case:

- Ammunition and explosive items
- Major end items
- Classified items
- Obsolete items
- Nonstandard items
- Technical data packages
- Excess Defense Articles

The preceding description of CLSSA, which came from Chapter 4 of the NAVSUP Pub 526, describes the breadth of the typical CLSSA arrangement. Given that CLSSA is limited to items currently used by U.S. Forces; its application to an FMS customer that purchases an OOI weapon system is limited.

The purpose of a CLSSA is to provide the customer peacetime support similar to that given U.S. forces having the same priority. The advantages of a CLSSA to the U.S. and the foreign government are:

- Improved supply support
- Reduced costs through higher volume procurement
- Increased accuracy in projection of requirements
- Increased equipment standardization

9.2.5.2.3 FOREIGN MILITARY SALES ORDER (FMSO)

There are two kinds of FMSO cases required to implement CLSSA. They are FMSO I and FMSO II FMS cases:

9.2.5.2.3.1 FMSO I

A FMSO I case defines the value of stocks to be maintained in the DoD inventory for the country. Items involved are MILDEP-managed repairables, consumables, and Defense Logistics Agency-managed consumable spares. This type of case also results in a financial obligation for the customer country of normally 17 months' demand value of the material. Upon acceptance of the case by the customer, the country must pay only the first five months' estimated demand, plus a 5 percent nonrefundable administrative charge, based on the five months' value. ☑ The accuracy of the USN-provided forecasted demand value should be validated to ensure that it represents demands reflective of the FMS customer operational scenario rather than the USN/USMC operational scenario. An inflated demand forecast would unnecessarily inflate a FMSO 1 investment, which in turn might cause an FMS customer to reject CLSSA. As discussed in Section 6.4.2, the USN VAMOSC system is an excellent source for O&S data that could be used to forecast FMSO 1 demand keyed to an FMS customer flying hour program.

9.2.5.2.3.2 FMS CUSTOMER-DRIVEN FMSO 1 DEMAND FORECAST

The USN permits an FMS customer to frame the size of their CLSSA program by allowing the FMS customer to provide their own demand forecast separated into repairable and consumable demand segments. The FMS customer is required to provide a listing of the repairable items they will order under CLSSA so that they may be added to the NAVICP "front-end-screen" which is the mechanism that the Navy uses to control submittal of repairable requisitions under CLSSA (see FMSO II discussion below). A requisition item screen is not done on consumable items, thus a pre-approved listing is not required.

9.2.5.2.3.3 FMSO II

A FMSO II case is established on an annual basis to permit the country to draw spares and repair parts from U.S. stocks as in-country stocks are consumed. This type of case is defined only in terms of a dollar value and does not define either items or quantities. The country is authorized to submit requisitions for all spares and repair parts required for support of the weapon systems under the CLSSA. ☑ This includes authority to requisition items not on the stock level case (FMSO I). Repairable items not listed on the FMSO 1 case will be screened and approved for processing as a CLSSA transaction by the applicable inventory manager. All consumable items will be processed as a CLSSA requisition until the dollar value established in the FMSO 1 case is reached. The FMS customer assigns the priority to the individual requisitions based on the Force Activity Designator (FAD) and Urgency of Need Designator (UND) approved by the U.S. Joint Chiefs of Staff. The requisition case is normally valid for the input of new requisitions for one year, at which time the replacement case must be established. The requisition case remains open for management purposes until all items requisitioned have been shipped, billed, and paid. In addition, the following restrictions apply to FMSO II.

- Resupply must be from stock, which is centrally managed and centrally stocked within the DoD supply system or at a designated contractor site under a DVD inventory management approach.
- Requisitions for quantities in excess of Maximum Release Quantities (MRQ) are filled to MRQ.

- When the highest dollar value justified by the current FMSO I investment is reached, requisitions are filled from stock above the reorder point or from new procurement only after the case is amended.

9.2.5.2.4 REPAIR

When FMS customers decide to return a component or engine to the U.S. for depot maintenance rather than repair it themselves, they can select one of the following options.

9.2.5.2.4.1 REPAIR AND RETURN (ROR)

The classic FMS ROR option is to repair and return the repairable item whereby the FMS customer returns the unserviceable unit to the U.S. for depot maintenance and/or modification and receives the same unit back after it is repaired, overhauled, or modified. The ROR charges include labor, material, and a modest admin charge imposed by the depot to cover administrative costs. Normal FMS surcharges are added, however, there is no supply system surcharge. The FMS customer may specify the scope of work and desired RTAT. If it is not specified, the scope of work will be according to USN policy for that component, and the RTAT goal will be 120 days. The customer selects the ROR FMS case manager. Options include NAVAIR, NAVSUP, or one of the Navy's repair depots. Regardless of which organization manages the case, the ROR case manager must track the repair process and take corrective action to eliminate delays. NAVICP Philadelphia has developed and maintains a web-based repair tracking database. It was funded by FMS administrative funds. FMS customers are encouraged to request that their designated ROR case managers use the NAVICP database as a repository for their ROR tracking data rather than develop FMS case funded unique tracking systems.

9.2.5.2.4.2 RIRO

If an FMS customer desires to exchange their unserviceable item with a serviceable DoD-owned supply system asset, they can do so under the Navy's RIRO – more commonly known as "Direct Exchange – procedures in lieu of ROR. Principles of RIRO are as follows:

- Items are excluded from the RIRO program based on NAVICP inventory manager assessment that there are not enough assets in the wholesale system to support another exchange customer.
- Items are also excluded from the RIRO program based on direction from the NAVAIR DAPML. The most likely reasons for the DAPML to exclude an item from the RIRO program are as follows:
    - The item is undergoing a modification program thus limiting the available spares in the DoD supply system
    - The item is being tracked in the USN life cycle tracking system and flying hour/failure data must be available by serial number for the NRFI item before the RFI replacement item is released from the supply system
    - The only RFI spares in the DoD supply system have ECPs incorporated that were not purchased by the FMS customer
- Requisitions must be submitted under a CLSSA FMS case. Material is released from government-owned stock after receipt of the FMS customer requisition. NRFI items are shipped to the designated government processing facility as directed by NAVICP. If the RFI item is not available in the DoD supply system for release, the requisition is backordered until an RFI asset becomes available as determined by the requisition priority. If the status provided by the supply system indicates an unacceptable backorder release

date, the FMS customer may elect to cancel the RIRO requisition and forward the NRFI component for repair and return under an ROR FMS case

- The replacement component received under the RIRO program will be in serviceable condition – meaning that it may either be "new and unused" or used but in serviceable condition after undergoing repair or overhaul at a USN certified repair facility
- The requisition will be billed at net price (i.e., repair cost + surcharge)
- The NRFI item will be repaired and returned to the government-owned stock. Title transfers for the NRFI after acceptance at the initial USG receiving point

☑ RIRO is a smart strategy for an FMS customer that has limited resources to invest in a lengthy spares pipeline to support an ROR program. Also, it should be emphasized that the USN RIRO program is quite different from the USAF equivalent program (i.e. "Direct Exchange"). For example: (1) under the USN RIRO program, requisitions are immediately filled if serviceable assets are available in the USN supply system without waiting until the unserviceable component is received and inspected by the USN supply system, and (2) an FMS customer can delay sending the unserviceable item back to the USN supply system while awaiting supply status on the RIRO requisition. If the supply status of the RIRO requisition indicates that the item will be backordered for a lengthy period of time, the FMS customer can cancel the RIRO requisition and return the unserviceable item to the depot for repair under ROR procedures.

9.2.5.2.5 FMS DUAL TRACK

NAVICP is currently testing an FMS "DUAL TRACK" concept that permits an FMS customer to initially submit a requisition to the U.S. under a hybrid FMS case. If the DoD supply system fills the requisition on receipt (historical data indicates that typically occurs 75-80% of the time) the material is shipped under normal FMS procedures. If not, the requisition is passed electronically to a FMS customer-designated CBS for purchase by them. Figure 9-1 depicts the FMS DUAL TRACK hybrid system. The major advantage of the FMS DUAL TRACK hybrid system is that it overcomes any buying delays caused by government Procurement Administrative Lead-Time (PALT) problems. An FMS customer must sign a separate FMS case if they want to participate in the FMS DUAL TRACK hybrid program. ☑ Full implementation of DUAL Track requires approval of DSCA.

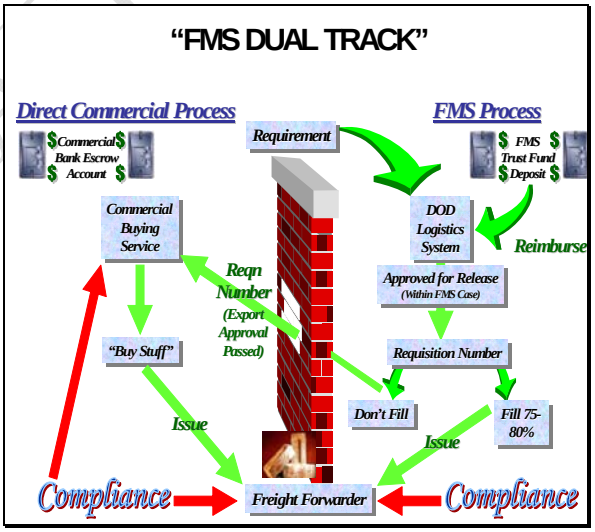


Figure 9-1 FMS DUAL TRACK FMS Case

9.3 DEFINING FOLLOW-ON SUPPORT REQUIREMENTS

Converting the planning into requirements sufficient for pricing involves separating the support for the international customer into two categories, i.e., standard replenishment support and specialized support.

9.3.1 STANDARD FOLLOW-ON SUPPORT

This support involves replenishing spares, minor equipment, and repair parts, CAD/PADS/AEPS and repair services. It is relatively straightforward and usually covered by a blanket order FMS case with requirements generated as material is consumed or new requirements identified. Material or services would be provided by DoD supply system as applicable. However the following issues benefit from emphasis and further discussion:

9.3.2 NON-STANDARD ITEM SUPPORT

The USN previously provided non-standard item support through a combination of NAVICP procurement and alternative procurement through a CBS concept known as FMS Acquisition Services Team Line (FAST-LINE). NAVICP cancelled its FASTLINE contract for new requirements on June 2002 and shifted the workload for part numbered items and aviation peculiar items to internal NAVICP Government buyers. DLA-managed items that were previously bought under the FASTLINE contract are satisfied by a combination of the following action

- DLA procurement
- Issue from the DLA-managed EMALL system
- Procurement via FMS DUAL TRACK (See paragraph 9.2.5.2.5)

9.3.2.1 EXPANDED NON-STANDARD ITEM SUPPORT

AIR-6.9 is exploring options for providing sustaining logistics and engineering (SL/E) support to OOI FMS customers via a NAVAIR-sponsored Product Support Contract (PSC) and/or obtaining SL/E support under the USAF Parts and Repair Ordering System (PROS II) CBS contract (see Section 10.5.1.2.1). The PSC concept is described in Section 10.5.1.2.4 .

9.3.3 INNOVATIONS IN FOLLOW-ON SUPPORT

The USN has expanded its sources for filling follow-on support FMS requisitions. These new sources include the following:

9.3.3.1 NAVICP SPONSORED INITIATIVES

9.3.3.1.1 WORLDWIDE WAREHOUSE REDISTRIBUTION SERVICE (WWRS)

The USN, in coordination with the USAF, has arranged to participate in the USAF WWRS program for Navy-managed material. The USN process follows USAF procedures. The primary difference is that an FMS customer that wants to sell Navy-managed material must establish an FMS "G" case with the USN (NAVICP) so that the financial arrangements between the USN and USAF can be fulfilled.

9.3.3.1.2 SALE MATERIAL OF POTENTIAL EXCESS MATERIAL

NAVICP periodically sells selected excess material at a discount of 50% off the standard price. These are limited time offers that appear on the NAVICP e-Business Suite.

9.3.3.1.3 INTERNATIONAL PROGRAMS E-BUSINESS SUITE

NAVICP (OF) has developed its e-Business Suite, which is a comprehensive and fully integrated package of web-based solutions, consisting of over 50 applications and numerous links, for our foreign and domestic customer base. Of particular note is the on-line requisitioning form that

allows FMS customers the ability to submit requisitions through a Web based interface. Stock numbered A01, part numbered A05 requisitions, and publications A04 requisitions may be submitted, as well as follow-ups, modifiers, and cancellations. Other capabilities of the e-Business Suite include the following:

- FMS customers can now submit electronic SDRs via the internet, as well as receive all reports, forms, closures, and status. Security provisions ensure that the FMS customer country representatives can only submit an SDR for their own country
- FMS customers can now submit QDRs for their respective countries online. Users of the online SDR will find the functionality of this form similar
- Potential EDA listings are periodically posted to the NAVICP e-Business suite. EDA material can be procured by FMS customers at reduced prices, provided an EDA FMS case has been established
- Requisition tracking capabilities include individual requisition status, shipment status, ad hoc queries, and individually tailored My Requisitions
- Metrics including stock sales, requisition volume, Logistics Response Time (LRT), First Pass Effectiveness, and open requisitions, both historic and daily
- Repair of Repairables tracking database, Tailored Repairables Items List (TRIL), and on-line turn-in and tracking documentation
- Case financial snapshots, Information Warehouse and document imaging systems.
- Procurement site in which the FMS customer can see NAVICP future spare procurements and can plan their procurements accordingly to take advantage of economics of scale.

9.3.3.1.4 NAVICP CONSOLIDATED BUYS

NAVICP provides FMS DAPMLs and FMS customers a schedule of planned NAVICP domestic buys and invites FMS customers to participate in the buy to achieve the maximum leverage in the market place.

9.3.3.2 DLA INITIATIVES

The following are a few of the various DLA initiatives to improve supply support and provide FMS customers with information of their requisitions.

9.3.3.2.1 WEBLINK INTERNATIONAL

WEBLINK International (linkhelp@daas.dla.mil) provides a single sign-on to multiple logistics information systems for the international logistics community. . It complements MISIL, which is the official USN Management Information System (MIS) for FMS logistics information. Logistics information available through WEBLINK includes asset availability, status of requisitions, and descriptive information about supply items and organizations. Special features include the ability to submit batch or automatically recurring queries". The WEBLINK International customer selects a database, builds queries, and submits them to the LINK server for processing. The databases available through WEBLINK International include:

- Defense Automatic Addressing System Center (DAASC)
- Defense Reutilization & Marketing Service (DRMS)
- Logistics Information Processing System (LIPS) provides requisition, supply status, and shipping status information for all requisitions

- Logistics Remote Users Network (LOGRUN) provides descriptive information about items of supply in the Federal Government inventory
- Standard Automated Material Management System (SAMMS) gives visibility of inventories managed by and your requisitions processed by the Defense Logistics Agency Inventory Control Points

9.3.3.2.2 WEBCATS

WEBCATS www.dscr.dla.mil is a Government only website. However, FMS customer's can request weapon system information from WEBCATS via the FMS DAPML. WEBCATS contains the following information**:**

- Weapon System Inquiry
- NSN/National Item Identification Number (NIIN) Inquiry
- Open Requisition Inquiry
- Supportability Analysis by Weapon System
- Special Program Requirements (SPR) by Department of Defense Activity Address Code (DODAAC)
- Order Placement Changes and Cancellations

9.3.3.2.3 VIRTUAL PRIME VENDOR

DLA has many initiatives to streamline their supply chain management. One of them is the Virtual Prime Vendor who becomes the single integrator for total logistics support (including technical services and forecasting). An Industrial Virtual Prime Vendor is a typical application of the Virtual Prime Vendor concept wherein the selected vendor forecasts/funds the industrial inventory and positions it at the industrial site for easy access. Metrics are established to ensure performance. While this concept helps support FMS customers that rely on organic depot support, it's conceivable that DLA would contract for a Virtual Prime Vendor at an overseas industrial location.

9.3.3.2.4 AVIATION INVESTMENT STRATEGY (AIS)

DoD initiative approved to budget execution of $500M across Fiscal Years (00-04) to improve DLA aviation supply effectiveness. The investment was allocated as follows: engines ($120M), other aviation support items ($334M), and Numeric Stockage Objective Items (i.e. slow movers) ($46M). All Services participated in selecting the items and FMS CLSSA demand was included in the calculation. The Navy focused on items impacting CWT and readiness. The material has begun delivering and DLA Logistics Response Time (LRT) is improving.

9.3.3.2.5 DLA METRICS

DLA has

9.3.3.3 HORNET INTERNATIONAL COOPERATIVE LOGISTICS EXCHANGE PROGRAM – F-18 OPERATORS ONLY

The FMS community is changing its role of relying on the U.S to becoming a full active partner in multi-national operations. This change by the FMS community not only makes good business sense, but also develops regional relations resulting in improved national security for the United States. The transfer of material occurs through an End-User Agreement that is a pre-approved blanket agreement that states the receiving country will protect and respect the classification of the same configured item from another country. The pre-approved agreements provide the FMS community the ability to exchange and repair parts in an efficient manner without having to go to the Department of State for each occurrence. The only requirement is to provide a quarterly report to the Department of State of items exchanged. The reduction of core maintenance capability with the U.S. Depots also stresses the benefits of the End-user Agreement to assure partners have the experience for repairs and become certified for various types of repairs. This will help assure the U.S. Military has access to certified repair sites that can be reached quickly throughout the world

9.3.4 SPECIALIZED SUPPORT

This support may involve ammunition, major end items, increased in-country depot capability, technical data support, technical manual updates and a Technical Coordination Group (TCG) for technical and engineering service support. Some major requirements covered under specialized support are:

9.3.4.1 IN-COUNTRY DEPOT CAPABILITY

During the initial support phase early depot capability may have been established. However, typically an FMS customer elects to increase in-country depot capability after they operate the weapon system and gain experience in the maintenance and repair process. An FMS case (defined order) is needed to provide all the resources and training necessary to establish depot capability. Requirements include: Aircraft Service Period Adjustment (ASPA) training, engine overhaul, managing the depot maintenance process, etc. It is imperative that the FMS customer require that the USN team conducting the depot maintenance study has the requisite skill levels to price out and identify the full range of depot maintenance training. This may require the assistance of organic and commercial depot personnel. A visit by the FMS customer to applicable depots – both organic and commercial would help establish the range of requirements. Technology transfer issues preventing the establishment of depot capability should have been addressed in the initial LOA, but may surface when additional depot capability is requested. The Navy IPO policy on depot maintenance is as follows: the following will be authorized for all weapon systems sold to foreign customers under the FMS program[37].

- Depot repair of airframe and related safety of flight accessories and components
- Depot repair of avionics and other components according to existing disclosure guidance

☑ Given the above USN policy, and the fact that the USN decision to repair at the I or D-level was an economic decision based on the cost of numerous logistics factors, most requests for P&A data to establish depot maintenance should be acted upon favorably by the FMS DAPML.

[37] Navy IPO letter 4920 Serial 02A/3U010713 dated 16 Nov 93

9.3.4.2 TECHNICAL INFORMATION SUSTAINMENT

Critical information, such as that detailed below, is provided in a timely manner to all FMS customer operators of Navy weapon systems. Other data is subject to review upon request by the FMS customer.

- Planned ECP documentation. It is in the USN interest for FMS customers to "buy into" a proposed ECP because the FMS customer could assist the USN in offsetting the non recurring engineering cost to develop the ECP.
- Safety bulletins and inspections provided as occurring.
- Diminishing manufacturing source bulletins published on the NAVICP Web page
- Access to USN historical maintenance data, from representative USN/USMC aircraft operations (See NALDA below)

☑ It is recommended that the FMS customer request that the USG include in follow-on support LOAs the extent of its commitment to promptly provide when requested, all the available technical and logistics data that the FMS customer will need to operate and maintain the approved weapon system configuration in a safe condition for flight.

9.3.4.2.1 NALDA II SYSTEM

NALDA II is an automated database and information retrieval system for aviation logistics management and technical decision support. NALDA II consists of various databases that are linked through a common server for maintenance data collection and analysis. One of the most useful databases for FMS customers is the LMDSS system as discussed below.

9.3.4.2.1.1 LOGISTICS MANAGEMENT DECISION SUPPORT SYSTEM (LMDSS)

LMDSS assesses the "logistics health" of aviation programs using the standard metrics of readiness, supportability, and cost. It is decision support system that permits continuous action by the DAPML and other logistics managers to measurably reduce the cost of ownership while protecting fleet readiness. The system applies to aircraft, engines, and support equipment. Of particular note is that LMDSS has the capability to compare actual performance against the planned performance and provide a report of items that are either above/below selected parameters. FMS customers currently do not have access directly to LMDSS, but they can request reports via their DAPML. Reports include the following[38]: Reports can be tailored to provide for comparisons against FMS customer data, or provide insight into repair potential that's not being realized in-country.

- **Trend Analysis** to analyze system degraders to determine the basic problem(s) and examine underlying cause(s). Data is provided as a report of statistics over time such as:
  - Intermediate maintenance activity
    - WUC history
    - Reliability/maintenance reports
    - Aircraft verified failures and repairs at the I-level

[38] Available reports are found on NAVAIR Web page http://logistics.navair.navy.mil/lmdss/overview.html

- **Supply Analysis** consists of specialized summary and forecasting reports intended for use by supply personnel. The utility provides a means through which both readiness and cost factors are examined concurrently:
    - Repair cycle time
    - Mean flight hours between failures
    - Average customer wait time
    - Planned versus actual opportunity cost
- **Engine Analysis** consisting of tools that allow the analyst to view projected actual costs and hours for different engines.
    - Depot Engine Repair Cost
    - Top 10 Reasons for Removal
    - Engine Removal Analysis
    - Engine Removal Trend

9.3.4.3 ILS TRAINING

There are numerous ILS training courses sponsored by NAVAIR designed to train USG personnel in the various ILS elements such as maintenance management, configuration management, etc. Most of the courses are taught in the Washington, D.C. or Patuxent River, Maryland area using formal classroom training techniques complemented with field trips to selected agencies/commands. Also, the ILS courses can be tailored to non-standard subjects if requested. FMS case funds would be used to tailor the courses. Examples of non-standard subjects include depot maintenance management, RBS, and life cycle costing. All courses could be taught overseas if required.

9.3.4.4 POST PRODUCTION SUPPORT (PPS)

When several FMS customers operate the same weapon system, the USG may establish a TCG. A TCG – may be known under another acronym – is a group of weapon system operators that form together to share the overhead cost of maintaining the TCG, and exchange information such as technical and engineering data, maintenance experience, problem resolution, and upgrade information. Users contribute funds on a prorated basis for the overhead services and sustaining engineering provided by the USG and the Prime Contractor. The format and scope of each TCG is weapon system peculiar as determined by the program office in collaboration with their FMS customer group. It is planned that FMS customers will fund the overhead supporting a TCG from their FMS case. The use of unique web pages and the users of the World Wide Web (www) should be considered for enhancing communications among users.

9.3.4.4.1 USN POST PRODUCTION SUPPORT ISSUES IMPACTING FMS CUSTOMERS

- Impact of Production Line Shut Down on maintenance support concepts
- Plan to procure/manufacture non-stocked items., e.g. XB/PB SM&R coded
- Availability of reprocurement data packages
- Retention of special tooling
- Funding to update technical manuals
- Plan to sustain or replace existing support equipment

- Plan to overcome obsolescence (see below)

9.3.4.5 OBSOLESCENCE PROBLEM SOLVING

The use of aging weapon systems beyond their original life expectancies has placed unexpected demands on supply systems initially provisioned to support shorter life cycles. These unexpected demands have put unanticipated demands on spares. The combination of Diminishing Manufacturing Support (DMS), electronic component failures, and the attrition of non-electronics parts from age, fatigue and corrosion, threaten to make the problem grow to critical proportions. In addition, the OEM may no longer be available as the primary source for spares, repair parts, and sustaining engineering support for aging weapons systems. In attacking the obsolescence problem, the FMS DAPML typically would call upon government or contractor specialists from many fields to perform studies for developing and evaluating practical, alternative solutions using a wide range of analytical tools. Some of the government databases that are available include LMDSS a (see Section 9.3.4.2.1.1) and the Government-Industry Data Exchange Program (GIDEP) program (See Section 9.3.4.6 below). An excellent source for obsolescence problem solving information is available at the Naval Warfare Center, Crane Indiana DMS Technology Center (http://dtc-dms.crane.navy.mil/dtc.htm). Obsolescence problem solving services from NWC Crane are available via an FMS case. ☑ The annual NWC Crane DMSMS Conference is an excellent source for DMSMS information. It's believed to be open to all U.S. citizens and non-citizens with a legitimate interest in helping the military mitigate its obsolescence issues. While no classified information will be discussed at the Conference, the DMSMS Conference Committee reserves the right to require non-U.S. citizens to provide documentation of their affiliation to a U.S. military program. This documentation may be via a letter on official military letterhead stating the registrant's involvement in the specific military program, or from a military organization's security office stating the registrant's security status[39]. DoD has established http://www.dmsms.org/ as a one-stop shop for DMSMS information. Not all of the links are available to FMS customers, but a great deal of the information is very useful in attacking obsolescence problems.

9.3.4.5.1 OBSOLESCENCE MANAGEMENT CYCLE

The approach to minimizing critical spare part problems would use a resolution process that is integrated with an overall risk management and attention to Total Ownership Cost (TOC). One contractor's approach to obsolescence problem solving is illustrated in Figure 9-2, the Obsolescence Management Cycle, a robust, five-phase process for approaching avionics obsolescence problems.

- Phase 1 - **Configuration** for the managed item is established. Data packages, drawings, bills of materials etc., are collected.
- Phase 2 - **Critical Parts** (or issues) are identified.
- Phase 3 - **Resolution** process. A detailed description of this step is illustrated in Figure 9-3. In this step integrated solutions are evaluated for system impact and ROI.
- Phase 4 - **Validation** of solutions is accomplished
- Phase 6 - **Logistics** changes required by the validated solution. Changes in NIINs, Drawings, etc. are fed back to the **Configuration** phase. To achieve maximum benefit from this process the cycle must be repeated to exploit the costs savings associated with early detection of critical parts or other logistics issues.

[39] Per NWC Crane Web Site

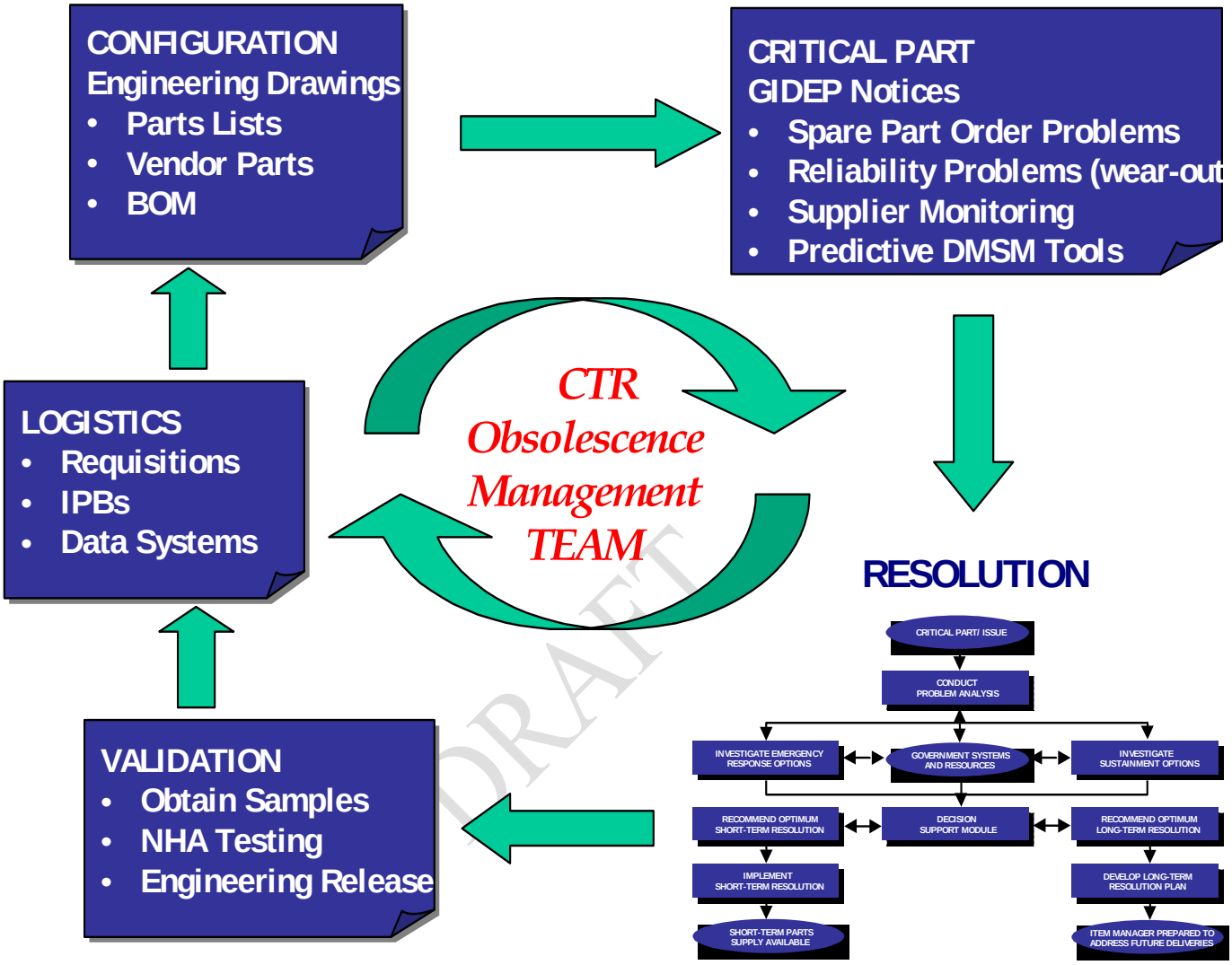


Figure 9-2 Obsolescence Management Cycle

Table One. Data Collection Activities

Data Element	Description	Possible Source(s)
Configuration Data	Manufacturer part numbers, generic part numbers, Next Higher Assembly (NHA), NSN, CAGE Code, FSC.	IPBs, repair manuals, physical survey, IM, DLA
Part Capabilities	Performance, functional, and environmental characteristics of the part	Drawings, repair manuals specifications, test data, operational data, OEM
Application Stresses	Operating environment – including temperature, vibration requirements, unique mounting or handling requirements	Drawings, repair manuals specifications, test data, operational data, OEM, physical survey
Obsolescence Data	Information on part availability and future status	GIDEP, DLA, OEM, commercial predictive database tools (e.g., TacTECH)
Operational Data	Operating hours, mission criticality	NALDA,LMDSS, MESL
Reliability and Usage Data	Failure rates, demands, inventory level, and quantity per aircraft	NALDA, LMDSS, Depot NSN usage data, NMCS, interviews of maintenance personnel ,SAMMS, IM
Maintainability Data	Repair time, logistics delay time	NALDA,LMDSS, Depot NSN usage data, NMCS, interviews of maintenance personnel

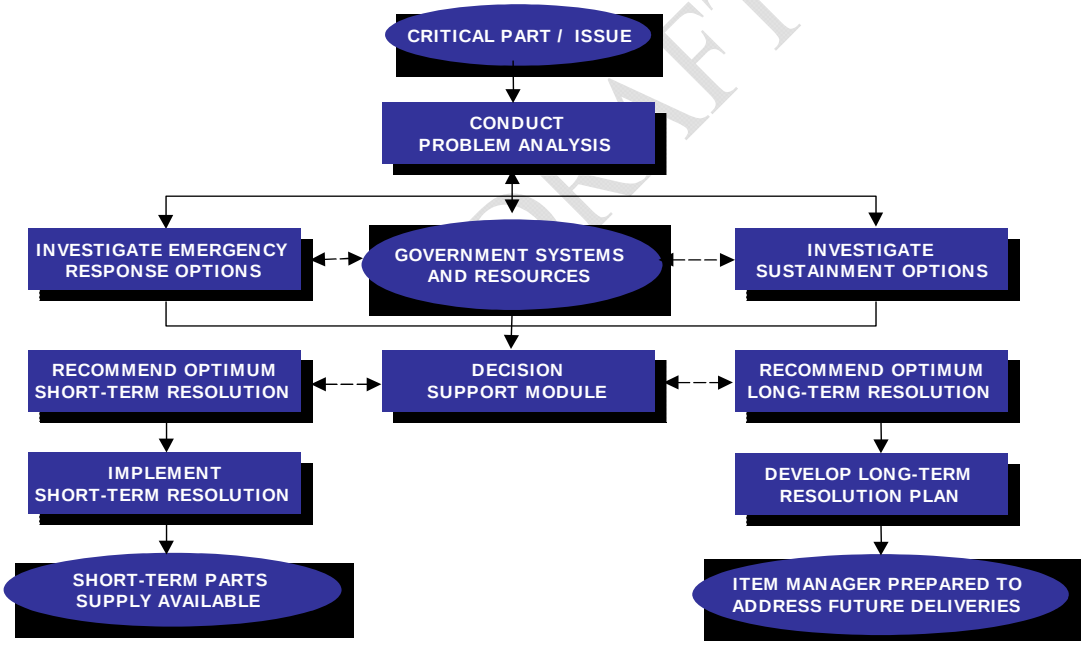


Figure 9-3 Resolution Phase of Obsolescence Management Cycle

INVESTIGATE SUSTAINMENT OPTIONS

Table 2 summarizes sustainment options that are available to the FMS DAPML to solve avionics obsolescence problems:

TABLE TWO. Sustainment Options

Substitution—Other manufacturer components may be Form Fit Function (F3) -compatible with the original manufacturer's component. Conduct market surveys to locate other manufacturers or aftermarket sources for alternative replacements.
Uprating—Commercial parts can sometimes be uprated to more specialized requirements, such as MIL-SPEC requirements. Risks and life-cycle costs associated with uprating must be identified. Because of these risks, this resolution is not a preferred resolution that involves safety critical items.
Life-of-type or bridge buy—Enough inventory may exist to meet projected future requirements, or the original manufacturer may continue to produce the component for a specified amount of time.
GIDEP Urgent Data Request—A method used to query the GIDEP participants, to see if someone has the component or information needed to resolve the critical part problem. Currently there are more than 1,200 government and industry GIDEP participants.
Emulation—A government or industry laboratory may have developed or have the capability to develop a F3 replacement that matches the original component. The DMEA offers support with emulation including Very High Speed Integrated Circuit Hardware Descriptive Language (VHDL) modeling.
System redesign—If no other resolution is cost-effective, the system may need to be redesigned to accept alternative components A minor redesign would be a new layout of a circuit board, a more extensive redesign would be replacing the motherboard with an open system architecture (e.g., Versa Module Europa (VME)).
System reengineering—A structured process, sometimes involving technology insertion, to resolve identified deficiencies in the current design, application, or support concept.
Other— Unique resolutions that are tailored to the specific program. Examples include reliability improvement programs, production warranties, or system replacement.

9.3.4.6 GOVERNMENT-INDUSTRY DATA EXCHANGE PROGRAM (GIDEP)

GIDEP is a cooperative activity between USG and industry participants seeking to reduce or eliminate expenditures of resources by making maximum use of existing information. The program provides a media to exchange technical information essential during research, design, development, production and operational phases of the life cycle of systems, facilities and equipment.

GIDEP is managed and **funded by the USG**. Among its participating organizations are: US Army, Navy, Air Force, Defense Logistics Agency, National Aeronautical and Space Administration, Department of Energy, Department of Labor, Department of Commerce, General Services Administration, Federal Aviation Administration, US Postal Service, National Institute of Standards and Technology, National Security Agency, as well as, the Canadian Department of Defense. There are also hundreds of industrial organizations producing parts, components and equipment for the government which participate in the program.

Participants in GIDEP are provided electronic access to the six different databases listed below:

1. **ENGINEERING DATA** contains quality assessment, engineering test, evaluation and qualification test reports, nonstandard parts data, parts and materials specifications, manufacturing processes, process controls, solderability data and related engineering data on parts, components, materials and processes. This data includes significant amounts of energy and environmental information**.**

2. **FAILURE EXPERIENCE DATA** contains objective failure information as a result of ALERTs, SAFE-ALERTs, Problem Advisories and Agency Action Notices which notify users of nonconforming parts, components, chemicals, processes, materials, safety and hazardous situations. This data also includes failure analysis and problem information submitted from laboratory analysis**.**
3. **METROLOGY DATA** contains calibration procedures and technical manuals for test and inspection equipment. It also contains engineering information on calibration laboratories, calibration systems and measurement systems. National Institute for Standards and Technology contributes a significant portion of the engineering data related to measurement science**.**
4. **PRODUCT INFORMATION DATA** contains notices on parts, components and materials which are being discontinued or the attributes have been changed by the manufacturer. This data includes Diminishing Manufacturing Sources and Material Shortages (DMSMS) Notices of product discontinuances which suppliers have forwarded to GIDEP. It also contains information on alternate sources, after market suppliers, Department of Defense focal points of contact and related information. Another significant type of data is the Product Change Notices that are also distributed as a part of this data set.
5. **RELIABILITY AND MAINTAINABILITY (R&M) DATA** contains failure rate, failure mode and replacement rate data on parts, components, and subsystems based upon field performance and demonstration tests of equipment, subsystems and systems. This also includes reports on theory, methods, techniques and procedures related to reliability and maintainability practices**.**
6. **URGENT DATA REQUEST** system permits participants having technical problems to rapidly query the GIDEP community to obtain information which resolves the problem. A UDR form is initiated by the GIDEP Representative and mailed electronically to the GIDEP Operations Center which distributes the UDR to all participants. Responses to requests for information are provided directly to the representative making the urgent data request.

FMS customers do not currently have access to any of the GIDEP databases. However, DLA, the Government agency that manages GIDEP, is seeking to provide limited FMS customer access to the Product Information Database so that the FMS customer can conduct their own obsolescence analyses. In the interim, FMS DAPMLs can access GIDEP on behalf of an FMS customer and provide GIDEP data to the FMS customer subject to technology transfer considerations. In addition, the USN as discussed below has several programs that would assist an FMS customer in attacking obsolescence issues.

9.3.4.7 OBSOLESCENCE PREDICTION TOOLS (OPT)

Both NAVAIR (AIR-4.1D) and NAVSUP (SUP-4C2C) have developed OPTs which are software applications designed to provide an automated process to monitor obsolescence of weapon systems via parts status and technology trend forecasts. By automating these capabilities, OPT provides multiple benefits. First, weapon systems managers can receive early proactive notification of parts obsolescence thereby allowing for intervention of potential problems. Second, the programmed methodologies provide consistent predictions across multiple related case scenarios. Third, individual program assessments can be conducted with the knowledge that the analysis is based on consistent methodologies. And fourth, automated analysis provides for larger volumes of data to be

evaluated and for a higher frequency of analysis to occur. FMS customers interested in acquiring either of the OPTs should contact their FMS DAPML for further information.

9.3.4.7.1 KEY DOD AGENCIES INVOLVED IN OBSOLESCENCE PROBLEM SOLVING

- NAVSEA Division Keyport Washington - rtaylor@kpt.nuwc.navy.mil
- DLA Generalized Emulation of Microcircuits (GEM) - gemoffice@dscc.dla.mil
- NAVAIR Aging Aircraft - loesleinGF@navair.navy.mil
- NAVSUP Rapid Retargeting (RRT) - http://nlp.navsup.navy.mil/
- Defense MicroElectronics Activity (DMEA) www.dmea.osd.mil/partnership.html

9.3.4.8 TECHNICAL ASSISTANCE TEAMS

Periodically, FMS customers require a team of USG or contractor personnel to provide technical assistance. These teams take many forms as described below:

1. Mobile Training Teams (MTTs) – A MTT consists of USG personnel, TAD to a foreign country to provide specified training. MTTs do not provide technical assistance
2. Technical Assistance Teams (TATs) – A TAT consists of USG personnel, TAD to a foreign country, who maintain or repair equipment provided under an FMS program. TATs typically are called in when an FMS customer is having problems maintaining equipment, but they can also be used to augment an FMS customer's logistics infrastructure when a weapon system is initially introduced
3. Contractor Field Team (CFT) – The contractor field teams typically are contracted from the OEM to solve specific technical problems in the installation, operation, or maintenance of a weapon system or equipment. Contractor teams provide training or hands-on maintenance as required

9.3.4.9 RELEASE OF TECHNICAL DATA

FMS customers often request technical information such as engineering drawings, or specifications. Requests of this nature are often for "M" source coded items. The requests are often denied because of a misinterpretation of the definition of "M." The first letter of the SM&R code stands for manufacture and the second letter stands for the maintenance level (i.e., O-Organizational, I-Intermediate Afloat/Ashore, D-Depot) at which the manufacturing could be accomplished. It should be noted that the word "Manufacture" means "local manufacture" by a level of maintenance whose capability (i.e., personnel expertise: metalsmith, machinist, etc.), stocked common material (i.e., sheet aluminum, steel, extrusions, etc.) and facilities (i.e., metal working tools, heat treatment ovens, surface treatment vats, etc.) meet the minimum requirements necessary to manufacture the item. Local manufacture does not mean production manufacturing. Local manufacture means to produce a part once which has been damaged due to an incident, wear and tear, or corrosion during the life cycle usage of the weapon system. Production manufacturing means to produce a given quantity based on a known procurement run of an end item.

9.4 ECP PROCESSING

It is in the Navy's interest that FMS customers participate (i.e." buy in") in the Navy modification program including both emergency ECPs to correct safety of flight problems as well as product improvement programs. For this reason it is important that an FMS customer have a general understanding of the Navy's ECP program. With this knowledge, the FMS customer has time to

understand the planned ECPs, staff them within their own country and be prepared to commit funding according to the USN ECP processing schedule.

9.4.1 OPERATIONAL SAFETY AND IMPROVEMENT PROGRAM (OSIP)

The OSIP is the means by which retrofit engineering changes/upgrades are planned and budgeted for. These engineering changes included improvements in safety, performance, reliability, maintainability, survivability, and service life along with modernization to update weapon system to the latest state-of-the-art. The formal OSIP process begins biennially in the August-October time frame when the CNO issues a call for inputs to the Navy budget. NAVAIR PMs prepare prospective new-start OSIP candidates and update on-going OSIP programs and submit them to the CNO staff for approval. The latest Navy OSIP budget is available on the WWW by following the links at the following web site: http://navweb.secnav.navy.mil/pubbud/04pres/budget_pb04_u.htm . Funds for emergency ECPs to address immediate safety or operational requirements are reprogrammed as needed. ☑ Too often the FMS customer does not have ample time to staff the approval of an ECP within its own chain of command before the USN procurement window expires for purchasing the associated kits. It is therefore suggested that the FMS customer coordinate with the PM to understand the ECPs that make up the OSIP submission. Other characteristics of the OSIP program that impact FMS customer's are as follows:

- Aircraft and related systems must have 5-years of Service Life remaining after completion of the modification/upgrade installation. Safety changes are exempt from this prohibition
- Modification/Upgrade programs should be planned for completion within a maximum of 5-years from the initial installation year

9.4.1.1 DOD CONFIGURATION MANAGEMENT GUIDANCE

The DoD Configuration Management Guidance Handbook (MIL-HDBK-61A (SE)) provides guidance to DoD managers assigned the responsibility for configuration management on how to ensure the application of product and data configuration management to defense materiel items, in each phase of their life cycle. Acquisition practices, including the manner in which CM is specified in a contract and the process of monitoring contractor application are evolving as the result of two interacting transitions[40]. MIL-HDBK-61A (SE) can be found at the following web site http://www.reliasoft.org/mil_std/mil_hdbk_61.pdf . ☑ Appendix (D) of the ECP Management Guide states that FMS requirements will be provided to the contractor four months prior to the ECP request and that FMS logistics managers will be included in ECP development meetings.

9.4.2 NAVAL AVIATION CONFIGURATION CONTROL OVERVIEW

9.4.2.1 CONFIGURATION ITEM (CI)

A CI is an aggregation of hardware and/or software which:

- Satisfies an end use function
- The government needs to manage
- Requires tracking and documentation

[40] MIL-HDBK-61A(SE) dated 7 February 2001

CIs provide the specific technical description of an item at any point in time. Refer to Figure 9-4:

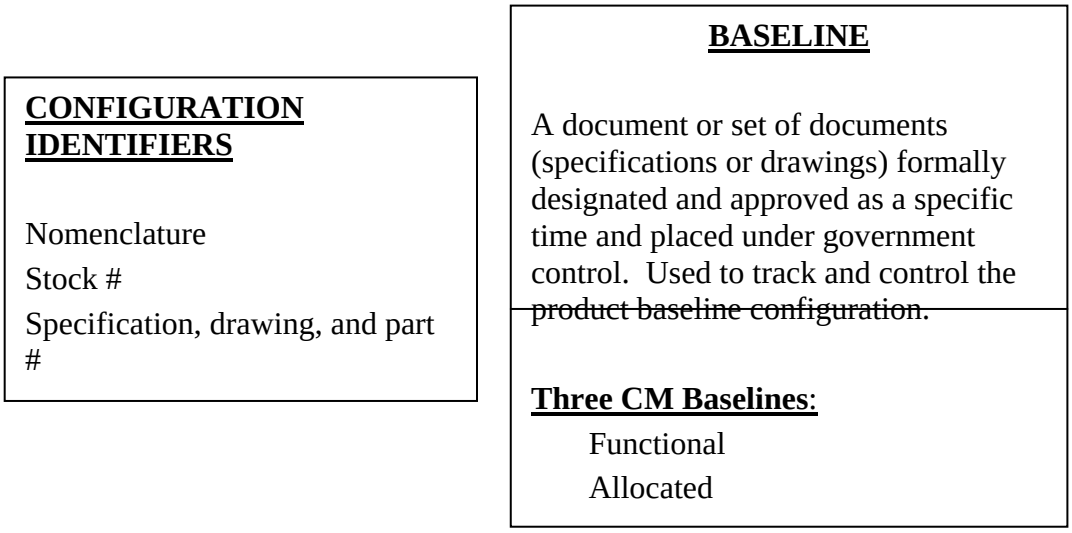
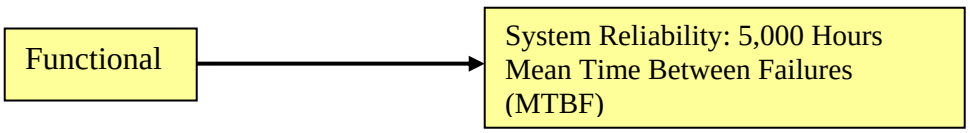


Figure 9-4 Configuration Identification

9.4.2.1.1 FUNCTIONAL BASELINE

A Functional Baseline is described as follows:

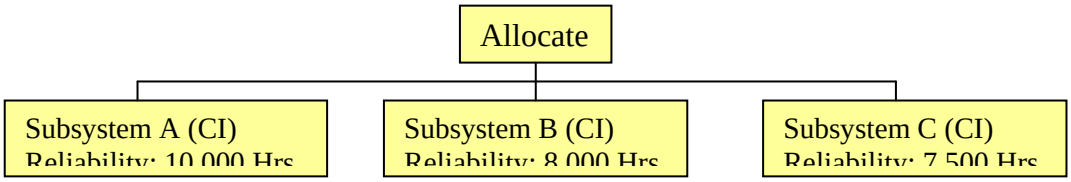
- Used to Identify **System Level** Performance Requirements.
- Defined in the **System** Specification and **Concept** Drawings (Functional Configuration Documentation)
- Established at a **Technical Review** in the Program Definition and Risk Reduction (PD&RR) Phase of the System Life Cycle
- Changed Only by Government Approval (PM)



9.4.2.1.2 ALLOCATED BASELINE

An Allocated Baseline is described as follows:

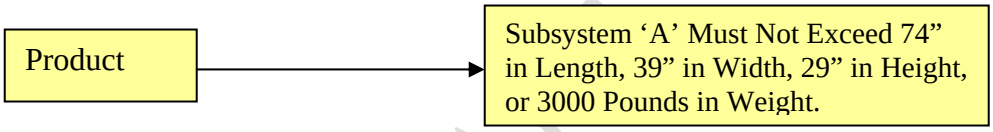
- Created for Each CI to Describe **Performance** Requirements Allocated to it
- Defined in the **Item Development** Specification and **Development Design** Drawings (Allocated Configuration Documentation)
- Typically Established at a **Technical Review** early in the System Life Cycle
- Changed Only by Government Approval (PM)



9.4.2.1.3 PRODUCT BASELINE

A Product Baseline is described as follows:

- Describes the **Physical** Characteristics of Each CI
- Defined in the Item **"Product," "Process," and "Material"** Specifications & **Product** Drawings (Product Configuration Documentation)
- Typically Established Early in the Production, Fielding/Deployment & Operational Support (PF/D&OS) Phase of the System Life Cycle
- Changed Only by Government Approval Using the ECP Process



9.4.2.2 ENGINEERING CHANGE

Any change to a designated CI that affects its configuration documentation *after* government approval of a product baseline. There are two basic types of Engineering Changes:

- Class I Change:
  - Requires formal government approval
  - Affects performance, safety, or support systems
  - Involves retrofit; or costs government money
- Class 11 Change:
  - Minor changes to CI or its documentation
  - Accomplished by contractor within scope of existing contract and funding

9.4.2.2.1 ENGINEERING CHANGE LOGISTICS ISSUES/IMPACTS

The FMS DAPML is responsible for notifying the FMS customer of new ECPs that they might be interested in. The notification normally occurs as the ECP goes through the NAVAIR Change Control Board (CCB) approval process. The CCB considers all ILS elements (e.g. maintenance planning, supply support, SE, etc.) when evaluating the impact of adopting an ECP. Other factors impacting logistics include the effect on operational forces, ILS costs and savings, and delivery schedules.

9.4.2.2.1.1 DESIGN CHANGE NOTICE (DCN)

The primary purpose of DCN documentation is to introduce new configuration into the Naval Supply System following the approval of an ECP. DCN provisioning is accomplished by the Integrated Weapon Support Team (IWST) personnel at NAVICP responsible for support of the

weapon system affected by the ECP. Introduction of the new configuration includes supporting spares and repair parts. The IWST DCN processor is responsible for ensuring that all DCN data required to support the new configuration is complete and accurate.

The information provided on the DCN is crucial to establishing a new configuration that reflects its intended use on the weapon system. Additionally, associated engineering data (drawings) must be included. Engineering data provides identifiable characteristics associated with NSN items. These characteristics are mandatory logistic/technical data requirements governed by DOD cataloging policy. Data extracted from the DCN and associated technical data will reside in the Defense Logistics Information Services (DLIS) data repository. Additional data will reside in the NAVICP MIF, including non-stock numbered items. FMS application should also be reflected in the MIF.

9.4.2.2.2 OTHER ENGINEERING CHANGES

- Rapid Action Minor Engineering Changes (RAMEC)
  - Simple changes to aircraft, components, and SE
  - O-level or I-level
  - 8 man hours or less to install
  - No kits or new/additional SE
  - Approval by the PM
- Logistics Engineering Change Proposal (LECP)
  - Sponsored by NAVICP
  - Applicable only to items in the Supply System Inventory
  - Must demonstrate a 2:1 ROI over five years
  - Funded by the NWCF
  - NAVAIR CCB has final approval authority. NAVICP implements the LECP

☑ FMS customers that use the NAVICP RIRO program will benefit from LECPs when they purchase components from the supply system on an exchange basis. Some LECPs require an infusion of PM funds to meet the ROI criteria. Additional LECPs might be accepted for implementation if the FMS customers collaborate with the PM to infuse funds on a shared basis into a proposed LECP. Also, FMS customers can offer LECPs for consideration by NAVICP based on results demonstrated within their own fleet of aircraft.

9.4.2.3 SPECIAL TOOLING/SPECIAL TEST EQUIPMENT (ST/STE)

FMS customers often operate a weapon system after the USN begins phasing it out. Therefore, it's important to the FMS customer that they understand USN policy on protecting critical ST/STE after the production line shut down and as the USN begins phasing out the weapon system.. The following typical DAPML ST/STE strategy is provided for FMS DAPML and FMS customer reference:

- **DEFINITIONS**
  - Special Tooling - FAR 52.245-17 defines Special Tooling as jigs, dies, fixtures, molds, patterns, taps, gauges, other equipment and manufacturing aids, all components of these items, and replacements of these items that are of such specialized nature that without substantial modification or alteration their use is limited to the development or production of particular supplies or parts thereof or

performing particular services. It does not include material, special test equipment, facilities, general or special machine tools, or similar capital items.

- Special Test Equipment - FAR 52.245-18 defines Special Test Equipment as either single or multipurpose integrated test units engineered, designed, fabricated, or modified to accomplish special purpose testing in performing a contract. It consists of items or assemblies of equipment, including standard or general-purpose items or components that are interconnected and interdependent so as to become a new functional entity for special testing purposes. It does not include material, special tooling, facilities, and plant equipment items used for general plant testing purposes.

9.4.2.3.1 ST/STE DISPOSITION PLAN

An ST/STE disposition plan, to meet future aircraft and component repair, modification, and spare parts requirements should be available in the PPSP. The ST/STE disposition plan should be tied to the plan to support (spares, repair, and modification) the USN/USMC domestic operations including planned mobilization requirements. The plan to support the USN/USMC should include FMS considerations until the USN begins phasing out the weapon system.

A roadmap should be included in the PPSP that reflects the operational plan for the domestic fleet and when it's anticipated that the domestic fleet will begin phasing out of the USN inventory. The general rule is that is that tools will not be saved or stored unless there is a specific reason, for doing so. If not, the default is a "scrap" decision. An exception to this philosophy is to retain ST/STE and associated technical data in the FMS Reserve for future FMS requirements. See the LCLSP Volume II for details on the FMS Reserve program.

NAVICP typically manages the ST/STE tooling disposition program for an IPT. They also provide NWCF to protect tooling needed for reprocurement of spares.

9.4.2.3.2 ST/STE STORAGE AND MANAGEMENT

ST/STE will be stored in one of the following facilities:

- NADEP Any ST/STE identified for retention may be warehoused at the applicable NADEP (discretionary).
- The primary storage site for ST/STE is the Charles Melvin Price Support Center located at Granite City, Illinois. This storage facility, consisting of warehouses and sheds, is under the cognizance of NAVAIR 3.6.1.1 and is operated solely for the purpose of storing ST/STE for future utilization.
- Outside Storage is available at AMARC. Only very large, static ST items will be stored at AMARC
- NAVICP Code 0713.14 manages all ST/STE stored at Granite City and AMARC.
- Requests to withdraw equipment from the Granite City or AMARC storage sites are coordinated through NAVICP[41].
- Tooling technical data must accompany all tooling which is retained. That data should include a description of the process where the tool is used, how the tool is used/set-up/calibrated, and what other tools are required.
- Peculiar FMS tooling will be dispositioned by the FMS customers.

[41] NAVICPINST 4810.1J.

9.4.2.4 GOVERNMENT FURNISHED EQUIPMENT (GFE)

A separate retention process needs to be established for GFE tooling. The Master Government Furnished Equipment List (MGFEL) list is the source document for GFE items. An analysis of the MGFEL will identify those items of GFE that would no longer be manufactured after production ends. NAVICP should take the lead and conduct a GFE supplier survey to capture and store applicable GFE-related ST/STE.

LOGISTICS SUPPORT OF WEAPON SYSTEMS PHASED OUT OF THE ACTIVE USN INVENTORY

10.0 LOGISTICS SUPPORT OF WEAPON SYSTEMS PHASED OUT OF THE ACTIVE USN INVENTORY

10.1 BACKGROUND

FMS customers that are either operating weapon systems that are phasing out of the active USN inventory (referred to as OOI weapon systems) or considering buying OOI weapon systems that are phasing out/have phased out of the USN inventory, must take a "hard look" at supportability of the weapon system for its anticipated remaining life cycle. Of particular concern is the availability of peculiar spares, SE, and training materials that are vital to future weapon system support. In addition, the availability of in service engineering support and associated technical data is particularly critical to supportability for older weapon systems.

The USN has an excellent track record of supporting weapon systems that were sold to FMS customers and subsequently phased out of the active USN inventory (e.g. A-4, A-7, etc.). Typically, USN PMs rely on a small Government staff to manage the OOI FMS programs and a mix of organic and commercial sources of supply/engineering to sustain support. Because USG depots shift resources to newer programs as weapon systems are phased out, the majority of support for OOI weapon systems comes from commercial sources.

To strengthen support of OOI weapon systems, a DoD memorandum (see Paragraph 9-4) has authorized and required an FMS Reserve. The purpose of establishing the FMS Reserve was to protect government-owned assets, under tightly controlled conditions, for current and future support of foreign-owned weapon systems that have been phased out of use by the US forces. However, depending on the weapon system platform, there is a finite amount of critical material available in the FMS Reserve that my limit supportability for new FMS customers. ☑ **Bottom Line**: It may be that the cost of supporting an OOI weapon system under FMS, DCS, or hybrid arrangement may be too great for the international customer to bear and that alternatives should be sought to satisfy operational needs elsewhere. However, before an FMS customer takes action to look elsewhere, they should coordinate closely with the responsible USN PM to ensure that all viable options have been explored and priced out correctly.

10.2 USN PHASE-OUT PLANNING

Once it is decided to begin phasing out a weapon system the USN/USMC flying hour program will be periodically reduced. As the flying hour decreases the demand for spares will diminish (see Figure10-1.) causing the spares to become excess to the supply system and eligible for disposal. The same is true for support equipment and training materials as squadrons are disestablished (see Figure 10-2).

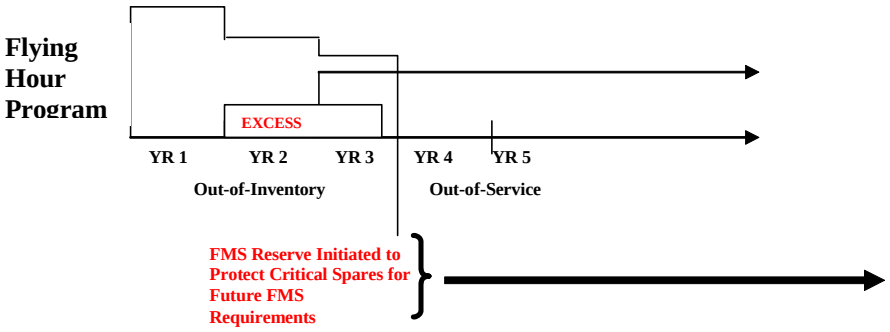


Figure 10-1 Decreased Flying Hours Drives Excess Spares

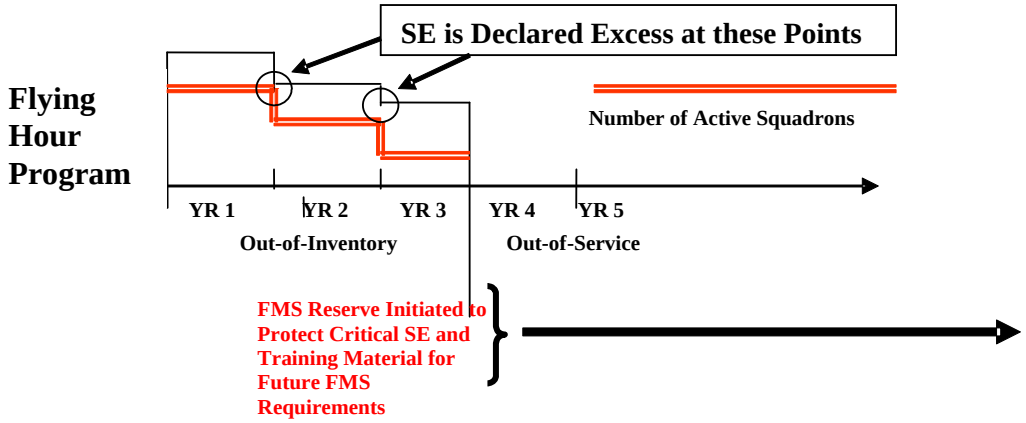


Figure 10-2 Decreased Flying Hours Drives Disposal of SE and Training Materials

☑ Refer to Section 10.4 for a discussion of the FMS Reserve Program

10.3 FMS INFRASTRUCTURE FOR OOI LOGISTICS SUPPORT

10.3.1 DOD POLICY

- The only references in the SAMM to supporting FMS customers operating weapon systems that have been phased out of the DoD inventory are as follows
- "When a system is to be phased out of the DoD inventory, countries which have acquired the system under FMS will be given the opportunity to determine support item requirements and to place final orders designed to maintain the capabilities of the system through the remainder of its service life"[42].
- "DoD will take reasonable steps to support systems which are not used by US forces"[43]
- DoD will ensure that FMS customers are offered a TPA when purchasing weapon systems under an FMS case[44].
- LOAs may be used to provide nonstandard support. Nonstandard support may include hardware or services required to support commercial end items; support of obsolete end items, including end items that have undergone system support buy outs; and support of selected non-U.S. origin military equipment[45]
- Although not yet cited in the SAMM, DoD established the FMS Reserve - discussed at length in Paragraph 9-4 - to provide continuing support for FMS customers that operate weapon systems that have been phased out of the DoD inventory.

10.3.2 NAVY POLICY

There is no overarching Navy policy on supporting OOI weapon systems still operated by FMS customers. However, based on historical practice the following Navy IPO policy can be construed:

[42] SAMM Paragraph C4.3.3

[43] SAMM Paragraph C4.3.3

[44] SAMM Paragraph C4.5.3

[45] SAMM Paragraph C5.4.5

- Establishment of a robust initial operating capability consistent with the intent and available resources of the FMS customer
- Assist the FMS customer to safely operate and sustain the weapon system throughout its life cycle in the configuration that was sold under an FMS case.
- When a weapon system is phased out of the active USG inventory and subsequently offered for sale to a customer country, the Program Manager shall ensure that the customer country is offered a Total Package Approach (TPA)[46] in the LOA. ☑ Although not cited in the SAMM or Navy policy documents, the following policy is based on historical Navy FMS support of OOI weapon systems (e.g. A-7E to Greece/S-2E to Taiwan). Since the DoD infrastructure supporting the phased out weapon system has likely shifted to newer workload, the Program Manager should seek to fulfill the TPA through a partnership with industry that commits to continuation of a reasonable and cost effective level of life cycle support. Reasonable is defined as providing assistance to an FMS customer to safely operate and maintain the OOI weapon system in the condition when the LOA was signed.

10.3.3 NAVAIR POLICY

NAVAIR Program Managers continue responsibility to field and support OOI weapon systems operated by FMS customers. PMs retain specific responsibility for program management, FMS case management, and technology transfer oversight. They have access to material and equipment protected under the FMS Reserve, discussed below. Each PM develops its own support concept in consonance with AIR-1.4 and Navy IPO and based on a variety of factors that are platform unique based on cost effective and available Government and commercial suppliers. Typically, much of the day-to-day logistics and engineering functions are shifted to a long-term commercial contract between the program office and a highly qualified team of contractors. The DoD logistics support system continues to provide support for common systems. NAVAIR has developed several initiatives that are used by PMs in conjunction with their unique support concepts. These initiatives include the following:

10.4 FMS RESERVE

A 1995 DoD memorandum authorized and required an FMS Reserve. The purpose of establishing the FMS Reserve was to protect government-owned assets, under tightly controlled conditions, for current and future support of foreign-owned weapon systems that have been phased out of use by the US forces. The FMS Reserve includes selected: (1) secondary items (e.g. stock numbered items that are centrally managed/stocked), and (2) Sponsor Owned Material (SOM), e.g. test equipment, training devices, etc. owned and managed by HSCs such as NAVAIR. Both the Navy and DLA participate in the FMS Reserve Program. FMS Reserve items are available to fill both initial and follow-on support requisitions. ☑ Material in the FMS Reserve is not available for sale to commercial contractors unless the USN determines that the requested material will not be needed for future FMS sales. Thus, commercial contractors that have an export license to provide logistics support to an international customer under a DCS arrangement may not have access to material in the FMS Reserve without approval of the designated NAVAIR FMS logistics manager.

[46] SAMM Paragraph C4.5.3

10.4.1 FMS RESERVE SALE PRICE

Because FMS Reserve material is considered a protected requirement within the supply system inventory it is not available for transfer under EDA provisions. As such, DoD policy has mandated that material in the FMS Reserve be sold at the standard price (including a supply system surcharge or CRR as it's now called). However, two policies tend to lower the selling price of material in the FMS Reserve making FMS Reserve material more marketable to an FMS customer. They are as follows:

- Recognizing that material in the FMS Reserve may not have a full service life remaining, DoD policy provides the inventory manager the authority to sell FMS Reserve material at market price as applicable
- NAVICP has recently adopted a flexible pricing policy. Under this policy, items that are being phased out of the active USN inventory and no longer require active inventory management will be CRR of 5%

☑ Aircraft are not considered items of supply inventory and therefore can be transferred to an international customer under EDA provisions. Thus potential international customers for OOI weapon systems may find that the aircraft itself is available for sale at a very low price, but the logistics support could be moderately expensive. However, as discussed below, there are support concepts (see Paragraph 9.5.1.2) that could lessen the initial investment in logistics support making life cycle support for an OOI weapon system reasonable compared with commercial alternatives.

10.5 PRODUCT SUPPORTABILITY

A weapon system that is being phased-out of the active USN inventory has, over its life cycle, been subjected to engineering changes and modifications. As such, an older weapon system is a collage of originally procured systems that may, or may not be supportable in the future. The USN team must thus develop a support strategy that considers future supportability given both Government and commercial logistics support.

10.5.1 SUPPORTABILITY ISSUES

It is suggested that international customers that are considering the purchase of an OOI weapon system request that the Navy or commercial contractor (DCS procurement) identify in writing, potential supportability problems and plans to ameliorate those problems throughout the weapon system life cycle. Questions that might be posed include the following:

- Identify historical reliability problems to the sub-system level (e.g. radar, landing gear) and the USN plan to overcome these problems in the future. Include USN historical failure data, expected improved failure data once fix is in place, and cost to incorporate modification/upgrade
- Describe the USN process to address ongoing obsolescence issues for OOI weapon systems
- Advise the extent that USN technical data is available to procure spare parts/tools in support of specific OOI weapon system airframe/engine/support equipment
- Would the USN consider providing non-proprietary technical data to country (x) so that country (x) can manufacture selective parts as required for its fleet of OOI weapon systems acquired from the USN under an FMS case?

- Advise the extent that USN repair depot (organic or commercial) remains capable of supporting a specific OOI weapon system

10.5.1.1 MINIMIZING INITIAL INVESTMENT

Many of the potential international customers for OOI weapon systems do not have the resources to establish a full initial support capability (e.g. 2-year spares package and full O/I-level maintenance support) when the aircraft begin operations in-country. Recognizing this, concepts are available that minimize potential customers initial investment while ensuring that an agreed upon level of operations can be sustained when the aircraft arrive in-country. Several of these concepts are discussed below.

10.5.1.1.1 FOCUS RESOURCES ON CRITICAL SYSTMS

The NAVAIR PM and the FMS customer would review the approved configuration and agree which sub-systems must be operational to meet the customer's operational needs (e.g. surface search vice anti submarine capability). Following that determination, logistics support for the critical systems would be emphasized at the expense of other sub-systems that are not as important.

10.5.1.1.2 PHASED LOGISTICS SUPPORT OPTION

The following is a phased logistics support concept that would provide for an operational training program at weapon system IOC and the phasing in of FMS customer in-country maintenance capability as resources permit to achieve self-sufficiency over time:

- Initial Support:
    - SE/Pubs/Training for full O-level capability
    - SE/Pubs/Training for selected I-level capability (e.g. wheels, brakes, communication, navigation)
    - Minimum level of high demand O-level spares and robust bit/piece part support for selected I-level capability
    - Technical manuals, training (if required) to establish in-country depot capability for common aerospace-like components (e.g. hydraulic, electrical, fuel, gyro)
    - Modest investment in piece part "lay in" to support depot RTAT at both in-country and U.S. depots
    - Extra aircraft as source for spare parts/engines
- Sustainment:
    - USN establishes an in-country bond room containing Government-owned spares in the vicinity of the FMS customer. The bond room is stocked with peculiar, high demand Government-owned spare and repair parts. Customer orders repairables on an exchange basis and consumables as needed. Government replenishes the bond room from Government-owned stock in the U.S. FMS case funds would fund the establishment (i.e. transportation) and management of the bond room. Alternative would be to provide replacement material from USN stock on expedited basis including transportation to FMS customer country
    - FMS customer establishes following FMS cases for follow-on support:
        - FMS/DCS Hybrid FMS case to purchase spares from bond room and the supply system and from the commercial market if not readily available

from government sources. FMS case "to be determined" for RIRO program option
        - ROR FMS case to repair/return components where serial number integrity is required
        - Technical and Engineering FMS case
    - Following USN assistance provided to FMS customer as requested
        - Commitment to retain material in the FMS Reserve that is needed to sustain supportability throughout a weapon systems life cycle
        - Access to USG databases (e.g. GIDEP) via DAPML while coping with aging aircraft/obsolescence issues. See Section 8.3.4.5-8.3.4.7 for obsolescence problem solving tools
        - Assistance to FMS customer country industry competing for USN reprocurement and in-theater repair contracts
        - Access to reprocurement drawing packages for selected parts and SE consistent with USG technology transfer restrictions

10.5.1.1.3 RELIANCE ON "ASSET DRAWDOWN"

Under NAVSUPs "Asset Drawdown" procedure[47], the FMS customer requisition is filled with a NRFI item and the NRFI item is then repaired under either an initial support or follow-on support ROR FMS case. The customer is then billed at carcass price (10% of the standard price) plus the cost of repair. This saves paying the supply system surcharge. The surcharge cost avoidance could either be reinvested in the program or be used to install upgrades during the repair process with the FST/OEM suggesting what would make the most effective investment.

10.5.1.1.4 AGING AIRCRAFT TRENDS AND ANALYSIS

NAVAIR has an ongoing program to evaluate reliability and maintainability trends, impacts on major O&S cost elements, and aging trends for various types of equipment. Using the results of the studies a conceptual model of aircraft aging is developed that separates aging into the following four distinct groups. Subject to technology transfer restrictions if applicable, FMS customers can gain access to these studies via their FMS technical and engineering case with NAVAIR:

- Trend analysis examples – by major aircraft type – of the types of aging occurring during each aging phase
- Impact on military labor, consumable materials, component repair costs and depot rework of airframes and engines
- Impact on major cost drivers among systems and subsystems (e.g. propulsion, dynamic components, flight controls, etc. Recommendations focus on investment opportunities to control future O&S cost.
- Cost growth expressed as a percentage increase by year over time is provided for budgeting purposes.

[47] NAVSUP-526 – Section 020416

FMS customers are entitled to receive USN studies that apply to their configuration. FMS customers can also fund specific studies through an FMS technical support case that use FMS customer-provided data. The FMS DAPML can provide additional information on this program.

10.5.1.2 LIFE-CYCLE PRODUCT SUPPORT

To complement PM-unique support options for OOI weapon systems, AIR-6.9, in collaboration with NAVICP is exploring several concepts for providing logistics and engineering support for OOI FMS weapon systems.

10.5.1.2.1 NAVY USE OF USAF-MANAGED PROS II CONTRACT

PROS II is a unique USAF contract vehicle designed and focused to support the USG's historical commitment to provide logistical help to our Foreign Allied Partners who purchased weapon systems from the DoD. PROS II and its predecessor contracts have been designed to provide supply, maintenance, and task orders for difficult to support FMS weapon systems, but is never intended to impact existing USG positions. PROS II can be used to satisfy a FMS customer's non-standard parts needs while dealing with regular DoD workload, satisfying old backorder requirements when the FMS customer needs the assets immediately, and when inventory managers and equipment managers cannot support programmed FMS requirements from military Service stock. The benefits of using PROS II are low fill fee rates with service from the contractor's procurement center; an extensive, high-value, long-term vendor base; competitive prices for parts and repairs; and fast responses to urgent requirements. Other benefits include streamlined processes using e-commerce interfaces; real-time customer access to status from the contractor's Web-based systems; and a new contractor EDI-based information system. Another benefit is that any other company can be reached as a subcontractor to satisfy FMS customer requirements. Technical services opportunities include low multiplication effect prices; no general and administration costs on task orders; streamlined management via a single task order manager; best value and top quality; and highly competitive labor rates. Technical services are provided in the following functional areas: engineering, logistics analysis/management, financial/cost management, production management, program management, computer technology, purchasing services, legal services, and training. FMS potential for task orders for studies/analyses and technical services are shown below:

10.5.1.2.2 Task Orders

- Studies and Analyses - fleet enterprise analyses, obsolete parts solutions, and decision support systems
- Engineering –DMSMS and engineering solutions for aging systems
- Logistics Analysis and Management – improve mission capable rates, reduce support costs
- Program Management – comprehensive, professional project management of major programs using modern computer tools
- Financial and Cost Management – independent cost estimates, cost-reduction process analysis, and contract financial management
- Production Management – production benchmarking and process improvements, quick reaction parts solutions
- Computer Technology – new and modernized FMS information systems; information technology analyses, development and implementation services

- Purchasing Services – specialized FMS commercial buying services
- Legal Services – modern litigation support, contract document warehousing and management
- Training – virtual schoolhouse for worldwide Internet-based training, in-country classroom training

10.5.1.2.3 U.S. ARMY SERVICES CONTRACT

The U.S. Army Communications – Electronics Command (CECOM) Rapid Response (R2) Program contract streamlines the process for government systems managers to quickly obtain the engineering and manufacturing support required to sustain older weapons platforms and communications, electronic warfare, and information systems. With R2, Department of Defense (DoD) and other Government communities can immediately establish support for Government platforms, systems, subsystems, and items. The R2 contract is also available to provide support to FMS customers via an FMS case. Tasks areas include the following:

- Research and Development
- Technology Insertion, Systems Integration, and Systems Engineering
- Installation
- Incidental Construction
- Hardware and Software Fabrication
- Test and Evaluation
- Certification
- Studies and Analysis
- Technical Data Management
- Logistics Support
- Training
- Acquisition Support
- Quality Assurance

10.5.1.2.4 PRODUCT SUPPORT CONTRACT (PSC)

AIR-6.9 has considered establishing its own product support contract which is depicted in Figure 10-3. This action will only be taken if reliance on existing contract vehicles discussed above do not provide responsive support to Navy FMS customers

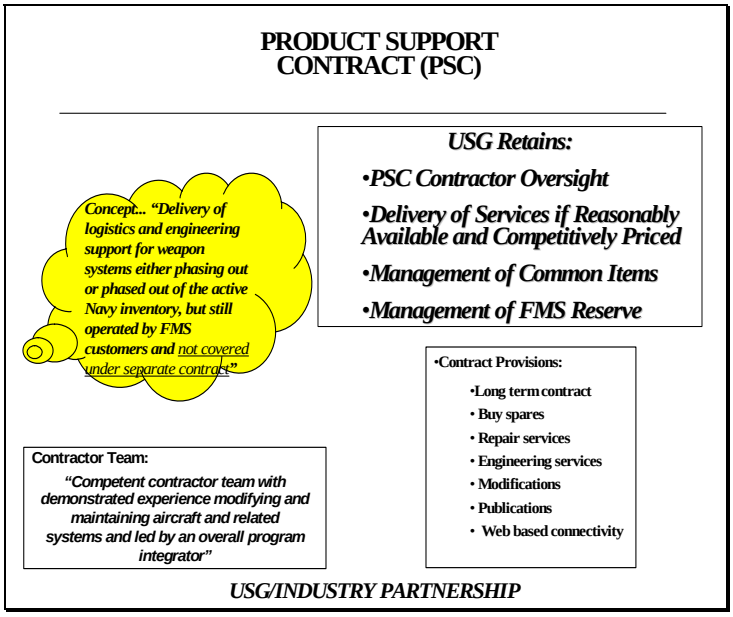


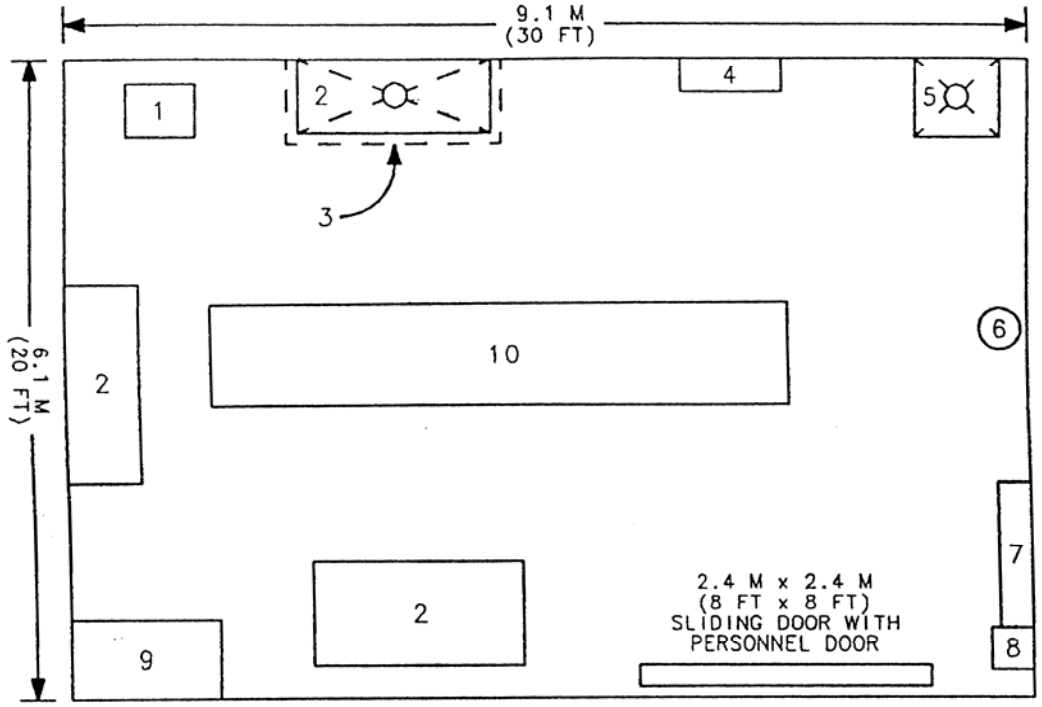
Figure 10-3 Product Support Contract Concept

ATTACHMENT A

FACILITIES PLANNING DATA FOR THE SITE SURVEY

Facility Name	Dimensional Requirement Meters (Feet)	Total Area Square Meters (Square Feet)	Remarks
Aircraft Parking Apron	14.33 x 14.33 (47ft-0 in. x 47ft- 0 in.)	205.2 meters^2 (2,209ft^2)	Each Aircraft, See Note (1)
Aircraft Washrack Pavement	25.9 x 25.9 (85ft-0 in. x 85ft- 0 in.)	671.1 meters^2 (7,224ft^2)	
Aircraft Compass Calibration Pad	11.9 x 40.8 (39ft-0 in. x 133ft- 8 in.)	485.3 meters^2 (5,224ft^2)	
Clear Area	4.42 x 40.8 (14ft-5 in. x 133ft- 8 in.)	180.3 meters^2 (1,904ft^2)	
Arming and Dearming Pad		7,023.2 meters^2 (75,5600ft^2)	
Aircraft Direct Fueling Area			Pumping Rate 1,608.61/min. Pressure 3.87 kg/cm^2
Aircraft Arresting Gear			E=28, Mk 7 or Equivalent
Blast Deflector Fence	3.66(12ft) Height		Length Determined by Local Requirements
Maintenance Hanger (Hanger Bay)	58.7 x 30.48 (192ft-8 in. x 100ft- 0 in.)	1,789.9 meters^2 (19,267ft^2)	Requirements for 5 Aircraft
O-Level Maintenance Shops	58.86 x 13.72 (193ft-1 in. x 45ft- 0 in.)	807 meters^2 (8,690ft^2)	Requirements for 10-12 Aircraft
O-Level Line Maintenance Administration	58.73 x 13.72 (193ft-1 in. x 45ft- 0 in.)	807 meters^2 (8,690ft^2)	Requirements for 10-12 Aircraft
O-Level Line Maintenance Shelter	3.66 x 6.10 (12 ft-0 in. x 20ft- 0 in.)	22.3 meters^2 (240ft^2)	
Power Check Pad Without Sound Suppression	29.87 x 38.10 (98 ft-0 in. x 125ft- 0 in.)	1,137.9 meters^2 (12,249ft^2)	Aircraft Engine Run Up
Aircraft Acoustical Enclosure	Irregular	780.4 meters^2 (8,400ft^2)	Required Only If Unsuppressed Power Check Runs Are Not Authorized I/D Level
Corrosion Control Hanger	41.33 x 37.49 (135ft-7 in. x 123ft- 0 in.)	1,542.6 meters^2 (16,605ft^2)	I or D Level
Structures	Irregular	192.5 meters^2 (2,072ft^2)	I-Level, See Note (2)
Fiberglass/Plastics/Composites	9.14 x 7.47 (30 ft-0 in. x 24ft- 6 in.)	68.7 meters^2 (740ft^2)	I-Level, See Note (2)
Cleaning	9.14 x 6.10 (30 ft-0 in. x 20ft- 0 in.)	55.7 meters^2 (600ft^2)	I-Level, See Note (2)

Machine	11.89 x 8.23 (39 ft-0 in. x 27ft- 0 in.)	99.5 meters^2 (1,071ft^2)	I-Level, See Note (2)



TYPICAL FIBERGLASS SHOP

INDEX NUMBER SUPPORT EQUIPMENT

1 REFRIGERATOR 115VAC, 60Hz, 1PH, 1.1 KVA
2 STANDARD WORKBENCH
3 HOOD, EXHAUST WITH EXHAUSET FAN (DUCT TO OUTSIDE) 115VAC, 60Hz, 1PH, 0.7KVA
4 CABINET, FLAMMABLE STORAGE
5 EYE WASH/DELUGE SHOWER WATER AND DRAIN REQUIRED
6 VACUM CLEANER, SHOP 115VAC, 60Hz, 1PH, 1.0 KVA
7 DESKS & CHAIR
8 FILE
9 SHELVING, STORAGE
10 WORKTABLE, SPECIAL (LOCAL MANUFACTURE), E-2C CPMPONENT, 5.1M (16.7 FT LONG

FACILITY REQUIREMENTS

1. A ROOM EXHAUST SYSTEM WITH MAKEUP AIR IS REQUIRED TO REMOVE TOXIC FUMES.
2. SINGLE-PHASE, 120V, 20 AMP, 60 Hz CONVENIENCE OUTLETS REQUIRED.
3. LOW PRESSURE COMPRESED AIR AT 862KPA (125PSI) FOR PROTABLE POWER TOOLS.
4. A SLIDING DOOR, 2.4M X 2.4 M (8FT X 8FT), WITH A 0.76M (2.5 FT) PERSONNEL PASSAGE DOOR SHOULD BE PROVIDED AT THE SHOP ENTRANCE TO ACCOMMODAT THOSE LARFE ITEMS PROCESSED IN THIS SHOP.

LIST OF ACRONYMS

2M	Miniature/Microminiature
AD	Air Worthiness Directive
AEPS	Aircrew Escape Propulsion System
AIS	Aviation Investment Strategy
ALSP	Acquisition Logistics Support Plan
AMARC	Aerospace Maintenance and Regeneration Center
AMC	Acquisition Method Code
AMSERL	ASSET Master Support Equipment Requirement List
AMSC	Acquisition Method Suffix Code
Ao	Operational Availability
APM,SE	Assistant Program Manager, Systems Engineering
APMTS	Assistant Program Manager for Training and Training Systems
ARROWS	Aviation Retail Requirements Oriented to Weapon Replaceable Assemblies
ASPA	Aircraft Service Period Adjustment
ASSET	Advance System for SE Tracking
ATE	Automatic Test Equipment
BDE	Basic Design Engineering
BIT	Built-in-Test
BITE	Built-in-Test-Equipment
CA	Criticality Analysis
CAD	Cartridge Actuated Device
CAI	Critical Application Item
CBS	Commercial Buying Service
CCB	Change Control Board
CDRL	Contract Data Requirements List
CETS	Contractor Engineering Technical Services
CFE	Contractor Furnished Equipment
CFSG	Contracting for Supportability Guide
CFT	Contractor Field Team
CI	Configuration Item
CINC	Commander in Chief
CLS	Contractor Logistics Support

CLSSA	Cooperative Logistics Supply Support Arrangement
CM	Corrective Maintenance
CM	Configuration Management
CNO	Chief of Navy Operations
COMPASS	Computerized Provisioning, Allowance and Supply System
COTS	Commercial-Off-the-Shelf
CRR	Cost Recovery Rate
CSE	Common Support Equipment
CSP	Contractor Support Plan
CST	Contractor Support Team
CSI	Critical Safety Item
CWT	Customer Wait Time
DAASC	Defense Automated Addressing System
DAPML	Deputy Assistant Program Manager for Logistics
DAPS	Defense Automated Printing Service
DCN	Design Change Notice
DCS	Direct Commercial Sales
DFARS	Defense Federal Acquisition Regulation Supplement
DFAS	Defense Finance and Accounting Service
DISAM	Defense Institute of Security Assistance Management
DLA	Defense Logistics Agency
D-Level	Depot Maintenance
DLIS	Defense Logistics Information System
DMS	Diminishing Manufacturing Sources
DMSMS	Diminishing Manufacturing Sources and Material Shortages
DMEA	Defense MicroElectronics Activity
DoD	Department of Defense
DODAAC	Department of Defense Activity Address Code
DoS	Department of State
DRMO	Defense Reutilization Marketing Office
DRMS	Defense Reutilization and Marketing System
DRP	Direct Requisitioning Procedure
DSBM	Decision Support and Budgeting Model
DSC	Defense Supply Center
DSCA	Defense Security Cooperation Agency
DVD	Direct Vendor Delivery
E&MD	Engineering and Manufacturing Development
ECIS	Expanded Contractor Initial Support
ECM	Electronic Countermeasures
ECP	Engineering Change Proposal
EDA	Excess Defense Articles
ESA	Engineering Support Activity
F3	Form, Fit, and Function

FAD	Force Activity Designator
FAST-LINE	FMS Acquisition Services Team Line
FCA	Field Calibration Activity
FIST	FMS Initial Support Tracker
FMC	Fully Mission Capable
FMECA	Failure Mode, Effects, and Criticality Analysis
FMS	Foreign Military Sales
FMSO	Foreign Military Sales Order
FRI	Functional Requirements Identification
FSCAP	Flight Safety Critical Aircraft Part
FST	Fleet Support Team
GEM	Generalized Emulation of Microcircuits
GFE	Government Furnished Equipment
GIDEP	Government-Industry Data Exchange Program
GPETE	General Purpose Test Equipment
GRF	Gross Removal Factor
GRL	Gross Requirements List
HSC	Hardware Systems Command
I	Intermediate Level
ICP	Instrument Calibration Procedure
ICPM	Integrated Country Program Manager
ILCO	International Logistics Control Office
I-Level	Intermediate Level of Maintenance
ILS	Integrated Logistics Support
ILSAM	Integrated Logistics Support Acquisition Manual
ILSDS	Integrated Logistics Support Detail Specification
IM	Item Manager
IMC	Integrated Maintenance Concept
IMTWP	Integrated Maintenance Transition Work Package
IPT	Integrated Product Team
ISE	In-Service Engineering
ISI	Integrated Support Plan
ITV	Intransit Visibility
IWST	Integrated Weapon System Team
JATDI	Joint Aviation Technical Data Integration
JCS	Joint Chiefs of Staff
JEDMICS	Joint Engineering Data Management Information and Control System
LCC	Life Cycle Cost
LCPD	Logistics Conference and Program Definition
LECP	Logistics Engineering Change Proposal
LEM	Logistics Element Manager
LIPS	Logistics Information Processing System
LMDSS	Logistics Management Decision Support System

LOA	Letter of Offer and Acceptance
LOGRUN	Logistics Remote Users Network
LOI	Letter of Intent
LORA	Level of Repair Analysis
LPIT	Logistics Process Improvement Team
LRT	Logistics Response Time
M	Maintainability
MAM	Maintenance Assist Module
MC	Mission Capable
MDCS	Maintenance Data Collection System
MFA	Maintenance Functional Analysis
MGFEL	Master Government Furnished Equipment List
MIF	Master Item File
MILDEP	Military Department
MIR	Master Index of Repairables
MIS/IDE	Management Information System/Integrated Data Management
MLDT	Mean Value of Logistics Delay Time
MMH/FH	Maintenance Man-Hour Per/Flight Hour
MP	Maintenance Plan
MRF	Maintenance Replacement Factor
MRQ	Maximum Release Quantities
MSC	Maintenance Significant Consumable
MT&R	Module Test & Repair
MTBD	Mean Time Between Demand
MTBF	Mean Time Between Failure
MTBMA	Mean Time Between Maintenance Action
MTBR	Mean Time Between Removal
MTT	Mobile Training Team
MTTR	Mean Time to Repair
NAD	Naval Air Depot
NAD	Naval Air Depot
NALDA	Naval Aviation Logistics Data Analysis
NAMP	Naval Aviation Maintenance Program
NAMSA	NATO Maintenance and Supply Agency
NAMSO	NATO Maintenance and Supply Organization
NAST	Naval Aviation Systems Team
NATEC	Naval Air Technical Data and Engineering Data Command
NATOPS	Naval Air Training and Operating Procedures Standardization
NAVAIR	Naval Air Systems Command
NAVICP	Naval Inventory Control Point
NAVSUP	Naval Supply Systems Command
NAVY IPO	Navy International Programs Office
NAWCAD	Naval Air Warfare Center, Aircraft Division

NAWCWD	Naval Air Warfare Center Weapons Division
NCL	Navy Calibration Laboratory
NDPC	National Disclosure Policy Committee
NHA	Next Higher Assembly
NIIN	National Item Identification Number
NIST	National Institute of Standards and Technology
NRFI	Not Ready for Issue
NSN	National Stock Number
NUWC	Naval Undersea Warfare Center
NWCF	Navy Working Capital Fund
O	Organizational Level
O&S	Operation and Support
O&ST	Order and Ship Time
OCS	Omnibus Contractor for Services
OEM	Original Equipment Manufacturer
O-Level	Organizational Level of Maintenance
OOI	Out-of-Inventory
OOP	Out of Production
OPNAVINST	Chief of Naval Operations Instruction
OPT	Obsolescence Prediction Tools
OSIP	Operational Safety and Improvement Program
P&A	Price and Availability
P&SP	Program and Support Plan
PAD	Propellant Actuated Device
PALT	Procurement Administrative Lead Time
PBH	Power-by-the-Hour
PBL	Performance Based Logistics
PD&RR	Program Definition and Risk Reduction
PF/D&OS	Production, Fielding/Deployment & Operational Support
PKI	Public Key Infrastructure
PM	Program Manager
PM	Preventative Maintenance
PM	Program Manager, AIR
PMD	Program Management Database
PMIC	Periodic Maintenance Information Card
PMR	Program Management Review
PMS	Planned Maintenance System
POL	Petroleum, Oil, and Lubricants
PPS	Post Production Support
PPSP	Post Production Support Planning
PROS	Parts and Repair Ordering System
PS	Product Support
PSC	Product Support Contract

PSE	Peculiar Support Equipment
PSM	Product Support Manual
PSMP	Product Support Management Plan
PSTL	Product Support Team Leader
PTD	Provisioning Technical Documentation
QDR	Quality Deficiency Reporting
R	Reliability
R&D	Research and Development
R&M	Reliability and Maintainability
RAC	Records of Action
RAC	Record of Action
RAMEC	Rapid Action Minor Engineering Change
RBS	Readiness Based Sparing
RCM	Reliability Centered Maintenance
RCT	Repair Cycle Time
RCT	Repair Cycle Time
RFI	Ready For Issue
RIRO	Repairable Item Replacement Option
ROI	Return on Investment
ROR	Repair of Repairables
RPF	Rotable Pool Factor
RTAT	Repair Turnaround Time
S	Supportability
S&RP	Spare and Repair Parts
SA	Security Assistance
SAIP	Spares Acquisition In-Production
SAMM	Security Assistance Management Manual
SAMMS	Standard Automated Material Management System
SAO	Security Assistance Organization
SDLM	Standard Depot Level Maintenance
SDR	Supply Discrepancy Report
SE	Support Equipment
SECDEF	Secretary of Defense
SERD	Support Equipment Recommendation Data
SIMA	Specialized Intermediate Maintenance Activity
SIPS	Supply Information Processing System
SL/E	Sustaining Logistics and Engineering
SM&R	Source, Maintenance, and Recoverability
SOM	Sponsor Owned Inventory
SOW	Statement of Work
SPR	Special Programming Requirement
SRA	Shop Replaceable Assembly
ST/STE	Special Tooling/Special Test Equipment

SVI	Single Vendor Integrity
T	Time
TAT	Turnaround Time
TAT	Technical Assistance Team
TBI	Test Bench Install
TCG	Technical Coordination Group
TECHREP	Technical Representative
TIOL	Tailored Initial Outfitting List
TLCSM	Total Life Cycle System Manager
TMMP	Technical Manual Management Program
TOC	Total Ownership Cost
TOC	Total Ownership Cost
TPA	Total Package Approach
TPS	Test Program Set
TRIL	Tailored Repairables Items List
TTEP	Training and Training Equipment Plan
UMMIPS	Uniform Material Movement and Issue Priority System
UND	Urgency of Need Designator
USG	United States Government
USMC	United States Marine Corp
USN	U.S. Navy
VAMOSC	Visibility and Management of Operating and Support Costs
VHDL	Very High Speed Integrated Circuit Hardware Description Language
WRA	Weapon Replaceable Assembly
WSLO	Weapon System Liaison Office
WSP	Weapon System Partnership
WUC	Work Unit Code
WWRS	Worldwide Warehouse Redistribution Service
WWW	Worldwide Web