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MBA PROFESSIONAL REPORT

Logistics and Maintenance Options to Support the P-8A Poseidon's Expeditionary Mission

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June 2010

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LOGISTICS AND MAINTENANCE OPTIONS TO SUPPORT THE P-8A POSEIDON'S EXPEDITIONARY MISSION

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Submitted in partial fulfillment of the requirements for the degree of

MASTER OF BUSINESS ADMINISTRATION

from the

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LOGISTICS AND MAINTENANCE OPTIONS TO SUPPORT THE P-8A POSEIDON'S EXPEDITIONARY MISSION

ABSTRACT

The purpose of this research is to identify the maintenance and logistics support structure needed to support the P-8A's Anti-submarine Warfare (ASW), Anti-surface Warfare (ASUW), and Intelligence, Surveillance, and Reconnaissance (ISR) missions, while operating away from Permanent Deployment Sites (PDS) in austere operating areas, and to provide a set of possible support recommendations for these missions. This study will focus on the existing maintenance and logistics support structures currently being utilized for missions being performed by the P-3 Orion, and to propose organizational and operational recommendations to better support the agile, flexible, and responsive missions requirement of the P-8A. The result will provide feasible alternatives for decision makers regarding organizational design as well as logistics and maintenance requirements to support overseas deployments to remote, forward operating locations (FOL).

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LIST OF ACRONYMS AND ABBREVIATIONS

AIMD	Aviation Intermediate Maintenance Department
ALSS	Aviation Life Support System
AoA	Analysis of Alternatives
AOR	Area of Responsibility
ASUW	Anti Surface Warfare
ASW	Anti Submarine Warfare
BAMS	Broad Area Maritime Surveillance
C4I	Command, Control, Computing, Communication, and Intelligence
CPRF	Commander Patrol and Reconnaissance Force
CNAF	Commander Naval Air Forces
CNO	Chief Of Naval Operations
CONOPS	Concept Of Operations
CONUS	Continental United States
COP	Critical Obsolescence Program
CTF	Combined Task Force
DLA	Defense Logistics Agency
DoD	Department of Defense
DUPMP	Dual Use Parts Management Program
FAA	Federal Aviation Administration
FISC	Fleet & Industrial Supply Center
FOB	Forward Operating Base
FOL	Forward Operating Locations
FRC	Fleet Readiness Centers

GSE	Ground Support Equipment
HOA	Horn Of Africa
ICD	Initial Capabilities Document
IFR	In Flight Refueling
ISR	Intelligence Surveillance and Reconnaissance
JOA	Joint Operating Area
JOPES	Joint Operational Planning and Execution System
LS	Logistics Specialist
MAG	Marine Air Group
MALS	Marine Aviation Logistics Squadron
MCAS	Marine Corps Air Station
MIW	Mine Warfare
MMA	Multi Mission Aircraft
MOB	Main Operating Bases
MPF	Maritime Preposition Force
MPRF	Maritime Patrol and Reconnaissance Force
MTOC	Mobile Tactical Operational Center
NADEP	Naval Aviation Depot
NAMP	Naval Aviation Maintenance Program
NMS	National Military Strategy
NAS	Naval Air Station
NAVAIR	Naval Aviation Systems Command
NSA	Naval Support Activity
OCONUS	Outside Continental United States
OEF	Operation Enduring Freedom

OIF	Operation Iraqi Freedom
OPCON	Operational Control
PDS	Primary Deployment Sites
PUK	Pack Up Kit
RFI	Ready For Issue
SLAP	Service Life Assessment Program
STONS	Short Tons
TPFDD	Timed Phase Force and Deployment Data
TYCOM	Type Commander
UAS	Unmanned Aircraft System
USJFC	United States Joint Forces Command
USTRANSCOM	United States Transportation Command
VP	Fixed Wing Patrol Squadron

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I. INTRODUCTION

> *Expeditionary Warfare requires its practitioner to devote as much time towards preparation for supporting forces logistically as it does to getting them to the theater of operations and using them once they get there.*
>
> (Bradford, 2006, p. 5)

The Maritime Patrol and Reconnaissance Force (MPRF) is the United States' premier Anti-submarine Warfare (ASW), Anti-surface Warfare (ASUW), and maritime and littoral armed Intelligence, Surveillance and Reconnaissance (ISR) asset utilized in providing responsive and worldwide forward presence, deterrence, maritime security, sea control, power projection, and humanitarian assistance/disaster relief (WBB Consulting 2007, p. i). Its mission is to provide "first on-scene" mission coverage against ever-changing, worldwide maritime and littoral threats (WBB Consulting, 2007, p. i).

The current platform of the MPRF (and the longest sustained naval aviation program currently in the fleet) is the land-based maritime patrol aircraft, the P-3C Orion. The Orion has been the Navy's primary maritime patrol aircraft since the early 1960s and was built on a "fixed" force structure and positioning that was primarily designed to guard against threats of the Soviet Union during the "Cold War" (WBB Consulting, 2007). In 2008, the MPRF community recognized the need to transition away from fixed basing and a rigid logistics and support system and toward a force capable of meeting the ever-evolving threats and the challenges of the 21st century. In order to make these changes, it requires having immediate and sustained access to any region of the world (Naval Air Systems Command, 2009). This meant having the ability to operate away from fixed basing structure, and operate at forward operating locations (FOL) without significant external support, creating a flexible, scalable, responsive, and expeditionary force capable of reacting to threats worldwide (WBB Consulting, 2007).

This new concept of deployment would require a robust, sustainable platform other than the aging P-3C, which had already gone through several service-life extensions from its initial 7,500 to 20,000 flight hours. The weapon system chosen to meet the Navy's needs in ASW, ASUW and ISR missions is the Boeing P-8A Poseidon Multi-

mission Maritime Aircraft (MMA), a design utilizing a 737-800 fuselage with 737-900 wings (Naval Air Systems Command, 2009).

Given the introduction of an aircraft that fundamentally differs in design from its predecessor (switching from turboprop to turbofan), and the new concept of operations that depends upon an entirely different sustainment concept, the MPRF faces new challenges that can potentially affect the sustainability of its missions. This new expeditionary deployment concept presents a logistics challenge because the concept of operations and deployment for the new P-8A relies very little upon historical fixed deployment sites with an already established support infrastructure (former P-3C fixed FOLs), but instead on strategic international airfields closest to the maritime and littoral threat, and in possibly austere environments. The current maintenance concept for the P-3C is based upon a hub-and-spoke model with X-level maintenance at the hub and Y-level maintenance at the spoke; this model has been both effective and efficient with respect to generating fully mission capable operational sorties (Figure 1).

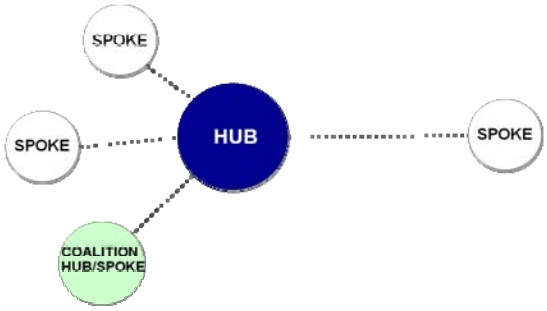

Figure 1. Hub-Spoke Operational Concept

The P-8A will instead require the movement of maintenance and operations support assets—to include equipment and personnel—to the Forward Operating Location (FOL) to sustain the aircraft and crew for an extended period. This new requirement to transport personnel, ground support equipment, maintenance tools, spare parts, habitability, weapons, and fuel presents a significant challenge to the P-8A community as MPRF does not have dedicated airlift assets and must rely on the shared transportation resources and established regulations of both Commanders of the U.S. Joint Forces Command (USJFC) and the U.S. Transportation Command (USTRANSCOM).

II. BACKGROUND

A. HISTORY OF OVERSEAS EXPEDITIONARY SUPPORT

In May of 1898, the United States sent troops across the Pacific Ocean for the first time to fight against Spain in the Philippines in what was to become the Spanish-American War. The 1898 deployment of troops to Manila Bay marked the inauguration of a new type of warfare in the U.S. military: expeditionary warfare (Bradford, 2006). The acquisition of the Philippines brought the United States its first commitment to defend a territory outside the western hemisphere, requiring changes in the roles of the Army and Navy to meet the requirements of maintaining territories that spread across the Pacific Ocean. The difficulty of sustaining transoceanic military operations outside North America became a military concern for both services.

Expeditionary warfare involves overseas operations and must include a naval segment in any operation; however, throughout its history, the Navy has been slow to embrace any change that shifts focus away from a Mahanian fleet-on-fleet engagement. Navy strategic planning in the early 20th century focused on winning surface battles and, to a lesser degree, conducting amphibious warfare. Not until the 1920s did the Navy and Marine Corps work together to establish expeditionary forces specifically for future amphibious operations. The Marine Corps focused on amphibious warfare and developed doctrine that separated Landing Operations from long-term expeditionary warfare and did not address any long-term logistical support for Marines once ashore (Bradford, 2006). These early experiences in expeditionary warfare would be the foundation upon which the Navy would rely when developing aircraft and their accompanying concepts of operation to project power, surveil the battlespace, and attack both surface and undersea vessels.

B. MARITIME PATROL AND RECONNAISSANCE FORCE (MPRF)

The mission of Maritime Reconnaissance and Patrol Force (MPRF) originated with coastal reconnaissance patrols during World War II, developing into open-ocean

missions to seek out German and Japanese submarines. Following World War II, the MPRF's mission evolved to adapt to the new challenges of the "Cold War" era, and the threats of the Soviet Union's submarines and surface ships (Osborne & Prindle, 2003, p. 276). Since then, the mission for MPRF has expanded beyond ASW and ASUW.

MPRF has become one of the United States' most valuable national assets in countering maritime threats. However, as MPRF leaders transition MPRF from its existing "Cold War" structure to one that can better respond to 21st century maritime threats anywhere around the world, they have developed five key characteristics to transform the organization: (1) Agile—eliminate the dependence on fixed deployment locations and rigid logistics and support systems; (2) Flexible—create an Expeditionary Concept of Operations (CONOPS) with global Command and Control (C2) allowing operational effectiveness anywhere in the world; (3) Scalable—create deployment packages, outfitted and sized for each specific mission; (4) Responsive—capability to deploy forces on short notice; and (5) Supported—expeditionary capability through expeditionary maintenance (WBB Consulting, 2007, pp. 1–2).

Currently, MPRF leaders conduct operations using the P-3 and the EP-3. MPRF's transition to its expeditionary force concept will require the transition to three different platforms: the P-8A Poseidon, the Broad Area Maritime Surveillance (BAMS) Unmanned Aircraft System (UAS), and the Mobile Tactical Operations Centers (MTOC) acting as the centerpiece of the MPRF mission in providing continuous C2 and Command, Control, Computing, Communication, and Intelligence (C4I) (WBB Consulting, 2007, pp. 3–4).

The MPRF will assume the following as primary missions:

- ASW,
- ASUW,
- Intelligence, Surveillance, & Reconnaissance (ISR),
- C3,
- Command and Control Warfare (C2W),
- Mobility,
- and Mine Warfare (MIW).

Secondary mission areas are elements of:

- Strike Warfare (STW),
- Missions of State (MOS),
- Non-Combatant Operations (NCO),
- Fleet Support Operations (FSO),
- Anti-Air Warfare (AAW),
- Amphibious Warfare (AMW),
- and Homeland Defense (HLD).

In addition to those missions identified above, the MPRF has adopted other missions to include maritime interdictions, counterdrug activities, maritime shipping protection, and overland strike mission support (WBB Consulting, 2007).

C. NAVAL AVIATION MAINTENANCE PROGRAM

The Chief of Naval Operations (CNO) established the NAMP to set standards and guidelines for the three levels of maintenance in naval aviation. As time progressed and systems became more complex, the NAMP changed to capture concepts utilized in the civilian industry. This established metrics in cost savings. The latest version of the NAMP incorporates new policies for FRCs. The objective of the NAMP is to improve aviation material readiness and safety standards within the Navy and the Marine Corps (Naval Air Systems Command, 2009).

1. Levels of Maintenance

The NAMP is based on three levels of maintenance: Organizational, Intermediate and Depot. The Navy established these levels to facilitate better management of personnel, material and funds. The result was maximum availability of aircraft to the fleet. The NAMP provides standard operating procedures for establishing and maintaining each level of the organization.

a. Organizational-Level Maintenance

Organizational-level maintenance activity is the lowest level of maintenance in which mechanics perform the day-to-day scheduled and unscheduled

maintenance on the aircraft. Scheduled maintenance is performed on two schedules: calendar and hourly. Hourly inspections are based on how many hours the aircraft has flown or the total amount of engine hours operated. They are conducted within a time interval of ± 10% of the scheduled inspection (e.g., a 100-hour inspection can be completed at between 90 and 110 hours). Calendar inspections are based on days and weeks. They are performed within ± 3 days from the scheduled date. For example, an 84-day inspection can be performed on any day between day 81 and day 87 (Naval Air Systems Command, 2009).

b. Intermediate-Level Maintenance

Intermediate-level Maintenance activity is the second level of maintenance defined within the NAMP. It is performed at IMAs or AIMDs and is supported by the FRCs. The Navy recently established a structure in which IMAs and AIMDs, which used to be stand-alone activities, now fall under the control of the FRCs. The FRC brings a concept of combining highly skilled and knowledgeable depot artisans with Navy Sailors, enabling minimal depot-level repairs to be performed at the local IMAs and AIMDs. The Navy implemented this measure in an effort to reduce costs and increase availability of Ready-for-Issue (RFI) components.

c. Depot-Level Maintenance

Depot-level Maintenance activity is the Navy's most in-depth maintenance facility and falls under the FRCs. Within the depot facilities lie the Navy's artisans. They bring years of aviation maintenance experience that ensures operational efficiency and integrity of systems. Their abilities include manufacturing parts, modifying, testing, inspecting, sampling and reclamation. The FRC sites also provide engineering assistance to the Organizational and Intermediate maintenance levels to determine disposition of discrepancies beyond their maintenance capabilities.

D. AVIATION LOGISTICS AND MAINTENANCE AT FORWARD OPERATING BASES

The P-8A deployment model differs significantly from that used by the P-3, as is its maintenance and logistics support while operating from forward locations. The level of maintenance approved for the P-8A aircraft is primarily a two-level concept (2LM), from organizational to the depot level (O-D); O-level being remove and replace (with limited troubleshooting), and D-level referring to complete depot-level repair/overhaul (DON, 2008). This concept limits the amount of maintenance to be performed when forward deployed to remote and possibly austere locations (WBB Consulting, 2007, p. 18). Although mostly O-D, the P-8A still has some systems on the aircraft that remain as intermediate (I-level) functions, specifically Aviation Life Support Systems (ALSS), Ordnance, and Battery Maintenance. With the P-3 infrastructure currently in place, I-level organizations such as Aviation Intermediate Maintenance Departments (AIMD) or Fleet Readiness Centers (FRC) already exist in CONUS, Hawaii, and in the 5th, 6th, and 7th Fleet areas of operations (AOR). The Naval Aviation Depot (NADEP) for the P-3 is located at NAS Jacksonville, FL. With the P-8A, additional parts support may come from commercial means as the Navy negotiates the Federal Aviation Administration (FAA) Dual Use Parts Management Program (DUPMP) in which the Navy shares common parts with the commercial fleet of Boeing 737s worldwide (Willett, 2009, p. 8).

Maintenance and logistics support at FOLs will vary depending on the length of the contingency operation at that location, with Logistics support to the forward bases accomplished by means of airlift or sealift (WBB Consulting, 2007).

Resupply points of origin will be from DoD/DLA storage facilities located in Guam, Bahrain, or Spain (WBB Consulting, 2007). All inter-theater airlifts will be provided by U.S. Air Force C-5 or C-17, and all intra-theater airlifts will be transported by means of C-17, C-40, or C-130.

Required aviation ground support equipment (GSE) will be airlifted to Cat-0 through Cat-2 FOL airfields, and categorized in three types of kits: (1) Fly-away Kit—equipment that travels with the aircraft; (2) Pack-up Kit—equipment that travels with the maintenance support team; and (3) Follow-on Support Kit—additional equipment needed to support extended operations (WBB Consulting, 2007). The airlift of spares and general supplies to support the forward-deployed detachments depends on a number of factors, specifically the size and duration of the detachment, and the operating environment, system usage, and availability in the open market. Fuel for both aircraft and GSE will be transported to the FOL either by airlift or sealift, depending on the fuel type (see Table 1). Mission and Life Support Equipment will be required at all FOLs, and will be transported to site by means of airlift.

Table 1. Lift Requirements for Sustainment

Equipment Category	Mode	Short Tons (Per 7 Day Supply)	Distance *(Average-1SD)*	Distance *(Average+1SD)*	# Re-Supply Missions
Consumables	Airlift	87	686	6091	1
Expendables	Airlift	4478	686	6091	40
AV Fuel	Sealift	3544	686	6091	1
Fuel	Airlift	205	686	6091	1
Spare and General Supplies	Airlift	23	686	6091	1

III. LITERATURE REVIEW

A. OVERSEAS COMBAT SUPPORT BASING

Based on recent denial of U.S. military access by several countries, the Air Force took an in-depth look at Air Force forward-positioned bases to determine where combat support assets should be forward positioned (Lang, 2009). The study also identified locations for the Air Force to place combat support basing material that will cover a broad range of potential missions and maintaining the flexibility to shift assets to other locations while supporting the mission. The Air Force took an approach of looking at the problem from a global combat support network that is reliable against node disruptions and robust against problems or uncertainties. There are two questions asked regarding overseas basing: "How capable are the Air Force's current overseas combat support bases of managing the future environment?" and "What are the costs and benefits of using additional or alternative overseas combat support bases for storing combat support materiel?"

When planning for the likely location for future deployments, decision makers may know the exact location, or they may make changes to the site prior to deployment as political situation dictates (Lang, 2009, p. 14). Locations where items are ultimately needed are called *demand nodes*. A different type of node in the logistics network is a *supply node*, where items demanded are stored until they are requisitioned and then transported to the end-user. Determine node location based on several factors, including how close the node should be located to possible points of demand. If demand is not equally dispersed across points, then the nodes should be placed closer to points with higher demand (Lang, 2009). Decision makers must also identify risks as they determine the location of supply nodes; risks associated with node location could include such things as force protection, severe weather, and availability of local resources (labor, fuel, utilities).

Transportation between supply nodes and demand nodes is a basic requirement unless they are collocated and the transfer of items does not require additional resources. Leaders determine which transportation type will be used for shipment depending on special shipping requirements, and what local transportation infrastructure is available. Typical transportation networks will require vehicles to transport between supply nodes and demand nodes; however, aircraft and helicopters are widely used to transport items from supply nodes. Time is often a factor for nodes when transportation is required; time becomes the critical factor for supporting a demand node's high-priority requisition. Transportation specialists, item managers, and suppliers all consider tracking time to be a critical measurement as an item makes its way through the warehouse and transportation network and finally between nodes. Time is tracked by many stakeholders as a crucial metric that measures effectiveness or responsiveness of the entire supply chain. Supply chains that include an international segment must transverse multiple modes of transportation through several military tollgates as well as customs. International nodes have many more obstacles to overcome compared to the vanilla hub-and-node system in CONUS.

The researchers sought to develop an analytic tool to assist policy-makers to identify and locate a reliable set of facility locations for the Air Force to position combat support basing and the materiel that allows for potential disruptions in the nodes and support network. Researchers offer recommendations, including preparing for multiple nodes failures simultaneously, expanding potential nodes and networks in South American locations, and cautioning against multiple facilities loss along with transportation failure. Based on our analysis, we recommend that:

- Using global approach to select combat support basing locations is more effective and efficient than allocating resources on a regional basis.
- Political and other concerns need to be addressed in any decision about potential overseas basing locations.
- Closer attention should be paid to Africa and South America both as a source of instability and as a possible location for combat support bases.

B. CHINESE ANTI-ACCESS STRATEGY AND EXPEDITIONARY BASING

China's overall anti-access strategy for dealing with the U.S. military includes attacks against its logistics system. By attacking United States forces in this manner, China would render existing forces in the region less effective or more vulnerable because of a lack of timely supplies of material needed for warfighting. Chinese military planners note that the high technology requires more support than less-advanced or analog systems, which are not as resource dependent. United States forces are heavily dependent and are supported by complex logistics systems; they require large "iron mountain" or support equipment to sustain operations. The U.S. military has a critical vulnerability if an enemy strikes at the logistics system and can disrupt the logistical and transportation networks. Military forces rely on oil, supplies, ammunition and other items, along with installations and bases, that are included in the United States' "long supply lines and large [support] structure" (Cliff, 2007). These are all soft targets, the destruction of which would be crippling (Cliff, Burles, Chase, Eaton & Pollpeter, 2007, p. 61). Critical to the Chinese anti-access strategy is disruption of the enemy's campaign depth or rear area railway and highway hubs, ports, bridges, and other transport systems and logistic supply networks (Cliff et al., 2007, p. 61). According to PLA authors, the logistics infrastructure is especially vulnerable to missile strikes, air attack, and sabotage; this includes fuel storage bases, supply depots, and warehouse facilities (Cliff et al., 2007).

C. SELECTION OF STRATEGIC AIR BASES

Wohlstetter, Hoffman, Lutz, and Rowen conducted a study in 1954 analyzing the critical factors in strategic base selection for the Air Force's strategic bombing force. They discovered some interesting finds, based on Soviets threats to U.S. bases forward-deployed overseas, that current decision makers could reassess in light of existing threats from Theater Ballistic Missiles (TBM). Wohlstetter et al. found that overseas operating base systems are too vulnerable, and that air refueling and ground refueling are much less vulnerable to enemy attack than systems that rely on overseas operating bases. Although they based their study on supporting B-47 aircraft, their findings will translate well into

21st century warfare because the concepts focus on basic aircraft support at overseas bases. The advantages and disadvantages of locations will drive base selection by focusing on items such as proximity to targets, vulnerability to enemy attacks, logistics and the local economy all have great effects on the overall system cost and effectiveness of each of these locations.

Wohlstetter et al. also identified that the supply distance on maintaining a wing of bombers in the United States must be increased by over 50 percent to cover the additional cost of operation from primary bases overseas (Wohlstetter, Hoffman, Lutz & Rowen, 1954). They also found that costs do not increase substantially with supply distances in peacetime. Costs that are already high for overseas support are only moderately affected by increasing distance—even when the distances increase by up to 10,000 surface miles. There are extra costs involved in additional capability in an overseas base to meet bomber requirements (such as additional operating facilities, airlift, stocks, etc.). Wohlstetter et al found that adding an additional refueling facility is much more cost-effective than adding complete operating facilities, even with vulnerability considerations.

D. USMC AVIATION LOGISTICS AND DEVELOPMENT OF FLY-AWAY KITS

In April 1999, OPERATION NOBLE ANVIL presented Marine Corps aviation logistics planners with challenges that they had not encountered in the past. Although they are accustomed to worldwide deployments in support of various operations and contingencies, Marine Air Group Thirty-One (MAG 31) and its Marine Aviation Logistics Squadron (MALS 31) received short notice orders to deploy in an “as is” state, with 24 of its 36 assigned F/A-18D aircraft. They were asked to deploy with the smallest possible footprint and to be self-sustained in support of OPERATION ALLIED FORCE against the former Republic of Yugoslavia, a location in which a deployment site from which to operate was not yet determined (Wade, 2002, p. 43). MALS (an entity of the MAG that provides aviation intermediate “I-level” maintenance and logistics support to its assigned air wing or MAG) is structured to be mobile under the Marine Aviation Logistics Support Program (MALSP) (pp. 9–10). A MALS consists of a variety of support packages, broken down like building blocks, which can be mobilized in different

configurations depending on mission requirements to support an air wing deployment. However, mobilizing all support packages requires large-scale transportation coordination and planning, as some items are flown in, and others prepositioned or sealifted via the Maritime Preposition Force (MPF) and Aviation Logistics Ships (T-AVB). The MAG required a small footprint, without the support of the MPF and T-AVB. MALS 31 aviation logistics planners faced two challenges: (1) not all aircraft were deploying (so some support needed to be maintained at the MOB); and (2) the MALSP contingency package was too large of a footprint to transport all parts, mobile facilities, support equipment, and personnel in theater, in such a short period of time (pp. 21–22).

Planning for a short-notice deployment to an unknown location and having unknown resources and support channels can be difficult. Therefore, MALS 31 developed different levels of required support packages of maintenance and supply capabilities based on their criticality to the mission (based on historical data), and these support packages would then be tailored down as more information became available. Additionally, a Surveillance, Liaison, and Reconnaissance Part (SLRP) was sent out to provide area intelligence, and to perform a site survey of possible deployment sites, existing capabilities in the area, and potential issues the MALS and air wing may face. Once decision makers choose a deployment site and determine requirements, the military must transport the identified support packages in stages so that they do not interrupt or hinder any maintenance support required to safely fly all 24 F/A-18D to their future base of operations (e.g., I-level support capabilities that were required to support the squadrons in transit and upon arrival accompanied the fly-in echelon (FIE) (Wade, 2002, pp. 30–31).

Military leaders must organize the maintenance and logistics support packages by importance to the mission, and then tailor the packages down once requirements are known as a way to significantly reduce the footprint of the logistics support. The Marine Corp continues to works with the MALSP model to determine support requirement for future deployments.

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IV. TRANSITIONING FROM THE P-3C ORION TO P-8A POSEIDON

A. P-3C ORION

Since the Cold War, the MPRF has relied on the P-3 Orion to accomplish the ASW and ASUW missions, Signals Intelligence (SIGINT), and maritime and littoral armed Intelligence, Surveillance, and Reconnaissance (ISR), in addition to "first on-scene" mission coverage around the world (WBB Consulting, 2007, p. i). The Orion has been the Navy's primary maritime patrol aircraft since the early 1960s, making it one of the longest sustained aviation programs in the Navy's history. The Orion's core mission is land-based long-range anti-submarine warfare (ASW). Over the years, it developed into an effective platform to execute other maritime missions such as anti-surface warfare (ASUW), command and control (C2), and intelligence, surveillance and reconnaissance (ISR) (Tallant, Hedrick & Martin, 2008, p. 103). The Orion has expanded over the years from a strictly maritime-focused platform to performing over-land missions in Kosovo, Afghanistan, and Iraq as part of naval aviation assets contributing to the joint air war.

The P-3A took its first operational flight in August 1962. After several updated versions, the current fleet of P-3Cs came to the Navy in August 1969. During its production run, the P-3C Orion has seen several major improvements and upgrades including its current modernization programs. All tactical systems (navigation, communications, and weapons systems) have been upgraded to satisfy Navy and joint requirements. Beginning in 2004, decision makers initiated Critical Obsolescence Program (COP) to improve availability among critical mission support systems. The current ongoing sustainment program is extending the program to match its replacement's roll-out schedule and reduce the fleet's inventory to 130 aircraft by 2010. The Orion service-life ceiling was extended from 7,500 flight hours to 20,000 hours on all airframes with that limit being extended multiple times in certain airframes. Leaders based the original limits on conservative assumptions about in-flight stresses such as maneuvers and payloads; new flight-hour limits reflect actual operating experience and a more modern analysis of the original fatigue test data (Tallant et al., 2008). The elevated

flight-hours-per-airframe has rapidly degraded the P-3C mission availability and will push the Orion out of the operational fleet faster than the replacement can be fielded.

In December 2008, a grounding of 39 P-3Cs for structural fatigue caused great concern about the aircraft's reliability. After ongoing analysis found stress cracks on the wings, decision makers grounded one quarter of the fleet indefinitely until all the identified aircraft received an overhaul to reinforce the problem areas in the wings. After the initial aircraft grounding, decision makers determined that three of the affected aircraft should be retired from service. An emergent program was established to refurbish aircraft structures to sustain all airframe lifespan. The Service Life Assessment Program (SLAP) has been funded through the supplemental budget in FY09 and will need to be funded in future-year operation and support costs if the program is to survive until the P-8A delivery.

The current level of support required to sustain "peacetime deployment" operations can be substantial for an entire squadron of P-3C Orions at any of its three Primary Deployment Sites (PDS). The reliance on large logistics and support infrastructure has made the patrol fleet rigid and inflexible, which has limited the reach of the P-3C and its ability to support operational commanders. The P-3C is very limited in its ability to operate from austere airfields at remote locations without significant external support and lead-time. The limited ability for the current patrol fleet to redeploy away from its PDS location and its incapacity to operate at forward operating locations have left the P-3C community on the outside looking in during contingency operations and rapid reaction missions. During the current overseas contingency operations, the P-3C has operated from over 240 airfields worldwide in support of OIF, OEF, and other ongoing operations overseas.

B. P-8A POSEIDON PROGRAM

In 1998, the Navy completed a functional area needs analysis as part of its process to replace both the P-3C Maritime Patrol Fleet and the EP-3 Reconnaissance aircraft with a single replacement multi-mission aircraft (MMA). As a result of the needs analysis, the Navy identified 19 tasks as suitable for the MMA platform that would meet a goal for

fleet rollout by the 2010–2015 timeframe. The resulting mission needs statement (MNS) called for an aircraft required for Broad Area Maritime and Littoral Armed Intelligence, Surveillance, and Reconnaissance (ISR). A Joint Undersea Surveillance Study that looked at eight critical capabilities required for undersea superiority.

In 2002, the Navy conducted an Analysis of Alternatives that examined the requirement for both manned and unmanned options and joint programs already in the aviation arsenal that would fill the need identified by the National Military Strategy (NMS) and reinforced by the Undersea Superiority ICD. The findings pointed to a medium sized commercial or military derivative manned aircraft for broad area ASW that could conduct the maritime ISR mission. As a result of its analyses, the Navy chose the P-8A Poseidon Maritime Multi-mission Aircraft (MMA) to counter the current and projected nuclear- and diesel-powered submarine threats (Tuemler, Cobough & Bacon, 2009, Appendix-A-1). The Poseidon will sustain Naval and Joint commanders in anti-access areas during crisis, a cornerstone of Sea Power 21 capability areas of Sea Shield and Sea Basing (DON, 2008). The P-8A will support elements of the Mine Warfare (MIW) capabilities alongside Command and Control missions (C2), as well as secondary mission areas will include elements of Strike warfare, military operations other than war (MOOTW), and supporting across the broad spectrum of range of military operations (ROMO).

Designers based the P-8A airframe on a derivative of the Boeing 737 used commercially throughout the world (WBB Consulting, 2007, Appendix-A-1). The P-8A will have a unique configuration for a 737 airframe, with key characteristics highlighted in Table 2. Its physical dimensions can be compared to the existing patrol aircraft, the P-3C Orion in Figure 2. The aircraft sensors are based upon the proven and upgraded maritime patrol sensors and systems utilized in the P-3 Modified Upgrade Program with a host of other systems upgrades and additions (Tuemler et al., 2009). The P-8A is currently in Milestone C of the acquisition cycle. By 2012, the P-8A training squadron is scheduled to have 12 aircraft in its inventory, and the first operational squadron is scheduled to have its primary assigned aircraft allowance of seven by 2018 (WBB Consulting, 2007, Appendix-A-1). The Navy will transition to the new MPRF platform

one base and one squadron at a time beginning with the Fleet Readiness Squadron (FRS) and VP squadrons and NAS Jacksonville, FL, followed by the VP squadrons in MCBH Kaneohe Bay, HI, and NAS Whidbey Island, WA, respectively.

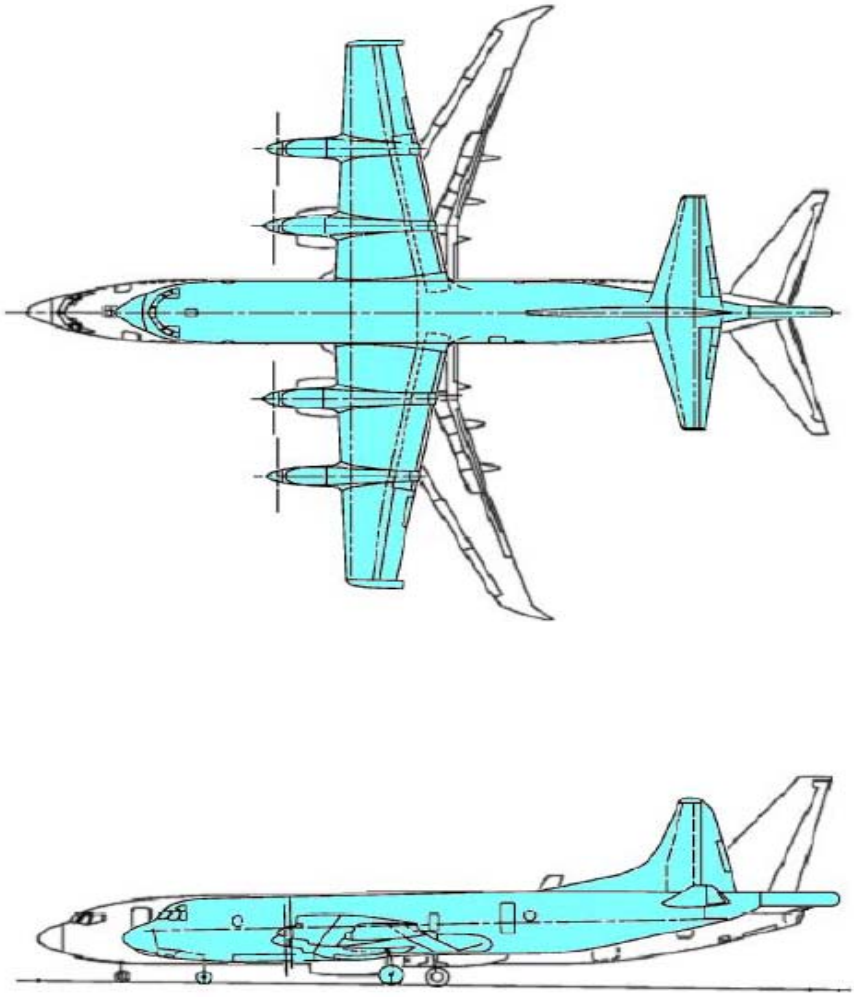


Figure 2. Size Comparison, P-3 and 737-800
(From NAVAIR MER Facilities Document, 2009, p. 6)

The P-8A is powered by two CFM International CFM56-7B27A turbofan engines and is equipped with in a universal aerial refueling receptacle that will provide In-Flight Refueling (IFR) capability. This new in-flight refueling capability for the Navy Patrol community provides increased the operational flexibility and reach of the P-8A by

extending its time on station, and enabling persistence and continuity of operations during ASW, ISR and ASUW missions (DON, 2007).

Table 2. P-8A Physical Dimensions
(From NAVAIR MER 2009, p. 2)

ITEM	DIMENSION
Wing Span	124 feet, 6 inches
Horizontal Tail	47 feet, 1 inch
Internal Cabin Width	11 feet, 7 inches
Height	16 feet, 0 inches
Height at Tail	42 feet, 2 inches
Length	129 feet, 6 inches
Fuel Capacity	75,169 pounds
Weight (Empty)	141,800 pounds
Weight (Max Takeoff)	187,700 pounds

C. POSEIDON DEPLOYMENT CONCEPT

Currently, P-3s operate from three Main Operating Bases (MOB) where patrol squadrons (VP) are permanently assigned. These MOBs are located at NAS Whidbey Island, WA, NAS Jacksonville, FL, and MCAS Kaneohe Bay, HI. From these MOBs, a squadron deploys in rotation to a designated Primary Deployment Site (PDS) located in the 5th, 6th, and 7th Fleet Areas of Operation (AOR). These PDSs are the centers of operations for each deployed MPRF squadron and are capable of sustained operations and performance of all major aircraft maintenance. From the PDSs, squadrons deploy aircraft detachments to various Forward Operating Locations (FOL) that have known and established support capabilities. Squadrons are capable of sending out multiple detachments at one time. Although detachments are not sent to the same FOL during every deployment, there are, however, known and fixed P-3 detachment sites with an infrastructure already established to service and support P-3 aircraft and aircrew, and with the capability of facilitating limited aircraft maintenance should it be required.

The basing and deployment concept of the P-8A Poseidon shares many similarities to that of the P-3; however, the P-8A deployment concept aims to eliminate the reliance on fixed deployment locations, rigid support systems and with a smaller fleet of aircraft. The P-8A is designed to deploy with the Broad Area Maritime Surveillance (BAMS) Unmanned Aircraft System (UAS), the Navy's version of the Air Force's Global Hawk, Unmanned Aerial Vehicle (UAV). It is also designed to provide long-range, persistent maritime Intelligence, Surveillance, and Reconnaissance (ISR) missions to complement MPRF operations (WBB Consulting, 2007, Appendix-A-2).

The current concept of operations (CONOPS) calls for the P-8As to operate from 6 locations in one AOR for more than 30 days. Unlike the P-3's deployment concept of fixed, robust, established sites, the deployment concept that the new P-8As will adopt is more flexible and eliminates the dependence on fixed deployment locations (p. 2). Instead, it deploys to a specified FOL, with maintenance support airlifted to that location (based on the mission and length of deployment and Category (Cat) of that airfield) (WBB Consulting, 2007). This method of deployment allows for a more flexible and agile force to deal with future threats throughout the world but also mandates a greater degree of sophisticated planning, and introduces several significant risks due to the necessity of a highly robust supply chain.

D. P-8A POSEIDON SUPPORT REQUIREMENTS

Because of the new deployment strategy that the MPRF will undertake with the deployment of the P-8A, new support requirements will need to be considered in order to support the P-8A at the FOLs. The transition to this new expeditionary concept of deployment involves moving an entire support detachment to include personnel, ground support equipment, tools, spare parts, habitability items, maintenance and operations and berthing structures, weapons and weapons storage, fuel, and fuel storage to the forward location to support maritime and littoral ASW, ASUW, and/or ISR missions.1 Additionally, provisions will have to be made to resupply those items necessary to conduct ongoing missions. This transition to a more flexible, scalable, and responsive

1 The Appendix lists all required support assets that must be transported to the FOL according to airfield category.

expeditionary deployment concept significantly increases the MPRF transportation requirements. Table 3 highlights transportation requirements and the various combinations of transportation options modeled in Figure 3, associated with the transition to the P-8's deployment concept. Coordination of these requirements must take into consideration a number of factors, specifically:

1) the type of mission and MPRF tasking
2) the category of airfield from which to redeploy or operate
3) the means of transportation to consider to deliver aircraft and mission support assets, and
4) the type of support package required to sustain the aircraft, the mission, and its personnel during a specified timeframe.

Table 3. Logistics and Maintenance Systems to Support P-8A Expeditionary Support Requirements

Mission +	**Airfield Category +**	**Support Package +**	**Transportation Requirement**
Sizeable ASW	0	Complete Pre-Proposition Stock	Military Sealift
ASW / ISR	1	Full PUK	Military Airlift
ISR	2	GSE	Commercial Airlift
HA / DR		Weapons	Commercial Sealift
		Stores	Intra-Theater Lift
		Combination	Organic Assets
			Combination

E. JOINT OPERATIONAL PLANNING AND EXECUTION SYSTEM (JOPES)

To move personnel and equipment downrange to the FOL, transportation must be coordinated well in advance of the actual deployment. Planning and coordination of personnel and equipment moves to FOLs is accomplished through the Joint Operational Planning and Execution Systems (JOPES), an electronic information system that is used to monitor, plan, and execute mobilization, deployment, and sustainment activities associated with joint operations, and overseen by the U.S. Joint Forces Command (USJFC) and the U.S. Transportation Command (USTRANSCOM) (Bates 2004). Force

movement information fed up-line in JOPES is used by operators and planners to maintain and manage the Time-Phased Force and Deployment Data (TPFDD) database used to plan and execute the strategic movement of forces from one geographic region to another. (Bates, 2004).

Because neither MPRF nor CPRG own dedicated airlift assets solely assigned to support deploying VP squadrons (such as Navy Reserve C-130s), deploying squadrons must rely on JOPES to coordinate and schedule transportation from the MOB to their PDS and FOLs. This involves communicating requirements to TRANSCOM via the MPRF JOPES single point of contact: how many seats to reserve for passengers, how much cargo must be transported, the destination of the passengers and cargo, and the date that the airlift must happen. To qualify for a "dedicated" airlift to the PDS or FOL through JOPES, 100 people and at least 15 short tons (STONS), or 30,000 pounds of cargo, must be requested for airlift, and there may be no mixed-in cargo or passengers from outside entities, and no intermediate layovers for loading/unloading of separate passengers and cargo. There is a minimum of 15 STONS of cargo (30,000 lbs), and if the JOPES request does not meet the minimum requirements, TRANSCOM aggregates the lift with additional cargo and/or passengers, which induces layovers and delays en route to the PDS or FOLs (Patrol Squadron TEN, n.d., p. 2). Additionally, on the day of on-load, the number of passengers boarding the aircraft should be within 5 percent of the initial JOPES request, as TRANSCOM tends to look unfavorably at the requesting organization should the passenger numbers conflict with the initial manifest. (Patrol Squadron TEN, n.d., p. 2) Once a JOPES request is approved, the request must be met within 72 hours.

V. SUSTAINMENT CONSIDERATIONS

A. TRANSPORTATION CONCERNS OF PRESENT P-3C AND FUTURE P-8A DEPLOYMENTS

Currently, the most austere FOL utilized by Navy P-3 squadrons is the U.S. Naval Expeditionary Base, Camp Lemonier, Djibouti, and Africa. Because there is preexisting infrastructure in Djibouti, very little equipment needs to be airlifted to this FOL to support the occupying VP squadrons. However, the established infrastructure at Camp Lemonier presents three problems with respect to expediting mission, aircraft, and habitability equipment as well as a support detachment to the FOL. Because of the light cargo load to Djibouti, the JOPES airlift request doesn't meet the strategic minimum lift requirements for a dedicated lift. Therefore, TRANSCOM must aggregate VP loads with additional cargo, resulting in the delay of support personnel and equipment reaching the FOL (Patrol Squadron TEN, n.d., p. 3).

Secondly, in the event that a P-3 must be deployed to a strategic FOL with little to no available aircraft support, the community does not have standardized procedures to support heavy MPRF redeployment during a heavy ASW, ASUW, or ISR mission, including any combination of these missions. This presents a potential problem in coordinating airlifts, in that cargo and passenger data needs to be fed up line through JOPES well in advance of the date of departure, and multiple revision to the cargo load and passenger count is highly discouraged by TRANSCOM (as this adversely affects the cargo requests of other requesting organizations). (Patrol Squadron TEN, n.d., p. 1) Currently, ad hoc transportation of equipment that includes spare parts, test equipment, and weapons that need to be transported to the FOL uses spare cargo capacity on the P-3 aircraft being used at the FOL.

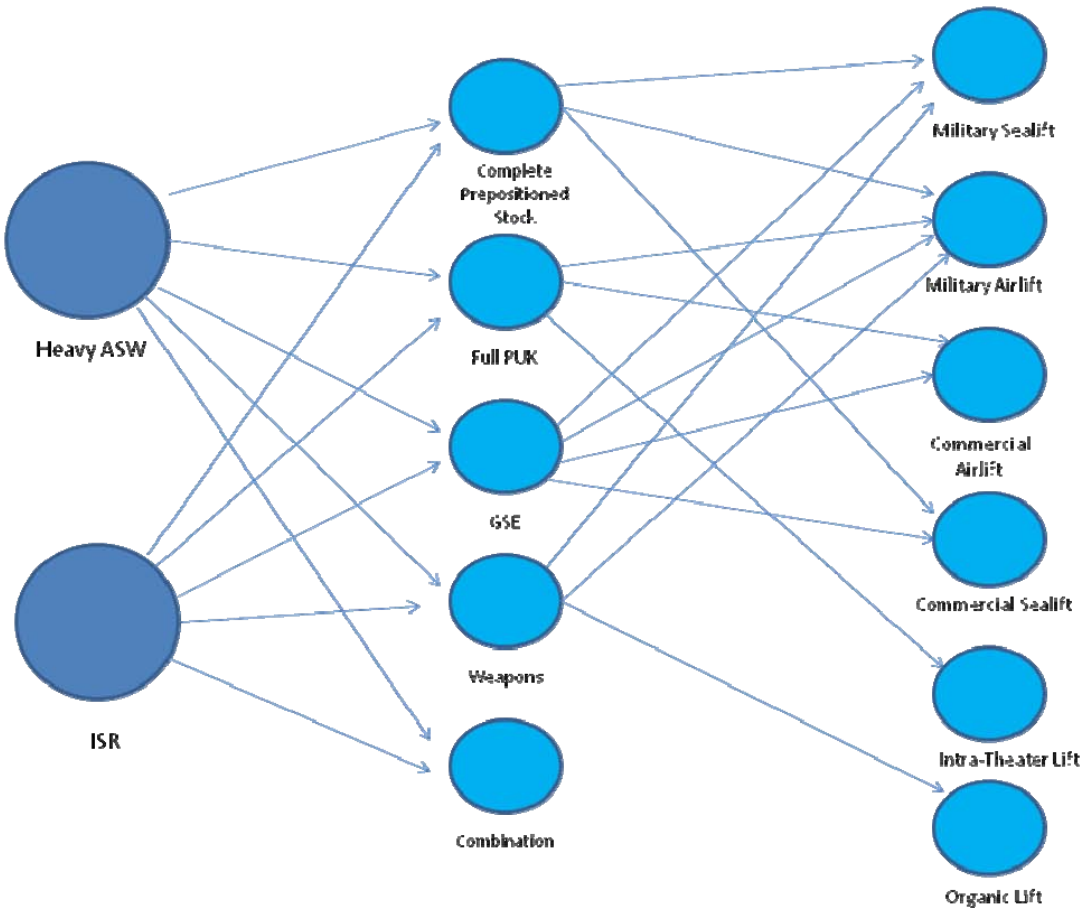
Finally, with the transition to the new P-8A Poseidon and the MPRF's new concept of deployment, transportation of personnel and support packages based on airfield classification and mission type generates additional airlift requirements that grow significantly with deployments to lower category airfields, such as CAT-0 and CAT-1. The additional airlift requirements generated by the P-8's new CONOPS will require

advance planning in streamlining what are the “must-haves” downrange at the FOL and require building support and airlift packages, or PUKs, accordingly as well as increasing the number of dedicated lifts from TRANSCOM.

B. NETWORK TRANSPORTATION MODEL FOR THE P-8A

There is risk associated with any support infrastructure that includes transportation of sustainment items OCONUS. Military transportation networks can often be very complex; they are frequently subject to delays, customs, and cargo restrictions that prevent the end-user from receiving required items at the right time. To illustrate the possible future complexity of the P-8A support infrastructure, Figure 3 shows how complicated the sustainment and transportation network will be for MPRF, no matter how small the detachment footprint. Future support staff must able to recognize, anticipate, and maneuver the much larger sustainment structure of the P-8A through the transportation network as well as retrograde all material. Figure 3 makes the assumption of two typical mission sets are being executed, each possibly requiring a full set of sustainment and support packages, and possible combinations of transportation modes. A prepositioned system will support the mission packages with items collocated at the hubs and will accompany any PUK parts along with required GSE, weapons, and other gear. These missions support items can be task organized to better allow for greater flexibility and responsiveness for the MPRF. The multiple transportation modes in Figure 3 are all possible routes and transportation modes to move MPRF equipment to an austere FOL. The complexity of redeployment and sustainment using the network flow model in Figure 3 illustrates that MPRF’s risk areas are highest in transportation and sustainment to austere FOL.

Figure 3. Network Flow Model of Transportation and Sustainment of P-8A



Identifying the necessary and critical items needed to support the new P-8A for various mission types, deployment lengths, and airfield categories requires extensive planning and coordination, and presents a challenge to the MPRF as it transitions away from its "fixed" FOLs. Currently, the weight and cube requirements for the additional equipment required to support the P-8 and its expeditionary concept of operations is unknown. However, it is known how many additional line-items are required, and we can use what little information is available to provide some estimate of the additional sustainment requirement for the P-8 (versus the P-3). Figure 4 identifies the differences in current support requirements between the P-3C and the P-8A based on:

- ASW missions
- P-8A FOL requirements based on deployment to austere CAT-0 airfields
- P-3 FOL requirements based on Djibouti, Africa current infrastructure setup
- Deployment length of less than 90 days
- Support requirements for 1-4 aircraft requiring major sustainment
- Airlift support provided by Air Force C-17 aircraft
- No differentiation in tonnage regarding general support equipment between P-3 and P-8 (WBB Consulting, 2007, Appendix-C-22)

Note: Current MPRF requirements using the fixed-basing structure utilized by the P-3 are highlighted in gray. As the MPRF transitions to the P-8A, additional support requirements are highlighted in black.

Figure 4. Difference in Support Requirements in Transitioning to the P-8A

	P-3C	**P-8A**
<u>Requirements</u>:		
PUK:		**Modified PUK**
Cargo Lift / Redeployment:		
Sustainment:	**(by request)**	
MTOC:	**Not Applicable**	**(Not deployed during peacetime)**
Aviation Fuel:	**Where contract support is available**	

C. P-3 VERSUS P-8 FOL REQUIREMENTS

A notable difference in the comparison between the P-3 and P-8 in Figures 3 and 4 is the increase in support requirements needed to deploy and sustain the P-8 at a CAT-0 airfield. As mentioned earlier, this increase in requirements for the P-8 is due to the fact that P-3s currently operate from FOLs that already have an established support infrastructure—in which P-3 squadrons/detachments simply rotate in and out, and turn over custody of PUKs, aircraft support items, and weapons to the incoming P-3 units (Evangelista, 2008, p. 4). The MPRF's P-8 deployment concept, however, is moving toward a flexible, scalable, and responsive force that will react to global contingencies, allowing its aircraft to redeploy from its Hub or PDS, to potentially austere FOLs that have little to no aircraft and/or mission support capabilities available (WBB Consulting, 2007, p. 14). Therefore, to support a detachment of P-8 aircraft at a CAT-0 or CAT-1 airfield, the footprint for aircraft and mission requirements is considerably larger than that of the P-3's traditional concept of deployment—as a mission support package must be transported downrange to the austere FOL to allow the aircraft and personnel to properly conduct and sustain the MPRF mission in that specific AOR.

These comparisons highlights the differences in requirements between the current P-3 deployment concept and what would be required for the P-8 Poseidon aircraft to redeploy to an austere FOL—moving the aircraft and mission support package closer to the AOR of interest. Additionally, what should be noted is that the transportation requirements highlighted in Figure 4 for the P-8 are designed for contingency operations and MPRF's response to real-world threats. Under peacetime operations, the P-8's support footprint should decrease significantly (to reflect a footprint similar in size to that to support current P-3 FOL requirements), with notable exception to additional GSE and other P-8/Boeing 737-peculiar mission-required support items.

1. Packup Kits (PUK)/Modified PUK for Austere FOL Redeployment

Standard Navy aviation PUKs contain the necessary spares to support deployed aircraft, such as critical or high-failure/high-usage aircraft parts, components, and high-value/high-usage consumables. Current P-3 detachments operate from FOLs with a PUK

already forward positioned, in which inventory of the PUK is continuously turned over from the outgoing detachment to the incoming one (Evangelista 2008, p. 4).

Conversely, for P-8s to redeploy to an austere airfield, arrangements must be made to transport a PUK downrange to the FOL that contains the items necessary to sustain the aircraft for that specific type mission. The P-8A PUK requirements highlighted in Figure 4 indicate a Modified PUK, as the items in this PUK will need to include 737-common, mission-specific, and Navy-common repair parts. PUKs may differ for each type of mission and may be tailored to minimize transportation efforts and footprint in that AOR. Many of the P-8's 737-common aircraft components are shared commercially with civilian airliners that use the Boeing 737 and may be used to augment the PUKs. This will be an area of high risk because of commercial regulations, and it requires more test cases CONUS before integrating with deployed VP units and the supporting PUKs.

2. Cargo Lift for Redeployment and Sustainment

As represented in Figure 4, there is a significant difference in the number of airlifts required to support the P-8 versus the P-3, again due to the existing support infrastructure that exists at all P-3 FOLs. To redeploy a P-8 to a CAT-0 FOL requires the transportation of personnel, equipment, tools, habitability and operations items, GSE, weapons, sonobuoys, PUK, test equipment, vehicles, MTOC, fuel, etc.—requiring significant airlift support (WBB Consulting, 2007). GSE assets alone required to support one to four aircraft during major sustainment up to four C-17 aircraft (WBB Consulting, 2007, pp. C-21–C-22). An additional airlift would be required to transport diesel fuel to the FOL to support the operations of GSE, should the availability of local diesel fuel suppliers not be available. (WBB Consulting 2007, p. 23, 25). One last airlift would be required to transport personnel, along with their habitability, mission equipment, tools, etc to the FOL (Patrol Squadron TEN n.d., 2–3).

3. Aviation Fuel

P-3s operating at current FOLs rely on contracted support for refueling aircraft. At an austere FOL, contracted supported aviation refueling may not be available. For contingency planning, should contracted aviation full support not be available, the MPRF requires the resupply of aviation fuel, transported by means of surface vessel (WBB Consulting, 2007, p. 25).

VI. RECOMMENDATIONS

Coordination of logistics support for expeditionary naval assets OCONUS is very challenging, even for experienced logisticians. Both inter- and intra-theater sustainment is even more complex and demanding, requiring more logistics planning and proper organizational structure. The OCONUS MPRF model requires operations on short notice with task-organized forces using a hub-and-spoke operational concept to employ the full spectrum of MPRF capabilities. Naval logistics personnel are faced with supporting a new naval aviation airframe that:

1) has an entirely new configuration based upon a commercial aircraft
2) has a high degree of uncertainty in the demand for spares and lead times for replenishment
3) must operate with a reduced footprint and
4) must operate in an austere environment without established infrastructure overseas.

Combatant Commanders plan and develop the theater logistics systems, however service component commanders and numbered fleet commanders have operational logistics responsibilities within the geographical boundaries to provide services and execute the system. The logistics task force commander normally exercises operational control (OPCON) of assigned combat logistics forces and is responsible for coordinating the replenishment of forces at sea. However, the MPRF and other Naval Expeditionary Forces are focused on supporting the naval forces on the ground and requires different sustainment when supporting and moving naval forces into theater (Joint Pub 4-0, 2008).

A. ESTABLISH PARTNERSHIPS AND SIGN MEMORANDUMS OF AGREEMENT

The MPRF and CPRF must inquire about potential partners within naval expeditionary or defense logistics systems to create partnerships to better support the expeditionary environment in which the P-8A is expected to operate (Nilsen, Tessier, Lugo & Perez, 2004). Working with USTRANSCOM for dedicated airlift priority for

redeployment of ASW and ISR missions, as well as supporting austere spoke locations where cargo lift assets do not normally fly, will be essential to maintaining operational readiness under the new CONOPs. Within the OCONUS operational logistics infrastructure already in place to support the Fleet Commander, we recommend that a Memorandum of Agreement (MOA) be signed with Naval Logistics Forces under the fleet commanders (i.e., CTF-53/73/63) for dedicated intra-theater cargo lift and other logistics services to support MPRF sustainment and critical movement of Boeing DUPMP concept downrange at potential FOBs.

B. CREATE A POSIEDON EXPEDITIONARY MAINTENANCE AND LOGISTICS CELL

In addition to ensuring external logistics support, it is recommended that the CPRF create an Expeditionary Maintenance and Logistics Cell (EMLC) initially focused on Poseidon support and later the full Family of Systems (FOS). The EMLC will be a fundamental shift for MPRF units and elements to better support expeditionary operations beyond PDSs. Supporting the MPRF's Expeditionary mission of enabling the MPRF to be flexible, scalable, responsive and expeditionary, the EMLC will be critical to OCONUS logistical and maintenance support, continuity of operations, and sustainment of support knowledge in theater. Poseidon operations will require a more robust support footprint than P-3 Orion operations would need in austere environments, see Figure 4. In addition to normal peacetime hub-and-spoke locations, the EMLC will be essential for pushing spokes downrange into operating locations where airfields within category 0, 1, or 2 are utilized.

C. ESTABLISH SUPPORT BILLETS

There are several options to develop and employ the EMLC with the current Command Structure under COMPATRECONFOR: (1) An expansion of the CTF staff, creation of additional billets co-located with CTF 57 and CTF 72 in Bahrain and Japan, or anywhere hub support structure may be located, and (2) The establishment of a separate command under CPRF and OPCON to the CTF commander. The focus of the billets will be in expanding any current support personnel with several layers of expertise

that will include qualified petty officers, chief petty officers and officers. The focus of the personnel filling these billets will primarily be logisticians, maintainers, and embarkation specialists. Many of the requirements needed of the EMLC personnel can be aligned with local existing infrastructure to better suit the CTF commander's needs. For example, certain elements will need to interface on a daily basis with the AIMD at hub locations and may be required to serve as EMLC detachments at AIMD Sigonella/Bahrain/ Kadena. Several critical skill sets that are not maintained within organic VP organizations include:

1) **Embarkation**–Providing permanent JOPES expertise for embarkation and deployment of VP squadrons, as well as experience in sealift and airlift in theater. This embarkation staff will conduct flight planning, palletization, and interaction with USAF and USN cargo load masters. **2) MTOC support** – All items in addition to current MPRF that will support MTOC operations, movement, and security associated with those missions.
2) **Logistics / Expeditor**–A dedicated supply cell that manages and tracks all required items, interacting with the Boeing support team for DUPMP commercial support. Logistics services will also include HAZMAT, small purchasing, and contracts support.
3) **PUK and IMRL**–The EMLC will take responsibility for PUKs at Hub locations.
4) **AIMD GSE Liaison**–Coordinate the transportation and oversee the movement of required GSE to the FOLs, and communicates GSE shipping requirements to AIMD in preparation for airlifts.

The EMLC team should take the majority of the external supply burden off of VP squadron LSs, which are required to be located at all spokes as well as one LS as CNAF expeditor TAD in Norfolk throughout deployment and 2 LSs to be required at ASD Bahrain (Evangelista, 2008). As MPRF transitions to the FOS, VP squadrons supply personnel will struggle to sustain MPRF assets and maintain hub operations, while multiple logistics specialists are not at the hub. Naval Aviation assets at the squadron-level organization only maintain a minimal of enlisted supply personnel and normally no

Supply Corps officers at either the squadron or the wing level. The navy enlisted rating (LS) Logistics Specialists are a recent reclassification of the Storekeeper (SK) rating, after being combined with the (AK) Aviation Storekeeper rating. Prepositioning equipment and PUKs in custody of the EMLC will be a cultural shift away from VP squadrons as temporary custodians every 6 months, to a full-time dedicated custodian who is directly responsible to the CTF commander for maintaining the readiness of the PUK and GSE.

D. DEVELOP AND INVEST IN PREPOSITIONED FLY-AWAY-KIT

We also recommend the creation of additional stock of pre-established kits collocated at the PDS locations. These items are historically difficult to transport through either commercial or military transportation networks, long lead items, and items that the MPRF never wants to run out of. These kited items can be maintained by a third party support organization such as Fleet and Industrial Supply Center (FISC), DLA or a commercial warehousing company such as used in Bahrain. The Bahrain and New Zealand (BANZ) warehouse and freight terminal in Bahrain is collocated at Naval Support Activity Bahrain, utilized by various CTFs and TYCOMS as temporary storage of non-classified material for further transfer to naval deployed assets within the 5th Fleet AOR. Recommended items based on historical "Head-Hurters" and post deployment reports include:

- Bottled Gases
- HAZMAT
- Weapons including sonobuoys
- Heavy and oversized SE and GSE
- Forklifts (20K Hyster) if needed for P-8 maintenance and cargo loading
- Consumables / office supplies / small purchases
- Fabric Hangers / new MPRF expeditionary

APPENDIX

Table 4. Infrastructure Requirements for Expeditionary Operations (From WBB Consulting, 2007, p. 16)

Infrastructure Elements	Airfield Categories			
	Cat-0	Cat-1	Cat-2	Cat-3
Runway and Ramp				
ATC and NAV Aids				
Fuel Storage and Distribution	✓	✓		
Water Storage and Sewage Treatment	✓	✓		
Communication (Secure/Unsecure)	✓	✓	✓	
Power Generation	✓	✓		

Table 5. Facility Requirements for Expeditionary Operations (FromWBB Consulting 2007, p. 17)

Facilities Elements	Airfield Categories			
	Cat-0	Cat-1	Cat-2	Cat-3
Aircraft Hangar	✓	✓		
Maintenance Spaces	✓	✓		
Operations Spaces	✓	✓		
C2/C4I Space and Storage	✓	✓	✓	
Supply Storage	✓	✓		
Munitions Storage	✓	✓	✓	
Billeting	✓	✓		
Messing	Not required			
Medical	Not required			

Table 6. Operating Factors for Establishing an Expeditionary Aircraft Hangar (From WBB Consulting, 2007, p. 18)

Duration	MPRF Program Activity
< 90-Days	No Action Required. Expeditionary Aircraft Hangars are not required for this limited period of operations
91-Days – 3-Years	Assess the anticipated duration of the contingency operation and coordinate to have an expeditionary maintenance facility establish at the location
3-Years – 6-Years	Assess the anticipated duration of the contingency operation and coordinate to have an expeditionary maintenance facility establish at the location or initiate the required MILCON action for a permanent facility

Table 7. Equipment Requirements for Expeditionary Operations (From WBB Consulting, 2007, p. 20)

Equipment Elements	Airfield Categories			
	Cat-0	Cat-1	Cat-2	Cat-3
AIMD Automated Test Equipment (ATE)	N/A	N/A	N/A	N/A
Aircraft Support Equipment	✓	✓	✓	
Mission and Life Support Equipment	✓	✓	✓	✓
Weapons Handling	✓	✓	✓	✓
Vehicles				

Table 8. Consumable Requirements for Expeditionary Operations (From WBB Consulting, 2007, p. 22)

Consumable Elements	Airfield Categories			
	Cat-0	Cat-1	Cat-2	Cat-3
Food	✓	✓		
Water	✓	✓		
Spares and General Supplies	✓	✓		
Fuel – Aviation, Diesel and MOGAS	✓	✓		
Oils and Lubricants	✓	✓		

Table 9. Expendable Requirements for Expeditionary Operations (From WBB Consulting, 2007, p. 24)

Expendables Elements	Airfield Categories			
	Cat-0	Cat-1	Cat-2	Cat-3
Weapons	✓	✓	✓	✓
Sonobuoys	✓	✓	✓	✓
Mission Data Storage Devices / Media	✓	✓	✓	✓

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