

Dispersion: A Concept of Employment For Naval Aviation In Operational Maneuver From The Sea

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EXECUTIVE SUMMARY

Title: Dispersion: A Concept of Employment For Naval Aviation In Operational Maneuver From The Sea

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Thesis: Naval air operations must be revised in order to support Operational Maneuver From The Sea (OMFTS).

Background: Tempo will be the cornerstone of success for OMFTS. In order to maintain superior tempo, fire support must be generated at a rate proportionate to the MAGTF commander's speed of operations and scheme of maneuver. Although advanced naval surface fire systems will be able to deliver accurate fires at extended ranges, these weapons will be ill-suited to provide timely and responsive close-in fire support for the ground maneuver elements due to their long times of flight (TOFs). Emerging naval surface fire systems will be more effective in the shaping of the deep and deep-deep battlespaces. As a result, aviation will continue to be the main source of fire support for the GCE. However, because OMFTS dictates that naval forces will remain over-the-horizon in order to counter future threat capabilities, traditional naval air operations will lack the responsiveness and flexibility required in the dynamic OMFTS environment. This is due to the time-distance problem associated with over-the-horizon flight operations and the "bottleneck" effect inherent to single deck flight evolutions. As a result, a new concept of naval aviation employment that focuses on timely and effective fire support must be adopted if OMFTS is to become a reality.

Recommendation: The limitations of single deck flight operations can be overcome and responsive and effective fire support can be provided by dispersing naval aviation assets throughout an area of operations (AO). Aircraft can be dispersed at sea by forming a naval expeditionary force (NEF) from the assets of the carrier battle group (CVBG), the amphibious ready group (ARG), and future flight operation capable Maritime Preposition Squadrons (MPS). On land, dispersion is possible through the exploitation of new systems and technologies such as the Joint Strike Fighter, the KC-130J, and miniaturized munitions. By dispersing its air assets, a NEF can circumvent the restrictive nature of traditional seabased flight operations. More importantly, the synergy that will result from dispersing aircraft on land and/or on sea will provide the MAGTF commander with timely combat power that can be exploited at the time and place of his choosing.

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Introduction

Making Operational Maneuver from the Sea (OMFTS) a viable warfighting doctrine will require a significant change in how naval aviation is employed. Because of the ever-increasing capabilities of the future threat, OMFTS dictates that naval forces conducting littoral operations will have to operate at extended over-the-horizon ranges in order to enhance force survivability. The time-distance problem that will result from this over-the-horizon posturing and the procedural limitations of traditional seaborne air operations will impede the ability of naval aviation to provide effective aerial supporting fires to ground maneuver elements operating at the high tempo levels envisioned for OMFTS. Since aviation will remain as the Marine Corps' primary source of fire support, any limitations or constraints imposed on its availability and responsiveness will degrade the Marine Air-Ground Task Force's (MAGTF) ability to accomplish its mission.

The intent of this paper, then, is to propose dispersion as a viable concept of employment for naval aviation in support of OMFTS. By dispersing, naval aviation can overcome the limitations that historically have diluted the effectiveness of single deck flight operations. Whether based at sea or on land, dispersed aviation assets will be able to operate with greater responsiveness and survivability than is possible using current naval aviation procedures. By capitalizing on new aircraft, emerging weapons technologies, and advanced command and control (C2) concepts, naval forces can make the dispersed basing of naval aviation assets a reality for littoral expeditionary operations. The resulting responsiveness and flexibility of naval aviation will provide the

overwhelming combat power required to make OMFTS the naval warfighting doctrine of the future.

Tomorrow's Battlefield

In the future, the Marine Corps will find itself involved in a wide spectrum of missions ranging from multi-nationally sanctioned humanitarian efforts to unilateral missions of national interest. Because 70% of the world's population lives within 200 miles of the ocean and 45% of the world's population (2.5 billion people) lives in an urban environment, it can be deduced that the preponderance of these future missions will involve some form of littoral, urban conflict. The odds go up exponentially when one considers that by the year 2025, the world's urban population will double to 5 billion people placing 61% of the world's populace in cities. Moreover, of the 325 cities with a million or more people, two-thirds exist within the developing, unstable, and mostly littoral regions of Asia, Latin America, and Africa.¹

These demographic statistics are significant to OMFTS for two reasons. First, since the preponderance of future conflicts will take place in the underdeveloped littoral regions of the world, expeditionary forces can expect little infrastructural support in terms of basing, logistics, and host nation cooperation. As a result, American forces will have to possess the inherent capability to support and sustain themselves throughout the entire scope of their operations. Second, if the prediction that future engagements will occur in the urban environment holds true, the MAGTF commander's requirement for precise, proportionate, and responsive fire support will be greater than it ever has been before. Hotbed areas of the world will offer a range of conflict that includes civil

disobedience, terrorism, unconventional “small wars”, and conventional combat. Often these varying degrees of conflict will occur simultaneously. In such an environment, non-state actors can dilute the combat power advantage habitually enjoyed by U.S. forces. The United States’ experiences in Haiti and Somalia are evidence of this. Moreover, although the United States will not face a Soviet-sized conventional force any time in the near future, it will have to face an array of relatively unsophisticated adversaries that possess advanced weapon systems and technologies made available by the ever-increasing world arms market. Transnational terrorists (groups similar to those organized by Osama Bin Ladin that transcend or ignore national boundaries) now have access to modern communications and transportation, global sources of funding, and training in modern explosives and weapons.² As a result, these groups are becoming increasingly more organized and effective in countering the modern forces of advanced nations. Additionally, aggressive countries with adequate force structures will be able to develop effective conventional forces with the accompanying command and control (C2), intelligence, logistics, and combined arms capabilities that have been the trademark of the more advanced, power projecting nations of the world. Croatia’s Operation Storm showed that a relatively modest national defense force could be transformed into an offensive-oriented combined arms task force in less than two years.³ In basic terms, then, the MAGTF commander of the future will face a diverse and capable threat in a complex operating environment. As a result, he will require fire support assets that are responsive,

¹ Marine Corps Intelligence Agency (MCIA), *Marine Corps Midrange Threat Estimate – 1997-2007: Finding Order in Chaos*, Defense Intelligence Reference Document, MCIA-1586-001-97, August 1997, 1-3.

² *Ibid*, 4.

³ *Ibid*, 14.

proportionate, and capable of surgically eliminating lethal adversaries while simultaneously reducing the risk to “friendlies” and collateral damage to civilians.

Operations of the Future

OMFTS seeks to address this future operating environment. In order to counter the threat’s combat power potential, it is intended that naval and amphibious forces will remain over the horizon, exploiting the inherent mobility of seaborne forces. Capitalizing on new maneuver assets such as the MV-22 Osprey and the Advanced Amphibious Assault Vehicle (AAAV) as well as the already proven CH-53E and the LCAC, naval forces will move combat power ashore at any number of points along the enemy shoreline. As per Frederick the Great’s observation that “he who defends everything defends nothing,” OMFTS’s intent is to render the enemy force irrelevant by forcing him to defend a large area in the face of a naval force’s extensive mobility and deep power projection capabilities.⁴ Moreover, the requirement to secure a traditional beachhead will be eliminated since assault forces no longer will move from ship to shore but will proceed directly to their objectives. This Ship-to-Objective-Maneuver (STOM) is what will generate the overwhelming tempo required for success on the future battlefield.

Since tempo is sustained by effective logistics, it is logistics that will determine what is operationally possible.⁵ The Marine Corps’ OMFTS supporting concept of Sustained Operations Ashore (SOA) correctly dictates that the logistics footprint ashore must be kept to a minimum. In order to accomplish this, the SOA concept proposes that “maneuver units will operate under a ‘logistics pull’ concept, drawing support from the

⁴ Marine Corps Combat Development Command (MCCDC), *United States Marine Corps Warfighting Concepts for the 21st Century* (Quantico, VA: Concepts Division, 1998), II-7.

⁵ *Ibid*, VII-15.

floating combat service support areas.”⁶ Only priority items (fuel, water, food, and ammunition) will be provided to mobile forces ashore by seabased distribution facilities. In terms of the MAGTF’s ACE (Air Combat Element), the SOA concept envisions that naval tactical aviation assets primarily will remain seabased and only by exception would they operate from shore based facilities. By remaining afloat, it is postulated that the aviation logistics footprint can be eliminated as an operational hindrance. To make this work, all support requirements would be satisfied by maintaining a flexible and responsive organizational and intermediate maintenance capability aboard a resident aircraft carrier (CV) or amphibious assault ship (either an LHA or LHD). The SOA concept goes on to state that by effectively exploiting the maneuver space offered by seaborne operations, naval air operations can provide flexible and responsive fire support by moving closer to shore and reducing flight distances to MAGTF objectives.⁷

The OMFTS/Naval Aviation Paradox

Unfortunately, when naval air operations are analyzed within the OMFTS construct, a challenging paradox comes to light. In order to counter the threat, naval forces must remain over the horizon; but, in order to support the high tempo of ground forces, naval aviation assets must move closer to the enemy coastline. As already mentioned, the enemy of the future will be ill-defined and unconventional, yet he will possess an impressive and lethal range of combat capabilities. The current trend among potential adversaries is to acquire advanced weapon systems such as anti-ship missiles, avionics upgrade packages for older aircraft, and inexpensive (yet effective) sea mines. In terms of system capabilities, the Marine Corps could find itself facing an opponent of

⁶ *Ibid*, II-22.

⁷ *Ibid*, IV-11 – IV-12.

relative technological parity in the very near future. By integrating these new capabilities with a basic command and control system, an adversary could establish an effective littoral defense system designed to engage amphibious forces while they are still at sea. This means that naval aviation may not have the option of moving close to shore in order to support the MAGTF scheme of maneuver.

Of these emerging capabilities, the surface launched anti-ship missile poses the most immediate threat to naval forces. Currently, there are more than ten potential threat countries capable of employing anti-ship cruise missiles. Most of these weapons are highly maneuverable, supersonic, sea-skimming missiles that are extremely difficult to target once launched. Their extensive effective employment ranges will require naval forces to increase their over-the-horizon ranges significantly. For example, the North Koreans have developed the AG-1 cruise missile based on the Chinese CSS-2. It is postulated that this system is operational and possesses a range of up to 75 miles.⁸ In the Persian Gulf where the average width of the water is 100 nautical miles (nm) or less⁹, this type of weapon system would severely restrict the maneuverability of naval forces attempting to conduct flight operations, not to mention it would preclude the option of moving closer to the shoreline as a means of increasing aviation responsiveness.

Commensurate with the increased effectiveness of surface launched threats, the increased capabilities of air launched weapons also pose a significant challenge to naval forces. As of today, there are thousands of older aircraft such as F-5s and MiG-21s in service throughout the world. These simple, reliable, and inexpensive aircraft can be armed with guns, rockets, bombs, air-to-air missiles, and guided air-to-surface missiles.

⁸Maj Jeffrey P. Davis, USMC, "Ship-to-Objective-Maneuver: Will This Dog Hunt?" *Proceedings*, August 1998, 32.

Additionally, engine, electronics, avionics, and weapons system upgrade packages currently are offered on the open market to increase their performances to state-of-the-art levels.¹⁰ The associated proliferation of sophisticated air-launched anti-ship weapons is of particular interest for amphibious forces. Aerospatiale has upgraded its 65 kilometer range MM 38/40 Excocet missile with technologies borrowed from the supersonic ANS missile and is now offering it on the open market. It is inevitable that the Russian 3M-80Ye “Moskit” (SS-N-22 Sunburn) missile will be available worldwide with its capability to fly a high-G, 2.5 Mach maneuvering flight profile at an altitude of ten meters or less against targets at ranges between 90-120 kilometers.¹¹ The significance of these weapons is not lost on the MCIA which points out that “the capability to launch sophisticated, long-range anti-ship cruise missiles from relatively low performance aircraft is one niche which is expanding rapidly making the U.S. advantage indistinct.”¹² The force protection challenge these systems pose is illustrated in the fact that naval forces operating in the Persian Gulf have approximately 30 seconds to acquire, identify, target, and engage Iranian aircraft before they enter an acceptable “launch and leave” anti-ship missile employment envelope.¹³ What this means for future OMFTS operations is that over-the-horizon ranges will have to be extended even further in order to provide adequate stand-off protection and threat response time.

An expeditionary force’s ability to maneuver close to a threat’s coastline will be limited further by the proliferation of mines. Simple, cheap, and easily obtained, mines promise to be an integral part of any potential adversary’s littoral defense system as

⁹ *Ibid*,31.

¹⁰ MCIA, 26.

¹¹ *Ibid*, 25.

¹² *Ibid*, 50.

evidenced by the fact that the world inventory of mines has increased by 50% since 1991.¹⁴ Recent history confirms their effectiveness. In 1988, during the Iran-Iraq War, an Iranian pre-World War I designed contact mine nearly sank the USS *Samuel B. Roberts* (FFG-58) in the Persian Gulf. During Desert Storm, the USS *Princeton* (CG-59) and the USS *Tripoli* (LPH-10) both sustained major damage after striking Iraqi mines.¹⁵ Even more disconcerting, mine technology is advancing and proliferating at an ever increasing rate. Within the next ten years, littoral defense mines designed with nonmetallic casings, oddly-shaped (non-cylindrical) casings, anechoic coatings (special coatings which absorb or diffuse sonar signals), and self-burial casings will be available on the open market. India already has developed and marketed a “smart” mine that selectively detonates when certain ships pass overhead. Costing a mere \$20,000, this mine “combines acoustic and magnetic signature recognition fusing and can deploy for several hundred days.”¹⁶ Taken in concert with other potential threat capabilities, these advanced mine capabilities will ensure that seaborne aviation platforms remain over-the-horizon.

This leads to the second half of the OMFTS/naval aviation paradox. As previously mentioned, in order to support the MAGTF commander’s high tempo of operations, aviation launch platforms must move closer to the enemy coastline. However, survivability dictates that these high value assets remain outside weapons envelopes (i.e. over-the-horizon). The natural question to be asked, then, is “Can traditional single deck flight operations support the high tempo of OMFTS from over-the-

¹³ Admiral Stanley Arthur, USN (Ret), lecture presented at the Marine Corps Command and Staff College, Quantico, VA, 26 February 1999.

¹⁴ Jeffrey P. Davis, 32.

¹⁵ *Ibid*, 32.

horizon?" A careful analysis leads to the conclusion that they cannot. There are three main reasons for this. First, the physical characteristics of the littoral operating environment preclude the generation of high volumes of sorties from a single platform. The Persian Gulf, the Adriatic Sea, the Red Sea, the Gulf of Oman, and the eastern Mediterranean provide a small sampling of tomorrow's potential littoral operating areas. Within these areas, oil platforms, commercial shipping, third party territorial waters, sea state, and adverse weather present continual impediments to fixed wing flight operations even in benign, low threat situations. In this environment, aircraft carriers find it difficult to obtain the adequate sea space required to launch and recover large volumes of aircraft. In the author's recent Persian Gulf experience, an aircraft carrier could effectively and consistently launch and recover at most 30-35 aircraft in a given cycle due to limited steaming room. This means that 15-18 aircraft (many of which were support aircraft not assigned ordnance delivering missions) would be launched before 15-18 aircraft would be recovered. Carrier operations are restricted further since the carrier's position must provide sufficient room for the rendezvousing and marshalling of launching and recovering aircraft in order to avoid penetrating the airspace of neutral third party nations as well as avoiding other military or commercial aircraft. Lastly, even if a ship's captain has the maneuver room to launch aircraft en masse, he will be reluctant to do so since a carrier is most vulnerable to attack during launch and recovery evolutions. This is because a carrier must maintain a relatively steady heading in order to generate the appropriate winds over the flight deck for flight operations. As a result, the ship is in an extremely predictable position that facilitates enemy targeting and attacks. Presently,

¹⁶ MCIA, 29-30.

these issues pose significant planning and execution challenges to daily operations in the Adriatic Sea, the Red Sea, and the Persian Gulf. These issues will continue to adversely affect the sortie generation rate (SGR) capability and the operational tempo of naval aviation platforms supporting OMFTS.

The second reason traditional single deck flight operations cannot support OMFTS operations from over-the-horizon is because of flight deck cycle times. A ship's deck cycle is the amount of time between each scheduled aircraft launch and recovery period. Today, most aircraft carriers use a 1 ½ hour (1+30) deck cycle. A deck cycle is commenced with the launching of aircraft (this usually takes between seven to ten minutes). Once all the launching aircraft are airborne, the previous cycle's aircraft land (this takes between ten to twenty minutes depending on the number of aircraft recovering, environmental factors, etc.). The next thirty minutes of the deck cycle is committed to parking and moving the recovered aircraft in preparation for the next launch ("respotting the deck"), aircraft servicing and maintenance, aircraft rearming, and flight deck maintenance (catapults, arresting gear, etc.). For the final thirty minutes of the deck cycle, aircraft are started and taxied into position for the next launch. The important point to realize is that there is very little flexibility imbedded in the deck cycle. The 1+30 time frame must be strictly adhered to since it is just enough time to accomplish the tasks listed above. If the deck cycle is interrupted, then the carrier will fail to maintain a smooth operational flow from launch to launch. Simply stated, under normal procedures, the number of sorties that are generated by a launching platform is not dictated by the abilities of aircraft, but rather by the aircraft carrier itself.¹⁷ For example, assume that an

¹⁷ The discussion concerning flight deck cycle times is based on the author's personal observations from two six month aircraft carrier deployments.

aircraft carrier has three Joint Strike Fighter (JSF) squadrons aboard and each squadron has seven aircraft on the flight deck (six available for operations and one as a maintenance spare or alert aircraft). Furthermore, assume that all of these aircraft are dedicated to supporting the MAGTF's scheme of maneuver. Since the JSF's sortie generation requirement for carrier operations is 4.0 sorties per 16 hour fly day during initial surge operations (days 1-7),¹⁸ the MAGTF commander can expect to have 72 sorties available to him per day throughout his initial seven days of operations. While this sounds like an impressive figure, its value in terms of combat power begins to diminish when viewed in terms of sortie availability. Since the carrier's deck cycle is strictly adhered to and not determined by the MAGTF's scheme of maneuver, the MAGTF commander can expect to receive sorties (in this case, eight to ten sorties per deck cycle) as they are made available by the seaborne platform's launch and recovery schedule. In other words, the MAGTF commander eventually will receive sorties but they may not be in the volume he needs or at the time and place of his choosing.

The third reason over-the-horizon single deck flight operations will not support the MAGTF in OMFTS is because over-the-horizon posturing creates a significant time-distance problem that negatively affects aircraft on-station and response times. Because aircraft will have to fly longer ranges to get to and from the battlefield, they will have less fuel available for target area operations. Once these aircraft depart the target area, there will be a significant delay in air support coverage since follow on relief aircraft must wait to launch according to the carrier's deck cycle. For example, assume that a MAGTF is engaged in a mission 50 nautical miles (nm) inland while an Amphibious Ready Group

¹⁸ Joint Strike Fighter (JSF) Program Office, *Joint Initial Requirements Document (JIRD) III*, (Arlington, VA: JSF Program Office, 25 August 1998), 25-26.

(ARG) built around a LHD is operating 100 nm off the coast. Any requests for air support will require aircraft to transit at least 150 nm before they can deliver fires. Assuming that the aircraft maintain an average airspeed of 420 knots ground speed (kgs) throughout the entire mission (an unrealistic assumption due to fuel consumption), it will take a section (two aircraft) 22 minutes to arrive at the objective and 22 minutes to return to the ship. If the LHD is operating on a one hour cycle, fixed wing assets will be available for approximately 16 minutes of tactical employment. What is most tactically significant is the fact that the MAGTF commander cannot expect to see any more fixed wing support for 44 minutes after the first section's weapons impact their targets due to deck cycle times (Figure 1). In terms of modern ground combat with mechanized forces, 44 minutes can be an eternity. Moreover, the above calculations do not account for the multitude of external elements that impinge on seaborne flight operations. Flight rendezvous, pre-mission in-flight refueling, and on-deck maintenance troubleshooting, all combined with weather and high sea state impediments, will limit air asset availability even further. To make this situation worse, the Marine Corps envisions that future ARGs will deploy with ten (10) JSFs, twelve (12) MV-22s, four (4) CH-53Es, and nine (9) "skids" (AH-1s and UH-1s).¹⁹ Even if the CH-53Es and the "skids" are "farmed out" to the small deck amphibious ships (i.e. LPDs and LSD's), this "12 and 10 mix" will cause the flight decks of LHAs and LHDs to be extremely crowded. This will serve to exacerbate the bottleneck effects and the sortie generation problems already inherent to single deck flight operations.

¹⁹ LtCol Joseph Shusko, USMC, Aviation Program Analyst, Assessment and Acquisition Support Branch of Programs and Resources, HQMC, "JSF Concept of Employment Brief to CG MCCDC," personal e-

fire support availability. It is important to note that these calculations still do not consider the weather, sea state, and sea space restrictions discussed previously. Also, the problems of coordinating the STOVL (Short Takeoff/Vertical Landing) flight operations of carrier-based Marine JSFs with traditional “cat and trap” (catapult and arrested landing) operations will hinder SGRs even further.

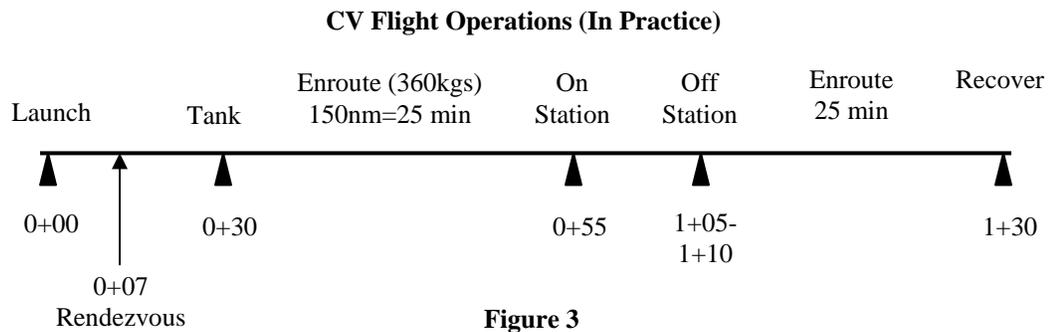


Figure 3

In the final analysis, traditional naval flight operations conducted over-the-horizon will lack adequate responsiveness to support forces ashore. Although the JSF (or any other aircraft, for that matter) will be able to generate an impressive amount of sorties throughout a fly day, the launching platform’s inability to quickly generate a high rate of sorties will lead to inadequate support for ongoing ground operations. Traditional amphibious ship-based and carrier-based flight operations simply will fail to provide the “quick reaction, high sortie rates, [and] flexibility” that will be required on the future battlefield. The MAGTF commander must be able to expect effective and timely delivery of aerial fires as he needs them if he is to drive the fight against an increasingly capable enemy.

Is There a Solution?

Many of the concept papers included in The *United States Marine Corps' Warfighting Concepts for the 21st Century* look to advanced naval surface fires as a possible solution to supporting Ship-to-Objective-Maneuver. Emerging technologies promise to give seaborne weapons the capability to engage a wide range of targets deep within the MAGTF commander's battlespace. For instance, an extended range guided munition (ERGM) for the U.S. Mk45 five-inch naval gun with a 63 nm stand-off range is scheduled for delivery in the year 2000. The Navy currently is planning a demonstration to show the 50-270 nm targeting capability of the 155mm Vertical Gun/Advanced Ship. In 1995, an amphibious ship successfully test-fired the Army Tactical Missile System (ATACMS) at targets up to 160 miles away. A more forward looking idea envisions the development of an arsenal ship or an arsenal submarine which would be equipped with a deep magazine of long-range precision-guided rockets and longer-range naval gun projectiles²¹.

These new weapons, however, are better suited for shaping the deep and deep-deep battle than they are for supporting engaged ground maneuver elements. As the *Advanced Expeditionary Fire Support* Concept paper states, "there is a greater time sensitivity associated with fires in support of maneuver elements than there is with fires in support of battlespace shaping."²² Because of the longer employment ranges and times of flight of these weapons, the time delay between fire requests and weapon deliveries could prove to be decisive. In the deep and deep-deep battle, this time delay holds relatively little significance. However, when engaging targets in close proximity to

²¹ "Naval Strategy Executive Summary," Navy Educational Website, downloaded from *America Online*, 1.

²² MCCDC, VI-12.

“friendly” or in a dynamic urban combat environment, a delay of a few minutes can mean the difference between mission accomplishment and excessive casualties. In essence, while future naval surface fires may provide an outstanding battlespace shaping capability, they are unlikely to fulfill the critical requirement to “rapidly process fire requests, quickly engage targets, and deliver and sustain a high volume of fire” when directly supporting ground maneuver forces.²³

It would seem, then, that aviation will continue to be the fire support source of choice for amphibious operations. As previously discussed, however, single deck flight operations will fail to generate sorties with the responsiveness needed to support OMFTS. If the full combat power of tactical aviation is to be realized, airpower “must first escape its two-dimensional world of large parking ramps, taxiways, and runways” as well as the restrictions of single flight deck operations.²⁴ In order to do this, naval forces must adopt the concept of dispersion. By dispersing, naval forces will reap two critical advantages: (1) increased survivability in the littoral environment and (2) increased sortie generation rates.

The idea that the dispersion of air assets enhances survivability is not a new one. In the late 1950s, the concept of “reactive movement” was conceived as a way to defend aircraft from the Soviet tactical nuclear threat. According to this concept, clusters of aircraft would conduct flight operations for several days from numerous, random, unprepared sites such as abandoned airfields or stretches of highway. A main base located in the rear would provide logistical and maintenance support for ongoing

²³ *Ibid*, VI-12.

²⁴ Mike Kiraly and John Bioty, *The Importance of Basing Flexibility: Expeditionary Airpower for Full Spectrum Dominance*, Anser Corporation study prepared for the Joint Strike Fighter Program Office, (Arlington, VA: The JSF Program Office, August 1998), 3.

operations and subsequent overhauling and repairing of aircraft. Since only one-third of the surveyed sites would be occupied, enemy targeting would be reduced to a complicated shell game.²⁵ This concept was first validated in a 1979 Defense Science Board study. Assuming that an enemy could attack each friendly air base with ten tactical ballistic missiles with a 50 meter circular error of probability (CEP), the study concluded that the more bases were dispersed, the less likely they were to be closed by enemy interdiction fires (Table 1).²⁶

<u>Probability of Base Closure</u>	<u># of Alternate Launch and Recovery Sites</u>
0.18	3
0.38	2
0.65	1
0.90	0

Table 1

The application of these results to seaborne aircraft platforms and OMFTS is obvious. Multiple ships maneuvering and conducting flight operations over-the-horizon will increase the complexity of the enemy’s targeting problem dramatically. Not only will “friendly” force survivability increase, but the battlespace tempo and initiative will remain in the hands of the MAGTF commander as the enemy hesitates during his engagement cycle.

Dispersion also enhances sortie generation rates. By distributing air assets throughout a theater of operations, a commander can reduce the bottleneck effect of conducting flight operations from a single base and, therefore, increase his effective combat power through increased aircraft availability. Moreover, the debilitating effects of weather and sea-state can be reduced significantly by increasing the number of sites from which aircraft can launch and recover. The Marine Corps’ Gulf War experience

²⁵ *Ibid*, 5.

²⁶ *Ibid*, 7.

confirms the conclusion that dispersed sites (particularly sites located close to the forward edge of the battle area) significantly improve sortie generation rates.²⁷ By cycling through forward operating bases (FOB), sections of Marine aircraft routinely launched from a main operating base (MOB), provided six combat sorties, and returned to the MOB in less than four hours. Harriers were able to produce as many as 150 sorties per day by launching up to four aircraft per minute and landing up to seven aircraft per minute at FOBs.²⁸ The Tanajib FOB achieved the highest SGR on 26 February, 1991, when it refueled, rearmed, and serviced 34 sorties in five hours.²⁹ These numbers are significant in that they directly translate into effective and responsive firepower. It is not enough that aircraft are present over-the-horizon, they must also be operationally available to the MAGTF commander at any given moment. The Gulf War experience showed that dispersed, forward-based aircraft could surge as required to support ground force requirements. Moreover, it showed that flight operations do not have to be constrained by the limited sortie generation capacity of a single sea or land air base. In the most basic terms, dispersion gives the MAGTF commander the flexibility to employ aviation fires on demand based on his situation and scheme of maneuver rather than on the limited ability of an air base to make sorties available.

Making Dispersion a Reality

Can dispersion work within the constraints of the OMFTS operating environment? On the one hand, traditional single deck air operations will fail to meet the MAGTF commander's tempo and response requirements. On the other hand, traditional fixed land based air operations will prove to be too cumbersome to support and too

²⁷ *Ibid* 9.

²⁸ *Ibid*, 29-30.

vulnerable to protect. “If airpower is...to be responsive to the [commander], in the next conflict it must provide him with options, not problems.”³⁰ The arrival of new technologies and systems and the adoption of a new naval employment concept will make dispersion possible and provide the commander with options. By exploiting the advanced mobility, maintainability, and lethality of emerging systems, the MAGTF commander can transcend the limitations imposed by contemporary naval air operations by using all the basing resources available to him within an area of operations (AO). Depending on the threat level and the littoral infrastructure, naval forces can choose to operate from naval platforms, austere land bases, or a combination of both. Regardless of the basing option, the basic goal is to provide the commander with “lethal air assets that can be moved and dispersed at any time, to be massed at any place to destroy, neutralize, or delay any target, and to attack as many times as necessary.”³¹

The first option, basing from naval platforms, is most in keeping with current Marine Corps warfighting concepts. As pointed out in the SOA concept paper, the size and vulnerability of the logistical support footprint can be reduced significantly by conducting aviation operations exclusively from seaborne platforms. Dispersing assets afloat, however, will require a significant increase in the number of flight decks from which to launch and recover aircraft. In order to increase the number of flight decks, the way in which naval forces deploy must be revised and, more importantly, more aviation capable platforms must be procured.

The easiest and most immediate step that can be made toward making dispersion a reality is to merge the assets of the CVBG (Carrier Battle Group) and the ARG into a

²⁹ *Ibid*, 34.

³⁰ *Ibid*, 48.

single Naval Expeditionary Force (NEF). Traditionally, because of aircraft incompatibility and mission disparities (i.e. “blue water” versus “brown water” missions), CVBGs and ARGs have deployed simultaneously but have operated as separate entities. As a result, both carrier and amphibious fixed wing operations have been hamstrung by the disadvantages associated with single deck flight procedures. The basic commonality of airframes within the Navy and the Marine Corps and the rise of littoral operations as the preeminent naval mission make the merging of ARGs and CVBGs into a single NEF the logical progression of naval force structure for the OMFTS environment. By combining assets into a single NEF centered around an aircraft carrier, the number of platforms from which aircraft can operate doubles (assuming that the ARGs deploy with a single LHD or LHA). More importantly, the resulting synergy of fire and command and control effects will increase the combat power available to support OMFTS.

Combining the ARG and CVBG into a single NEF is only the first step. More platforms must be added to the NEF’s list of basing assets. New flat deck amphibious ships that are cheap, simple, and capable of performing intermediate level (I-level) aircraft maintenance should be procured so that each NEF can deploy with at least three aviation platforms (one carrier and two amphibious ships). Similar in concept to the escort carriers of World War Two and the Korean War, the NEF’s two amphibious assault ships could deploy with a squadron’s worth of STOVL JSFs that are fully integrated into the resident carrier’s command and control system and operational evolutions. While primarily serving as main bases for resident JSF units, these “escort carriers” could also serve as auxiliary bases for non-resident STOVL JSFs that need fuel,

³¹ *Ibid*, 46.

immediate maintenance, or rapid turnarounds for follow-on missions that fall outside their host deck's cycle times. Moreover, the additional deck space provided by spreading the NEF's air assets among these ships will alleviate the deck congestion that would result from the current "12 and 10 mix" plan for amphibious assault ships.

Along with these "escort carriers," maritime prepositioning ships (MPS) should be utilized as additional basing assets. As the Marine Corps' *Maritime Prepositioning Force 2010* concept paper states,

Maritime prepositioning ships will be multi-purpose in nature and provide facilities for tactical employment of assault support aircraft, surface assault craft, advanced amphibious assault vehicles, and the ships' own organic lighterage in conditions of at least sea state three. Further, the ships' communications systems will be fully compatible with the tactical command and control architecture of the ATF (amphibious task force), allowing access to the advanced capabilities and shared SA which will be available in the future. While future maritime prepositioning ships will not have a true forcible entry capability, they will possess the versatility to reinforce the striking power of the ATF.³²

Although not specifically mentioned, JSF operations from MPSs is just as viable. Small detachments of support personnel could conduct rapid and flexible JSF flight operations from MPSs even while major logistical evolutions are underway in support of the MAGTF. The only required design feature for future MPSs is that they be able to support a 450' vectored thrust takeoff. There would not be any requirement to add hangar or large maintenance facilities since all major aircraft maintenance could be performed on one of the three available flat deck platforms.

Dispersing at sea will support the intent of OMFTS. Not only will the NEF be more survivable, but its overall logistics footprint will be minimized significantly by having numerous seaborne platforms capable of conducting aircraft refueling, rearming,

³² MCCDC, III-6 – III-7.

and repairing. Furthermore, dispersing at sea will reduce the NEF's reliance on strategic tanking assets since there will be more indigenous NEF tankers available to conduct refueling operations from numerous platforms (these assets include S-3s, F/A-18Fs, and MV-22s [assuming that it is configured with the refueling pod that is under current debate]). This will be crucial to conducting future expeditionary operations since U.S. forces will not always be able to rely on Gulf War levels of host nation support or U.S. Air Force aerial refueling augmentation (70% of USN strike flights required land-based USAF tanker support to complete their missions during the Gulf War³³).

Most importantly, dispersing at sea will increase the NEF's ability to generate sorties from over-the-horizon. Naval aviation will still be hindered by the time-distance problem inherent in over-the-horizon operations as well as by the limitations of deck cycles, steaming space, and weather. But, by staggering the deck cycle times of the NEF's various aircraft platforms, the MAGTF commander will have more sustained air coverage than is possible using traditional procedures. As seen by the data presented in Figures 1 through 3, a section of aircraft using traditional launch and recovery procedures can provide approximately ten to fifteen minutes of air support to a GCE engaged 50 nm inland. Assuming that a NEF has four seaborne launch and recovery sites available (one carrier, two L-class ships, and one MPS), it would be possible for seabased aircraft to provide at least 40 minutes of coverage every hour with no external support. Using an aggressive organic tanking plan, this time could be increased even further by ten to twenty minutes.

³³ Richard G. Davis, *Decisive Force: Strategic Bombing in the Gulf War*, Air Force History and Museums Program (Washington, DC: GPO, 1996), 21.

The second and most responsive form of employing aviation in support of OMFTS is operating from dispersed, austere land bases. Not only would aircraft be closer to the supported units, but the effects of weather, sea state, and limited sea maneuver room would be virtually eliminated. However, the Marine Corps' SOA concept discourages austere basing since "it subjects personnel and equipment to many vulnerabilities and increases the strain on the combat service support system."³⁴ This mindset is a product of past littoral operations and exercises where Harriers could provide only limited combat power at an extremely high logistical cost. Because future systems will enhance aircraft lethality and supportability, austere basing should rise as the preeminent mode of employing a NEF's air assets. A recent basing flexibility study prepared for the Joint Strike Fighter Program Office found that a STOVL type aircraft that is "easily maintainable [and] operating from dispersed, austere bases near the front lines, without the need of extensive ground support, will be able to generate greater number of sorties [than aircraft operating from other bases]. This translates into more bombs on target, quicker. Commanders will ...benefit by receiving the responsive air support they need, along with the added benefit of economy of force."³⁵ In other words, the MAGTF commander can receive unprecedented combat power and responsiveness from dispersed land-based aircraft for less logistical cost than is possible today.

How much responsive combat power can be generated? Consider a division (four) of JSFs operating 50 nm from the MAGTF's ground elements. Assume that the MAGTF is facing an attack from a mechanized force that is 15 kilometers distant and comprised of 95 tanks and 105 other vehicles spaced 25-50 meters apart and moving at

³⁴ MCCDC, IV-12.

³⁵ Kiraly and Bioty, 48.

30 kilometers per hour (kph) (i.e. thirty minutes from close contact). While on deck at their refueling and rearming site, the JSFs receive initial target cueing data via LINK-16 from airborne platforms such as JSTARS, AWACS, or other JSFs already conducting missions (air-to-air or air-to-ground). Once launched, the JSF pilots refine this information with their onboard targeting systems and create a detailed tactical situation overlay. This overlay includes friendly positions, enemy vehicle type identifications, column dimensions (to include the number of vehicles and their speed of advance), and significant terrain features (such as high ground and road networks that indicate probable routes of advance and likely chokepoints). Once this information is processed and targeting assignments are issued throughout the division via intraflight data link (IFDL), the JSFs engage the highest priority targets as dictated by the MAGTF commander. According to the *JSF Operational Employment Support Concept*, a JSF carrying six CBU-105s can achieve approximately 24 kills against mechanized targets in this type of situation even if the enemy disperses. For this scenario this means that four attacking JSFs could eliminate a total of 96 enemy vehicles or nearly half of the attacking force!³⁶ Of equal significance is the fact that the JSFs could be delivering ordnance in less than ten minutes of receiving initial targeting information simply because they are positioned close to the fight. If the ground forces had to depend on over-the-horizon, seaborne assets they would, at best, receive support in 25-30 minutes. In simple terms, this difference in time equates to the enemy being engaged ten kilometers away from friendly forces instead of when they are in close contact.

³⁶ The Joint Strike Fighter Program Office, *Joint Strike Fighter Operational Employment Support Concept (JSF OESC)*, (Arlington, VA: The JSF Program Office, 1998), 4-21 – 4-24.

Can the NEF sustain dispersed, land based air operations? As the *United States Marine Corps Warfighting Concepts for the 21st Century* points out, “Tempo is tied closely to logistics. Logistics sets the bounds for what is operationally possible.”³⁷ Simply put, aircraft will have to have a place to operate from and they will have to be refueled and rearmed. Historically, these elements have been the cause of the ACE’s large logistics footprint. During the Cold War, Soviet planners knew that “the air base was the Achilles heel of [western] airpower.”³⁸ The typically large and cumbersome bases required to support combat air operations were easily targeted, difficult to defend, and logistically expensive to maintain. Moreover, the weight of these large aviation logistics packages run contrary to the basic tenets of OMFTS. If these large, prepared airfields were no longer a requirement, then force commanders could enjoy a greater range of basing flexibility and survivability at less logistical cost. An Israeli Air Force (IAF) study came to the same conclusion after it determined that if takeoff distances were less than 1200 feet, the number of suitable jet airfields within Israel could be increased from eleven to forty.³⁹

Fortunately, expeditionary operations have been a matter of focus for the development of new systems such as the JSF, the KC-130J, and new munitions technologies. Despite the proposal that “Marine air will...be seabased to the maximum extent possible,”⁴⁰ it has been recognized that ground forces must “increasingly take advantage of sea-based fires and seek shore-based fire support systems with improved

³⁷ MCCDC, VII-15.

³⁸ Kiraly and Bioty, 46.

³⁹ *Ibid*, 9.

⁴⁰ MCCDC, IV-11.

tactical mobility [emphasis added].”⁴¹ As a result, the *Joint Strike Fighter Master Plan* has embraced the concept that aircraft basing flexibility “provides the foundation for forward basing which, in turn, increases responsiveness.”⁴²

With this in mind, the JSF is being designed to possess two key attributes: (1) mobility and (2) maintainability. These two characteristics will provide the MAGTF and Joint Force commanders with a devastating and responsive weapon system that can satisfy their full-dimensional mission needs from any location within the battlespace. The source of the JSF’s mobility is its STOVL capability. The ability to launch and recover from a variety of surfaces and sites will be the basic cornerstone of effectively employing the JSF throughout the breadth of the littoral battlespace. Consequently, the Marine Corps’ JSF variant is being designed to meet the following minimum requirements:

- (1) The USMC STOVL JSF will be capable of executing a 500’ Short Take-off (STO) from LHAs, LHDs, and aircraft carriers on a tropical day with 10 knots of operational wind-over-the-deck (WOD). From this type of launch, the JSF will have a minimum combat radius of 400 nm. (The UK STOVL variant minimum is a 450’ ski jump STO and a combat radius of 450 nm.)
- (2) From austere sites, the USMC desired minimum is for the JSF (loaded with two 1000 pound JDAMs and two AIM-120 AMRAAMs) to be able to operate within 1200’ on wet AM-2 matting with 15 knots of crosswind. Following launch, the JSF must fly a 50 nm Close Air Support (CAS) mission and return 150 nm to a sea-based platform. Additionally, the JSF will be able to execute

⁴¹ *Ibid*, I-19.

⁴² Kiraly and Bioty, 15.

a Short Takeoff and Landing (STOL) for all STOVL missions when operating from any U.S. standard, two lane, asphalt road.⁴³

Because the JSF will have these capabilities, the MAGTF's options for land basing aircraft will be numerous. In situations where host nation support (HNS) is available or where the threat permits, classic FOBs or Forward Arming and Refueling Points (FARPs) using AM-2 matting could be established. In situations that logistically or tactically do not permit such sites, road and highway networks could be used to support JSF operations. Since 27% of the world's countries have limited point-to-point connectivity with all-weather roads, 55% have good national road infrastructures, and 18% have well developed national all-weather highway transport systems,⁴⁴ the use of road networks should be one of the MAGTF commander's primary aircraft basing options. With a detailed Intelligence Preparation of the Battlefield (IPB), a menu of operating sites could be created from those locations deemed suitable for JSF operations. From this menu, sites could be activated as required to support the ongoing NEF mission. By capitalizing on the JSF's STOVL and austere basing capabilities, the MAGTF can take the first step toward breaking away from the inefficient traditional methods of generating airpower from the sea. For the MAGTF commander, this translates into timely and responsive combat power that can be positioned virtually anywhere within the NEF's battlespace.

The JSF's maintainability will prove to be the crucial element to sustaining dispersed air operations. From its conception, the JSF has been designed to reduce the number of required support personnel, streamline the maintenance action process, and

⁴³ JSF Program Office, *JIRD III*, 36.

⁴⁴ MCIA, 55.

increase the number of combat turns per maintenance action.⁴⁵ By incorporating new technologies and management tools such as single stack avionics, self-bleed hydraulics, advanced Built-In-Test (BIT) systems, and advanced troubleshooting and maintenance procedures, the JSF promises to be 2.5 times more reliable than current aircraft.⁴⁶ The following is a brief description of the key elements of the JSF's general support concept that will make this increased reliability and maintainability possible.

- (1) The Prognostics and Health Management System (PHM) - Known as the "brain of the support concept,"⁴⁷ PHM allows the JSF to perform self-diagnostics in order to identify aircraft discrepancies even while airborne. By identifying faults early, maintainers on the ground can proactively start and rehearse maintenance actions before the aircraft recovers.
- (2) The Joint Distributive Information System (JDIS) – In basic terms, JDIS is an all inclusive datalink system that permits the real-time dissemination of information between individual aircraft, the Maintenance Department, and Current Operations. While airborne, PHM transmits aircraft status information to JDIS. This information is automatically sent to the squadron Operations and Maintenance Departments. If maintenance is required, JDIS automatically initiates the necessary parts requisitions and provides the necessary information so that Maintenance Control can schedule maintenance and send a recovery crew to the appropriate aircraft recovery location. Meanwhile, Operations can enter the aircraft's next required configuration via

⁴⁵ JSF Program Office, *JSF OESC*, 2-6.

⁴⁶ *Ibid*

⁴⁷ *Ibid*, 2-6.

JDIS thereby giving ordnance personnel adequate time to prepare and stage weapons for the aircraft's follow-on mission.⁴⁸

- (3) The Integrated Combat Turn (ICT) – The ICT is what puts this advanced information into action. With JDIS information, maintenance crews can properly position themselves with the appropriate repair parts and equipment before the aircraft lands. Once they have access to the aircraft, the ICT crew can turn an aircraft around in far less time and with fewer people than is currently possible with legacy systems. The ICT operation will allow a three man weapons loading crew and a two man maintenance crew to reconfigure and turn a JSF from a Deep Air Support (DAS) mission to a Defensive Counter Air (DCA) mission in less than thirty minutes. This means that a pilot could recover from and debrief a completed mission and then brief and launch on a completely new mission all within 45 minutes.⁴⁹ This rapid turnaround cycle is made possible by the JSF's advanced design and safety improvements. Because of these improvements, the basic tasks of refueling, rearming, and repairing can be completed simultaneously (i.e. in parallel) and, as a result, the reactive and inefficient nature of traditional sequential turn around cycles are eliminated (see Figures 4 and 5).⁵⁰

⁴⁸ *Ibid*, 4-24.

⁴⁹ *Ibid*, 4-12.

⁵⁰ *Ibid*, 3-4.

Legacy Systems (Reactive/Sequential)

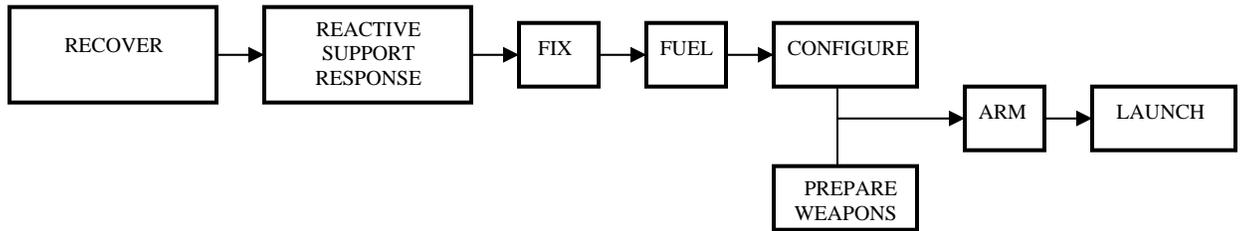


Figure 4

JSF (Proactive/Parallel)

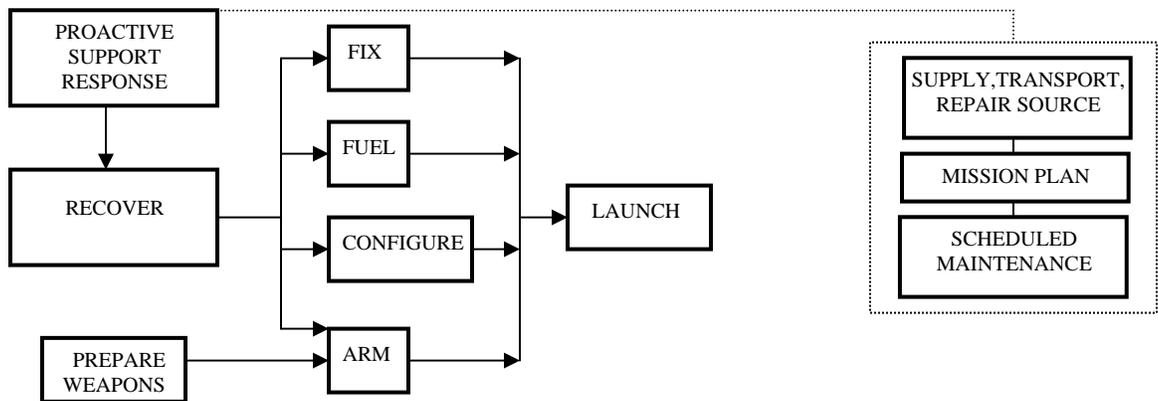


Figure 5

(4) The “Maintenance Box” – The “maintenance box” is the area required to conduct JSF maintenance. According to the *JIRD III*, this box should be no larger than 60 feet long, 43 feet wide (38 feet for a CV), and 20 feet high. All maintenance activities will take place within the confines of this area. These activities include weapons loading, turnaround maintenance, propulsion system removal and installation (R&I), ejection seat R&I, and Low Observable (LO) panel and surface restoration.⁵¹ The ability to conduct all major organizational level maintenance actions within such a compressed area

lends itself nicely to the concept of dispersion and to limiting the landward logistical footprint.

The net result of these advanced concepts and systems will be the dramatic reduction of the aviation support footprint. In terms of dispersion, this reduced footprint is critical to exploiting and sustaining the mobility and lethality that is inherent in the JSF. By taking advantage of the JSF's full range of capabilities, the MAGTF commander will guarantee himself a responsive and devastating source of fire support.

Finding places for the JSF to operate from will be the easy part. Getting maintenance crews, fuel, and ordnance to the aircraft will be the true challenge of dispersed land operations. Fortunately, the KC-130J will be an asset that can deliver all three simultaneously to the MAGTF commander just about anywhere on the battlefield, day or night. Designed with expeditionary operations in mind, the KC-130J will fly 35% farther, cruise 9% faster, and take off in 28% less distance than current aircraft. These performance enhancements make the "J" capable of delivering 57,500 pounds of fuel and 24,000 pounds of personnel, ordnance, parts, and support equipment to a 2800 to 3300 foot unprepared landing site (this assumes that the KC-130J is based 500-nm away). Once on the ground, the "J" will be able to conduct rapid ground refueling (RGR) four times faster than is currently possible. This equates to two JSFs being refueled simultaneously at a rate of 300 gallons/2040 pounds per minute per aircraft. Moreover, the KC-130J's internal and external Night Vision Imaging System compatible lighting, as well as its own inherent night vision capability, will enable JSF support operations to be conducted virtually around the clock. Finally, while on deck, the aircraft can allow its

⁵¹ JSF Program Office, *JIRD III*, 27-28.

propellers to windmill freely even as its engines run in a low speed ground idle condition know as “Hotel” mode. This will not only offer greater safety for ground personnel and aircraft, but it also will allow the “J” to maintain a launch-ready status for the rapid extraction of support teams should the tactical situation deteriorate.⁵²

Admittedly, 57,500 pounds of gas and 24,000 pounds of cargo does not seem adequate to support and sustain flight operations as they are understood today. Under normal contemporary procedures, this amount of support would arm and fuel approximately four F/A-18s for only one sortie each. This assumes that all 24,000 pounds of cargo lift is consumed by ordnance thus leaving no room for maintenance personnel, equipment, or parts. The JSF, however, is not a Hornet. The fact that a five man team can perform a complete ICT, to include the loading of ordnance, means that only a fraction of the “J’s” available 24,000 pounds of cargo will be consumed by maintenance personnel. Also, the JSF’s Prognostics and Health Management system will eliminate the need for extensive tool kits, parts packages, and support equipment since pilots will be able to identify significant systems failures airborne and proceed back to one of the major support ships for repairs vice recovering at an austere site. Because the JSF’s maintenance footprint will be so small, more room for fuel, weapons, and site security personnel will be available on each KC-130J.

Advances in weapons technology will contribute greatly to sustaining austere air bases. Of particular worth are the advances in Miniaturized Munitions Technology (MMT). Realizing that “to constrain [the JSF] design to 1940 bomb bodies and 1970-1980 weapons guidance kits would be shortsighted and limit the return on investment in

⁵² Maj Andrew M. McHugh, USMCR, “KC-130J Operations From an Austere Base,” brief provided by Marketing Manager, Marine Corps Programs for Lockheed Martin Aeronautical Systems, Winter 1998.

the JSF weapon system,”⁵³ the U.S. Air Force has taken the lead in developing a new class of munitions that will be able to service targets in three major target groups: Attack Operations (hardened targets), Suppression of Enemy Air Defenses (SEAD), and Armor/Interdiction.⁵⁴ Weighing only 250 pounds and measuring a mere six inches in diameter and six feet in length, the Miniaturized Munitions Technology Demonstration (MMTD) effort has proven that a small 50 pound explosive warhead can hit targets with an average 1.3-meter accuracy and penetrate up to six feet of reinforced concrete.⁵⁵ As of right now, a JSF should be able to carry six to ten of these munitions. In effect, this will double the number of targets that a JSF could engage or destroy with current general purpose weapons.⁵⁶ Moreover, because of its accuracy, versatility, and limited size, this weapon will be ideally suited for future urban operations where a wide array of targets must be engaged while minimizing collateral damage and rubble effects. In the end, the reduced weight and smaller size of MMT weapons will equate to more air-to-air and air-to-ground weapons being delivered by a much smaller aircraft support footprint.

Finally, the value of KC-130J sustainment operations can be enhanced by intelligently managing fuel allocation. Since JSFs will be operating in close proximity to frontline fighting, fuel consumption rates per sortie should drop significantly. As a result, it would not be necessary for each JSF to launch with a full fuel tank on each mission. Taking 5000 pounds of gas during the RGR evolution⁵⁷ would be enough for a JSF to transit 50-75 nm to the target, react to any threats, deliver ordnance, and return to the

⁵³ JSF Program Office, *JSF OESC*, 1-15.

⁵⁴ “Miniature Munition Capability: Miniaturized Munitions Technology Demonstration (MMTD),” *FAS Military Analysis Network*, downloaded from *America Online*, 8 October 1998, 3.

⁵⁵ *Ibid*, 1-2.

⁵⁶ JSF Program Office, *JSF OESC*, 4-38.

⁵⁷ This assumes that 2000 pounds of fuel remains in the aircraft after landing. Therefore, the aircraft’s total fuel weight at takeoff would be approximately 7000 pounds.

launch site for rearming and refueling. With 57,500 pounds of gas available, a single KC-130J could sustain eleven JSF sorties using this procedure. The number of supportable sorties will go down significantly, however, should it become necessary to divert assets from an austere site to a JFACC or NEF air-to-air mission since these missions require full fuel loads.

Inevitably, sustaining these operations will depend on how quickly the KC-130Js can be cycled into the dispersed sites. Since operations will be constrained by limited aircraft and limited crews, austere base support will be reduced to a planning and scheduling drill. Some of these planning difficulties could be overcome by incorporating an inflight refueling capability into the “J”. KC-130Js could extend their support timelines twofold by receiving fuel airborne and then returning to an austere site. Lockheed Martin has made this a viable option for the aircraft but, as of yet, the Marine Corps has not decided to purchase this capability.⁵⁸

In the final analysis, dispersed air operations will have to be phased to coincide with the support requirements of ground operations, the ability of the NEF to sustain operations throughout the battlespace, and the prevailing environmental conditions of the AO. When the MAGTF’s focus of main effort calls for a surge in fire support, the NEF should exercise its austere land base capability. During periods of ground consolidation, aircraft should flow back to their parent ships or bases in order to repair aircraft and rest crews. During periods of bad weather, aircraft should move to areas where weather effects are minimized. In other words, dispersing air operations within the littorals should not be viewed as an “either/or” proposition. Dispersion should be seen as a range

⁵⁸ McHugh.

of options that the MAGTF commander can choose from in order to best complete his mission with the assets he has available.

Controlling Dispersion

The traditional method of “pushing” information to pilots via an Air Tasking Order or radio communications will prove inadequate as the ability to generate and receive information increases throughout all echelons of the MAGTF. A decentralized command and control system based on unfettered information access will be the key to focusing the combat power of dispersed aviation assets within the NEF’s battlespace. Conceptually, the MAGTF command element would act as the conduit for information distribution, filtering out noise (i.e. unnecessary data) and distributing a common operational picture (COP) to subordinate elements. At the same time, theater surveillance, reconnaissance, and ordnance delivering platforms would inject real-time and near real-time (NRT) information into the system for processing and dissemination (see Figure 6). As a result of this two-way sharing of information, the commander will be able to focus the efforts of the MAGTF as a synergistic whole to maintain and exploit the high tempo that OMFTS generates. The goal of such a command and control system will be to arm subordinate elements with the commander’s intent and a COP so that they can execute the “intuitive decisionmaking” that yields the “speed and agility [that] create the ‘initial condition,’ allow [Marines] to preserve the initiative, and force the enemy to react by design to [Marine] actions.”⁵⁹ Simply stated, units will not have to wait for information and direction to be “passed”. They will act in accordance with higher intent and drive changing situations to exploit enemy weaknesses as they pursue mission accomplishment.

The JSF will be an ideal element of this “access-based” command and control system. According to the *JIRD III*, the JSF will have the minimum capability to “have the linkages and associated bandwidth to pass and receive timely information, to include: broadcast (e.g. threat updates, weather), command and control direction (e.g. target information), inter/intra flight datalink communications, FAC communications, and aircraft status reporting information.”⁶⁰ Tactically, this means that the JSF, whether airborne or on deck, will be able to upload pre-planned mission data that is stored in the aircraft or download new information that is available over the “information net”. The goal is to provide the pilot with unambiguous and easily assimilated on-board and off-board real time information that will facilitate the rapid generation of sorties and increase the survivability and lethality of each aircraft.⁶¹ For the MAGTF commander, this will equate to the rapid and efficient day or night delivery of effective ordnance on his highest priority targets.

It is important to note that the JSF will not be just an information “sponge”; it will be an information provider. As Metcalf’s Law states, “the power of a network increases as the square of the number of nodes in the network.”⁶² With its IFDL capability and LINK-16 connectivity, the JSF will be an invaluable node in the MAGTF C2 network. By utilizing the JSF’s cockpit recorder with split screen playback function, pilots will be able to provide near real-time bomb impact assessments (BIA) to the MAGTF commander so that he can make immediate targeting and asset allocation decisions (i.e. restrike requirements). Moreover, the ability of the JSF’s systems to simultaneously

⁵⁹ MCCDC, IV-12.

⁶⁰ JSF Program Office, *JIRD III*, 15.

⁶¹ *Ibid*, 15-16.

“paint the air picture,” monitor the ground situation, and transmit tactical data via a secure joint data link will give the MAGTF an all inclusive battlespace situational awareness (SA) asset. As espoused in Vice Admiral Arthur K. Cebrowski’s Network Centric Warfare (NCW) theory, it is this linking of sensor, engagement, and information grids that creates the condition necessary to allow “shooters to engage targets more rapidly and exploit emerging opportunities in the battlespace.”⁶³ In other words, the linking of grids and the accessing of information will be what allows dispersed aviation platforms to mass their destructive effects at unprecedented levels of responsiveness and efficiency.

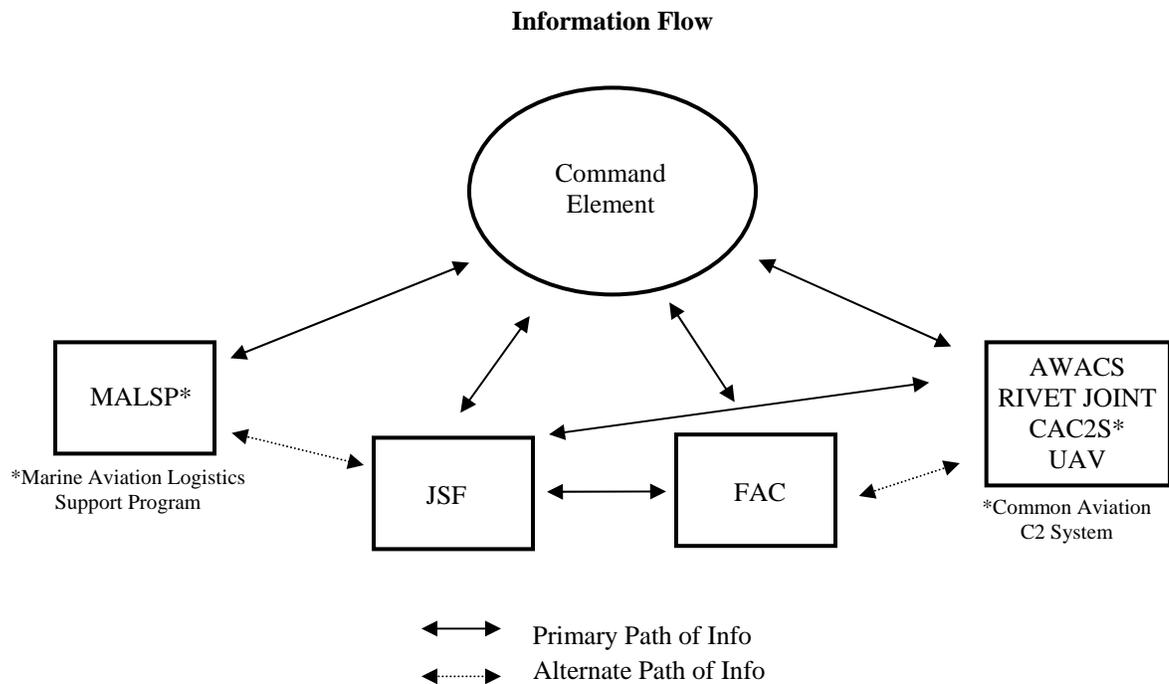


Figure 6

⁶² Leslie West, “Exploiting the Information Revolution: Network-Centric Warfare Realizes Its Promise,” *Sea Power*, March 1998, 38.

⁶³ *Ibid*, 39.

Conclusion

Two major obstacles stand in the way of making dispersion a reality. The first, as always, is money. The cost of building a “dispersion-capable” fleet will be high. The naval services would be far better served if more LHD/escort carrier type ships were procured instead of “ground attack” ships such as the DD-21. As previously mentioned, the long range weapon systems that would be incorporated into such a ship will not fulfill the close battle fire support needs of the MAGTF commander. Aviation, on the other hand, can provide responsive and effective fires across the entire range of the battlespace as well as satisfying the counter-air needs of the NEF and MAGTF. Regardless, developing a class of escort carriers and JSF compatible MPSs will require a significant budgetary investment that may outstrip public perceptions of necessity. Furthermore, energy and dollars must be allocated to sustaining the current fleet of flat deck ships (CVNs, LHAs, and LHDs) so that they will be available and functional for OMFTS operations well into the 21st Century. The second obstacle, the Navy’s inevitable reluctance to alter the nature of its deploying forces, will be far more difficult to address. The idea that CVBGs and ARGs ought to be merged into NEFs that directly support dispersed air operations may appear as a direct challenge to the preeminence of the carrier battle group as the nation’s power projection tool of choice.

Still, the naval services are progressing toward OMFTS as their future warfighting doctrine, and the ability of traditional carrier operations to support this doctrine is severely limited. The emotional attachment to classic “tailhook” aircraft and “cat and trap” flight deck operations should not override the fact that the evolving nature of warfare necessitates a change in how air power is generated from the sea. The reality of

future littoral operations is that naval forces will have to remain over-the-horizon in order to counter future threat capabilities. If the limitations of seaborne air power are “fairly dusted” away with conceptual jargon, then the Marine Corps will be setting itself up for failure in future operations. An assessment of traditional single deck naval air operations leads to the conclusion that they simply cannot generate enough timely and responsive fire support to satisfy the high operational tempo envisioned for OMFTS. Dispersion is the best practical means of solving the responsiveness problem and making OMFTS a viable doctrine for the 21st Century. If the commitment to dispersion is not made today, then OMFTS will remain as a warfighting doctrine in theory but never will rise as a warfighting doctrine in practice.

GLOSSARY

AAAV	Advanced Amphibious Assault Vehicle
ACE	Air Combat Element
AO	Area of Operations
ARG	Amphibious Ready Group
ATACMS	Army Tactical Missile System
BIA	Bomb Impact Assessment
BIT	Built-In-Test
CAS	Close Air Support
C2	Command and Control
CEP	Circular Error Probable
CV(N)	Aircraft Carrier
CVBG	Carrier Battle Group
DAS	Deep Air Strike
DCA	Defensive Counter Air
ERGM	Extended Range Guided Munition
FAC	Forward Air Controller
FARP	Forward Arming and Refueling Point
FOB	Forward Operating Base
HNS	Host Nation Support
IAF	Israeli Air Force
ICT	Integrated Combat Turn
IFDL	Intra-Flight Data Link
IPB	Intelligence Preparation of the Battlefield
JDIS	Joint Distributive Information System
JFACC	Joint Force Air Component Commander
JIRD	Joint Initial Requirements Document
JSF	Joint Strike Fighter
LHA/LHD/LPD/LSD	Amphibious Assault Ships
LO	Low Observable
MAGTF	Marine Air-Ground Task Force
MCIA	Marine Corps Intelligence Agency
MMT	Miniaturized Munitions Technology
MMTD	Miniaturized Munitions Technology Demonstration
MOB	Main Operating Base
MPS	Maritime Prepositioning Ship
NCW	Network-Centric Warfare
NEF	Naval Expeditionary Force
NRT	Near Real Time
OMFTS	Operational Maneuver From The Sea
PHM	Prognostics and Health Management System
RGR	Rapid Ground Refueling
R&I	Removal and Installation
SA	Situational Awareness
SGR	Sortie Generation Rate

GLOSSARY (Continued)

STO	Short Take Off
STOL	Short Take Off/Landing
STOM	Ship-to-Objective-Maneuver
STOVL	Short Take Off/Vertical Landing
WOD	Wind-Over-the-Deck

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