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Abstract <p>The F/A-18D is one of the most capable strike fighters in the world. However, due to the multitude of missions the Delta aircrew are tasked to fulfill and the associated mission complexities, the greatest limiting factor of the F/A-18D is the aircrew attempting to effectively employ it. The excessive aircraft training requirements associated with the missions assigned to the F/A-18D make it virtually impossible for the aircrew to remain current and proficient in all areas. As with all other Warfighting platforms. The training and readiness Syllabus of the F/A-18D community stresses currency in all assigned mission areas; however, currency does not necessarily equate to proficiency. Issues ranging from ordnance allocation to current squadron manning levels combine to negatively impact training programs which in turn equates to a platform that is employed less than optimally. The Marine Corps should prioritize and reduce the missions assigned to the F/A-18D in order to allow better training efficiency; and, unnecessary requirements such as the ACTI Qualifications and the Air Superiority Aspect of a AAW should be removed. Additionally, training programs should be adjusted to enhance proficiency in order to give the Marine Corps what it paid for with respect to the F/A-18D.</p>		
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EXECUTIVE SUMMARY

Title: The F/A-18D Hornet: Is the Marine Corps getting what it paid for?

Author: Major Brian T. Beckwith, United States Marine Corps

Thesis: The current missions assigned to the F/A-18D are too numerous, thereby inhibiting the efficiency and effectiveness of the aircrew who operate it.

Discussion: The F/A-18D is one of the most capable strike fighters in the world. However, due to the multitude of missions the *Delta* aircrew are tasked to fulfill and the associated mission complexities, the greatest limiting factor of the F/A-18D is the aircrew attempting to effectively employ it. The excessive aircrew training requirements associated with the missions assigned to the F/A-18D make it virtually impossible for the aircrew to remain current and proficient in all areas. As with all other warfighting platforms, the training and readiness syllabus of the F/A-18D community stresses currency in all assigned mission areas; however, currency does not necessarily equate to proficiency. Issues ranging from ordnance allocation to current squadron manning levels combine to negatively impact training programs which in turn equates to a platform that is employed less than optimally.

Conclusion: The Marine Corps should prioritize and reduce the missions assigned to the F/A-18D in order to allow better training efficiency; and, unnecessary requirements such as the ACTI qualification and the air superiority aspect of AAW should be removed. Training programs should be adjusted to enhance proficiency in order to give the Marine Corps what it paid for with respect to the F/A-18D. The Corps must determine where the focus of its warfighting efforts should be placed. The warfighting niche for the Corps is the MAGTF and the most valuable fixed-wing player in that supporting arms mixture is the F/A-18D. If the Marines deem the FAC(A) and TACRECCE missions critical to the success of the MAGTF, it makes sense to have a platform that specializes in such missions.

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Preface

As I embarked upon this research project, it was my intent to address a perceived problem facing the United States Marine Corps and the F/A-18D community. The author has served tours in both the A-6E *Intruder* as a bombardier navigator and the F/A-18D *Hornet* as a pilot: the latter of which culminated with one year as the squadron operations officer. While serving as an operations officer, it became apparent that there were deficiencies between the missions assigned to the F/A-18D and the requirements set forth in the training and readiness syllabi. Issues that range from insufficient ordnance allocation to insufficient manning levels combine to negatively impact squadron training programs. This paper addresses the problems facing the F/A-18D as they pertain to training, readiness, and military occupational specialty (MOS) proficiency and sets forth recommendations to better employ the F/A-18D. As with all other warfighting platforms, the training and readiness syllabus of the F/A-18D community stresses currency in all assigned mission areas; however, currency does not necessarily equate to proficiency.

My focus is on the factors that affect the training program of the F/A-18D and will balance these factors against the missions assigned to it in order to determine if the Marine Corps is actually getting what it paid for with respect to the *Delta*. Additionally, there are many valuable lessons learned from the F/A-18D life cycle that hopefully can be used to avoid the same mistakes in future platform developments.

Introduction

For should the enemy strengthen his van, he will weaken his rear; should he strengthen his rear, he will weaken his van; should he strengthen his left, he will weaken his right; should he strengthen his right, he will weaken his left. If he sends reinforcements everywhere, he will everywhere be weak.

—Sun Tzu

It is arguable that the words of Sun Tzu can be applied in some capacities to the Marine Corps F/A-18D *Hornet*. An attempt to be strong everywhere may have resulted in pockets of weakness. This said, it is in no way suggested that the F/A-18D, more commonly referred to as the *Delta*, is an incapable platform. Conversely, it is one of the most capable strike fighters in the world. However, due to the multitude of missions the *Delta* is tasked to fulfill and their associated complexities, its greatest limiting factor is the aircrew attempting to effectively employ it. This is an inexorable fact given the explicit and implicit training requirements inherent to its missions. This statement is not intended as an indictment of the abilities of the men and women who operate this platform: they are by majority ably competent and consummate professionals. Rather, it is an indictment of the allocation of missions to the *Delta* given the parameters of the system to which its aircrew train.

The F/A-18D aircraft, because of its mission versatility and associated mission training requirements is not currently being employed to its full potential. Through no fault of their own, its aircrew wage a constant and unavailing battle against limited resources in their quest for mission proficiency. As we shall see, there are feasible alternatives available to the Marine Corps that would assure that the F/A-18D's capabilities would be fully employed. As stated by Marine Corps doctrine, the

operational concept of employment for a Fixed Wing Marine Fighter Attack All Weather (VMFA(AW)) squadron is to be employed as an integral unit of an Aviation Combat Element (ACE) in support of Marine Air Ground Task Force (MAGTF) operations.¹ Whether a *Delta* squadron is used in general or direct support of the MAGTF is of little significance to a force commander if the aircraft cannot perform its designed task. This paper will address the problems inhibiting full effectiveness of the F/A-18D and offer constructive solutions.

Evolution of the F/A-18D *Hornet*

The United States Marine Corps has been fortunate over the course of its history to have within its rank, individuals who were both visionaries and realists. Many times during the course of its history the Marine Corps has had to fight to justify its existence; thereby, earning a reputation as being a front-runner in innovative doctrinal development and imaginative force structuring. Many factors such as pride, professionalism, patriotism, and a sense of self-preservation have helped contribute to this legacy. Whether the external pressures were resultant from economics, national will, or the intent of our sister services to absorb the mission of the Marine Corps, the Corps has consistently responded by convincing Congress and the American public that it is an indispensable asset in the defense of this nation.

In the spirit of this visionary tradition, the Marine Corps correctly identified a requirement to restructure its fixed wing air combat forces during a time of limited and reduced defense spending. To accomplish this, it was necessary to combine several

¹ Department of the Navy, United States Marine Corps, Imagery Intelligence, MCWP 2-15.4 (Washington DC: GPO, 1999) 3-10.

fighter and attack aircraft that possessed limited mission versatility, into one multi-missioned aircraft capable of performing all previously assigned missions. The strategy formulated to accomplish this was referred to as a “neck down.” By the mid 1970s, many of the Marine Corps’ tactical jet platforms either were nearing the end of their service life or were promptly becoming obsolete with regard to technology. In an effort to consolidate several disparate missions into one platform, the Marine Corps in conjunction with the Navy sought to procure the F/A-18 *Hornet*. By doing so, the Corps was able to streamline its maintenance and support costs and field an aircraft that was state of the art, multi-missioned, and economically feasible.

The F/A-18 was scheduled to replace the A-4 *Skyhawk* and the F-4 *Phantom II* in all of the Corps’ fighter attack squadrons. The two-seat F/A-18D has been in service for ten years and is planned to be operational through the year 2016. The *Delta* assumed the missions of Tactical Air Coordinator Airborne (TAC(A)) and Forward Air Controller Airborne (FAC(A)) which were formerly carried out by the OV-10 *Bronco*, OA-4M *Skyhawk*, and the *Phantom*. The *Delta* also replaced, in a limited capacity, the all-weather night attack mission formerly carried out by the A-6E *Intruder*. In 1999, with the delivery of the Advanced Tactical Air Reconnaissance System (ATARS), the F/A-18D filled a ten-year void for manned tactical imaging reconnaissance by assuming the tactical reconnaissance (TACRECCE) mission previously conducted by the reconnaissance version of the *Phantom*, the RF-4B. Thus as we can see, the Marine Corps neckdown strategy was built upon a plan that the F/A-18 could fulfill critical missions in support of the MAGTF. However, requirements for aircrew proficiency

would demand mission specialization; and, aircrew management and coordination problems would predictably drive platform performance.

Force Structure

In an attempt to understand the argument for “platform employment maximization,” an understanding of the basic force structure of the F/A-18D community is important. Commensurate with the replacement of the F-4 and A-4 by the single seat F/A-18, the Marine Corps relied upon the services of the *Intruder* to fulfill its night attack all weather requirements. Anticipating the *Intruder’s* retirement, the Corps turned to the *Delta* to assume the role of a night-capable strike/fighter. Learning from the crew coordination concepts and procedures developed by both the *Intruder* and *Phantom* communities, the Corps retained the philosophy of a multi-crew concept for the F/A-18D in an attempt to divide the cockpit workload thereby enabling the aircrew to operate more effectively. Although the cockpit design of the *Delta* emanated from good intentions, its final design was not conducive to a seamless application of the *Phantom* and *Intruder* crew coordination procedures. The ability to perform almost all functions from the front cockpit, coupled with the tandem seating design, prohibited this seamless transition and remains to this day as an obstacle to crew coordination. Notwithstanding, an officer occupational specialty for the manning of the aft station in the cockpit was created and is referred to as a Weapons Sensor Operator (WSO). In the spirit of crew coordination, the primary flight responsibilities of the WSO would be the control of navigation and communication assets along with the employment of sensors in the Anti-Air Warfare (AAW) and Air-to-Surface (A/S) environments. The basic list of sensors employed by the *Hornet* is provided in Table 1.

The crew concept of the *Delta* was also designed to alleviate the pilot, during periods of high threat operations, from the requirement of “heads down” time thereby allowing him to fully concentrate on the tactical flying of the aircraft.² Coordinated with the phase-out of the A-6E by mid 1993, the Corps opted to equip the *Delta* with a dedicated night attack avionics suite to prevent losing the night attack capability. The night attack suite allows the *Delta* to conduct operations below the weather in a low altitude environment while utilizing Night Vision Devices (NVD’s) and Forward-Looking Infrared (FLIR) systems.

Currently there are six F/A-18D squadrons in the operating forces. Each squadron possesses twelve aircraft that are capable of being configured for the ATARS reconnaissance mission. However, due to limited procurement, only two aircraft in each squadron will be converted and adapted for ATARS operations.³ Those *Deltas* configured for ATARS will be referred to as F/A-18D(RC) for reconnaissance capable. The ATARS modification is a semi-permanent airframe configuration change that requires the removal of the internal M61 20mm gun. As is evident by this modification, the mission capabilities of the gun are sacrificed in order to obtain the reconnaissance capability of the ATARS suite.

Although the Marine Corps favorably positioned itself for platform efficiency when it developed its force structure for the *Delta* community, it ignored the implications of the

² Heads down time is a common phrase used within the F/A-18 community and refers to a nonspecific period of time when an aircrew must devote his/her visual scan inside the cockpit to perform any function ranging from administrative to tactical procedures.

³ At the completion of procurement, Marine Air Group 31 (MAG-31) will possess twelve aircraft configured for ATARS, six aircraft (two per *Delta* squadron) will have systems installed, two spare pallets, one squadron ground station (SGS) per squadron, and six data link pods for use by all three squadrons. MAG-11 will have eight ATARS pallets, three SGSs, and six data link pods. MAG-12 will have one SGS, and each MAG is scheduled to receive one Tactical Exploitation Group (TEG).

multi-mission assignment. It will be shown through the following mission statements and requirements that the *Delta's* multi-mission role requires aircrew to be proficient in 11 missions, 7 sensors, and over 17 variations of ordnance and mission combinations. Additionally, it will be shown that the quest to be proficient concurrently in all missions is unattainable given their associated requirements. The requirements of the various mission combinations collectively exceed the flight hours available in any day, month, or year.

Missions

The Marine Corps aviation Training and Readiness (T&R) manuals are the Marine Corps' official aircrew training documents that define training requirements and standards for Marine aircrew. In all respects, they are the "Bible" for Marine Corps aviation training. The T&R Manuals prescribe concepts for core competencies and currency for each Type/Model/Series (T/M/S) of aircraft. As defined by Volume I of the T&R Manuals, "core competency refers to those critical flying skills and missions that will be realistically assigned during combat operations."⁴ Therefore, to be considered core competent as either an aircrewman or combat ready as a squadron, prescribed levels of mission and ordnance delivery currency must be maintained in order to execute the stated core missions and flying skills. The specific core competencies for the F/A-18D are as follows: "Attack and destroy surface targets, day or night, under the weather [operating in visual meteorological conditions]; conduct multi-sensor imagery reconnaissance; provide supporting arms coordination; and intercept and destroy enemy

⁴ U.S. Marine Corps, "Aviation Training and Readiness Manual, Vol. I, Administrative (Short Title: T&R Manual, Volume I)," MCO P3500.14F, February 1999, B-2.

aircraft under all weather conditions.’⁵ Additionally, the following tasks are further delineated in both the Mission Essential Task List (METL) of Volume I, and the tactical manual Marine Corps Warfighting Publication (MCWP) 2-15.4 titled Imagery

Intelligence:

1. Conduct day and night Close Air-Support (CAS), under the weather.
2. Conduct day and night Deep Air-Support (DAS), under adverse weather conditions, including armed reconnaissance, radar search and attack, Air Interdiction (AI), and strikes against enemy installations, by using all types of weapons that are compatible with assigned aircraft.
3. Conduct multi-sensor imagery reconnaissance, including pre-strike and post-strike target damage assessment and visual reconnaissance.
4. Conduct day and night supporting arms coordination including FAC(A), TAC(A), and artillery/naval surface fire spotting.
5. Intercept and destroy enemy aircraft under all weather conditions in conjunction with ground and airborne fighter direction.
6. Conduct battlespace and target illumination.
7. Provide the capability of self-escort and escort of friendly aircraft.
8. Maintain the capability to conduct Suppression of Enemy Air Defense (SEAD) operations, and to operate from advance bases and expeditionary airfields.

The T&R manual further requires a core capable squadron to sustain the following minimum performances on a daily basis during sustained contingency or combat operations:

A core capable squadron is able to sortie [get airborne] two divisions of mission capable aircraft in day/night offensive air support (OAS) or AAW within six hours of frag order with the following imbedded capabilities: SEAD and High Value Airborne Asset (HVAA) escort as required for each division, night capable, operate from a main base or appropriate sized Expeditionary Airfield (EAF), employ Precision Guided Munitions (PGM’s) and air to air missiles, and to provide self escort. Be able to sortie four sections in a FAC(A) role in lieu of other missions, and within four hours of landing, sortie one division or two FAC(A) sections, same criteria.⁶

⁵ T&R Manual, Volume I, A-7. Assumptions made by the T&R manual (Vol. I, 3-6) regarding core competencies include 100 percent PAA (in this case, 12 aircraft), greater than 90 percent in reporting status, and greater than 90 percent Table of Organization (T/O) on hand in all occupational specialties. If less than 90 percent T/O, core capability will be degraded by a like percentage.

⁶ T&R Manual Volume I, A-7. A division is considered a flight of three or more aircraft in the same formation/flight. A section is considered a flight of two aircraft in the same formation/flight.

The implications of these stated requirements must not go unnoticed. OAS encompasses a multitude of missions in and of itself. According to MCRP 5-12D, Organization of Marine Corps Forces, OAS consists of CAS and DAS. DAS further encompasses the missions of strike coordination, AI, and armed reconnaissance. Additionally, the primary purpose of AAW is to gain and maintain some degree of air superiority and includes both offensive and defensive means to accomplish its objective.

The requirement of the T&R manual to launch two divisions of aircraft equates to a squadron having to maintain sixteen aircrew (eight pilots and eight WSOs) that are core capable in the assigned mission areas at all times.⁷ The additional requirement to launch four FAC(A) sections in lieu of other missions requires an additional eight aircrew current and trained in the FAC(A) mission. As can be seen, the demand for mission-qualified aircrew might soon exceed the squadron's supply even if they are fully staffed. The issue of aircrew supply versus demand will be further developed during the discussion about squadron manning.

Mission Requirements and Core Competency

An F/A-18D squadron is held accountable to certain mission standards and is required as a unit to demonstrate proficiency in all core competency areas. As part of its training cycle, a squadron will periodically demonstrate its proficiency under the scrutiny of the Marine Corps Combat Readiness Evaluation System (MCCRES). During a MCCRES evaluation, a squadron is required to perform each assigned mission and demonstrate a satisfactory level of proficiency in each. A MCCRES evaluator critiques

⁷ Doctrine calls for a division to be a flight of four aircraft. By definition, a division is a flight of three or more aircraft. The numbers used in this example are based upon doctrine.

the squadron's ability to perform each mission and determines whether it is combat ready. To fulfill core competency mission requirements and meet MCCRES standards, F/A-18D aircrew must train to the following areas:⁸

MISSIONS	SENSORS	WEAPONS	QUALIFICATIONS & SCHOOLS
OAS, CAS, DAS, AI, RECCE, FAC(A), TAC(A), SEAD, SCAR, Battlefield Illumination, EAF Ops, Carrier Ops* *capability, but not currently trained to	TFLIR NAV FLIR APG-65/73 Radars NVD ATARS Counter measures suite components	M61 20mm gun AIM-9 / 7 / 120 AGM-65 (IR/LASER) AGM-88 (HARM) JSOW JDAM PGM's GP Bombs ROCKEYE NAPALM Rockets (2.75"/5") LUU-2, SLAM	Qualifications: ACM, LAT, NSQ, LSO, AR, EW Section LDR Division LDR Mission CMDR NSI LATI, ACTI, WTI FAC(A)I, TAC(A)I Schools: TOPGUN, WTI, MDTC, HARM, ATARS, SLAM

Table 1. F/A-18D Core Competency Items.

As can be deduced from the foregoing, the aircrew training demands associated with this multitude of core competency items will be heavy. A weakness in any of the above areas degrades the potential performance of the aircraft as an effective weapons system. Arguably the world's most capable strike fighter aircraft, it is ironic that the designed combat potential of the *Delta* serves to exact the excessive training demands on the aircrew that operate it. Coupled with this fact is an intentional design compromise that was necessary in order for the F/A-18 to conduct both the AAW and Air-to-Surface (A/S) missions. To avoid a tangential discussion, certain capabilities were foregone when it was decided to incorporate a radar in the *Delta* that is capable of performing both the AAW and A/S missions. As a result, the *Delta* has become a jack-of-all-trades and master of few. However, the *Delta* has become an indispensable asset to the MAGTF

⁸ T&R Manual Volume I, 3-7/8, and as stated during the tactical air reconnaissance conference (TARC) held from 15-17 November, 2000, at MCAS Beaufort SC which the author attended.

warfighting concept as it relates to the prosecution of the deep battle. The F/A-18D is the only organic fixed-wing MAGTF platform capable of executing both the FAC(A) and TACRECCE missions that are deemed so critical to the ground combat element in support of its operations.

To the unsuspecting consumer the T&R requirements might seem attainable given the versatility and capabilities of the *Delta*. However, to the educated consumer the limiting factor is not the aircraft, it is the numerous requirements imposed upon the aircrew that operate it and their ability to meet these mission requirements in the hope of remaining proficient. Some of the important limiting factors include time to train, training assets (to include aircraft, ordnance, and sensors), and flight hours available via the mandated sortie-based training program. These factors are holistic in nature and combine to negatively affect squadron training and aircrew proficiency. The following analysis of the various *Delta* core competency mission requirements will demonstrate how the limiting factors listed above, coupled with squadron aircrew manning issues, adversely affect aircrew training and proficiency, thereby prohibiting platform maximization.

Manning

Squadron Aircrew

The current Marine Aviation Campaign Plan (MACP) states the following for officer staffing goals, “staff ACE units at or above 90 percent of the table of organization (T/O), and have first-tour aviators remain in the cockpit for 2 years (intent is to move toward 3 years) after qualification in T/M/S.”⁹ Presently, a *Delta* squadron rates nineteen pilots

⁹ Aviation Department, Headquarters Marine Corps, “Marine Aviation Campaign Plan,” *Marine Corps Gazette*, May 2000, 31.

and nineteen WSOs per the T/O.¹⁰ As we shall see, this presents a problem with relation to the first MACP staffing goal. If a *Delta* squadron is manned at a level below eighteen for either pilots or WSOs, it falls short of the staffing goal. A more realistic guideline that would lend credibility to the MACP staffing goal would be to staff ACE units to a level within three of the T/O. This would be more representative of the numbers in the Marine operating forces. As for the second MACP staffing goal, the longer a junior aircrewman is permitted to remain in the cockpit the better. As will be illustrated in the tier training process, it requires three years, or one complete tour, to complete the intermediate level qualifications.

The staffing levels set forth in the T/O are viewed as goals and are rarely attained except in times of crisis or contingency operations; however, prescribed T/O manning levels can be expected when a unit is assigned to combat operations. The T/O reflects the number of personnel, both officer and enlisted, that the Corps feels is necessary for a particular unit to effectively conduct its assigned missions. The authorized strength for the Marine Corps, which is mandated by Congress, is a figure that is lower than what the T/O calls for. Hence, the squadrons are staffed at much lower levels as evidenced by current fleet numbers that average fewer than 85 percent of T/O for pilots and 70 percent for WSOs. For example, at the end of calendar year 2000 the actual manning levels at each of the *Delta* squadrons in Marine Aircraft Groups (MAG) 31 and 11 averaged less than sixteen pilots and thirteen WSOs. This equates to 84 percent of T/O for pilots and 68 percent of T/O for WSOs, both of which are below the MACP staffing goal.

Moreover, not a single *Delta* squadron in the Marine Corps meets this MACP staffing

¹⁰ U.S. Marine Corps, "Aviation Training and Readiness Manual, Vol. II, Tactical Fixed-Wing (Short Title: T&R Manual, Volume II)," MCO P3500.15, February 1999, 3-6.

goal for both pilots and WSOs.¹¹ The decision to man squadrons at such levels is a manpower topic worthy of its own discussion; however, the relevance of these numbers most notably pertains to two points. First, the disparity between the number of pilots and WSOs and secondly, the inadequate quantity of WSOs assigned to the Marine operating forces.

It is arguable that it is a blessing for a *Delta* squadron to be manned at levels below those listed in the T/O. As long as staffing levels are not low enough to impact mission success, fewer individuals equates to a more attainable training program. However, as previously illustrated, the number of aircrew required to fulfill mandated missions during sustained contingency or combat operations leaves little margin for squadron staffing at levels below those prescribed by the T/O. Additionally, there are added safety measures set forth in the T&R Manual that mandate a prescribed mix of aircrew for training sorties. This mandate ensures qualified aircrew are present during all periods of instruction. The process of matching available qualified aircrew with the aircrew under instruction is important as it relates to manning levels and will be addressed in more detail later.

In addition to permanently assigned personnel, squadrons are assigned “augment” aircrew that traditionally come from supporting billets at higher headquarters. While these augments supplement squadron staffing levels, they impose additional training requirements. Their addition serves to exacerbate the issue of limited training resources and acts to decrease a squadron's Combat Readiness Percentage (CRP). Augment aircrew normally fly less than regular squadron personnel and therefore have reduced

¹¹ These numbers were obtained from the respective MAG operations departments of First and Second Marine Aircraft Wings and are current as of 19 January 2001.

currency. This in turn equates to a habitually lower CRP than the rest of the regular aircrew. Less flight time also means less training that in turn breeds reduced proficiency serving to further reduce the squadron CRP. However, if a squadron were tasked to deploy for contingency operations on short notice, the commanding officer can request support from external units for additional manning. A prime source for this type of augmentation aircrew is Marine Aviation Weapons and Tactics Squadron 1 (MAWTS-1), which serves to manage, standardize, and evaluate aviation weapons and training programs. MAWTS instructors normally remain proficient in all mission areas and require little effort to become current. MAWTS-1 was very effective in this capacity when it supported VMFA(AW)-332 and 533 during air operations over Kosovo in 1999. However, there is a hidden cost associated with augmenting fleet squadrons with MAWTS-1 instructors during unspecified periods of contingency operations. For the duration of the augmentation period, the remainder of the augmented community (in the case of Kosovo it was F/A-18s) must delay, modify, or cancel their current training programs due to the nonavailability of the MAWTS instructors. As this paper addresses the complexities of developing a training program, it will become evident that training programs are built like a house of cards; meaning, small deviations to the original design might have disproportionate sequential negative results.

Training

MACP

In February of 1997, with the introduction of the MACP, the Corps transitioned from an hourly-based flight program to a sortie-based one. The motivation for this transition

was fiscal in nature. Under the hourly-based program, flight hours were funded at the strategic level, allocated at the operational level, and flown at the tactical level. The yardstick used to measure success under this program was the amount of hours flown, and combat readiness was incorrectly assumed to be directly proportional to this amount. The current sortie-based program was adopted to correct this shortcoming.

The 2000 MACP states: “The sortie-based training program reinforces the concept that quality, frequency, and interval of flying is more critical than how much ‘time’ we fly – flight hours alone do not equal combat readiness.”¹² This philosophy has been fully embraced by the Marine Corps Combat Development Center (MCCDC) and is now the cornerstone of the T&R Manual training syllabi. Each sortie flown is a stepping-stone in a squadron’s training program and serves to update aircrew proficiency or currency thus increasing the CRP of the squadron.

Although an improvement, the new sortie-based program is not without liability. A drawback stems directly from the stated goal of the current MACP: “. . . to execute our flight operations program within 5 percent of our sortie based projections. The bottom line remains the same—plan the number of sorties you need and can fly, execute your plan, and account for your sorties.”¹³ The expectation that this goal will be achieved is realistically unattainable given a squadron makes its sortie projection for the next fiscal year almost four months in advance of it beginning.

¹² *Marine Aviation Campaign Plan*, 31.

¹³ *Marine Aviation Campaign Plan*, 32.

Sortie allocation (by day/month/ and year):

In order to make sortie projections as accurate as possible, squadrons specify exactly how many sorties they will fly per day for the entire year. Once their programs are approved, squadrons do everything in their power to execute them. During the course of the year, leniency may be granted to squadrons to account for unforeseen circumstances; however, quarterly and yearly projection figures must fall within acceptable parameters set by higher headquarters. It is important that the Marine Corps flies all of the hours it requests so that subsequent years will not be reduced. It is more important that the hours flown equate to quality training thereby yielding combat ready units. Quite often Marine Air Group (MAG) commanders solicit adjustments to the allocated sortie figures from their higher headquarters during the course of the FY. This is a conspicuous indication that the sortie-based projection process is broken.

An alternative approach would be to place the burden of sortie projection one level up the chain of command from the squadron to the MAG. MAGs have volumes of historical flight-time summaries and could use these in conjunction with the forecasted Training Exercise Employment Plan (TEEP) to accurately request sorties from higher headquarters. MAG's higher headquarters, Marine Air Wing (MAW), could then distribute sorties to the MAG on a quarterly basis. In this situation, the MAW and the MAG would retain the flexibility to adjust to dynamic situations as the year progressed. Once MAG projections have been submitted, approved, and allocated the squadrons could then justify their sortie requirements from the MAG on a more near real-time quarterly basis. This would allow the MAG to control the distribution of sorties (i.e. hours) on a short-term basis thus allowing greater flexibility to the dynamic flight program process. Additionally, it would serve to allow the squadron commander to more

realistically focus on the combat readiness of his unit knowing that he is not tied to projections that were made more than a year in advance.

Considerations involved in the development of a squadron's training program will be depicted in the next section. However, once a training program is developed and approved the squadron then prepares for its execution knowing that periods of crisis management shall ensue. Because training programs are required to be developed well in advance of execution, their forecasted numbers become irrelevant once changes occur during actual execution. From the first instance of change, the squadron's "house of cards" training program begins to teeter. Let us now take a look as to why this happens.

Training Plans

The three programs necessary to gain mission proficiency and obtain flight qualifications are academic, simulator, and flight training. All of these programs are mutually supporting and are incapable of achieving training objectives singularly. During the academic segment, the preponderance of instruction comes from the squadron and is augmented by the MAG. Standards and training requirements for proficiency and flight qualifications are set forth in the T&R manuals. Based upon these requirements, squadrons take into account the commander's intent and formulate training plans to achieve his objectives. Concurrent with serving the intentions of the commanding officer, these training plans must be achieved within the framework of the sortie-based program. This said, the development of a training plan becomes a complex process because the factors used for developing it are not concrete. Planning factors such as ordnance allocation, TEEP events, collateral training, and asset availability change on a regular basis thereby rendering earlier plans irrelevant. A brief glimpse into the

associated training program planning factors used by the squadron Pilot and WSO Training Officers (PTO/WTO) is now warranted.

Non-Combat Expenditure Allowance (NCEA):

In a vacuum, the T&R requirements would drive the NCEA; however, the non-nuclear ordnance requirement process injects fiscal reality into the equation. Thus, what we need or want for training is not necessarily what we are allocated for use. The T&R Manual requires specific amounts and types of ordnance in support of its training syllabus. Historically these figures are in excess of that which is supplied. Hence, the numbers do not match from the start. This ordnance mismatch creates obstacles to the smooth formulation of the squadron training program. The T&R states what is desired but reality provides something different. Yet another ordnance planning factor dilemma, unique to East Coast squadrons, is the inadequate number of local live fire ranges capable of supporting training sorties. East Coast units must utilize ranges on the West Coast during exercise deployments in order to update currency and proficiency in the areas of live ordnance delivery. Although attainable, this leaves little room for flexibility. For example, if prolonged periods of bad weather are experienced on such deployments, the opportunity is foregone to update currency in these areas.

It is no secret in the aviation community that ordnance availability drives training. However, the T&R Manual has granted commanders a general pardon from the ordnance shortfall issue by granting them the authority to make ordnance substitutions when the required ordnance is not available. By exercising this authority, squadrons can legitimately report CRPs that show no degradation due to ordnance shortfalls; however, actual combat readiness will in fact be degraded. BGen R.M. Flanagan, Deputy

Commander Two Marine Expeditionary Force (MEF), had this to say concerning air operations over Kosovo in support of Operation Noble Anvil:

Current NCEA does not support modern day training requirements. For example, nine tenths of MAG-31 (fwd's) combat expenditure in Kosovo were PGMs [precision guided munitions], as directed by the JTF [Joint Task Force] Commander, while the peacetime PGM allowances for FY [fiscal year] 99 was less than one-half of one percent of the entire ordnance allowance.¹⁴

As evidenced by this testimony, not only is ordnance quantity an issue, so is the mix of ordnance allocated.

Scheduled Training Exercise Employment Plans (TEEP):

The TEEP is a fiscal year list of every funded activity for a unit that ranges from quotas for school attendance to unit deployments. To a squadron, the TEEP serves as a long-range planning calendar and is used for projection purposes to help them develop advanced training programs. For example, the six-month period dedicated to a squadron deployment in support of its Unit Deployment Program (UDP) will be listed on the TEEP and can be relied upon as an event that will transpire barring any real-world contingencies. The same does not necessarily hold true for shorter-range TEEP events such as school quotas. Short-range events are bargained for among the MAG squadrons on a need basis. If for example squadron "X" recognized a future shortfall in trained subject matter experts for a particular weapon system and countered this by planning to send an aviator to school for training, it is safe to say that squadron "X" is relying upon that school quota in order to prevent a reduction in its instructor base. However, squadron "Y," through no fault of its own, suddenly finds itself with no subject matter

¹⁴ U.S. Congress, House, Armed Services Committee, *Kosovo After Action Report*, 106th Cong., 19.

experts for this weapon. Most probably squadron “Y” would get the immediate school quota and squadron “X” would wait for the next available class seat. In a situation such as this, the MAG should act in the best interest of all concerned and yield the slot to squadron “Y.” However, in all cases at least one unit will be deviating from its planned training program at the expense of its readiness. A factor such as this cannot be predicted but is a recurring event given the dynamic nature of personnel issues within a MAG.

Collateral training (officer and enlisted):

Every Marine is a rifleman first; hence, Marines are required to spend a prerequisite amount of time training to this mission. This equates to periods of nonavailability that has an impact on the scheduling process of the training program. Although coordinated as much as possible at the squadron level to minimize its impact on the training program, the PTO and WTO need to account for these periods of personnel absence. The absence of either officer or enlisted squadron personnel, if left unaccounted during the conduct of collateral training, is one of the quickest ways to derail an existing training program.

Aircraft and aircrew availability:

The fact a squadron has twelve aircraft assigned to it does not equate to twelve available assets for training. Scheduled and unscheduled aircraft maintenance, aircraft modifications, and grounded aircraft combine to erode the number of aircraft available for training. The number of aircraft available might change several times during any given day. To circumvent this variable, a forecasted training plan can be built around an agreed upon number of aircraft that will be available each day. As an example, VMFA(AW)-224 had a working agreement between its operations and maintenance

departments that eight aircraft per day could be relied upon for scheduling purposes.¹⁵

This figure served as both a goal for the maintenance department and a restriction for the operations department. Aircrew conversely are variables that cannot be mitigated.

Factors such as health, crew rest, collateral duties and ground training requirements unexpectedly remove aircrew from the training program and combine to negatively affect the scheduling process.

MAG allocation of assets:

Sensors such as targeting FLIRs, navigational FLIRs, and lasers are in short supply in the Marine Corps. For example, MAG-31 has approximately eighty-five F/A-18s and only enough FLIR pods to equip one-third of the aircraft. Besides being insufficient in quantity they are prone to break. Due to their limited numbers, MAGs monitor squadron training phases and assign these sensors to squadrons to support their upcoming training cycles. Sensors such as FLIRs are used primarily for A/S training. Therefore, it is difficult for a squadron to shift its training focus from AAW to A/S due to this lack of sensors. In addition, F/A-18C squadrons that deploy aboard aircraft carriers take with them nearly 1/3 of the available FLIR pods in the MAG inventory. This problem is avoidable. If the Corps were to purchase additional sensors, the shortage would be alleviated and squadrons would have more flexibility in the execution of their training plans. However, until such procurement occurs Marine F/A-18s shall continue to operate in this environment.

¹⁵ This was the standing agreement during the period when the author was serving as the Operations Officer with VMFA(AW)-224, an F/A-18D squadron in MAG-31.

This list of factors affecting training plan development is by no means all-inclusive; but, it serves the purpose to show that there are numerous competing issues that collectively make training plan development difficult.

The T&R “Bible” and Core Competencies

As with all aviation units in the Marine Corps, the T&R manuals are considered the “Bibles” for training. There exists a synergistic relationship between the T&R manuals and the MCCRES that serves to form a standardized format. Before analyzing the requirements set forth in the T&R manual, it is beneficial to establish the meaning of key terms as they pertain to the conduct of training. These terms have great value for our analysis and are defined by T&R manual, Volume I as follows:

Core competency – Those **critical flying skills and missions** that can be realistically **expected to be assigned in combat**.

Currency – Currency is a control measure used to provide an additional margin of safety based on exposure frequency to a particular skill. **It is a measure of time since the last event** demanding that specific skill. Loss of currency does not effect a loss of CRP.

Proficiency – Proficiency **is a measure of achievement** of specific skill. Units shall emphasize proficiency training in core competencies. Refly factors establish the maximum time between demonstrations of those particular skills. CRP/MRP (mission readiness percentage) is a measurement of demonstrated proficiency. If an aircrew exceeds the refly factor for a particular event, the individual loses CRP/MRP for that particular event. To regain proficiency, an individual shall refly the delinquent event with a proficient crewman/flight lead.¹⁶

What is of importance to note is the assumption made by the definition of proficiency. If an aircrew demonstrates proficiency at the completion of a sortie, it is assumed that this proficiency is retained until a prescribed refly period is exceeded. This is a false

¹⁶ T&R Manual Volume I, B-2,5. Added emphasis placed in text by author.

assumption made by the T&R syllabus program. The dictionary defines proficiency as, “being highly qualified in an art, skill, or field of knowledge: adept.”¹⁷ Certain aviation skills are more perishable than others and the degree to which they are perishable are dependent upon the frequency of exposure, retention capability, and skills of the individual aircrew. The T&R manual assigns an arbitrary period of time for a reflly factor and assumes retention of proficiency for the entire period.

This problem has not gone unrecognized by the fleet operational forces. Recently, the Marine Corps implemented a computer-based program named SARA to help combat this identified deficiency. One of the many functions of SARA is to decrease the weighted CRP value of a T&R code proportionally over the reflly factor period. For example, if a T&R code has a CRP weight of .4 and has a reflly factor of six months, three months into the reflly window the corresponding CRP weight would be .2.¹⁸ By doing this, a more accurate CRP is reflected for the unit. It can be argued that a CRP is irrelevant because it is used only by the commanding officer. The CRP is not reported to higher commands and is used solely as a tool by the commanding officer to aid him in evaluating his unit’s combat readiness. It reasons, therefore, that the more accurate the instrument of measurement, the more accurate is the evaluation of combat readiness.

F/A-18 aircrew come to the fleet from a fleet replacement training squadron with a 60 percent CRP. They are considered combat capable but not combat ready or proficient. It is expected that readiness and proficiency will be gained during their fleet tour by advancing through the 200 and 300 level T&R sorties, also known as tiers two and three.

¹⁷ *Riverside-Webster’s II Dictionary*, 1st ed., 1996, under the term “proficient.”

¹⁸ LtCol T.C. Moore, USMC, Future Operations Officer, MAG-31, MCAS Beaufort SC, interviewed by author, 10 January 2001.

Tactical unit training is composed of four tiers that are defined by the phases of the T&R syllabus. In other words, tier 1 equates to combat capable training and a CRP of 60 percent, tier 2 equates to combat ready training with 75 percent CRP, tier 3 is 95 percent CRP and combat qualified, and tier 4 is considered full combat qualified with a 100 percent CRP. Table 2 represents the notional fixed-wing training progression model from T&R Manual, Volume I and Table 3 is the actual progression model contained in Volume II.¹⁹

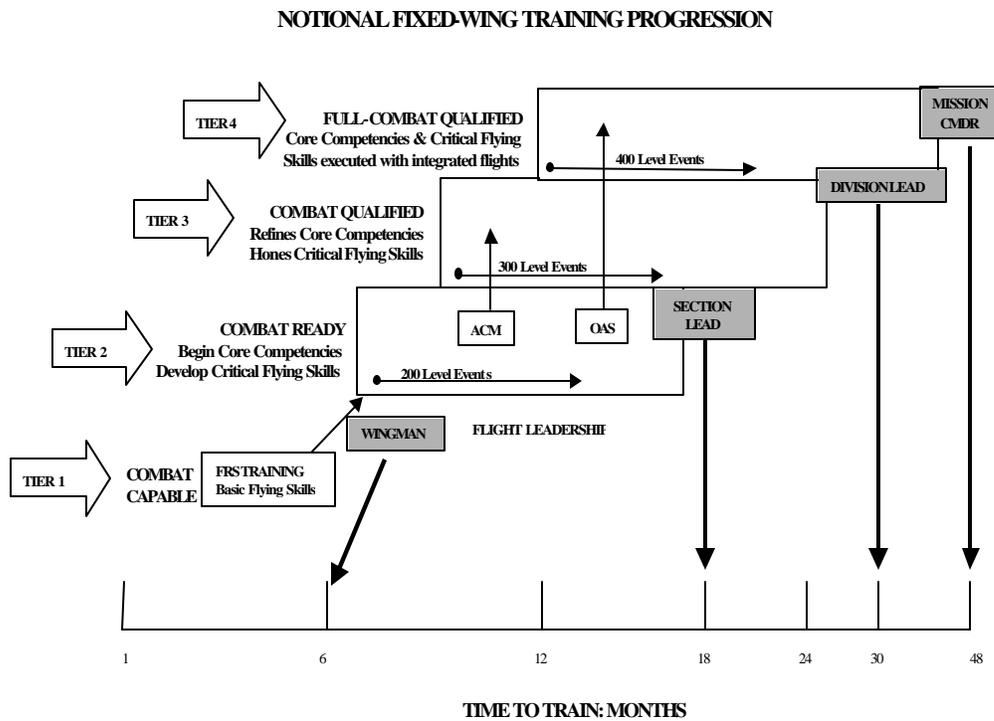


Table 2. Notional F/A-18D Core Progression Model.

¹⁹ T&R Manual Volume I, 2-6.

As can be seen, Table 2 is divided into tiers that are allocated over a period of four years. When aircrew join a fleet squadron from a fleet replacement squadron they are 60 percent CRP as previously stated. This equates to the six-month mark on the timeline and leaves 3.5 years to work up through tier 4. If we recall the 2000 MACP goal of having junior aircrew remain in the cockpit for two years (the goal is three), this would put these aircrew at the 30-month mark on the timeline. This is the notional time for pilots to attain the division lead qualification but not become tier 4 complete.

Conspicuous by its absence from the notional model are the recommendations for such qualifications such as FAC(A), Air Combat Tactics Instructor (ACTI), Night Systems Instructor (NSI), and Weapons Tactics Instructor (WTI). We must refer to the actual model for these recommendations; however, the intriguing item put forth in the actual progression model is the placement of the recommended first and second deployments. To begin with, the point at which a deployment occurs in a training cycle is not a controllable factor and the time between deployments has changed from 12 to 18 months. Therefore, new aircrew may have anywhere from one to seventeen months before they deploy depending upon their timing. T&R Manual, Volume I states that a squadron will not jeopardize the training of the squadron as a whole for the purpose of training specific individuals. However, this is unavoidable due to the uncertainties involved with the training cycle. For example, a squadron accounts for a specific period of time that will be dedicated to the work-up for a qualification during the projection process of the annual training plan. If the length of the work-up begins to exceed the amount of time allocated via the training plan, the squadron cannot afford to get to the end of the time period with no additional qualifications to show for their efforts. If this is

the case, the squadron is likely to focus its assets during the allocated time period in order to complete the work-up.

In a like way, if a squadron is nearing the time to embark upon a deployment and wishes to obtain an additional critical qualification prior to deploying, the squadron might be forced to concentrate on an individual qualification. In this worst-case scenario, the remainder of the squadron flies secondarily to the priority aircrew. It is imperative for the purposes of core competency that a squadron obtains advanced qualifications; however, it is a travesty when this is accomplished at the expense of junior aircrew that are in the most need of flight time and experience. The long-term effect of this flight prioritization process on junior aircrew is a delay in attaining flight proficiency, competency, and a reduction in currency.

Another factor for consideration is the type of deployment that is embarked upon. If a squadron deploys in support of real world contingencies, there are little or no opportunities to embark upon a training program. In this instance, an aircrew must wait until he returns from deployment to continue with additional qualifications. This jeopardizes the actual progression model timeline. Listed below is the actual progression model contained in Volume II of the T&R Manual.

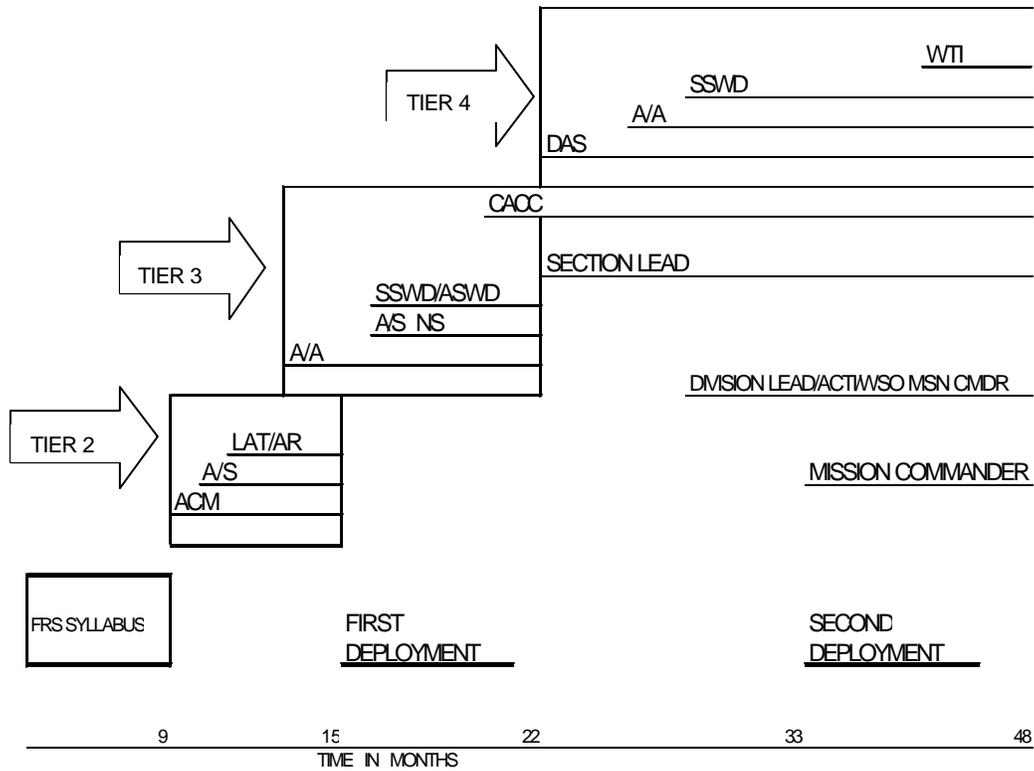


Table 3. Actual F/A-18D Core Progression Model.²⁰

Although some of the flaws of the progression model have been highlighted, the T&R syllabus is built to support this timeline and squadron-training programs attempt to adhere to this schedule. An objective of the MACP is to keep initial aircrew in a squadron for a minimum of two years. If this is accomplished and the above timeline is adhered to, these aircrew will leave the fleet having freshly attained a division lead qualification. Barring the deployment timing issue, the timeline set in table 3 is achievable but requires meticulous management by the squadron training departments.

A helpful aspect built into the T&R training syllabus is the concept of chaining. With chaining, proficiently flying higher-level sorties will in some instances update the proficiency of a related lower level sortie. Although this concept seems to alleviate some

²⁰ For the purposes of clarity, all new acronyms introduced in this table can be found in the acronym section.

of the training requirements, it actually has little impact. Within the F/A-18D training syllabus only 6 of the 99 training codes can be chained to lower sorties.²¹

The T&R manual states that in order to be considered core competent, a squadron must possess the following minimum numbers of aircrew who are combat qualification syllabus complete in each core skill.²²

CORE SKILLS	PILOT WSO		FLIGHT QUALIFICATIONS	PILOT WSO	
A/A	12	12	SECTION LEAD	8	NA
A/S	12	12	DIVISION LEAD	6	NA
SSWD	8	8	MISSION CMDR	4 TOTAL	
ASWD	8	8	NSI	2	2
LAT	12	12	ACTI	4	4
NS	12	12	LATI	2	NA
AR	12	12	WTI	2	2
FCLP/EQ	12	12	FAC(A)I	2	2
DAS	12	12	TAC(A)I	1 TOTAL	
CAS	12	12	LSO	*1	NA
FAC(A)	6	6			
TAC(A)	2	2		* Field Qual Only	

Table 4. Number of Aircrew Required for Core Competency.

The following table states the minimum number of sorties required per aircrew to individually attain these core skills. According to the T&R manual, to attain competency in core skills, aircrew must be current in 75 percent of the sorties listed in the 200 and 300 level syllabi for each skill.²³ Assuming successful attainment of required proficiency during the first sortie attempt, the minimum number of sorties required to achieve competency in each skill area is contained in the following table:²⁴

²¹ T&R Manual Volume II, 3-126

²² *T&R Manual Volume II, 3-6/7.* : If a squadron is less than T/O, required numbers are reduced by a like percentage and combat qualification complete refers to 75 percent CRP in the core skill.

²³ *T&R Manual Volume II, 3-7.* Two hundred level syllabi sorties are those applicable to the combat ready phase and three hundred level syllabi sorties apply to the combat qualified phase.

²⁴ T&R Manual Volume II, 3-7.

SKILL AREA	REQUIRED SORTIES: (NUMBERS APPLY TO BOTH PILOTS AND WSO'S)
A/A	26
A/S	10
SSWD	7
ASWD	3
LAT	4
CAS	4
NS	8
DAS	5
AR	2
FCLP/EQ	2
CACC	10
TOTAL	81

Table 5. Sorties Required to Attain Core Skills.

Of particular note in Table 5 is the inordinate amount of A/A sorties required for core competency: an issue that will be addressed in a later segment of this paper. Each of the sorties listed above has associated T&R requirements that must be completed in order for it to update currency and proficiency. If the T/O of a *Delta* squadron (38 aircrew) is multiplied by this sortie total, it yields 3,078 sorties.²⁵ In addition to this total, support and instructor sorties must be included. This seemingly unmanageable number of sorties can be reduced somewhat if the squadron pairs its aircrew during training thereby updating two aircrew with one sortie. Additionally, simulators can be utilized for updating some of the sorties. Nonetheless, it is evident given the multitude of variables associated with the development of a training program, that with a maximum of 260 flight days in a year it is an insurmountable challenge to keep a squadron current yet alone proficient in all of the skill areas.²⁶

²⁵ Thirty-eight aircrew (x) eighty-one sorties = 3,078 total sorties required.

²⁶ Given five fly days in a week and fifty-two weeks in a year, a maximum of 260 fly days exist. Holidays and safety stand-down periods are not accounted for in this calculation.

The FAC(A) and TACRECCE Missions

It has been demonstrated that there are opportunities to improve the F/A-18D syllabus. From its beginning as a replacement for numerous aircraft, to the *Delta's* present day status as a jack of all trades, there are two missions that distinguish the F/A-18D from the F/A-18A/C and the AV-8B *Harrier*. These are the missions of FAC(A) and TACRECCE. Both of these missions are unique to the *Delta* and serve to make it an indispensable platform to the battlefield commander. Whether the commander is from a JTF or MAGTF is of no difference, the *Delta* brings a multitude of unique capabilities to a theater. Due to their importance, a closer look into the FAC(A) and TACRECCE missions is warranted. This comprehensive look will serve to link our previous discussions concerning core competency, proficiency, and the training/qualification process.

Background

Although the MAGTF has organic helicopter squadrons capable of conducting the FAC(A) mission, their range and speed are limited. FAC(A) capable helicopters normally conduct these missions in close proximity (within 20 km) to the forward line of troops. As per the I MEF school of thought, the area 20 km beyond the Forward Line of Troops (FLOT) is referred to as the "close" battle space and is bounded by a control measure known as the Battlefield Coordination Line (BCL).²⁷ In essence, the BCL acts as the MEF Fire Support Coordination Line (FSCL). Between the BCL and the MEF's forward boundary is an area of responsibility in which the F/A-18D plays an important

²⁷ This paper neither supports nor admonishes the I MEF BCL concept but uses it solely for the purposes of illustration.

role performing FAC(A) operations. Because of its versatility and multi-tasking capability, the F/A-18D is invaluable to the MAGTF commander in this role; without it, the MAGTF commander will potentially lose his ability to effectively shape the battle area. As FAC(A) operations are complex, the qualification process is justifiably comprehensive. Training for this mission heavily depletes squadron resources and causes conflict with competing training requirements. This effect is readily apparent on examination of the FAC(A) syllabus.

Aircrew must absorb many hours of classroom instruction before flying the first FAC(A) training sortie. FAC(A) instructors, normally the squadron PTO and WTO, give this period of academics at the squadron level. There are seventeen lectures in the syllabus that last approximately one-hour each. After completion of the academic syllabus three simulator events of one hour each are flown followed by a syllabus of eight 1.5-hour flights. The most time consuming phase of any qualification is the time spent in preparation for each event. Each flight is preceded by a one hour brief that is given by the aircrew under instruction. During this brief, mastery of the academics and concepts must be exhibited. Upon completion of the training flight the student conducts a debrief lasting about one hour. Once the debrief is completed by the student, the instructors review all learning points with the student starting with the preflight brief. Once the academic, simulator, and flight syllabi are successfully completed aircrew are designated as FAC(A) qualified.

The T&R manual affords the commanding officer the discretion of waiving flights for a qualification work-up, but recommends at a minimum for the check ride to be flown. This discretionary decision is primarily intended for experienced aircrew who are

either transitioning from a previous aircraft or are re-qualifying after a period of absence from the community. The waiving of flights can compress the qualification time by weeks or months depending upon how many syllabus events were waived. For some of the generic qualifications such as section lead, waiving of syllabus flights for experienced aircrew is common. However, for more demanding qualifications such as FAC(A), that require operating in the night high-threat environment, it is prudent to complete the entire syllabus.

An important factor to keep in mind for the *Delta* community is the two-person crew. For this reason the qualification, currency, and proficiency process requirements increase by a factor of two. In a perfect world, there would always be a pilot and a WSO who were ready at the same time to undergo a work-up together. This would allow the squadron to train a “crew” from beginning to end while using the academic, simulator, and flight phase assets in the most efficient manner. However, since we do not live in a perfect world the increased burden imposed upon the squadron to train two individuals vice one is seemingly exponential. Squadrons make every attempt to “crew” qualifying aircrew when possible in order to economize organic assets as well as non-organic ones such as ground FACs, helicopters, and ranges. Additionally, having a second seat in the airplane imposes restrictions that would not normally be present in a single seat community. For instance, if a non-ACM qualified pilot were in need of an ACM sortie and there was an ACTI pilot available to lead the flight but no ACTI WSO to fly with him, the sortie could not be flown. Given this same scenario in a single seat squadron, the ACM sortie could be executed with this ACTI pilot. Hence, the Delta squadron would not advance in its training plan while the single seat squadron would. To further

illustrate qualifications and some associated problems, the requirements for FAC(A) certification are found in the following table:

Academics Syllabus	Flight Syllabus	Requirements for Flight Completion
FAC(A)/TAC(A) Employment	-8 Flight Containing the Following:	-Ground FAC, IDFS* assets
Planning & Mission Preparation	-low threat	-Ground FAC or FO, minimum of 10 HE and 2 WP rounds of naval/mortar/ or arty
Crew Coordination	-elevated threat	-8 illumination rounds
Attack Helicopter Employment	-naval gunfire/mortar/ artillery airspot	-2 rotary wing CAS aircraft, 2 or more dissimilar supporting arms, evaluation should be flown in a MAGTF level operation if possible
Artillery Call for Fire (CFF)	-control of rotary wing CAS in all threat environments	*indirect fire support
Naval Surface Fire CFF	-night low threat	**all 8 sorties require ground FACs. Other items pertain to multiple sorties.
Fire Support Coordination Measures	-night elevated threat.....	
MAGTF Targeting and Fire Support	-supporting arms integration in any threat environment (check ride)	
MACCS		
Integrated Airspace Command and Control		

Table 6. FAC(A) certification requirements.

One can readily ascertain that the qualification process is not entirely in the hands of the squadron. The flight phase of the FAC(A) syllabus requires a tremendous amount of external support to complete. Ground FACs and helicopters are required for the majority of the work-up sorties which in turn requires advance planning with the supporting units thereby making the schedule more resistant to change once agreed upon. Any instance where training is dependent upon an external unit will put the squadron in a disadvantageous position. In these situations the squadron executing the syllabus is no longer the sole determinant of its training program.

The FAC(A) qualification syllabus requires a minimum of eight sorties barring any waived events. If aircrew perform satisfactorily during each successive sortie and pass

the check-ride flight, a minimum of eight sorties will be flown during qualification. Often there are “hiccups” in the work-up syllabus that require aircrew to re-fly a sortie. These hiccups stem from a variety of sources but all serve to incomplete a work-up flight. An incomplete flight might be due to adverse weather, cancellation from a supporting unit, aircraft malfunction, poor flight performance on behalf of the aircrew, or aircrew health. As can be seen, the completion of a single FAC(A) sortie requires many competing factors to act synergistically.

ATARS and the TACRECCE Mission

The additional TACRECCE mission brought about by the incorporation of the ATARS system in the *Delta* is to conduct all weather multi-sensor imagery reconnaissance, including pre-strike and post-strike target damage assessment and visual reconnaissance. Presently this mission is undergoing growing pains. Not only are all of the components of the system not approved for operational use, but also, employment doctrine and training syllabi are neither developed nor incorporated. For the purpose of this essay, the entire ATARS suite is assumed to be operational to include the aircraft carried data-link pod, which is the one component still under operational evaluation. Due to the absence of a Marine Corps training syllabus for the ATARS/TACRECCE mission, once one is incorporated, it clearly will have an additional burdensome impact on F/A-18D training requirements. Although not incorporated as of this date, some of the proposed ATARS syllabi recommend up to eight core competency sorties for the T&R syllabus. The addition of such a training syllabus is only a matter of time and will serve to exacerbate the competition for scarce training resources.

Notwithstanding, ATARS brings a unique capability to the battlefield while supporting the MAGTF or theater commander. BGen R.M. Flanagan, Deputy Commander II MEF, further develops this statement:

Battle tested and combat proven, ATARS is a true force multiplier. In addition to the capabilities inherent in an F/A-18D squadron, an ATARS equipped unit provides the MAGTF Commander with the ability to see the area of operations, disseminate crucial imagery to decision makers, maintain the ability to rapidly respond to changing situations, and ultimately – win!²⁸

This said, the Marine Corps should not become too dependent upon ATARS contributions while it is deployed in general support of a MAGTF. Joint publication 0-2, Unified Action Armed Forces (UNAAF), lists three types of air support missions over which the Joint Force Commander will always have control. One of these is long-range reconnaissance, the exact mission for which ATARS is suited.²⁹ When a MAGTF deploys for sustained operations, the JFC has precedence for the tasking of ATARS via the air tasking order. After these requirements are satisfied, the MAGTF commander may then task the *Delta* for imagery collection in support of his operations. For this reason, the needs of the MAGTF commander will be secondary to those of the JFC, unless the JFC gives the MAGTF priority. No matter who is at the receiving end of the ATARS imagery collection process, the bottom line remains the same: a trained F/A-18D crew will be responsible for completing the assigned mission.

²⁸ *Kosovo After Action Report*, 6.

²⁹ The Joint Staff, *Joint Publication 0-2, Unified Action Armed Forces (UNAAF)*. (Washington DC: 24 February 1995), IV-4.

Procurement and Capabilities

Originally, the United States Air Force (USAF) was the lead service responsible for the procurement of ATARS. After the USAF abandoned the program in 1993, the Department of the Navy received congressional direction to proceed with the program, designating the Marine Corps as the lead service. The ATARS system developed by the Corps is comprised of four key components: the ATARS suite mounted in the nose of the aircraft, data-link pod, Squadron Ground Station (SGS), and the Tactical Exploitation Group (TEG).

The ATARS suite is capable of recording imagery from the Electro-Optical (EO) and Infrared (IR) spectrums as well as Synthetic Aperture Radar (SAR) giving it a true all-weather capability.³⁰ The ATARS components carried by the aircraft consist of a nose mounted camera system and an external centerline-mounted data-link pod. The camera records digital imagery onto tapes for post-flight analysis. The in-flight data-link pod transmits this imagery to the TEG at ranges up to 150 miles for time-critical analysis. The TEG, operating as the analysis and dissemination hub, is a MEF level asset located at MEF headquarters. It consists of three High Mobility Multi-purpose Wheeled Vehicles (HMMWV) with trailers and a tactical shelter that connect into a single unit. The TEG also has a data-link antenna associated with it that enables it to receive collected imagery from airborne platforms via radio frequency link. The SGS is a squadron level asset that is used for mission verification, exploitation, limited production of imagery products, sensor maintenance, and aircrew training. The most useful aspect of the SGS is the post-mission verification. During this process the aircrew can sit with imagery analysts and

³⁰ **EO**- electro-optic for high-resolution day/under the weather operations, **IR**- infrared for night operations, and **SAR**- synthetic aperture radar for all weather standoff operations.

aid each other in the identification of intelligence items. Once mission tapes are verified, they can be delivered to the TEG for further analysis and distribution. The targeted level of procurement for ATARS suite components will be completed by May 2002 and is as follows: 19 suites (camera systems), 13 data-link pods, 7 SGSs, and 3 TEGs. It can be ascertained from this level of procurement that ATARS assets will become a valuable commodity based upon the combination of their capability and scarcity. However, once in theater, ATARS will enable commanders to view the battlefield in a near real-time situation allowing them to more effectively prosecute the battle.

Implications

By design, the ATARS system is capable of operating autonomously in flight. This is an extraordinary capability and has led the Marine operational force squadrons, the ones developing the concept of employment for the system, to recommend that the TACRECCE mission be imbedded in the *Delta* squadron. The Fleet reasons that if adequate pre-flight mission planning is conducted, the ATARS mission can be executed while the same aircraft is simultaneously conducting a strike. This assumption is fundamentally true; however, with present procurement levels and the intent of MAG-31 to install only two ATARS suites per *Delta* squadron, the imagery assets will be spread thin.³¹ As long as the ATARS aircraft flies within parameters of a given collection point during the ingress and egress to and from a target area, imagery can be collected. Because the *Delta* can perform missions simultaneously, it is viewed as a waste of capability to singularly task an ATARS equipped aircraft with the TACRECCE mission.

³¹ Future employment options were presented by MAG-31 during the TARC held from 15-17 November, 2000, at MCAS Beaufort SC that was attended by the author.

Pre-mission planning conducted at the squadron level can be loaded onto memory units that are in turn loaded directly into the aircraft. These pre-loaded memory units are what allow the ATARS system to operate independently. After imagery is recorded, it is able to be recalled for viewing in the cockpit. The WSO identifies segments for transmission and then transmits them via the data-link pod. Although data-link pods were not used in Kosovo air operations, the following was said about the ATARS system:

ATARS was used primarily during strikes for BDA [Bomb Damage Assessment] purposes. It was also used to hunt down known targets using known lat/long coordinates to procure imagery for use by the Combined Air Operations Center (CAOC). The MEU(SOC) used the ATARS imagery extensively.³²

The most time demanding aspect of the ATARS mission occurs during both pre-mission planning and post-flight analysis. Pre-mission planning requires the input and verification of data through a myriad of systems to include the tactical air mission planning system and the portable light planning system. The post-flight analysis phase requires aircrew to assist in the analysis of imagery at the SGS with photo interpreters. The time that is spent with imagery analysts post-flight is in addition to the normal time that is spent debriefing the sortie. As can be seen, with the incorporation of the additional ATARS mission, yet another segment of time must be allocated for the initial and subsequent proficiency and currency training.

Conclusion

Each of *Delta* missions is individually manageable from the perspective of training. However, if the missions assigned to the F/A-18D and their associated training programs

³² Flanagan, 6.

are viewed holistically, it is evident that it is an unmanageable task to remain proficient in all areas. For example, as a stand-alone system ATARS is extremely manageable; however, coupled with the multitude of other assigned missions and their training requirements, they serve to further degrade the ability of the aircrew to effectively employ the aircraft. Whether the impediment to proficiency is due to weather, ordnance, or the other stated factors, the bottom line remains the same. With respect to the F/A-18D the Marine Corps is not getting what it paid for. In order to correct this, the Corps must shed some of the currently assigned missions of the *Delta* and prioritize the missions that remain.

Marine Corps Strategy 21 provides the strategic guidance for the Corps well into the 21st century and clearly past the expected service life of the F/A-18. If the axis of advance set forth in this document is truly how the Marines envision warfighting in their near future, then the F/A-18D will remain the focal point of the ACE for the MAGTF in order to fully integrate fixed-wing attack aviation into the single battle concept. Currently the Marine Corps is receiving adequate support from the F/A-18D; however, adequate in warfighting terms is unacceptable. Let us now take a look at some steps that can be taken which, if implemented, would go far to advance the employment efficiency of the *Delta* thereby giving the Marine Corps what it paid for.

Recommendations

Harder than getting a new idea in, is getting an old one out.

--B.H. Liddell Hart

The Marine Corps has numerous avenues of approach available to it in its attempt to solve the “platform maximization” issue. Available courses of action are varied, and

range from continuing as is to completely reorganizing the F/A-18 community. The preponderance of this paper has focused on the cause and effect factors associated with the *Delta* training program and the problems facing the community concerning its assigned missions and associated aircrew proficiency. It must be realized that the fleet operational squadrons are in a reactive mode to the mandated training requirements associated with the assigned missions.

To more fully integrate any weapon system, the Marine Corps must determine where the focus of its warfighting efforts should be placed. The warfighting niche for the Corps is the MAGTF and the most valuable fixed-wing player in that supporting arms mixture is the F/A-18D. If the Marines deem the FAC(A) and TACRECCE missions critical to the success of the MAGTF, would it not make sense to have a platform that specializes in such missions? Additionally, the Marines should recognize that some of the other missions we currently train too are not in our best interests. One such mission is air superiority. The Marine Corps should not be in the business of creating and sustaining air superiority: we are simply too small to provide this mission. This is a mission better suited for the Navy or the Air Force.

Presently there is too much emphasis and training devoted to the AAW mission. As related to the *Delta*, the ACTI certification phase does not justify the amount of time dedicated to it during the course of a training cycle. Three detriments of the ACTI program are: first, it is the most time consuming and asset depleting qualification currently trained too; secondly, it caters to a mission that should not be the emphasis of Marine tac-air; and lastly, it has long been deemed a right of passage within the F/A-18 community thereby validating and necessitating its continuation. With regard to the F/A-

18D community, the ACTI certification should be removed. It should be replaced with an AAW qualification that is sufficient in the depth of its training to allow aircrew to employ tactically at the section level and should be based on a firm understanding of the basics of air combat maneuvering. By reducing the amount of training devoted to the ACTI qualification, additional time could be spent honing aircrew proficiency in more critical mission areas.

With respect to the reconnaissance capable *Delta*, depending upon how it is integrated will determine whether the full extent of its capabilities will be employed. The integration of the F/A-18D(RC) is a current topic of discussion within the framework of the Marine Corps. It is important for the Corps to use foresight and address this issue while in the infancy stage of its integration. With the limited number of ATARS units being procured, it makes sense to combine all of them into one squadron. Currently there are nine F/A-18 squadrons supporting the Western Pacific (WestPac) UDP cycle, six *Delta* and three single seat squadrons. This is neither necessary nor prudent. If one of the East Coast Delta squadrons were to be pulled from this rotation, four squadrons would remain to support the WestPac UDP. This would equate to always having two F/A-18 squadrons deployed in theater and would yield an eighteen-month turn around cycle for those eight squadrons. The squadron removed from this UDP rotation could then become a dedicated F/A-18(RC) squadron and could augment the UDP cycle with a rotating detachment of three ATARS equipped aircraft.

Given the number of ATARS assets being procured by the Corps, a dedicated F/A-18D(RC) squadron would be able to equip all twelve of its aircraft. If this all ATARS squadron had a WestPac rotational cycle consisting of three aircraft every six months, it

too would have an eighteen-month turn around. Additionally, each rotation would have a TEG, two SGSs, and three data link pods. In actuality, there would be more of a capability deployed in this scenario than what is currently being provided. If a real-world contingency were to arise requiring ATARS, the squadron could then adjust its deployment cycle, and if need be deploy as an entire unit of twelve aircraft. This suggestion makes sense for three important reasons: first, it provides current theater commanders with additional capabilities; secondly, it provides the ability to rapidly deploy and mass the ATARS capability; and most importantly, it would allow such a squadron to focus on mission specialization during its peacetime training cycle thereby increasing platform efficiency. This argument along with the previous one seems to bring us full circle and requires the Corps to determine its mission priorities. If it is correctly assumed that the critical missions provided to the MAGTF by fixed-wing aviation are FAC(A), CAS, and DAS then the Marine Corps must adapt accordingly.

The “Do Nothing” Approach

Is it valid to argue that the Marine Corps need not change a thing with respect to the F/A-18D community? If it is determined that the *Delta* is adequately performing its assigned missions, then why fix something that is not considered to be broken.

The *Delta* community itself is in the best position to make this determination but must do so while playing the role as its own worst critic. If it is determined that the MAGTF is completely supported, then the *Delta* community should continue with its present conduct of operations, continue working to satisfy the training and core competency requirements set forth in the T&R manuals, and absorb the additional mission of ATARS. However, consider this scenario: if a GCE requests CAS or FAC(A)

and a *Delta* arrives on station as requested, the ground side of the house will perceive no problem. However, there may have been considerable issues within the squadron to muster a qualified aircrew for support of that mission. Contrarily, if the squadrons are without issue in providing the requested missions, then obviously there is no need for change. Only the squadron and its commander can honestly look at this situation and make the determination.

In the “do nothing” approach, there are those who argue that aircrew do not need to be proficient in all mission areas at all times. They argue that if a crisis were to arise, the squadron would then focus its efforts on the anticipated mission areas and by the required time of execution would be proficient enough to execute the missions assigned. Food for thought that counters this argument comes from LtGen Rhodes during his testimony to the House Armed Services Committee:

While our aircrew performed superbly, lack of sufficient PGM training assets contributed to a less than optimal performance during the initial stages of the operation. Proficiency increased in direct correlation to experience with the weapons even though that experience was gained under combat conditions.³³

Although it can be argued that the initial substandard performance was related to a shortage of peacetime training ordnance, if these squadrons had been proficient in PGM deliveries before deploying, their proficiency training would not have come during combat. It is fortunate that they faced a benign enemy. A fiercer one would have posed a much higher risk, and aircrew would have suffered accordingly. The bottom line is that these squadrons were not proficient at PGM deliveries and it begs the important question as to why. Quite possibly the answer lies with a preoccupation to remain core capable

³³ Rhodes, 8.

across the broad spectrum of missions assigned to the F/A-18D. It thus seems obvious that the “do nothing” approach is not the answer to platform maximization in and of itself.

Mission Prioritization

The notion that the F/A-18D is responsible for too many missions is true if equal emphasis is given to all of the assigned missions. What must change to make this a false statement is the prioritization of the missions, an adjustment to the associated CRP weights, and a de-emphasis on certain mission areas. If this is accomplished and adhered to, the Marine Corps is well on its way to getting the F/A-18D it paid for.

As a recommendation, the missions that should be assigned to the *Delta*, in order of priority, are: FAC(A), CAS, DAS (excluding AI but including precision strike), TAC(A), SCAR, battlefield illumination, SEAD, AI, and EAF operations. Of importance to note is that DAS consists of the subordinate missions of armed reconnaissance, strike coordination, and air interdiction. Accordingly, the T&R Manual’s CRP weighting system should be realigned to reflect this prioritization so as not to penalize a unit for not remaining current in a mission of lower value. Additionally, the *Delta* community could help itself if it were to adhere more stringently to the prescribed number of qualifications in the T&R manual to avoid over-training at the expense of other mission areas. For example, the ACTI program is the *Delta* community’s biggest culprit of over-training. To be considered core competent, the T&R manual requires four and four for pilots and WSOs respectively to be ACTI qualified. Currently there are squadrons possessing

upwards of 200 percent of the required number of ACTI qualifications.³⁴ Considering that the ACTI qualification is the most aircrew intensive, time consuming, and asset depleting qualification for which the *Delta* trains, there is no justification for squadrons to train to it as much as they do as it unnecessarily detracts from preparing for other vital missions. Doing away with the ACTI qualification in the *Delta* community requires a paradigm shift in thinking and will require a significant restructuring of the T&R manuals. Because the ACTI program has been a rite of passage in the *Hornet* community, careers and future orders can be adversely affected if it is done away with. Therefore, precautions must be taken so as not to allow this to happen. As an end state, core progression models must change along with a restructuring of the sortie CRP weightings in order to reflect the newly prioritized missions.

The ability to execute certain aspects of the A/A mission is important to a swing-role fighter. If a *Hornet* is conducting a self-escort strike, its crew must retain the capability/proficiency to leave the strike package and prosecute A/A threats as required. However, during the life of the *Hornet* there has been virtually no air-to-air threat in combat operations. Operation Desert Storm in Southwest Asia, Bosnia, and Kosovo had virtually no air-to-air encounters and therefore validates the argument that the amount of training we put towards this mission during peacetime is unwarranted. If the *Deltas* were to train to the A/A mission at a level far below that presently required for ACTI, would this be sufficient to satisfy any A/A requirement. Probably so. This brings us back to the point that ACTI has always been a rite of passage in the *Hornet* community and the mission that it serves is air superiority. It is recognizable from previous discussions in

³⁴ MAG-31 December 2000 core reports reflected some *Delta* squadrons possessing 6/6 ACTI qualified pilots and WSO's when the requirement was 4/3.

this paper that air superiority is not a realistic mission for the Marines and should be left to a service that can afford an air superiority fighter. Because the air superiority mission is one that the F/A-18D will not realistically be expected to fill during combat operations, the ACTI qualification should be eliminated.

Incorporating More Efficient Training Programs

For sake of argument, let us assume that the present missions assigned to the *Delta* and the training requirements remain unchanged. Core competency requirements will remain the same, continuing the F/A-18D community's requirement to meet the present level of standardization. In order to do this adequately and to maximize the F/A-18D under these conditions, regimented training programs must be incorporated. The training program set forth in this segment works hand-in-hand with the removal of the ACTI qualification.

One argument for the retention of the ACTI qualification is the flight leadership gained through its training process. For many aircrew this is the first time a squadron's focus for training has been in their direction. Items such as briefing techniques, weapons and systems knowledge, and flight performance are honed and evaluated. For WSOs, this is particularly true. If a WSO has not undergone FAC(A) training, the ACTI work-up could possibly be his first time in the spotlight. Pilots, by the time of an ACTI certification, will have normally been evaluated during section lead, division lead, and possibly FAC(A). Where then would aircrew, especially WSOs, obtain this level of instruction if the ACTI syllabus were removed? The answer lies within a training program that adheres to a regimented syllabus.

If a calendar year were divided into quarters, each three-month segment could serve as a training cycle. For example, during the first quarter of a year, January would be devoted to WSOs. Whether the flights were A/A or A/S does not matter, in fact two weeks dedicated to each would help optimize currency and proficiency. Because January is “WSO month,” they receive the priority and emphasis of training. They do as much pre-flight planning, airborne systems operations and post-mission debriefing as they can handle. When they have reached their limits, it teaches them to delegate responsibility (a good mission commander trait), makes them aware of their limitations, and identifies to the evaluators their levels of ability. Weaknesses are identified and focused upon and overall flight performance is enhanced. One of the most important items in the *Delta* concerning mission execution is crew coordination. During the month of focused WSO training, crew coordination would be secondary. The purpose of the focus of efforts is to challenge the aircrew to perform as many functions during the conduct of the flight as is deemed safe. As an aircrew becomes overloaded, task shedding occurs. At the first instance of task shedding, the aircrew’s ability level has been reached. Hopefully, through valuable debriefing techniques, the aircrew will be able to perform more functions on the ensuing sortie. At the end of January the roles are reversed and it is time to put the spotlight on the pilots. When their month is completed the third month of the cycle concentrates on putting the crews back into their normal roles in order to emphasize crew coordination training.

Under this type of training program aircrew receive a focus of effort for training four times a year as both an individual and as a crew. Compare this to the typical ACTI

spotlight and the probability exists to obtain a higher quality product under this proposed training program.

Implications for the Future

Gen. J. L. Jones, CMC, sets forth the following as future Marine Corps strategy:

Marine Corps Strategy (MCS) 21 is our axis of advance into the 21st century and focuses our efforts and resources toward a common objective. . . . MCS 21 fosters an organization that is proactive and adaptable to take advantage of opportunities, overcome challenges, and prudently employ the men, women, and resources entrusted to us.³⁵

It would be rather presumptuous to suggest that these words were written specifically to support the recommendations for change put forth in this essay. The intent of this quote extends far beyond the scope of any specific aircraft or weapon system. However, the notions of proactive organizations, adaptability, and the prudent implementation of resources pertain nicely to the arguments contained herein. In order for the *Delta* to be employed to its potential, it is necessary for Headquarters Marine Corps and the F/A-18 community to objectively consider the ideas and proposals that were previously presented. The F/A-18D is a lethal platform and the world's most pre-eminent strike/fighter; however, it can be made more deadly, especially on the first pass. The time to identify a lack of proficiency, is not during combat operations, it is now. For these reasons, issues that pertain to platform maximization must be addressed to ensure that the Marine Corps is getting the F/A-18D it paid for.

We cannot be certain as to what the future will entail; however, it is possible as well as prudent to arm ourselves with forethought. For example, what if the joint strike fighter

³⁵ U.S. Marine Corps, *Marine Corps Strategy 21*, November 2000, 1-5.

was to be canceled? What then would the Marine Corps do? Most probably, we would climb on board with the Navy and buy the F/A-18E/F. This seems to be an easy decision and a quick fix; the question that should be asked if we venture down that path is whether we buy the single-seat or two-seat version. Lessons learned from previous neck down ventures must not be lost. If we do not continue to take lessons learned from our past and apply them to our war fighting concepts for the future, we will have completely discarded our visionary legacy.

GLOSSARY

A/A	Air to Air
A/S	Air-to-Surface
AAW	Anti Air Warfare
ACE	Air Combat Element
ACM	Air Combat Maneuvering
ACTI	Air Combat Tactics Instructor
AGM	Air to Ground Missile
AI	Air Interdiction
AR	Aerial Refueling
ASWD	Aerial Specific Weapons Delivery
ATARS	Advanced Tactical Air Reconnaissance System
BCL	Battlefield Coordination Line
BDA	Bomb Damage Assessment
CACC	Combined Arms Coordination and Control
CAOC	Combined Air Operations Center
CAS	Close Air Support
CFE	Call for Fire
CRP	Combat Readiness Percentage
DAS	Deep Air Support
EAF	Expeditionary Airfield
EO	Electro Optical
EW	Electronic Warfare
FAC(A)	Forward Air Controller Airborne
FCLP/EQ	Field Carrier Landing Practice/Expeditionary Qualification
FLIR	Forward Looking Infrared
FLOT	Forward Line of Troops
FSCL	Fire Support Coordination Line
FY	Fiscal Year
GP	General Purpose
HARM	High Speed Anti-radiation Missile
HMMWV	High Mobility Multi-purpose Wheeled Vehicle
HVAA	High Value Airborne Asset
IDFS	Indirect Fire Support
IR	Infrared
JDAM	Joint Direct Attack Munition
JSOW	Joint Stand-off Weapon

JTF	Joint Task Force
LAT	Low Altitude Tactics
MACP	Marine Aviation Campaign Plan
MAG	Marine Air Group
MAGTF	Marine Air Ground Task Force
MAW	Marine Air Wing
MAWTS	Marine Aviation Weapons and Tactics Squadron
MCCDC	Marine Corps Combat Development Center
MCCRES	Marine Corps Combat Readiness Evaluation System
MCWP	Marine Corps Warfighting Publication
MDTC	Marine Division Tactics Course
MEF	Marine Expeditionary Force
METL	Mission Essential Task List
MEU(SOC)	Marine Expeditionary Unit Special Operations Capable
MRP	Mission Readiness Percentage
NCEA	Non-Combat Expenditure Allowance
NSI	Night Systems Instructor
NVD	Night Vision Device
OAS	Offensive Air Support
PGM	Precision Guided Munition
PTO	Pilot Training Officer
SAR	Synthetic Aperture Radar
SCAR	Strike Coordinator and Reconnaissance
SEAD	Suppression of Enemy Air Defense
SGS	Squadron Ground Station
SLAM	Standoff Land Attack Missile
SSWD	Surface Specific Weapons Delivery
T&R Manual	Training and Readiness
T/M/S	Type/Model/Series
T/O	Table of Organization
TAC(A)	Tactical Air Coordinator Airborne
TACRECCE	Tactical Reconnaissance
TAMPS	Tactical Air Mission Planning System
TARC	Tactical Air Reconnaissance Conference
TEEP	Training Exercise Employment Plan
TEG	Tactical Exploitation Group
TFLIR	Targeting FLIR
UDP	Unit Deployment Plan
UNAAF	Unified Action Armed Forces
USAF	United States Air Force
VMFA(AW)	Fixed Wing Marine Fighter Attack All Weather
WESTPAC	Western Pacific
WSO	Weapons Sensor Operator
WTI	Weapons and Tactics Instructor
WTO	WSO Training Officer

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