2017 MARINE AVIATION PLAN

MARINE CORPS AVIATION 2017-2027

The Marine Corps and Marine Aviation

The Marine Corps is manned, trained, and equipped to be an "expeditionary force in readiness", ready and forward deployed, capable of crisis response, entry and sustained operations, across the range of military operations (ROMO). The Marine Corps is by design a "middleweight force", equipped with the requisite organic capabilities to accomplish its mission, roles, and functions. Marine aviation, as one of the two combat arms of the Marine Air Ground Task Force (MAGTF), exists "to conduct air operations, project combat power, and contribute to battlespace dominance in support of the MAGTF's mission." 1

Where We Have Been

As we ended the fiscal year (September 30, 2016), the Marine Corps executed more than 80 operations (15 from the sea), 130 theater security cooperation (TSC) events, while participating in more than 150 exercises around the world. From 31st MEU VMM disaster relief operations following the Kumamoto earthquakes in Japan, to 22 MEU VMA/HMLA strikes in Libya in support of counter-ISIL operations, Marine aviation has been forward-deployed, ready, and relevant.

Where We Are Going

After fifteen years of emphasizing sustained operations ashore, the Marine Corps is refocusing on its naval and expeditionary roots and full-spectrum operations across the ROMO. The Marine aviation portfolio continues to evolve as we address the challenges and trends of the current and future operational environment.

Modernization

Over the next five years, as Marine aviation continues with its modernization plan, the MAGTF's Aviation Combat Element will enter the heaviest years of aircraft transition in its history.

Our TACAIR fleet will be in the middle of transition with a robust mix of F-35B, F-35C, legacy F/A-18A-D, AV-8B and EA-6B platforms. F-35B squadrons will be operational with both ARG/MEU and forward deployed land-based units, while our AV-8B and F/A-18 squadrons will receive modernization upgrades to maintain relevance in close air support, strike, and air defense missions through sundown. Marine F-35C squadrons will integrate with Navy CVNs in accordance with our TACAIR integration (TAI) commitments. Marine EA-6B squadrons will remain ready and forward deployed until their sundown in 2019.

Our rotary wing (RW) and tiltrotor (TR) communities will be closer to complete transition with AH-1Z, UH-1Y and MV-22B fully operational and deployed across the MAGTF. Our heavy lift assets (CH-53K) will be over halfway through transition, anticipating full operational capability by 2029.

We continue to develop and deploy our fleet of unmanned aircraft systems. The RQ-21 is being upgraded to provide additional sensor and platform capabilities, while deploying organically with Marine Expeditionary Units. The Marine Corps' Group 5 sea-baseable UAS—the Marine Unmanned Expeditionary (MUX)—has been formally approved by the Joint Requirements Oversight Council and will see major investment across the FYDP in order to field this capability in the mid-2020s.

Our expeditionary enablers are modernizing as well. We will introduce G/ATOR radars, replacing five of the Marine Corps legacy systems and providing a significant upgrade in capabilities. We will also field the Common Aviation Command and Control System (CAC2S) to better integrate aviation command and control functions.

With our materiel modernization, Marine Operational Test and Evaluation Squadron 1 (VMX-1) is a key enabler in exploring and operationalizing our new combat capabilities. Now co-located with MAWTS-1, VMX-1 is optimally postured to conduct experimentation, tactical demonstrations (TACDEMOs), concept development support, and operational testing in order to rapidly deliver warfighting capability to the fleet.

[1] U.S. Marine Corps, Marine Corps Operations, Marine Corps Doctrine Publication (MCDP) 1-0 (Washington DC: Headquarters U.S. Marine Corps, 2011), 2-8.

Readiness

Current readiness, at the squadrons and for Marine aviation as a whole, is below the level required to support steady-state requirements and provides limited capability to surge during crisis response and/or major combat operations. The combination of operational tempo, manpower challenges in critical military occupational specialties (MOSs), insufficient materiel support, and an aging aircraft inventory has forced resource tradeoffs and reallocation across the Marine aviation enterprise. HQMC Aviation has conducted a series of independent readiness reviews to obtain impartial recommendations to improve Marine Corps aviation readiness (AV-8B, CH-53, MV-22). Readiness recovery initiatives are being applied across every platform in Marine aviation, focusing on people, process, parts and funding.

Given the state of current readiness, coupled with an aging aircraft inventory, future readiness is an additional challenge that affects Marine aviation. Marine aviation is prioritizing current readiness initiatives and modernization in an effort to secure future readiness. Continuing its modernization effort, Marine aviation is halfway through the full transition of every tactical platform in its inventory. As older legacy aircraft are replaced by newer, more capable systems, materiel readiness will increase through planned efficiencies and the anticipated reduction in unscheduled maintenance.

Training

The training and readiness (T&R) program will remain the cornerstone for Marine aviation, generating and maintaining combat-capable units in support of geographic combatant command's OPLANs and global force management requirements.[2] By executing the T&R program, focusing on "brilliance in the basics", Marine Aviation will provide MAGTF commanders with an ACE capable of executing the six functions of Marine aviation.[3]

Marine Aviation Weapons and Tactics Squadron One (MAWTS-1) will continue to be Marine aviation's premier schoolhouse, conducting the twice-annual Weapons and Tactics Instructors (WTI) Course. Maintaining a robust WTI course/program underwrites a competent and relevant ACE by providing standardized advanced tactical training and certification of unit instructors, enabling units to gain maximum value and efficiency from the T&R program.

Exercises are another essential line of effort in developing and training a combat-capable ACE. We must extract every ounce of value from each exercise and training opportunity; exercises provide venues for experimentation and allow us to examine and validate current and emerging joint, naval and Marine Corps concepts.[4] Additionally, integrating "collective capabilities" at multi-T/M/S, MAGTF, naval, joint and/or multi-national exercise venues are invaluable to exercising higher-level missions and functions and developing warfighting relationships.

Let's Move Out

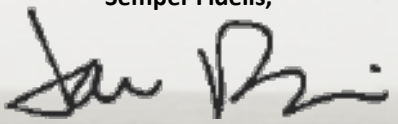
As with our forebears in the interwar years, form follows function in today's Marine Corps. As we innovate and drive forward with new aircraft and new systems, we also think hard about how we will maximize those systems; how we will integrate with naval, ground, and allied expeditionary forces; and how we will fight and win. We are leaning forward in the straps, finding ways to better support the MAGTF, making ourselves ready to be the first to fight. When we do think, innovate, execute our missions, and put our lives on the line, we will take our proper place alongside the long line of Marines and sailors who came before us. Their memory, and our nation, deserves nothing less.

[2] U.S. Marine Corps, Marine Aviation Training and Readiness Program, Navy-Marine Corps Instruction (NAVMC) 3500.14C (Washington DC: Headquarters U.S. Marine Corps, 2011), 1-3.

[3] Six Functions of Marine Aviation- Anti-air Warfare, Offensive Air Support, Assault Support, Air Reconnaissance, Electronic Warfare, Control of Aircraft and Missiles (MCWP 3-2, Aviation Operations)

[4] Joint Operational Access Concept (JOAC), Joint Concept for Entry Operations (JCEO), Littoral Operations in a Contested Environment (LOCE), Naval Operating Concept (NOC), Marine Corps Operating Concept (MOC), Expeditionary Advanced Base Operations (EABO), Distributed Aviation Operations (DAO).

Semper Fidelis,



LtGen Jon "Dog" Davis

Deputy Commandant for Aviatian

TABLE OF CONTENTS

SECTION ONE
MARINE CORPS OPERATIONS AND READINESS

1.1 Marine Corps Operating Concept

Marine Aviation and the MAGTF

1.2 Aviation Combat Readiness

RBA Recovery

Moving the Needle

Independent Readiness Reviews

1.1 MARINE CORPS OPERATING CONCEPT

In September 2016, the Commandant released the Marine Corps' new capstone operating concept, the Marine Corps Operating Concept, or MOC. Recognizing the trends of the future operating environment and the changing character of war, the Marine Corps developed 21st Century Maneuver Warfare as its new operating concept to addresses future adversaries, threats and challenges.

As we design and develop the capabilities and capacities necessary to execute 21st Century Maneuver Warfare, the future force must have the following characteristics:

1) **Naval-** Contributes to deterrence, maritime security, sea control and power projection

2) **Expeditionary-** Trained and equipped to operate in austere conditions and hostile environments

3) **Agile-** Able to navigate the physical and cognitive dimensions of complex situations and seize the initiative

4) L**ethal-** Uses combined arms, integrating and leveraging information warfare, to destroy and defeat our enemies across the five domains (air, land, sea, space, and cyberspace)

By designing this future force, the Marine Corps will be an integral part of the naval, joint, and combined force: tailorable, flexible, versatile and capable of responding to any crisis across the ROMO. As an integrated force, the Marine Corps recognizes that Marines both contribute and benefit from unique and complementary capabilities across the ROMO and all five domains.

"The 21st century MAGTF conducts maneuver warfare in the physical and cognitive dimensions of conflict to generate and exploit psychological, technological, temporal, and spatial advantages over the adversary. The 21st century MAGTF executes maneuver warfare through a combined arms approach that embraces information warfare as indispensable for achieving complementary effects across five domains – air, land, sea, space, and cyberspace. The 21st century MAGTF avoids linear, sequential, and phased approaches to operations and blends maneuver warfare and combined arms to generate the combat power needed for simultaneity of action in its full range of missions. The 21st century MAGTF operates and fights at sea, from the sea, and ashore as an integrated part of the naval force and the larger combined/joint force."

Increased blue/green integration to support sea control and power projection

1.1 MARINE AVIATION AND THE MAGTF




"The ACE affords the MAGTF the ability to deliver fires, facilitate integrated command and control, enhance mobility and maneuver, provide force protection, sustain combat power, and collect intelligence."

MCWP 3-2, Aviation Operations

Current and Emerging Supporting Concepts

These concepts are nested and aligned with current and emerging joint and naval concepts: joint operational access concept; joint concept for entry operations; littoral operations in a contested environment; and expeditionary advanced base operations.

Distributed Aviation Operations (DAO)

Background- In some regions, the proliferation of long-range, precision conventional threats, such as advanced SAMS and cruise missiles and armed UAVs, has contested the use of traditional bases and methods of operations. While advances have been made to counter such threats, such as interdiction, interception, and base hardening, the complexity of the problem and sheer number of threats demands that more must be done. In traditional warfare mass can be viewed as an asset however, in some scenarios mass, coupled with predictability, is also a liability.

Concept- The aviation combat element (ACE) of the Marine Air Ground Task Force (MAGTF) has the ability to conduct distributed aviation operations (DAO) in support of land and/or naval campaigns. DAO is a task organized MAGTF operation, employing ACE aircraft in a distributed force posture, independent of specialized fixed infrastructure. Doctrinally, the ACE conducts these types of operations from four types of forward operating bases (FOBs): main air base, air facility, air site, and air point.5 FOBs are classified in relation to their size, location, and characteristics in the form of airfield services, logistical supportability, and maintenance capability.6 Benefits for conducting DAO include:

1) Increased operational reach
2) Increased capacity (compliment/supplement sea-based sortie generation)
3) Distributes and reduces overall risk in A2/AD environments
   - Threats to traditional/established land-based air bases and sea-based aircraft carriers
   - Highly mobile site: occupation/duration determined by threat
4) Economy of force options for major maneuver elements
5) Capitalizes on flexibility and surprise

[5] *U.S. Marine Corps, Aviation Ground Support, Marine Corps Tactical Publication (MCTP) 3-20B (Quantico, VA: Marine Corps Combat Development Command, 2016), 3-2.*

[6] *Ibid.*

Distributed STOVL Operations (DSO)

Background- Distributed STOVL Operations is a subset of Distributed Aviation Operations.

Concept

Distributed STOVL Operations maximizes the capabilities of STOVL aircraft and expands basing options based on reduced runway requirements.7 DSO provides the same benefits as Distributed Aviation Operations. Increased and complementary basing options provide commanders with additional options to leverage the F-35's access, collection and strike capabilities.

Fifth generation STOVL aircraft launch from a sea base or land base to conduct multiple missions, with fuel and ordnance resupply conducted at mobile forward arming and refueling points (M-FARPS) located closer or within the operating area. Aircraft return to the sea or land base at the conclusion of each flight day.

Complementing and enabling the M-FARPs is the mobile distribution site (MDS) concept, a vehicle-mobile site located away from the M-FARP, intended to re-arm and re-fuel the M-FARP while maintaining an element of deception and decoy. DSO is sustainable using surface connectors, land-based MDSs and host nation support, enabling readiness and sortie generation for the MAGTF.

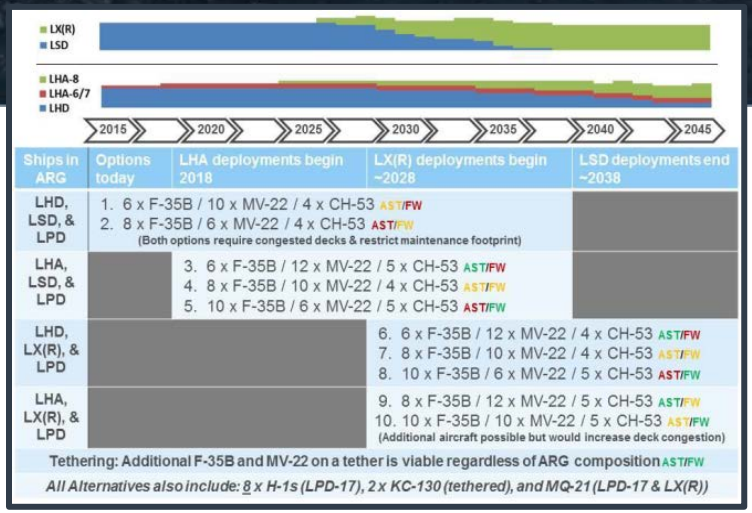
The DSO concept/sites are scalable based on the objective, operational environment and threat. DSO concept/site employment includes four major types/options:

1) Air-Connected Mobile
2) Light Mobile
3) Medium Mobile
4) Heavy Mobile

While DSO provides another employment option for MAGTF, naval, or joint forces, it may not be appropriate in every scenario. Employment of forces in a distributed STOVL fashion requires operational considerations including logistical support, command and control, and security.

[7] *U.S. Marine Corps, MAGTF F-35B Distributed Short Take-Off Vertical Landing (STOVL) Operations - DSO Concept of Operations, (Washington, DC: Headquarters, Marine Corps Department of Aviation, Aviation Plans and Policies, 1 February 2015).*

[8] *Marine Attack Squadron 542 (VMA-542). Hunter Army Airfield Distributed STOVL Operations After Action Report. Marine Corps Center For Lessons Learned Report (CDR 15154). Cherry Point, NC, May 2016.*



The Modular ACE and Aviation in the Future ARG/MEU

Background- Responding to demands of the global security environment, naval force employment and trends are placing a premium on presence and posture. The ARG/MEU is the Marine Corps' primary forward-deployed MAGTF; an ARG/MEU can operate independently, aggregate with other sea or land-based units, or serve as the advanced force for larger joint operations. Examining the current ARG/MEU construct, and looking forward to the LX(R) (Dock Landing Ship (LSD) replacement), we must explore new and creative methods of deploying and employing the ACE in order to provide maximum flexibility, capabilities and value to the naval and joint force. Aviation in the Future ARG/MEU examines future ARG/MEU constructs, employing LX(R), to maximize ARG/MEU (ACE) combat power, specifically leveraging F-35B, to address future threats.9 As the LX(R) replaces the LSD in the 2030 timeframe, the ARG will have additional flight deck and hangar space to accommodate a more robust ACE.

Concept- Marine aviation will deploy and employ in the most effective manner to maximize the combat capabilities of the MAGTF. Amphibious assault ships serve predominantly to project MEUs ashore but – as required – will be prepared to "reconfigure" to provide ready decks for 16-20 F-35Bs and 4 VARS-equipped MV-22s for a high-end fight or a mix of MV-22s, CH-53Es/Ks and UH-1Ys for humanitarian or disaster relief missions.

Aviation in the Future ARG/MEU

1) F-35- Eight (8) aircraft F-35 detachment

2) MV-22- V-22 Aerial Refueling System (VARS)

3) UAS

- MQ-21
- Expeditionary Group 5 UAS (MUX)

[9] Dickerson, Charles, Andrew Brown, *Aviation in the Future ARG/MEU* (Washington, DC: Center for Naval Analysis, May 2015), vi.

Lightning Carrier (CV-L)

Background- In the 2017-2027 time frame the Marine Corps will possess the majority of naval 5th generation aircraft. By 2025, the Marine Corps will operate 185 F-35Bs—enough to equip all seven L-Class ships. While the amphibious assault ship will never replace the aircraft carrier, it can be complementary, if employed in imaginative ways. The CVN-L concept has previous been employed (five times) utilizing AV-8B Harriers in a "Harrier Carrier" concept.10 The ARG/MEU's mission, and 13 mission essential tasks (METs), will not change; however, a Lightning Carrier, taking full advantage of the amphibious assault ship as a sea base, can provide the naval and joint force with significant access, collection and strike capabilities.

Concept- An amphibious assault ship (L-Class ship) equipped with 16-20 F-35Bs with an embarked, organic aerial refueling capability will create opportunities for the naval and joint force commander.11 A Lightning Carrier can be employed independently, as part of an ARG or Expeditionary Strike Group (ESG), or in conjunction with a Carrier Strike Group (CSG).12

1) F-35 employment- 16-20 x F-35B

2) Sortie Rate

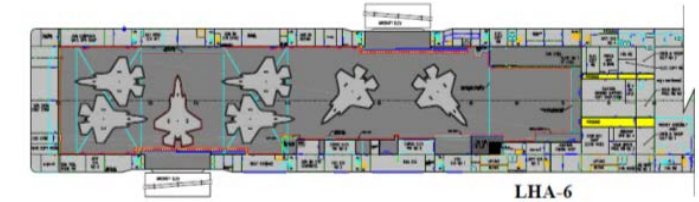
- +40 sortie sustained rate (anticipated)
- Leverages organic MV-22 VARS air-to-air refueling and DAO FOBs to maximize sortie generation and operational reach

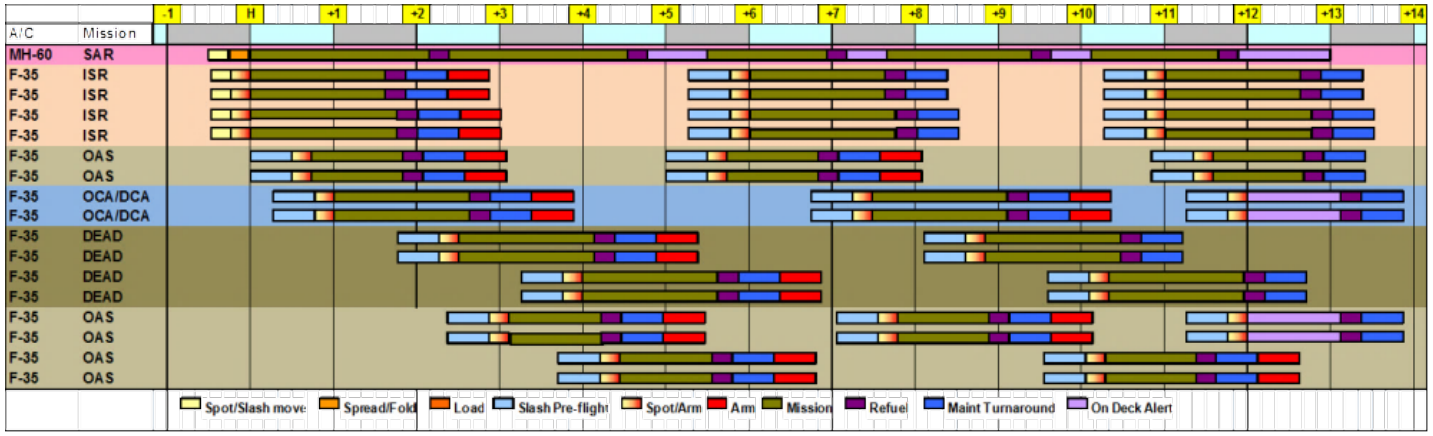
We might never need to employ this way - and may not want to, based upon the need to employ our amphibious ships in a more traditional role - but to not lean forward to develop this capability, to train and exercise with it, is to deny ourselves a force multiplier that highlights the agility and opportunity only the Navy-Marine Corps team can provide.

[10] Briefing, USS BATAAN OIF Post-Deployment Brief, subject: The Harrier Carrier Concept, OIF Execution, Lessons Learned & Template for the Future, May 2004.

[11] Briefing, HQMC Aviation, subject: The Lightning Carrier Concept, June 2012.

[12] Purdon, Jennifer, Robert Ward, Maximizing the Utility of LHA/LHDs as CV-Ls (Washington, DC: Center for Naval Analysis, July 2016), 3.





1.1 MARINE AVIATION AND THE MAGTF

The Marine Corps provides unique capabilities to the naval and joint force and we are manned, trained, equipped and funded appropriately.

MAGTF Digital Interoperability (Command and Control) - Digital interoperability is the seamless integration of Marines, systems and exchange of data, across all domains and networks throughout the MAGTF, naval, joint, and coalition forces in order to rapidly share accurate information, provide greater situational awareness, accelerate kill-chains, and enhance survivability. We continue to pursue integration and data exchange throughout the various arenas; situational awareness, aircraft survivability, intelligence, surveillance, and reconnaissance (ISR), fire support, and logistics. (CAC2S, G/ATOR, CTN)

MAGTF EW (Electronic Warfare, Fires) - MAGTF EW transitions the Marine Corps from a focus on the low-density/high-demand EA-6B, to a distributed, platform-agnostic strategy - where every platform contributes/ functions as a sensor, shooter and sharer - to include EW. Under MAGTF EW the Marine Corps is integrating multiple aviation platforms (unmanned, fixed wing, tiltrotor, and rotary wing assets); payloads; and ground-based EW nodes to provide commanders with an organic and persistent EW capability. Airborne electronic attack (AEA) capabilities post-EA-6B sundown will be provided by EW payloads such as the Intrepid Tiger II EW pod, UAS EW payloads, and the EW capabilities inherent to F-35.

TACAIR (Access, Intelligence, Fires) - Fifth-generation aircraft combines low observability with unprecedented targeting systems and expanded weapons capabilities, and will provide MAGTF ground commanders with a fighter, attack and electronic warfare platform unlike any other. Combining the on-board capabilities of the F-35B with the flexible basing options it provides will create difficultly for enemy planners; further enhance MAGTF commanders' fires capabilities; and enhance the fleet commander's ability to provide sea control to the joint force commander.

Assault Support (Maneuver) - With the speed and range of the MV-22B and the CH-53K, combined with the KC-130J, the MAGTF will have the ability to move Marines and equipment further, faster and with higher situational awareness than ever before. MAGTF and joint force commanders will take advantage of the speed and expanded flight ranges that our AH-1Z, UH-1Y, MV-22 and CH-53K provide, in order to give battle – or not – at the times and places of their choosing.

Expeditionary Aviation Enablers (Maneuver, Sustainment) - The expeditionary nature of Marine Aviation, coupled with the operational demand to disaggregate, re-aggregate and/or conduct distributed operations, requires the niche aviation capabilities inherent in our MWSS and MALS. Our expeditionary aviation enablers, with their ability to provide modular and task-organized units/capabilities , facilitate and sustain aviation readiness and generate combat power.

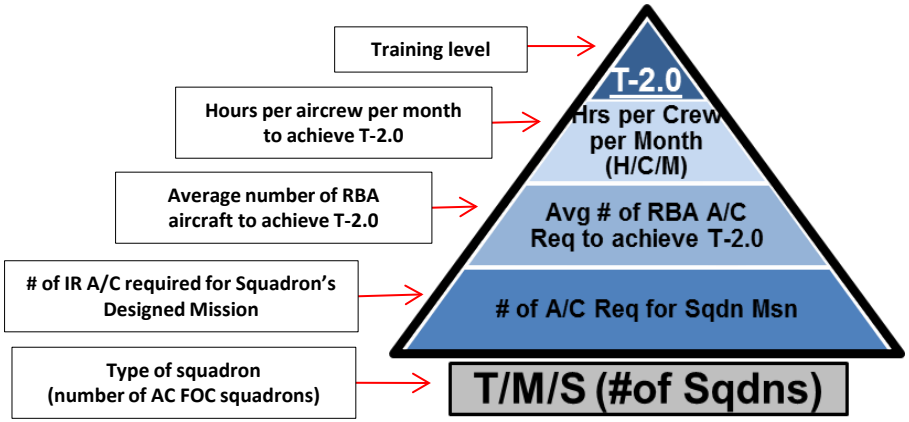
1.2 AVIATION COMBAT READINESS

To be the nation's force in readiness, the Marine Corps depends upon its aviation arm. Marine Corps aviation must be trained, manned and equipped to provide that "A in MAGTF" - to support operations plans and joint and ground force commanders to give battle at the time and place of their choosing. This endstate demands a 2.0 standard: a squadron equipped with up aircraft and with aircrew trained to fly them in any clime and place.

1) We need to increase the amount of time our aviators spend in the air.

2) Our Marine aviators need more "looks at the ball" which equates to more flight time and more time in the simulator.

The Core Competency Resource Model (CCRM) developed for each T/M/S calculates the number of hours each pilot/WSO/ECMO (or crew) must fly, based on the T&R manual, for a squadron to achieve the standards mandated for a Training Level of 2.0.



T-2.0: Squadron ≥ 70% METS trained

Our legacy gear will be ready until we are done with it. Improving the material readiness of our legacy gear—the key component to current readiness—is no easy task, but we must do it.

1) T-Rating is derived from all squadrons' reported T-Levels.

2) It is one of the primary assessment metrics for the naval aviation enterprise (NAE) to determine whether squadrons have the resources to generate readiness.

Highlighted in RED are the Primary Mission Aircraft a squadron needs to achieve training and wartime objectives. Highlighted in GREEN are temporary degraded PMAI measures taken to spread load available assets across the HMH and VMFA T/M/S to ensure squadrons were resourced with the minimum number of assets to achieve the RBA requirements to train to T-2.0. Highlighted in BLACK are the minimum number of RBA Aircraft required daily (on average) for a properly-resourced squadron to maintain a ready posture.

Properly resourced = correct number of personnel, aircraft and parts, and the training ranges to employ them.

SQDN	T/M/S	Primary Mission Aircraft Authorized (PMAA)	Temporary Degraded PMAI	RBA Required for T-2.0	Hours per Crew per Month (H/C/M)
HMH	CH-53E	16	12	7	15.1
HMLA	AH-1W	15		9	15.9
	AH-1Z				18.2
	UH-1Y	12		7	17.9
VMM	MV-22B	12		7	16.2
VMGR	KC-130J	15		9	23.9
VMAQ	EA-6B	6		3	15.1
VMA	AV-8B	16		11	15.4
VMFA	F-35	16		11	16.0
VMFA VMFA(AW)	F/A-18C/D	12		7	15.7

1.2 RBA RECOVERY

RBA RECOVERY PLAN

After over a decade and a half of near surge operations for Marine Aviation, combined with budget cuts, the Corps is currently 159 aircraft short to meet a T-2.0 training goal and we are 45% short of the "up" aircraft we need to meet our Title 10 responsibilities. To increase the number of Ready Basic Aircraft and build the comprehensive strategies to recover our readiness to meet flight line entitlement (FLE) warfighting requirements, we began a series of independent readiness reviews (IRRs) to identify both the issues and the resources necessary to turn this around. We have a POA&M to achieve our required readiness by type, model and series.

INDEPENDENT READINESS REVIEWS

The Marine Corps conducted the first readiness review of AV-8B Harriers in 2014, and followed with CH-53E Super Stallion in 2015 and MV-22B Osprey in 2016. H-1 IRR is in process this year. These reviews are intensive and dispassionate, and give us an in-depth look at the issues and concerns in each community.

WHAT IMPROVEMENTS ARE BEING IMPLEMENTED

Future Readiness: The real key to reducing risk in capacity and recovering readiness is in transition. Due to our aging fleet, we have to focus on both current readiness while simultaneously recapitalize TACAIR with the F-35 B/C, completing the H-1 transition, and soon initiate the transition to the CH-53K.

Current Readiness: Four main components surfaced within each IRR (with different combinations in each Type/Model/Series): People, Parts, Process, and Funding. The Marine Corps is tackling these components head-on and our numbers are starting to trend up, with a full recovery planned for 2019 (as long as we keep these initiatives funded and stay on track with recapitalization).

People: Ensuring the right people with the right training, leadership and skill sets are in positions of authority and responsibility.

1) The Advanced Aviation Management Training (AAMT) Course and the Advanced Maintenance Officer (AMO)Course initiatives are addressing this by providing skilled leadership at the deck plates.

2) Promotions will be based on demonstrated skills, knowledge, and qualifications.

3) Additional MOSs to track qualified maintenance personnel.

4) The Marine Corps intends to employ targeted bonuses and proficiency pay to keep our most qualified people.

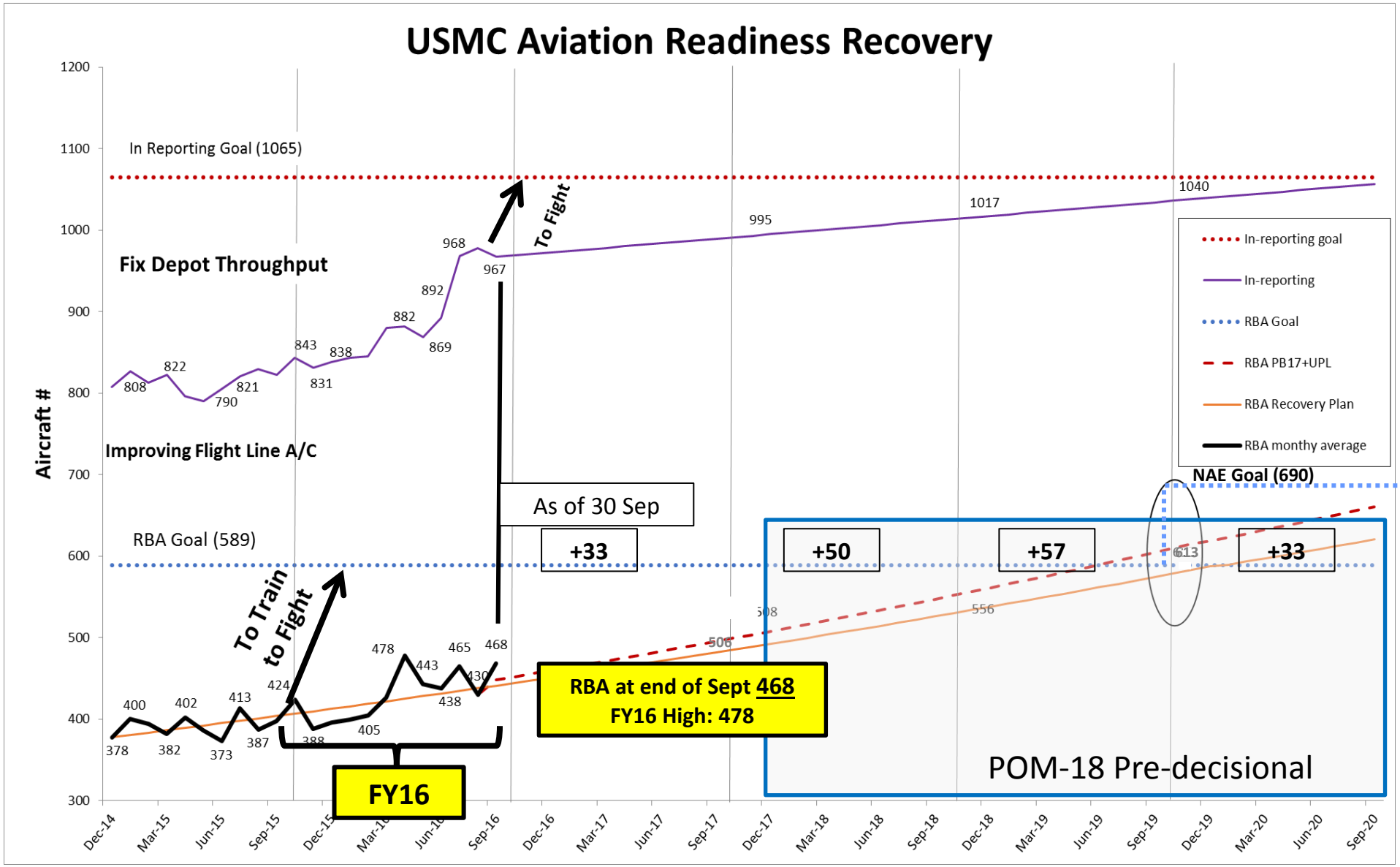
Parts: From our newest fifth generation F-35B to our oldest legacy platforms, our mission requires that we adequately fund our spare parts inventory. This detailed focus on supply chain means parts at the right time and in the right places to fulfill our readiness requirements. NMCS is debilitating and is our #1 casual factor for low readiness in Marine Corps aviation.

Process: Remove barriers to readiness recovery in our in-service repairs and depot backlogs (increasing throughput), and supply posture in our hangar decks and maintenance departments.

We learned in the course of our DoN F/A-18 readiness recovery strategy and three independent readiness reviews that no one solution fits all type/model/series aircraft. We are beginning an aggressive, tailored, funded and tracked roadmap to recover the readiness we need. We will hold our aviation general and flag officers accountable for executing that recovery process – beginning with the DCA.

Funding: Ensuring proper, sustained funding for legacy aircraft, flight hours and spare parts, and for procurement of future aircraft and systems.

1.2 RBA RECOVERY: MOVING THE NEEDLE



1.2 INDEPENDENT READINESS REVIEWS

HARRIER INDEPENDENT READINESS REVIEW (HIRR)

The Harrier Independent Readiness Review (HIRR) identified a cost-effective strategy through the remainder of the Harrier platform's service life to produce a daily 11 Ready Basic Aircraft average per squadron equivalent, and 15.4 flight hours per pilot per month, in order to produce the required T-rating of 2.0.

The HIRR focused on three key areas, which were tied to aircraft reporting status:

1) Out of reporting aircraft.
2) Manpower deficiencies and/or inefficiencies.
3) Supply.

HIRR output was tailored to two key areas for action:

1) Maintenance and material, which included RBA degraders, depot maintenance timeline management, and supply system transition from Boeing to NAVSUP.
2) Manpower, which included both contract maintenance and USMC manpower.

Since the HIRR, we have:

1) Established 55 RBA in operational squadrons as the single driven fleet goal for readiness.
2) Identified key degraders, and ensured that the supply chains for these parts are re-energized.
3) Conducted executive-level engagement with all DOD agencies that have a supporting relationship with the AV-8B program.
4) Conducted executive-level engagement with key vendors and OEMs, ensuring that
5) known deficiencies are being addressed.
6) Conducted a holistic analysis of the supply forecasting model for both the F402 engine and the air vehicle as a whole, resulting in improvements in the logistics system.
7) Ensured that funding levels for Program Related Logistics and Program Related Engineering are kept at acceptable levels.
8) Analyzed maintenance training

To date, we have seen an increase in readiness across the fleet; however, the increase is lagging the HIRR forecast. HQMC Aviation, in concert with the TMS lead (the MAG-14 commanding officer), is actively engaged at the executive level with OEMs, vendors, and all DOD commands that have a supporting relationship with the AV-8B program, in an effort to continue to increase readiness to meet our readiness requirements. While readiness is lagging the forecast there has been a marked improvement which has allowed us to more adequately meet out readiness goals.

1.2 INDEPENDENT READINESS REVIEWS

SUPER STALLION INDEPENDENT READINESS REVIEW (SSIRR)

In response to CH-53E readiness challenges, the Super Stallion Independent Readiness Review (SSIRR) was chartered to identify issues and gaps and conduct root cause analysis for aircraft, aircrew and maintenance personnel readiness and to recommend the best courses of action for the CH-53E community to produce the Ready Basic Aircraft (RBA) for requisite flight hours per pilot per month, in order to achieve and maintain T-2.0 until full operational capability (FOC) of the CH-53K. Findings and recommendations were focused on areas to improve combat readiness of the CH-53E fleet.

The SSIRR recommendations were categorized under surge and sustain recommendations. With the purpose of returning fully mission capable aircraft to the fleet, and of ensuring a ready, reliable, and relevant heavy-lift capability for the Marine Corps through transition to the CH-53K, the CH-53E community has taken several readiness recovery actions since the SSIRR:

1) Resetting all CH-53E fleet aircraft. The validation aircraft completed April 2016, with follow-on verification aircraft inductions complete as well as full rate in order to reset the entire fleet of CH-53Es in the next 3 years.

2) Building out Portable Electronic Maintenance Aids (PEMAS), now up to five per aircraft;

3) Fixing technical publication discrepancies;

4) Enhancing and formalizing academic Functional Check Flight (FCF) training for both pilots and crew chiefs;

5) AcceleratingT-64-GE-419 engine modification;

6) Restoring two AMARG MH-53Es for the FRS to use as basic stick-and-rudder aircraft to provide two CH-53Es back to the fleet;

7) Procuring test equipment and IMRL; and

8) Hiring contract maintenance field teams to provide over the shoulder training to our maintainers.

Efforts are currently underway to expand the CH-53E Performance Based Logistics (PBL) from 10 to 65 components with future growth potential. To increase readiness, HQMC Aviation, in concert with the program office and TMS lead, continue to be actively engaged with all who have a supporting relationship with the CH-53E program.

In summer 2014 our RBA gap was 23 aircraft. In the past two years we have applied the readiness surge and sustainment recommendations from the IRR. Meeting an RBA of T-2.0 is a continuous process as we sustain CH-53E and prepare for FOC of the CH-53K. Based on this continuous process, we have lowered our RBA gap to 12.

1.2 INDEPENDENT READINESS REVIEWS

The objective of the Osprey Independent Readiness Review (OIRR) was to identify issues, gaps and to conduct a root cause analysis for aircraft, aircrew, and maintenance personnel readiness. The OIRR recommended the best courses of action to achieve and maintain T-2.0 for the MV-22 community.

MV-22 readiness has been stressed due to accelerated deployments, accelerated squadron standups, continuous combat use since 2007 and emergent operational tasking. This OPTEMPO has been sustained in parallel with the medium lift transition from legacy assets which is only 75% complete. Additionally, the SPMAGTF construct has driven the requirement to adjust the VMM Table of Organization (T/O) in order to support detachment operations. As MV-22 employment grows and evolves to meet COCOM demand, the industrial and logistics support base is working to keep pace. As a maturing platform that is scheduled to reach FOC in 2020, the support base is maturing in parallel. This base, both industrial and organic, has been challenged to meet established repair timelines and required depot throughput. Across the enterprise, changes to manning are being made to support detachment operations, organic depot facilities are expanding, contracting strategies are evolving to support timely delivery of long lead items, and industry continues to grow their support capability. These and other adjustments are being made to ensure the support base is able to meet logistical requirements driven by current and future MV-22 operational requirements.

Readiness improvement opportunities span configuration management, reliability, supply, manpower, and maintenance key issues limiting readiness:

1) There are over 77 V-22 aircraft configurations and modifications
2) System / Component improvements are under-resourced
3) The supply system is not able to keep pace with material demands (34% NMCS)
4) Depot-level maintenance cannot keep up with demand
5) The quality of maintenance training curricula, maturation, and standardization has not kept pace with readiness requirements
6) Current maintenance manning levels are unable to support demands for labor

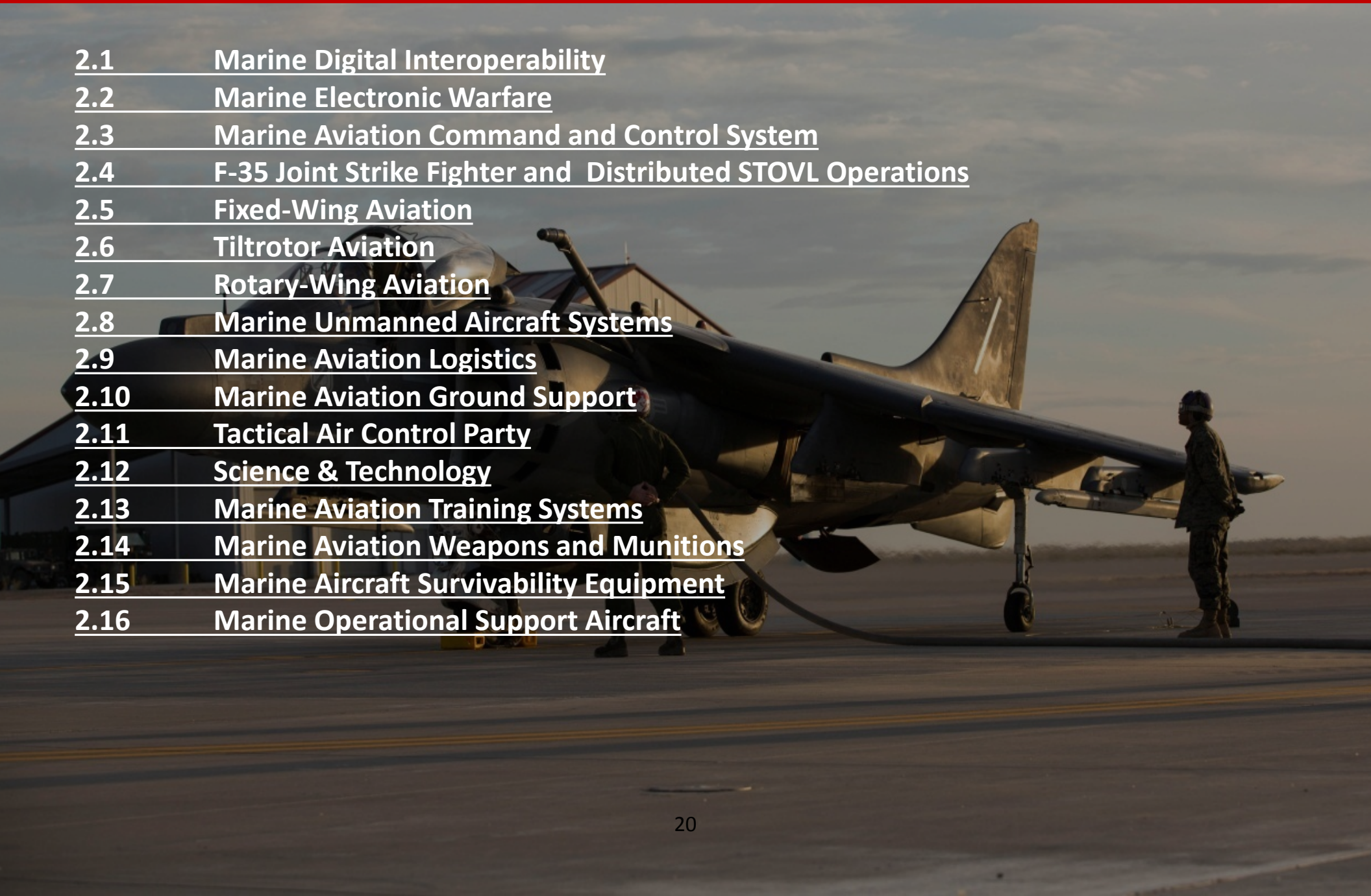
The current V-22 sustainment system cannot realize improved and sustained aircraft readiness / availability without significant change.

Since the OIRR, decisions have been made to implement the Common Configuration, Readiness and Modernization Plan along with nacelle improvements. The V-22 program will also pursue a plan and strategy for PBL Implementation to select "best of breed", confirm a Modification Manager/authority, continue to implement a Long Term sustainment strategy, develop a detailed PMI plan, pursue commercial PMI capability, and improve the supply chain. Many other initiatives were recommended and will all be considered and validated with respect to readiness improvements gained.

The OIRR shall lead to improvement of aviation support programs in association with advanced maintenance concepts and equipment, in order to provide increased and sustained levels of readiness across the Marine Corps. Development of analytical modeling tools shall demonstrate the feasibility and maturity of new technology and gain understanding in order to evaluate utility of this technology to expedite delivery of new capabilities.


T-2.0
FLYING HOURS
READY AIRCRAFT
DESIGNED MISSION
FIRST TO FIGHT
OPLAN READY

SECTION TWO
EXPEDITIONARY AVIATION PROGRAMS AND CONCEPTS



2.1 MAGTF DIGITAL INTEROPERABILITY

MAGTF Digital Interoperability (DI)

Digital interoperability is the seamless integration of systems and exchange of data, across all domains and networks throughout the MAGTF, naval, joint, and coalition forces, to include communication in degraded or denied environments, to rapidly share accurate information, provide greater situational awareness, accelerate the kill chain, and enhance survivability.

The interoperability goal is to provide the required information to the right participants at the right time, in order to ensure mission success, while improving efficiency and effectiveness. This approach provides the additional advantage of responsible spectrum use, which becomes increasingly important as spectrum demands increase, as technology advances, and our MAGTFs continually operate in more distributed and disaggregated manners. We continue to pursue integration and data exchange throughout the various arenas: situational awareness; aircraft survivability; intelligence, surveillance, and reconnaissance (ISR); fire support; and logistics.

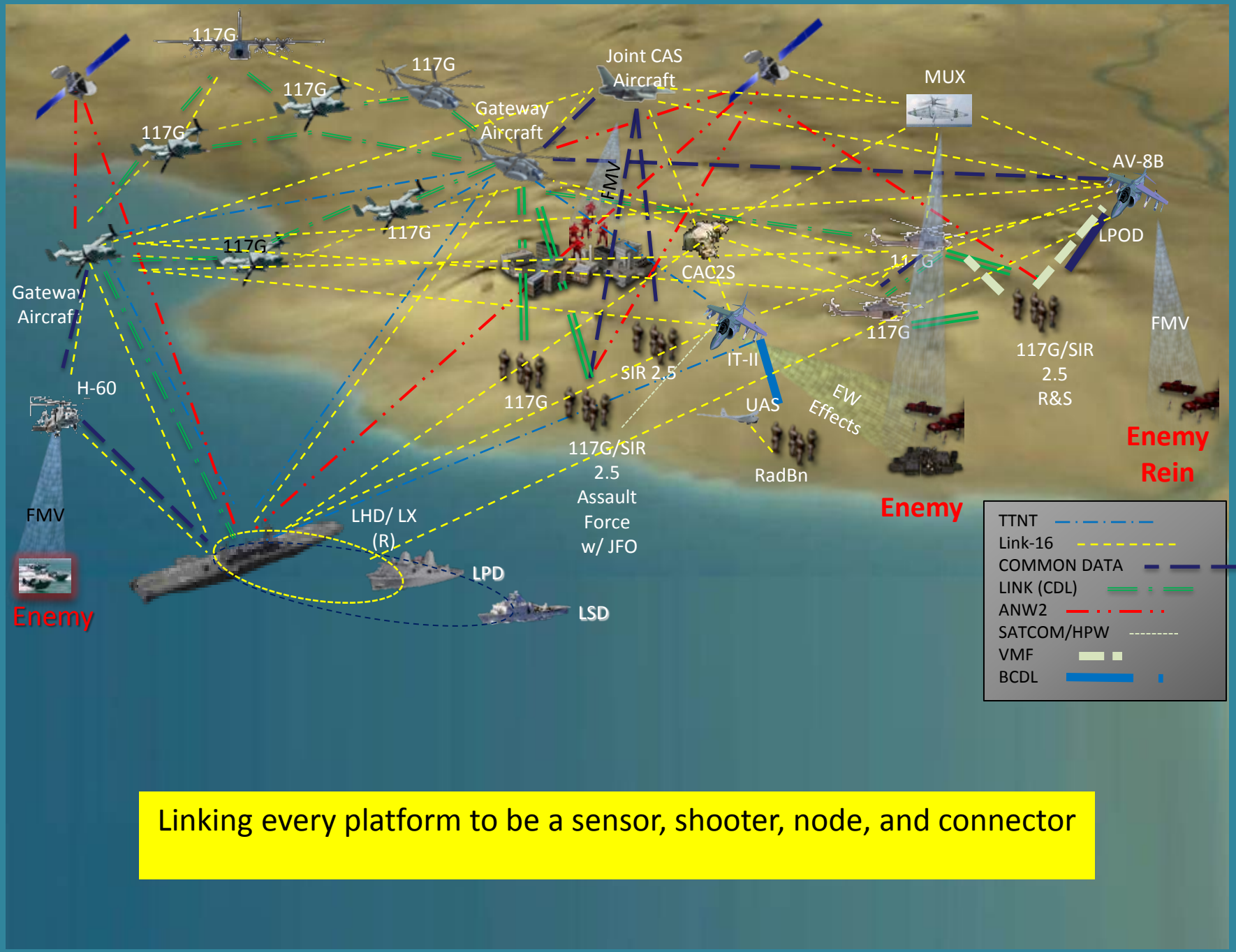
Vison – In order to validate our concepts, Marine aviation has adopted an "integration through innovation and experimentation" disruptive innovation approach to enhance the MAGTF. This approach attempts to couple existing and emerging technologies and integrate them into mission threads to assess their operational viability inside of large scale MAGTF exercises i.e., MAWTS-1 Weapons and Tactics Instructor course, IOC Talon Reach exercises, MCWL MIX's, and VMX early integration opportunities. The inclusion of emerging technologies within mission threads offers several benefits, which include the refinement of existing requirements and validation of the concepts leading to formal requirements generation.

2015 15th MEU Mesh Network Manager Risk Reduction system coupled with the Marine Air Ground Tablet (MAGTAB) configuration

Validation – The 2015 15th MEU assessment solidified the requirement for software-defined radios, airborne gateways, mesh network data exchanges facilitating maneuvering within spectrum, and encrypted wireless tablets in the hands of the operator. The ongoing efforts have and will continue to assist in the seamless integration, decreased kill-chain, and enhanced battlefield situational awareness throughout the MAGTF.

Execution – Years of innovative efforts and collaborations across numerous organizations i.e., NAVAIR, CD&I, MCWL, MARCORSYSCOM, HQMC C4 & Intel, NRL, and key industry partners have enabled transition from vision into execution. As a result the MAGTF Agile Network Gateway Link (MANGL) system comprised of a Software Reprogrammable Radio (SRP) Increment 2, Airborne Gateway, and Marine Air Ground Tablet (MAGTAB) is transitioning to a Program of Record. MANGL will enable the seamless integration of the MAGTF in an A2AD environment while enroute and during objective area execution. When coupled with systems such as Network on the Move Airborne (NOTM-A) access to SATCOM networks further enables the robustness of the network and access to mission thread information. Initially assault support platforms equipped with MANGL will enable information exchange amongst legacy systems such as H-1s equipped with onboard Full Motion Video and walk on/off ANW2 network radios. TACAIR growth through LPOD and internal platform upgrades will further enhance their participation within the network architecture. JSF's capabilities when brought to bear will expand the interoperability of the MAGTF. Efforts to ensure a future Group 4/5 UAS equipped with MANGL will facilitate network access in the absence of assault support platforms equipped for the Ground Combat Element.

Future – Miniaturization of Software defined radios will increase disembarked Marines network access available down to the squad leader. Innovative efforts such as NET-T AJ, Low Probably of Detection/Intercept, and data clouds remain on the horizon. Sensor fusion through the existing program of record Minotaur seeks to consolidate the shared platform information automating sensor collaboration for the operator interface. Technology advances are allowing us to use spectrum more efficiently and effectively in the areas of frequency, time, space, and modulation. The adoption of future technology will position the Marine Corps to be the warfighting force with the greatest flexibility in digital communications.

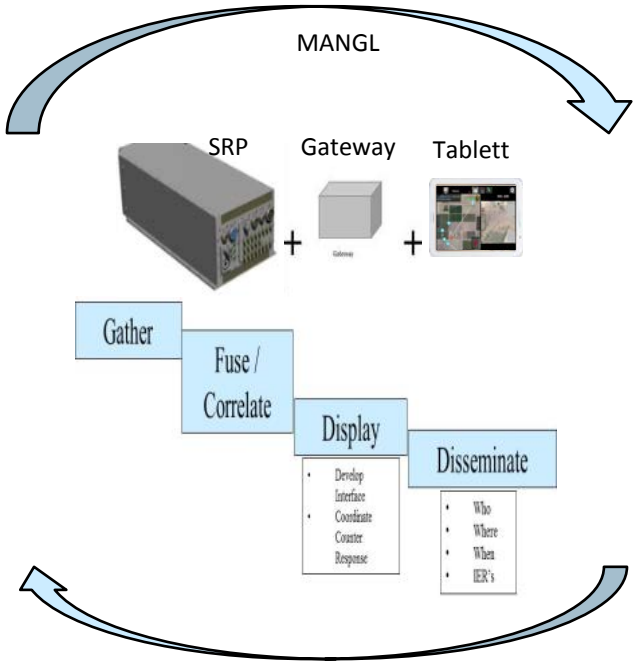


Linking every platform to be a sensor, shooter, node, and connector

2.1 MAGTF DIGITAL INTEROPERABILITY

Software Reprogrammable Payload (SRP) Increment 2 AN/ARC-254(C)

SRP is a software defined radio program that has the capability of hosting up to 7 waveforms simultaneously while offering an advanced embedded multi-level security architecture known as the Programmable Embedded Infosec Product (PEIP). SRP Increment 1 has previously demonstrated forward deployed capability on a Navy UAS platform, however it lacked the existing MAGTF waveforms. To align with the existing architecture of the MAGTF the following waveforms were coordinated for conveyance into the Increment 2; Link-16, ANW2, BE-CDL REV-B, and TTNT. MV-22 is the lead platform for SRP Increment 2 integration immediately followed by the CH-53E/K and KC-130. Link-16 fulfills the air picture and enables growth for DACAS potential, ANW2 radios continue to be proliferated throughout the Ground Combat Element, BE-CDL will expand on the existing CDL network facilitating the Type 1 ISR mandate and a far more capable waveform that will enable the furthering of payload control , lastly TTNT continues to enable large pipe traffic for information exchanges, range extension, and dynamic spectrum maneuvering. Emerging waveforms as they become available can and will be implemented as the MAGTF continues to expand its interoperability.



MV-22, CH-53, and KC-130 Airborne Gateways

Airborne gateways will serve as a conduit between disparate networks and waveforms on the current battlefield. Gateways possess the ability to receive one waveform/message type and process it into another waveform/message type before off boarding the data. Due to the inherent difficulties of replacing or adding new systems to some Marine aviation platforms, adding airborne gateways enables information exchanges across a variety of systems and networks. This increased prevalence of airborne gateways will provide data exchange capabilities throughout the MAGTF without each platform having to be equipped with every waveform currently being used on the battlefield. Airborne gateways, such as the Mesh Network Manager (MNM) utilizes a collection of radios and conducts message translation and processing for dissemination leveraging software that is interoperable with SOCOM.

The SRP, when used in conjunction with a gateway, will deliver an unprecedented capability to the MAGTF without significantly impacting current operations due to the reduced size, weight and power requirements. This construct is equally applicable to multiple air and ground platforms. This capability is complementary to the ongoing Network-On-The-Move Airborne (NOTM-A) initiative that provides Beyond Line of Sight reach back for SPMAGTF KC-130's and MV-22's (MV-22 NOTM-A limited fielding in 2017-1018).

Persistent Airborne Gateways (UAS)

Airborne gateways intended to provide persistent coverage as MAGTF platforms enter and depart the objective area will come in the form of a future Group 4/5 UAS. This will ensure post debarkation that the MAGTF in the absence of a MV-22, CH-53, or KC-130 will retain access to the network. As technology miniaturizes reduced size UAS platforms will become increasing valuable enablers and expand upon opportunities for distributed manned/unmanned teaming.

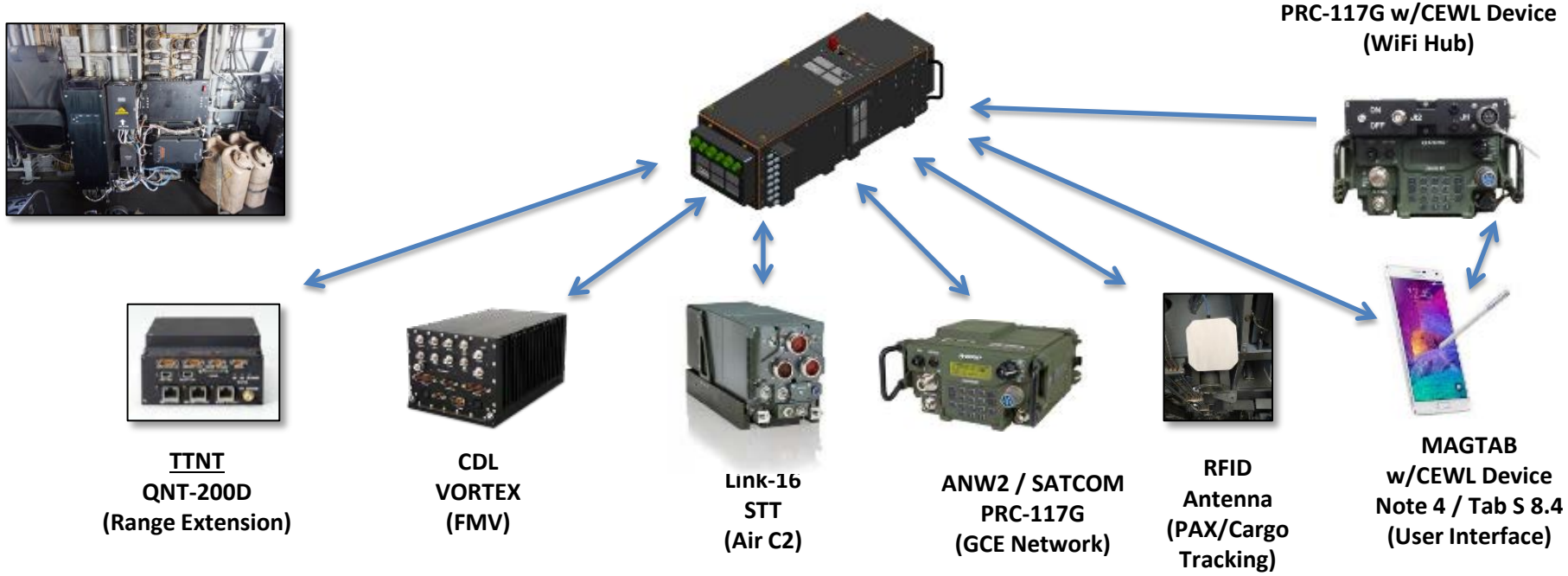
2.1 MAGTF DIGITAL INTEROPERABILITY

Transition to SRP / Gateway Program of Record

1) 2014-15 VMX (1 A Kit MV-22, 1 A Kit CH-53)
2) 2015 15th MEU (6 A Kit MV-22, 4 A Kit CH-53, 10 MNM B Kits)
3) 2017-2018 SPMAGTF Enroute C4 MV-22 UUNS (30 A Kit MV-22, 18 MNM B Kits)
4) Facilitates interoperability between disparate / legacy systems
5) Link-16, ANW2, TTNT, CDL, HPW SATCOM , Message Translation (J, K, CoT, VMF)
6) Interfaces with Marine Air Ground Tablets (MAGTAB) over encrypted WiFi link

Meshed Network Manager Risk Reduction

(Data Forwarding, Message Translation, Mission Processing, Network Health Management) TTNT



2.1 MAGTF DIGITAL INTEROPERABILTY

2019+ MAGTF Agile Network Gateway Link (MANGL) consolidates the Software Reprogrammable Payload (SRP) / Airborne Gateway / and tablet into a Program of Record fielding on MV-22, CH-53, KC-130. MANGL is the overarching system of systems for brevity.

SRP path forward consolidates the Mesh Network Manager Risk Reduction proprietary radio capabilities into one box and ports the waveforms onto SRP Increment 2 cards. This will gain back lost mission seats, and facilitates a future growth path for future MAGTF waveforms without repeat efforts for platform integration. The gateway capability of Mesh Network Manager is retained facilitating data forwarding, message translation, network health management, and threat off boarding.

SRP Increment 2 Waveforms

Link-16

ANW2

BE-CDL Rev B

TTNT

future waveforms…TBD

MUOS

WNW

LPI

MANGL

SRP / Gateway / Tablet

MANGL Participants

Network Access

ANW2

MANGL Participants

Network Access

Link-16 / FMV

2.1 MAGTF DIGITAL INTEROPERABILITY

Tablets

Android tablets continue to be the most effective way to deliver secure consolidated information to aircrew and embarked Marines. New aviation platforms come with highly integrated and complex operating systems that require years of development and testing prior to fielding. While necessary, this process is typically both time-consuming and costly. In many cases, incorporation of a federated tablet offers the aircrew or embarked Marines with new and relevant information while awaiting modification to the aircraft operating systems.

This method of integration also allows for rapid modification to a particular application without significant regression testing to determine the impact on the aircrafts systems. Industry and general aviation have been successfully employing this model for years. Wireless Android tablets integrated with airborne gateway capabilities will enable our ground forces participation enroute with aircrew collaborative planning and objective area real time updates.

Marine Air Ground Tablets (MAGTABs)

The MAGTAB was sourced on the 2015 15th MEU, SPMAGTF, TACDEMO's, and Talon Reach as a scalable capability for information consolidation and display for the aircrew operator as well as embarked Marines. While awaiting a fully networked and classified Electronic Kneeboards (EKB) under the PMA-281 Program of Record which is intended to be interoperable with the Marine Corps Common Handheld in work under MARCORSYSCOM the MAGTAB and Encrypted WiFi Links will continue limited fielding facilitating scalable integration into systems such as Airborne Gateways. The MAGTAB and Encrypted WiFi Link is covered with an Authority to Operate (ATO) that capitalizes on the KNOX security container capability afforded by the Android operating system. Applications such as RFID, ExChecks, Timeline, and Kinetic Integrated Lightweight Software Individual Tactical Combat Handheld (KILSWITCH) are some of the mission related applications that have continued to be enablers.

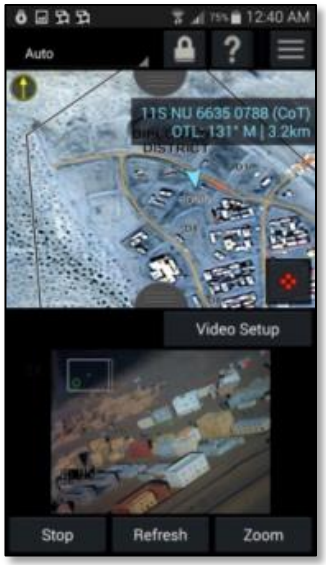
Miniature Encrypted WiFi Link (H-1) couples with PRC-152A

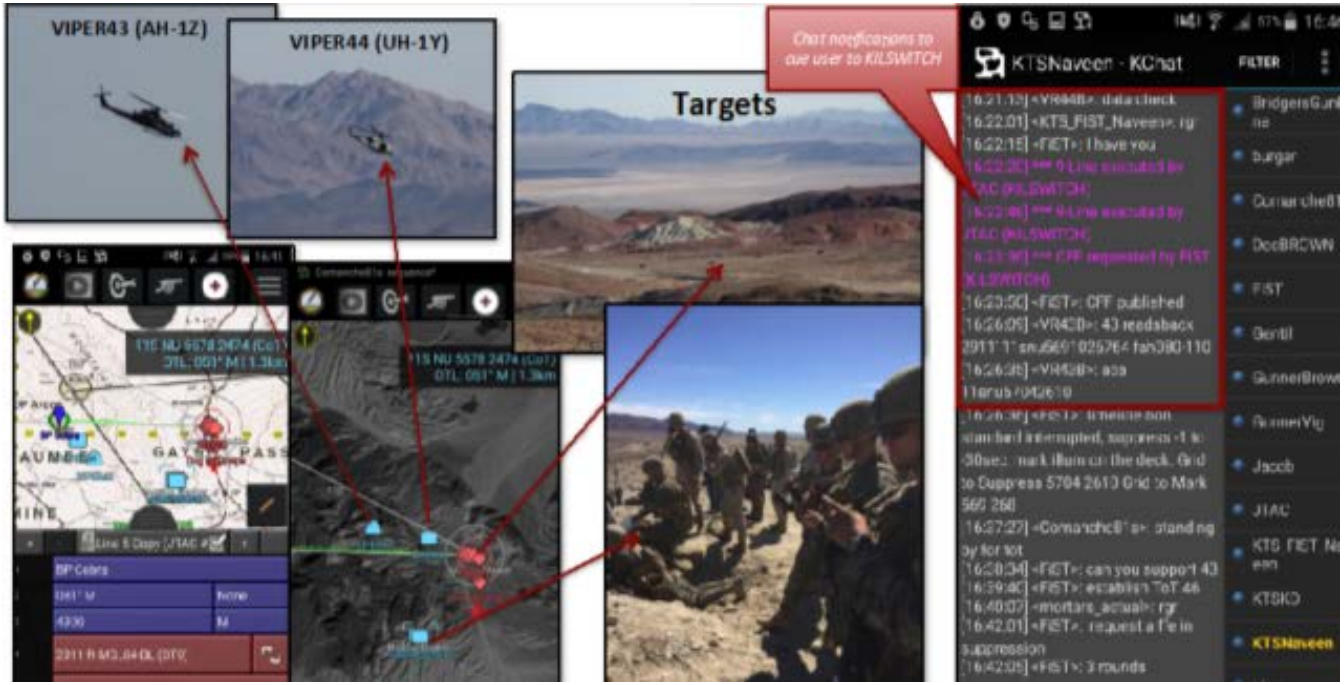
CoTs Encrypted WiFi Link (H-1) couples with PRC-117G

2.1 MAGTF DIGITAL INTEROPERABILITY

Electronic Kneeboard (EKB) / Electronic Flight Bag

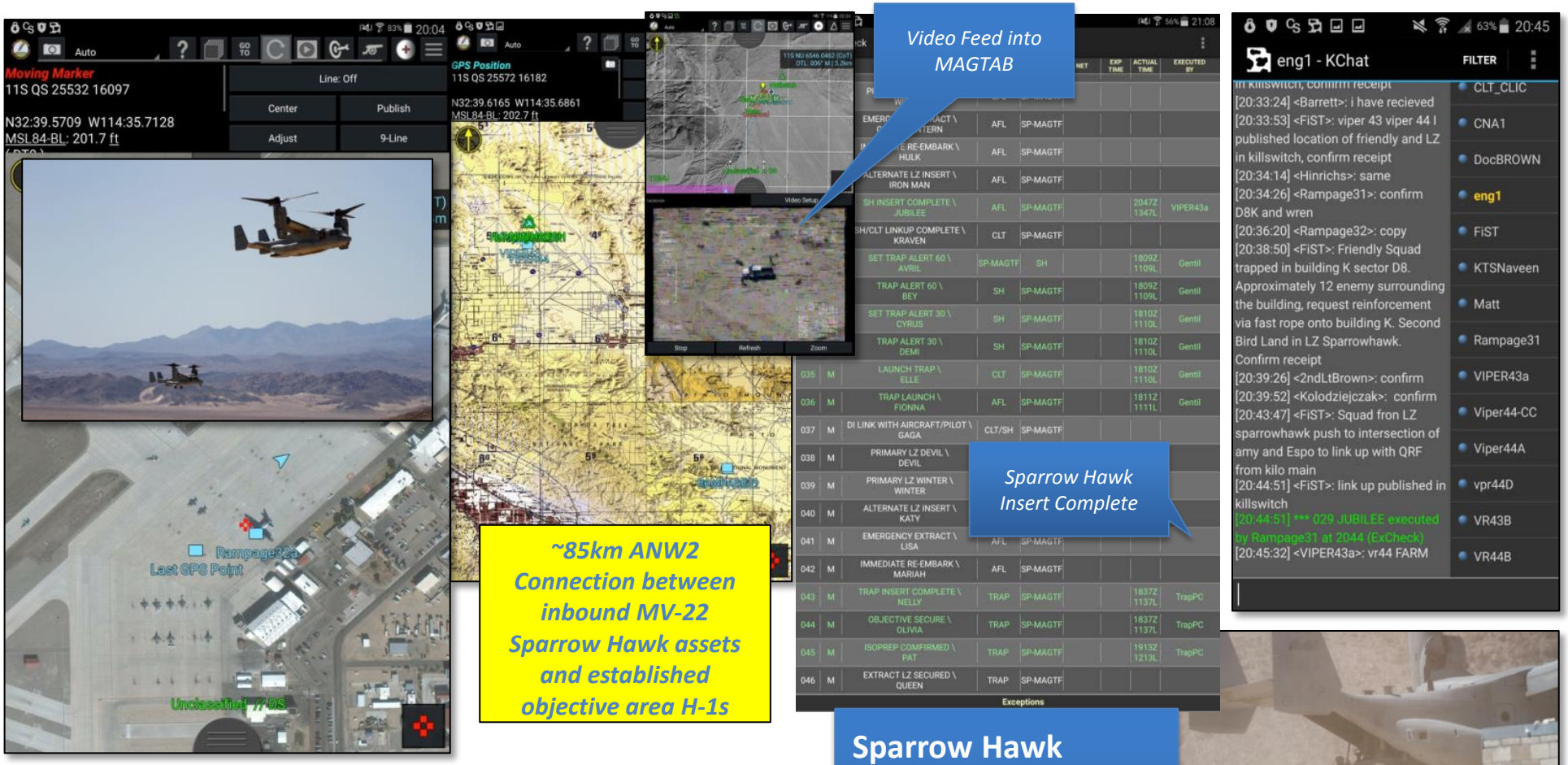
EKB devices approved under the PMA-281 flight clearance have been introduced over the past two years in limited quantity. PMA-281 procured and configured assets are planned for distribution over the next several years with tactical applications such as Kinetic Integrated Lightweight Software Individual Tactical Combat Handheld (KILSWITCH) and safety of flight applications such as ForeFlight. The EKB Program of Record growth path over the next several years is slated to begin fielding networkable devices that will capitalize on the lessons learned from the MAGTAB. Future opportunities to infuse mission related information extracted from aircraft sensors and data networks will further enhance kill chain execution and battlefield awareness for the end user.





2.1 MAGTF DIGITAL INTEROPERABILITY

Mesh Network Manager Risk Reduction & MAGTAB Integration
MAWTS-1 TACDEMO, Talon Reach, and VMX efforts ongoing



Sparrow Hawk Alert @ Yuma Awaiting Tasking

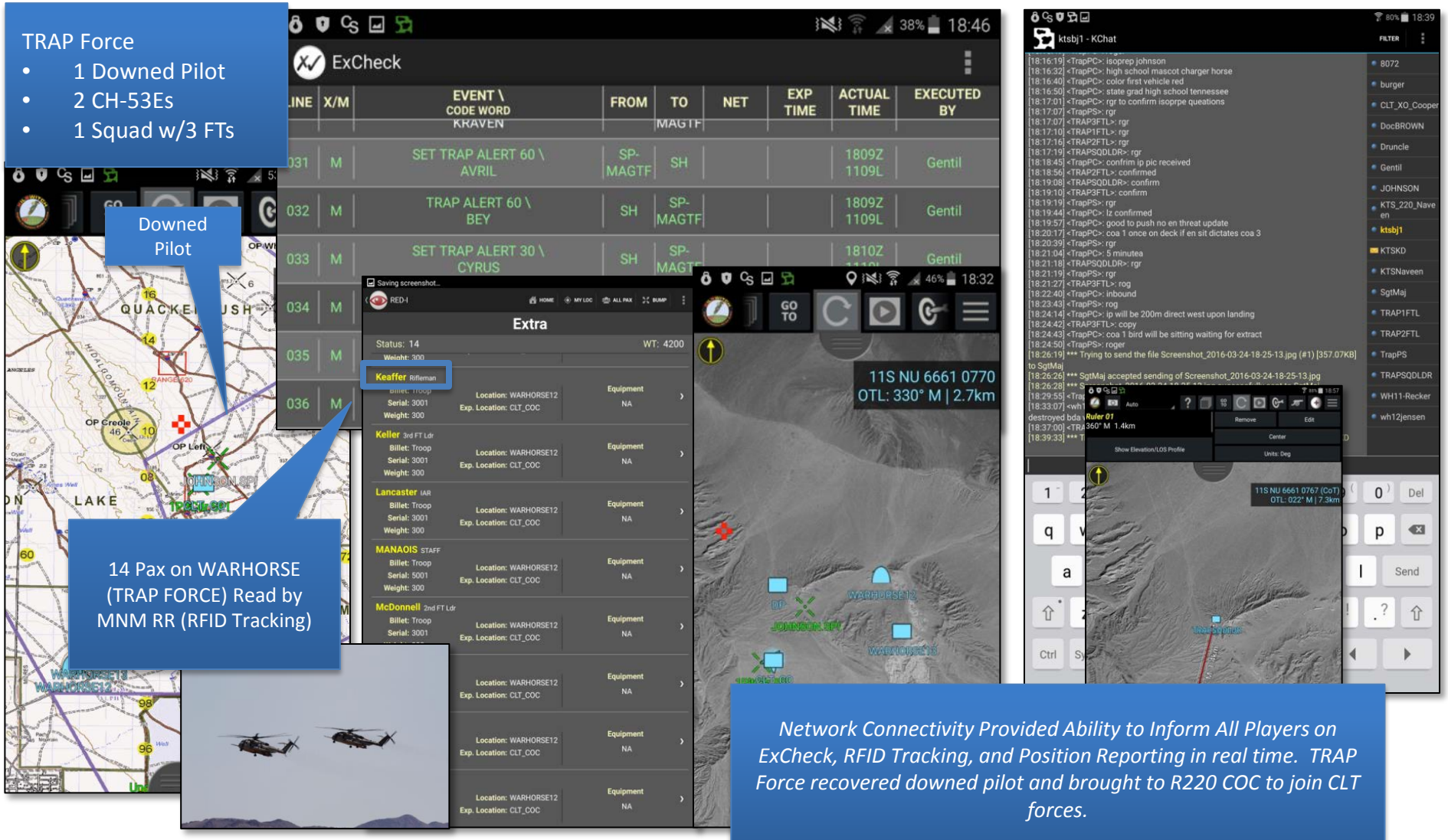
Sparrow Hawk
- 2 MV-22s with 2 Squads
- 1 AH-1Z, 1 UH-1Y

Rampage 32
Fast Rope Insert at R220

2.1 MAGTF DIGITAL INTEROPERABILITY

Mesh Network Manager Risk Reduction & MAGTAB Integration
MAWTS-1 TACDEMO, Talon Reach, and VMX efforts ongoing

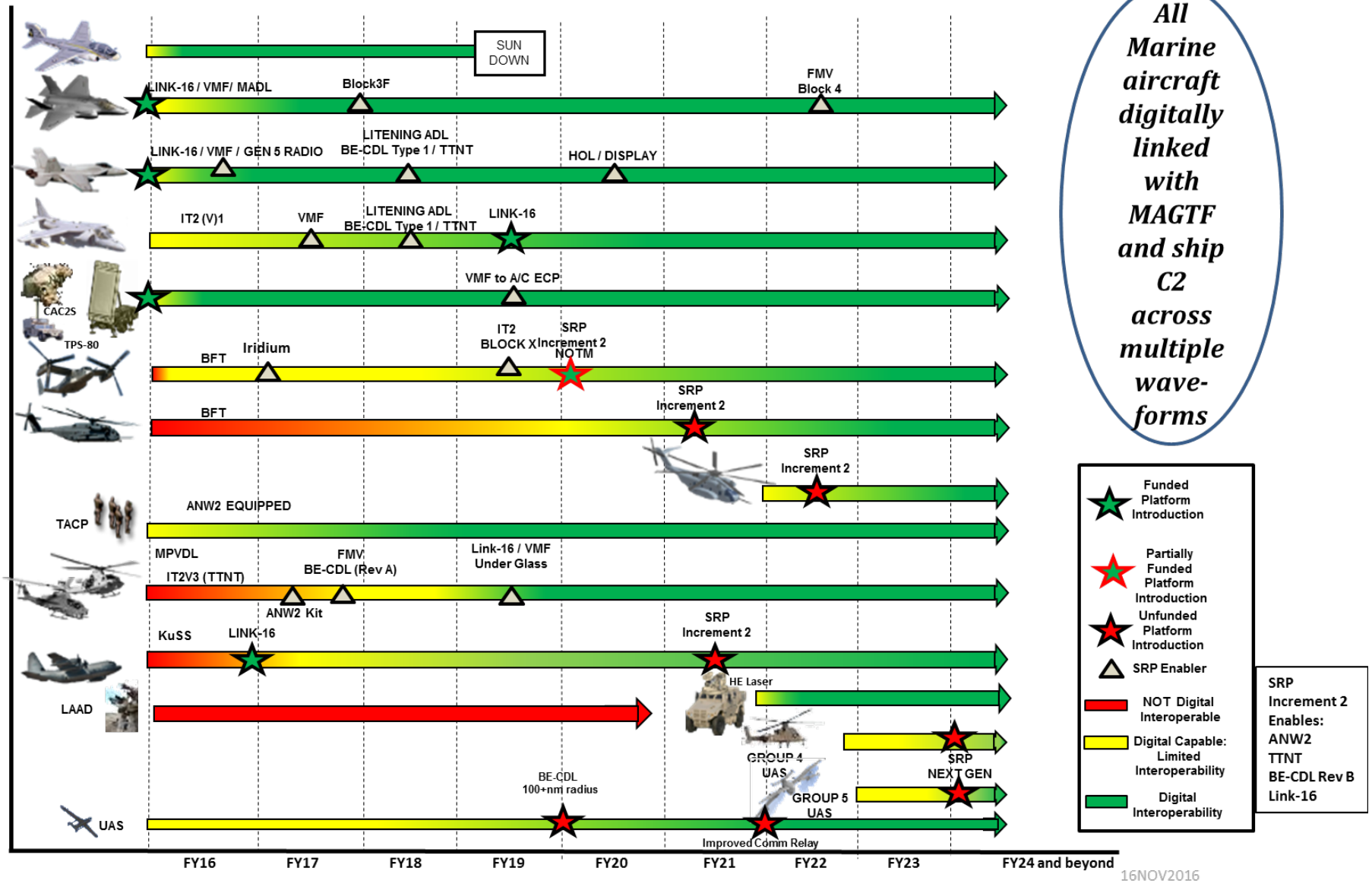
TRAP Force
- 1 Downed Pilot
- 2 CH-53Es
- 1 Squad w/3 FTs



Network Connectivity Provided Ability to Inform All Players on ExCheck, RFID Tracking, and Position Reporting in real time. TRAP Force recovered downed pilot and brought to R220 COC to join CLT forces.

2.1 MAGTF DIGITAL INTEROPERABILITY

Every platform will be a sensor, shooter, electronic warfare node and sharer – able to move information throughout the spectrum and across the battlefield at light speed.



2.2 MAGTF ELECTRONIC WARFARE

MAGTF EW MISSION:

Support the MAGTF commander by conducting electronic warfare, day or night, under all weather conditions during expeditionary, joint, or combined operations. Increase combat survivability of ground forces, assault support and strike aircraft and weapons by denying, degrading, and disrupting the enemy's ability to target and engage our forces.

FUTURE INITIATIVES:

The Marine Corps is continuing to build an organic and distributed electronic warfare system of systems known as MAGTF EW. MAGTF EW transitions the Marine Corps from a focus on the low-density/high-demand EA-6B, to a distributed, platform-agnostic strategy – where every platform contributes/ functions as a sensor, shooter and sharer – to include EW. Under MAGTF EW the Marine Corps is leveraging emerging technologies and integrating multiple aviation platforms (unmanned, fixed wing, tiltrotor, and rotary wing assets); payloads; ground-based EW nodes; and cyber capabilities to provide commanders with an organic and persistent EW capability – for every MAGTF – large and small. Airborne electronic attack (AEA) capabilities post-EA-6B sundown will be provided by EW payloads such as the Intrepid Tiger II EW pod, UAS EW payloads, and the EW capabilities inherent to F-35.

This integration of manned and unmanned airborne and ground EW capabilities will provide the MAGTF commander with greater flexibility and control of the electromagnetic spectrum – and in many cases giving that MAGTF commander a capability where previously they had none. MAGTF EW assets will be modular, scalable, and networked, utilizing an open architecture that is rapidly adaptable and remotely re-programmable at the tactical level to support future Marine Corps warfighting requirements.

2.2 MAGTF ELECTRONIC WARFARE

UAS are a planned critical component of the MAGTF EW concept. As such, the requirement for developing and maintaining Aviation specific EW expertise that is historically resident within the VMAQ community will over time become resident in the VMU community. The VMU community will begin to grow EW expertise "from the ground up" as capabilities are developed and procured. A payload for the MQ-21 is funded beginning in FY18; this will lay the foundation for further expansion as the Marine Corps moves towards a Group 4/5 UAS capability.

MAGTF EW AEA CAPABILITIES:

Intrepid Tiger II (IT-II): Precision EW pod providing organic distributed and net-centric AEA capability.

EOC of IT-II pod in OEF conducted in 2012

Approved Acquisition Objective (AAO): 136 total pods

1) Deployed on AV-8B and F/A-18A++/C/D aircraft, KC-130J in development
2) Deployed on UH-1Y (EOC FY16), AH-1Z (Future)
3) Additional future IT-II platforms: MV-22B, CH-53K
4) Radar AEA variant of IT-II in development (Block X)

UAS Payloads:

1) EW Payload for RQ-21 in development, production in FY20-21
2) Proposed EW Payload for MUX in mid 2020s

F-35: Expansion of inherent JSF EW capabilities and target sets

2.3 MARINE AIR COMMAND AND CONTROL SYSTEM (MACCS) PLAN

2.3 MARINE AIR COMMAND AND CONTROL SYSTEM (MACCS) PLAN

Marine Air Command and Control System Overview

Command and control is the means by which a commander recognizes what needs to be done and sees to it that appropriate actions are taken. It includes collecting and analyzing information, resource management, planning, communicating instructions, monitoring results, making decisions, supervising execution and making assessments. The Marine Air Command and Control System (MACCS) serves as the catalyst to the timely employment of Marine aviation assets, effective combined arms, and enabling MAGTF freedom of action throughout the battle space. The MACCS structure embodies the Marine Corps belief that:

No activities in war are more important than command and control. Through command and control, the commander recognizes what needs to be done and sees to it that appropriate actions are taken…it provides purpose and direction to the varied activities of a military unit. If done well, command and control add to the strength of a force.

-Marine Corps Doctrinal Publication 1-0, 2011

The MACCS provides the aviation combat element (ACE) commander with the agencies and assets necessary to exercise aviation command and control (AC2) and air defense in support of the MAGTF, naval, and joint operations. These agencies provide the ACE commander with the ability to execute the six functions of Marine aviation.

The MACCS is greater than the sum of its parts, a cohesive system made up of units from throughout the Marine Air Control Group (MACG). The MAGTF's structure, and our training, allows Marines to enjoy decentralized control of both ground and air forces providing greater flexibility and efficiency on the battlefield. Our philosophy is unique, resulting in closely integrated aviation and ground fires, reconnaissance, and other operations into an overall scheme of maneuver allowing for successful mission accomplishment. This seamless integration is accomplished and provided by the MACCS and only exists when all of the MACCS agencies are on the battlefield and expertly coordinating with their joint counterparts interpreting, integrating, and coordinating the MAGTF battle plan into the joint battle.

Aviation command and control affords the MAGTF commander the most lethal and responsive form of fire support available on the battlefield. Logistics occurs more rapidly and targets are identified and destroyed well before friendly ground forces come in contact with them. Efficient AC2 enhances safety of flight, giving the aviator an opportunity to assist when needed or direct where required, ultimately working collectively to accomplish the mission and satisfy the MAGTF commander's intent. An example of efficient AC2 are Operations IRAQI FREEDOM and ENDURING FREEDOM, where the MACCS functioned as a system. Greater efficiency and flexibility were realized, resulting in swift action from Marine aviation. Dynamic re-tasking of missions quickly supported rapid changes in battlefield events. Aircraft were diverted to trouble spots as needed within minutes. Further, ground-based fire support was requested, air cleared, and missions fired near simultaneously.

Since 2001, our current systems and organization construct have proven successful during combat operations. Looking into the future, the Marine Corps is rebalancing to support increasingly dispersed operations by smaller, task-organized forces over ever-greater distances. The fielding of CAC2S, and TPS-80 combined with CTN will allow the MACCS to employ additional C2 nodes over a greater geographical area. The MACCS must examine its organizational and training pillars to maximize capacity to support an increasingly distributed MAGTF.

The MACG commander must be able to employ task-organized AC2 nodes capable of providing task-organized MACCS capabilities supporting military operations. These agencies will be highly expeditionary and capable of seamless expansion based on evolving situations. There will also be a focused effort to support forces afloat. We will re-engage with the Navy and recommend where integration of command arrangements and control functions may provide a more cooperative and integrated blue/green solution for the AC2 of MAGTF assets afloat.

The MACCS is greater than the sum of its parts, a cohesive system made up of units from throughout the Marine Air Control Group (MACG). The MAGTF's structure, and our training, allows Marines to enjoy decentralized control of both ground and air forces providing greater flexibility and efficiency on the battlefield. Our philosophy is unique, resulting in closely integrated aviation and ground fires, reconnaissance, and other operations into an overall scheme of maneuver allowing for successful mission accomplishment. This seamless integration is accomplished and provided by the MACCS and only exists when all of the MACCS agencies are on the battlefield and expertly coordinating with their joint counterparts interpreting, integrating, and coordinating the MAGTF battle plan into the joint battle.

2.3 MARINE AIR COMMAND AND CONTROL SYSTEM (MACCS) PLAN

The future MACCS will be expeditionary; able to operate in a distributed manner; capable of fusing and integrating MAGTF AC2, sensor and weapons data across the joint force to provide shared situational awareness and increase the decision space for the MAGTF commander. Because of the unique position as the integrator between the ACE and GCE, the MACCS must ensure the ability to bridge divergent communication efforts within the MAGTF and joint force by providing beyond line-of-sight (BLOS) tactical data links (TDLs), data forwarding, radio relay, tactical gateways, and ground-based air defense (GBAD) capable of engaging low RCS targets. This vision will be realized with the fielding of CAC2S phase II, TPS-80, CTN and future GBAD weapons systems:

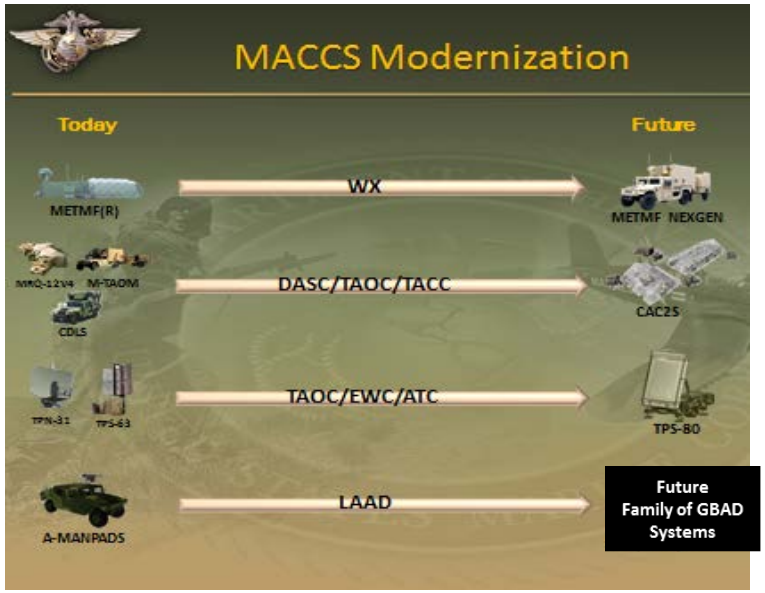
Common Aviation Command and Control System (CAC2S) – will fuse weapons and sensor data into a single integrated display, and serve as the integrator and gateway of waveforms between the ACE and GCE. This will be a tool for the MEF commander to see and shape his battlespace.

AN/TPS-80 Ground/Air Task Oriented Radar (G/ATOR) is a 3-D, medium range radar that gives the MAGTF commander unparalleled detection within their AO while also providing fire control quality data supporting Integrated Fire Control (IFC) concepts.

Composite Tracking Network (CTN) – is a land-based version of the US Navy's (USN) Cooperative Engagement Capability (CEC) which is a fused radar network providing shared sensor quality data between the Marine Corps & Navy.

Directed Energy (DE) – Directed Energy (DE) – provides game changing capabilities versus the low observable/low radar cross section (LO/LRCS) threat when integrated with CAC2S, TPS-80, and CTN. DE provides a low shot cost, deep magazine, precision accuracy, speed of light engagement solution for knocking down hostile UAS IEDs as well as hostile ISR UASs supporting indirect fires threatening both our Marines in the field and our high value aircraft on the ramp.

The most critical resource in the MACCS is the individual Marine. As we transition to a common set of equipment, new operational concepts, and operations in complex battle spaces, we must transition to a training paradigm that provides baseline knowledge for all AC2 operators to excel. The goal for MACCS operators is to become air command and control experts who will assist the commanders and decision makers in receiving and interpreting operational information and translating this information into effective direction and control for the platforms operated by Marine aviation.



The primary missions for our tactical agencies will remain intact throughout our MACCS modernization. As new common sets of equipment are fielded, the ability to employ future hybrid options becomes relevant. For example, the clearance requirements for extended range munitions have made knowledge of the ground situation and MAGTF fires critical for all MACCS agencies. The proliferation and persistent presence of UAS and civilian aircraft through the AO have highlighted the fact that all MACCS agencies need an air picture. Integration with special operations forces and the increased capabilities of new MAGTF platforms, such as the F-35 and MV-22, will enable hybrid employment options for the MACCS as we modernize and align our equipment and personnel.

Marine Air Traffic Control (MATC), normally focused upon airspace requirements in and around the airfield, has become more involved in the clearance of fires and the safe integration of new platforms and UAS into operational airspace. Recent history has also shown the need for the ACE to protect HVAs. This mission requires the close coordination and digital integration of MATC and the Low Altitude Air Defense (LAAD) Battalion.

2.3 MARINE AIR COMMAND AND CONTROL SYSTEM (MACCS) PLAN

Tactical Air Command Center

The TACC provides the MAGTF with the ability to plan and execute an air tasking order (ATO) in direct support of the MAGTF, integrate with the joint force, and seamlessly absorb the support of coalition forces through its flexible design. The TACC will provide the functional interface for employment of MAGTF aviation in joint and multinational operations.

Tactical Air Operations Center

The TAOC distributes the air picture to the MAGTF and joint commands while controlling deep air support, aerial refueling and anti-air-warfare (AAW) operations and routing itinerant aircraft. Newly fielded systems have transformed the TAOC into a highly mobile AC2 agency. With the completed fielding of the CTN, the TAOC will share date with the Navy's Cooperative Engagement Capability (CEC) network where it will exchange high fidelity radar track data. The combined capabilities of CAC2S, CTN and the future TPS-80 have put the TAOC at the forefront of force protection for the MAGTF.

Direct Air Support Center

The DASC is the critical link between the ACE and GCE within the MACCS. During OEF/OIF operations, the DASC has continued to conduct its core mission of processing immediate requests for air support and has also expanded its ability to control ever increasing and complex volumes of airspace. With the fielding of CAC2S Phase I, the DASC now has a standard set of equipment for a near real-time air picture used to enhance situational awareness and increase safety of flight in the assigned airspace.

Marine Air Traffic Control

MATC detachments provide all-weather air traffic control services to friendly aircraft operating in support of the MAGTF or within their assigned airspace. The continued development of the highly expeditionary ATNAVICS has ensured MATC's ability to meet mission requirements across the range of military operations (ROMO) with increasing interoperability and functionality as an AC2 node within the MACCS, until fielding of future systems.

Meteorological and Oceanographic

The Meteorological and Oceanographic (METOC) section, resident in the Marine Air Control Squadron, is tasked-organized to provide direct support to the ACE. It is equipped to support a variety of MAGTF deployments and operations. With the fielding of the Meteorological Mobile Facility (Replacement) Next Generation [METMF(R) NEXGEN], the METOC section has become a highly maneuverable capability that provides environmental products and mission impact assessments to the MAGTF commander and is currently being employed in support of SPMAGTF CC-CR. Additionally, METOC Support Teams (MST), sourced from either the MACS or the intelligence battalion, will utilize the stand-alone Naval Integrated Tactical Environment Subsystem Variant (IV) (NITES IV) to provide expeditionary METOC support to forward operating bases (FOBs), Marine Expeditionary Units and Special Purpose MAGTFs.

Low Altitude Air Defense Battalion

Low Altitude Air Defense Battalion – The LAAD Bn's capability to provide air and ground defense of airbases and MAGTF HVAs in an evolving battlespace is a critical tool for the ACE commander to meet force protection and AAW responsibilities. LAAD Bns have successfully conducted ground defense of FOBs and security force (SECFOR) tasks during OEF/OIF for over a thirteen year period. The SECFOR tasks included internal and external security along with tactical recovery of aircraft and personnel (TRAP), and training of Indigenous and coalition forces in counterinsurgency operations. In the future, the LAAD Bn will leverage defense innovation and technologies to provide three dimensional SECFOR capabilities to defeat an adversary's threat to destroy MAGTF HVAs.

Marine Wing Communication Squadron

MWCSs will continue to be in demand for data pathways between ACE, MAGTF, and joint/coalition elements. The MWCS incorporates numerous systems ranging from single-channel radio to systems with an emphasis on interoperability and BLOS communications for a broad spectrum of information services. These services include video, multimedia, data, and imagery which enable the ACE with a reliable communications architecture.

2.3 MARINE AIR COMMAND AND CONTROL SYSTEM (MACCS) PLAN

Aviation Command and Control Family of Systems

As we look to the future, the strategy to modernize the MACCS is synchronized with the arrival of our new, key platforms. The speed, range, and operational flexibility of the MV-22, and the firepower and electromagnetic spectrum dominance of the F-35B are new capabilities the MACCS, via its own advances, must fully exploit for the MAGTF commander. The AC2 family of systems (FoS) provides key material enablers that are on track to field to the operating forces and to modernize the ACE. The AC2 FoS is a set of related, scalable, and modular systems, which the MACCS can arrange or interconnect in various configurations to provide different capabilities. The mix of systems can be tailored to provide desired capabilities, dependent on the situation or mission assigned. The AC2 FoS includes the CAC2S, CTN, TPS-80 G/ATOR, and TPS-59 long-range radar.

Command and Control Systems

Common Aviation Command and Control System

CAC2S is the foundational command and control system of the future AC2 FoS. Increment 1 of CAC2S replaces equipment used by the TACC, TAOC, and DASC. Increment 1 is being developed and fielded in two phases:

1) Phase 1 replaced equipment in the DASC and is employed in conjunction with the Mobile TAOM in the TAOC. The TACC received improved communications capability from Phase 1 by upgrading the AN/MRQ-12v4 to the MRQ-13. CAC2S Phase 1 has completed fielding twenty systems.

2) Phase 2 completes the development and fielding of Increment 1 by including sensor integration and data fusion. Data fusion is accomplished through combining real-time sensor data (TPS-59, TPS-80, external sensors via a sensor network) correlating tactical data links (TDLs) and associating non-real time track data (TBMCS, AFATDS, IOS) in order to develop and display an integrated tactical picture. The result is an integrated situational display that can be manipulated by an operator to effectively command and control air operations. Phase 2 will also translate GCE waveforms (K-Series messages) into ACE (Link 16) waveforms. CAC2S's ability to translate these messages will increase situational awareness and information exchange throughout the MAGTF. CAC2S phase 2 fields common software and hardware to the TACC, TAOC, and DASC providing a modular and scalable capability across the MACCS.

The size and capability of these agencies will vary based on mission requirements. The future concept of employment for CAC2S is to create operational facilities capable of performing any AC2 function within the MACCS. The CAC2S Phase 2 Aviation Command and Control System (AC2S) will integrate the signal data element (UGS-4B) of CTN as its sensor interface and utilize the CTN antenna trailer to link into the network.

Composite Tracking Network

CTN is a land-based version of the USN's Cooperative Engagement Capability (CEC), which is a radar network that exchanges fire quality radar data between the Marine Corps & Navy. CTN/CEC is the primary network that will enable future Integrated Fire Control (IFC) capabilities that will provide multiple engagement solutions for MAGTF & Navy weapons systems. Specifically, CTN will extend USN Sea Shield/Sea Strike concepts inland by providing fire quality data to Aegis beyond its fire control radar. This accurate high rate data can provide the Navy with an opportunity to expand Aegis engagement solutions that protect the sea-base and sustain combat forces ashore. CTN will be employed with organic MACCS air defense radars ensuring a fused radar picture within the operational environment. Current Authorized Acquisition Objective (AAO) of ten systems has completed fielding.

2.3 MARINE AIR COMMAND AND CONTROL SYSTEM (MACCS) PLAN

Theater Battle Management Core System

TBMCS is a Joint Chiefs of Staff- mandated air war planning tool for the generation, dissemination and execution of air tasking orders and airspace coordination. TBMCS is the primary system utilized for airspace command and control, assault support processing and execution, and provides the ACE commander the ability to support the Joint Force Air Component Commander (JFACC). In the future, TBMCS is programmed to be replaced by the Command and Control Air Operations Suite - Command and Control Information Services (C2AOS-C2IS). This program is intended to develop, field, and sustain modular net-centric command and control applications and web-enabled information that will allow operators to plan and execute joint air operations.

2.3 MARINE AIR COMMAND AND CONTROL SYSTEM (MACCS) PLAN

SENSORS

AN/TPS-80 Ground/Air Task Oriented Radar

TPS-80 is a highly expeditionary, medium range multi-role radar able to detect smaller radar cross section targets, such as cruise missiles, rockets, artillery, and mortars (CRAM), UAS, and aircraft. TPS-80's expeditionary multi-role capabilities represent the next generation in ground radar technology and will provide greater accuracy, detection, target classification, and performance against new and evolving threats and enemy countermeasures. TPS-80 is being developed and fielded to cover both aviation and ground missions and will replace three in-service legacy systems. Each TPS-80 block consists of common hardware with different software applications that can be adjusted to pace the threat for decades.

TPS-80 Block I Air Surveillance Radar will provide the MACCS with a real-time display of all medium range air activity. Its ability to detect LO/LRCS targets will provide early warning and enhance force protection. TPS-80 Block I track data will interface with CAC2S and augment other sensor data to create a single composite track within the CTN/CEC network, improving opportunities for engagement of airborne threats. In the littoral combat zone, it will enhance force protection for USN Sea Shield/Sea Strike concepts by providing target cueing and early warning through the CTN/CEC network. Fielding will begin for TPS-80 Block 1 in FY18 with all seventeen systems fielded by FY24.

TPS-80 Block II replaces the GCE's AN/TPQ-46 and will provide counter battery target acquisition and detection for CRAM. TPS-80 Block II, known as the Ground Weapons Locator Radar (GWLR), will be capable of 90 or 360 degrees of coverage while extending range and increasing accuracy when compared to currently fielded counter battery/fire finder radars.

TPS-80 Block IV Expeditionary Airport Surveillance Radar (EASR) is the ASR replacement for ATNAVICS. This radar will provide a common ASR radar within the MACCS and bring MATC fully into the MAGTF digital interoperable network. This will provide the MAGTF commander the interoperability required to support a Base Defense Zone (BDZ) with longer range surveillance, increased TDL integration, weapons cueing, IFC, and MATC integration within the National Airspace System (NAS) and International Civil Aviation Organization (ICAO) ATC Systems.

AN/TPS-59 Long Range Radar

The improved TPS-59v3 radar provides the MAGTF and joint force with an expeditionary long range radar capable of ballistic missile detection. Currently the only MAGTF sensor that contributes composite track data to CTN/CEC networks and integrates with CAC2S. TPS-59 provides the MAGTF with the ability to control its airspace and conduct IAMD operations.

Marine Air Traffic Control Systems

The MATC equipment portfolio is a system of systems (SoS) that supports expeditionary MATC from liaisons to the MATC Mobile Team (MMT) up through multiple main airbases (MAB) in sustained operations. This SoS includes MATC command, control, and communications (C3); towers; navigational aids (NAVAIDS); and air traffic control (ATC) radars.

MATC Towers

The AN/TSQ-120C expeditionary ATC tower will be modernized into an expeditionary tower system (ETS) that is lighter, more mobile, and scalable, with the AN/TSQ-216 Remote Site Landing Tower (RSLT), to meet the range of military operations, and maximizes use of existing infrastructure. The mobilization of the TSQ-120C down shelter, combined with Tower Remoting Kits, provides the MATC Detachment with the flexibility and mobility necessary to maximize the use of available resources.

MATC Navigational Aids

The Legacy AN/TRN-44 TACAN is being replaced by the AN/TRN-47 v(2) Airfield Mobile TACAN (AMTAC), a trailer-mounted system that maintains current capability while reducing size, weight, logistical requirements and setup time. The AMTAC will provide navigational assistance and non-precision approach capability in a GPS denied environment. While the AN/TRN-47 remains a viable mobile TACAN for static operations, future developments will see a one man initial entry Navigational Aid, designed to provide initial terminal guidance during the early phases of a campaign, or while establishing short duration landing sites or points.

2.3 MARINE AIR COMMAND AND CONTROL SYSTEM (MACCS) PLAN

AN/TPN-31A Air Traffic Navigation, Integration, and Coordination System

ATNAVICS is the fielded Airport Surveillance Radar (ASR) and Precision Approach Radar (PAR) for the MATC detachments. ATNAVICS will bridge expeditionary MATC to the TPS-80 Block IV. As a bridging system, all modernization efforts in ATNAVICS are focused on MATC mission essential tasks (METs) including radar range extension to 60 nautical miles and fielding of the AN/TYQ-164 ATNAVICS Data Link System (ADLS) to support two-way TDL information exchange.

MATC Future Systems

The future MATC detachment will have CAC2S combined with TPS-80 Block IV. This will provide the MAGTF with state-of-the-art capability to launch and recover aircraft, while contributing to the integrated air defense system by providing accurate track data to future GBAD weapons systems. Additional capabilities will be gained in providing access to data communications down to the smallest of MATC capabilities. This will provide those elements the necessary interconnectivity for information exchange to the most remote points and sites.

Precision Approach Landing Capability Roadmap

Future precision approach capabilities will be GPS based. The Joint Precision Approach Landing System (JPALS) program was initially going to produce this system, but was dramatically scaled back to shipboard systems only. For the Marine Corps, this will provide a precision capability on all LHA and LHD amphibious ships to support the F-35B, and on all carriers to support the F-35C. Marine aviation will leverage maturing GPS technology to bring a self-contained precision approach landing capability (PALC) to MATC that is worldwide deployable.

METMF(R) NEXGEN

The METOC sensing equipment is the Meteorological Mobile Facility (Replacement) Next Generation [METMF(R) NEXGEN]. The METMF(R) NEXGEN is a mobile, fully integrated, FORCENet compliant, tactical meteorological support system which delivers relevant, timely METOC products and mission impact assessments to the MAGTF and joint force as required. The NEXGEN is a comprehensive environmental sensor capable of employing a Doppler weather radar, receiving weather satellite imagery, launching weather balloons to receive upper-air data and predicting expeditionary airfield local weather.

When employed as a standalone sensor and production capability, the METMF(R) NEXGEN's organic NOWCAST program downloads the Navy Global Environmental Model, current alphanumeric and area of responsibility upper-air data to produce an initialized weather depiction. When both NIPR and SIPR are available, the METMF(R) NEXGEN operates as a reach-back system, utilizing both national and international weather information which allows the MAGTF commander the ability to exploit environmental information in support of combat and combat support operations.

Weapons

No existing system has demonstrated an inherent robust end to end capability against the LO/LRCS and LSS air threat-but a combination of several capabilities could reduce the threat by neutralizing or destroying hostile UASs and CMs before and after launch. Marine Corps air defense is in the initial phases of defeating these threats by transitioning to an improved Integrated Air and Missile Defense (IAMD) family of system while continuing to provide integrated, low-altitude, Ground Based Air Defense (GBAD) and ground security of MAGTF HVAs.

2.3 MARINE AIR COMMAND AND CONTROL SYSTEM (MACCS) PLAN

The GBAD Initial Capabilities Document (ICD) was signed by the Assistant Commandant of the Marine Corps (ACMC) and identifies gaps and the required capabilities of the Stinger Missile replacement system. The GBAD ICD identifies the primary threat to the MAGTF as the LO/LRCS UAS. The secondary threats are: Fixed Wing (F/W), Rotary Wing (R/W), and CM.

The UAS and CM threat has outpaced the current program of record, the Stinger missile. In order to fill this capability gap and reverse current air defense kinetic strategy, the Marine Corps intends to invest in non-kinetic (Directed Energy) and improved kinetic (missiles and guns) technologies that create a cost-exchange ratio that favors the MAGTF and increases counter UAS and CM capabilities. The overall GBAD strategy to close all capability gaps will be accomplished in three phases:

1) Phase I: Field a roll-on, roll-off capability to detect, track, and exploit and/or destroy Group 1 UASs for MEUs, SPMAGTFs, and dismounted operations.

2) Phase II: Field non-kinetic/kinetic capabilities vs CMs, UASs, manned FW/RW aircraft in static defense of HVA such as main air bases and Division–level COCs.

3) Phase III: Field non-kinetic capabilities vs UAS, and manned FW/RW aircraft OTM in defense of maneuver force.

The LAAD Gunner will also transition from using the human eye to detect, identify, and engage targets to engagements that occur beyond visual range (BVR) to defeat the asymmetric air and ground threats using organic/non-organic fire control quality data to protect HVAs. This data provides the LAAD Gunner with the situational awareness to monitor and understand the air/ground battle space and evaluate friendly, enemy and neutrals that are in range of the future GBAD Weapon System. This requires the ability to share, exchange, and correlate fused information and sensor data across multiple agencies to facilitate real time coordination, collaboration, and decision making; therefore, we must leverage current investments in sensors and C2:

1) Sensor investment: TPS-80 G/ATOR provides the MAGTF with the increased ability to accurately detect smaller radar cross section air threats when compared to legacy systems.

2) C2 investment: Common Aviation Command and Control System (CAC2S) and Composite Tracking Network (CTN) provide integration into netted and distributed fire control architecture.

2.3 MARINE AIR COMMAND AND CONTROL SYSTEM (MACCS) PLAN

Future Marine Air Command and Control System Concepts

MACCS agencies have proven their utility supporting combat operations for over seventy years. The future MACCS will continue to be tactically flexible, scalable, and capable of rapid deployment. It will be manned by tactically and technically proficient AC2 Marines positioned to support the ACE/MAGTF commander in the execution of missions across the ROMO and will be interoperable with the joint force and aligned to support capstone operational concepts.

Future MACCS Employment

Marines in combat will always need varying degrees of air support, air defense/surveillance and a command post for the ACE. Current agencies and unit organization will remain the baseline and point of departure for any near-term MACCS re-organization. As the Marine Corps rebalances its forces to support increasingly dispersed operations with smaller forces over greater distances, aviation must adapt by providing new AC2 employment options for the MAGTF commander both ashore and afloat. These options must continue to provide task-organized, expeditionary, and state-of-the-art AC2 functionality.

MWCS detachments will provide the data communications requirements for a multi-functional C2 node providing planners more flexibility as data and long range communications will be internally sourced. Common data supporting shared awareness, automated decision aides, and distributed collaborative planning enables the aviation command & control to link warriors, weapons platforms, and targets, massing desired effects in a timely manner. The ability to command and control dispersed forces as they aggregate will become a core competency in this new force construct as highlighted by dispersed forward presence and quick crisis response. Balanced, expeditionary multi-functional nodes are ideally suited to respond quickly to global contingencies and allow for the seamless expansion of AC2 as the situation evolves

Amphibious Command and Control

The Commandant's updated planning guidance reaffirms that the Marine Corps is a critical portion of our integrated naval forces, designed to project power ashore from the sea. Our partnership with the Navy enables a forward-deployed and engaged force that shapes, deters, responds, and projects power well into the future. Marine aviation is actively engaged with their Navy counterparts to determine where integration of command arrangements and control functions may best provide a more cooperative and synergistic blue/green solution for the AC2 of MAGTF assets operating afloat.

The MAGTF commander must possess the ability to command and control their forces in support of an ever distributed and increasingly diverse mission set. As part of this they must also be able to provide the full range of MACCS capabilities from the sea base during STOM operations.

USMC Aviation & Tactical Air Control Group (TACGRU) leadership are integrating aviation command & control Marines into sea-based operations in order to optimize MAGTF littoral capabilities. Current lines of effort include aviation command & control Marines attending Tactical Air Control Squadron (TACRON) training to integrate with the Supporting Arms Coordination Center (SACC), Navy Tactical Air Control Center (NTACC) and the Landing Force Operations Center (LFOC) for future MEU deployments. Additionally, Joint Interface Control Officers (JICO) are augmenting the TACRON staff on MEU deployments while TACRON personnel are attending WTI as Command, Control & Communications (C3) students. To date, four Navy TACRON stduents have graduated WTI. The goal is to have at least one TACRON member per MEU who has graduated WTI.

This is required due to emerging aircraft capabilities aligning with an increase in disaggregated and distributed operations afloat. As new Marine aviation platforms begin to field, they will provide more capability and higher fidelity information to ships via new sensors and gateways enabling such concepts as Sea Shield and Sea Strike. Also, forward-deployed C2 nodes equipped with netted sensors, CAC2S and a TPS-80, will contribute fire control quality data to the naval force.

Our sea-based C2 integration will enhance the command relationships and partnerships among the Navy and Marine Corps team afloat. Properly employed MACCS Marines afloat, supported by the right mix of AC2 systems, and working with their naval counterparts will be positioned to process, integrate, and operationalize this myriad of information in support of MAGTF operations.

2.3 MARINE AIR COMMAND AND CONTROL SYSTEM (MACCS) PLAN

Integrated Fire Control

IFC is a concept that teams sensors and shooters together to address challenging AAW and air defense problem sets. Under the IFC concept, sensors from air, land, or sea providing high fidelity target data enable weapons to be fired from any domain, agnostic of platform. The IFC concept takes different forms (see operational graphic below):

Through the use of TDLs, composite tracking, and collaborative sensor sharing, the Marine Corps will have the ability to develop fire control solutions from information provided by one or more non-organic sensors. IFC provides several advantages for the MAGTF:

1) Reaction time will be decreased as detection and target information can be provided by both organic and non-organic airborne assets and ground-based radars.

2) Combat identification will be enhanced through the ability to access multiple sensors, providing better context of who is in the airspace.

3) Defense-in-depth will be increased through the use of data from non-organic sensors and weapons will be employed at their maximum effective kinematic range. This will provide a higher probability of kill due to a better view of the target, thus increasing the depth of defended airspace for the MAGTF.

4) Electronic attack (EA) resistance will be stronger, because weapons systems can rely on multiple sensors for firing solutions and be used at maximum effective kinematic range.

Digital Interoperability

Digital interoperability is a key component in synthesizing ACE combat power. MACCS Marines and systems continue to serve as the integrator and are focused on tactical air and ground command and control systems interoperability. They continue to aggressively pursue advanced capabilities leveraging a mix of TDL, proprietary waveforms, and commercial protocols. For the MACCS to be effective for the MAGTF and ACE commander it requires the capability to coordinate combat operations verbally and digitally using joint standard information exchange standards, such as Link 16, Joint Range Extension Application Protocol (JREAP), and Variable Message Format (VMF). The MACCS is the gateway for the MAGTF and joint force commander and must be appropriately equipped, trained and employed to fuse information from various sources, domains, and network participants in order to achieve decision superiority for the MAGTF and joint force commander.

The MACCS will also be a key component of digital kill chains. Digital requests will seamlessly flow from requesting to approving agency and back down the chain with mission data or reason for denial after adjudication. End-to-end digital fires will require the DASC and TAOC to serve as gateways/data-forwarders for these digital requests which will enable the information and the corresponding tracks that are produced in this process to be managed. MACCS agencies will bind all of the elements of the MAGTF and joint force.

CAC2S will implement standardized information exchanges, waveforms, and commercial protocols. This will allow the exchange of relevant, timely and actionable information between aviation, ground, naval platforms, agencies and organizations. Through this implementation, operators will have the information necessary to provide informed decisions, accelerate the kill chain, increase situational awareness, and enhance survivability. To facilitate the development and implementation of standardized information exchanges and employment concepts, VMX-1 AC2 operational test Marines will work to ensure mission effective exchanges of relevant tactical information during exercises, limited user evaluations, and quick reaction tests.

2.3 MARINE AIR COMMAND AND CONTROL SYSTEM (MACCS) PLAN

VMX-1 Operational Test and Evaluation and Tactics, Techniques, and Procedures Development

In July 2013, DCA established a consolidated Marine Aviation Operational Test & Evaluation Center at MCAS Yuma to provide a single source multi-platform USMC aviation operational test center that can optimize the development of ACE tactics, techniques, and procedures (TTPs). The VMX-1 AC2 Department was established as part of that effort. In concert with APX, MAWTS-1, MCSC, MCOTEA and the operating forces, the VMX-1 AC2 department will assist in the conduct of operational test and evaluation (OT&E) to ensure mission integration and effectiveness of aviation platforms with MACCS equipment and other aviation technologies across the force. The coordinated efforts of VMX-1 and MAWTS-1 define and refine employment concepts and TTP development that drives system/platform evaluation and digital interoperability throughout the aviation community.

Marine Air Command and Control System Training

Historically, the MACCS has trained in narrow specialties that develop specialized Marines to operate and maintain unique systems developed to carry out specific MACCS functions. As technology changes and more responsibility is levied on MACCS Marines by commanders, there is a demand that we modernize our training approach. The desire is to produce entry level Marines that can exploit the full capabilities of their AC2 system and execute process driven information exchanges.

Once in the operating forces, Marines will become experts in planning and controlling MAGTF airspace, integrating organic Marine and joint fires, employing TDL and radio communications, and employing MACCS agencies, and will be trained to operate in a joint and coalition environment. This expertise comes with a cost and requires a new emphasis on distributed learning capability, live-virtual-constructive (LVC) environments, and standards-based assessments.

A common set of equipment and new MACCS employment options will also drive us to look at the feasibility of a common controller in the DASC and TAOC. Currently, controllers in the DASC are officers and a majority of controllers in the TAOC are enlisted operators. Enlisted MACCS Marines will retain agency-specific skill sets early in their careers and then transition to becoming common aircraft controllers and finally to become MACCS specialists later in their careers. To do this we will need to greatly enhance our simulation capabilities and usage in the operating forces and in the supporting establishment.

The first step in this process was the creation of the Air Control Training Squadron (ACTS) at Marine Corps Communications Electronic School (MCCES) at MCAGCC Twentynine Palms, California. ACTS has successfully combined three of the four MACCS entry-level schoolhouses. The next steps will be to redesign enlisted and officer training to address these new training paradigms.

Officers

We envision our entry-level training paradigm creating MACCS officers who understand all facets of MACCS employment, not just that of their primary MOS. In addition to learning their primary MOSs in air defense, air support, GBAD or MATC, all MACCS officers will receive instruction in civil/military airspace, fires integration, digital interoperability, planning and employment of the MACCS agencies, and instruction in joint and coalition operations. This shifts the emphasis of company-grade officers away from initial controller qualifications and re-focuses them as agency directors and planners. This creates a more well-rounded AC2 officer much earlier in their careers, and better prepares them to perform duties in the TACC as well as their primary agency. This early exposure would also enhance an officer's knowledge baseline as they approach their duties as department heads. Most importantly it will empower our MACCS officers to operate independently in a distributed operations environment.

2.3 MARINE AIR COMMAND AND CONTROL SYSTEM (MACCS) PLAN

Enlisted

Early in their careers our enlisted Marines will hone their skills as operators in the specific agency for which they were initially trained. CAC2S provides the opportunity to be trained as common aircraft controller or a data link coordinator to work in the DASC, TAOC, or potentially, a future MEU based light, mobile Air C2 element . A move toward creating a more efficient operator will baseline skills across the MACCS and provide a larger pool of capability that gives greater professional continuity for an extremely perishable skillset. The ideal skillset we will build is:

1) the ability to positively and procedurally control aircraft;

2) an intimate knowledge of TDL, AC2 software applications, and communications equipment; and

3) expertise in MAGTF command and control and fires integration.

The career progression for a Marine in the DASC or TAOC will logically flow from operator (Private - Corporal), to controller (Sergeant – Gunnery Sergeant), to enlisted subject matter expert (Master Sergeant – Master Gunnery Sergeant). This progression aligns and better defines the career paths of our TAOC and DASC Marines. It also creates a better operator for the TACC because of their exposure to different aspects of the MACCS prior to working in the wing commander's command post which is an extension of the MEF commander's. Our enlisted Marines are the technical and tactical bedrock of our community and we need to ensure that we are making the best training available to them through all phases of their careers.

Maintenance Training

Just as the lines between the agencies have been blurred with the introduction of new equipment, so have the maintenance concepts for the equipment. As technology has advanced, troubleshooting has shifted from the traditional component-level to the lowest replaceable unit. Additionally, almost every piece of modernized equipment is software- and network-driven. The complexity of modernized equipment forces maintainers to take an active role in the setup, configuration, operation, and maintenance of this equipment.

Maintenance officers, as restricted officers, will be crucial to transitioning to new equipment and training by providing the subject matter expertise allowing operators to successfully employ their weapons system. The enlisted maintainer of the future will have to be agile enough to adapt to the potential for rapid changes in capabilities and system implementation amongst this AC2 FoS, and will be required to be as competent in basic data link implementation as operators. The synchronization between the roles of the operators, maintainers, and tactical users will continue to allow the MACCS to be successful in all future missions.

2.4 F-35 JOINT STRIKE FIGHTER AND DISTRIBUTED STOVL OPERATIONS

2.4 F-35B AND F-35C LIGHTNING II

F-35 DESCRIPTION

The F-35 is the next generation strike weapons system designed to meet an advanced threat, while improving lethality, survivability, and supportability. It will be the cornerstone of a multi-mission joint force possessing improved mission flexibility and unprecedented effectiveness to engage and destroy both air and ground threats.

The F-35 was developed using a complete analysis of legacy aircraft shortfalls, emerging threats, and consideration of future operating locations. This approach led to an aircraft design that incorporates advanced stealth characteristics and a powerful sensor suite that provides superior awareness to the pilot and ensures increased survivability and lethality in all environments.

The F-35 has an autonomous capability to strike a broad range of moving or fixed targets, either day or night and in adverse weather conditions. These targets include air and ground threats, as well as enemy surface units at sea and anti-ship or land attack cruise missiles. The F-35 can complete the entire kill chain without reliance on external sources by using fused information from its onboard systems and/or other F-35s. This capability allows shortened engagement times, less exposure to threats, and retains the element of surprise.

Together these elements allow the pilot to control the tactical environment using proactive tactics. The F-35 provides sensor data to Marine Air-Ground Task Force command and control agencies to enable intelligence collection and targeting across the force.

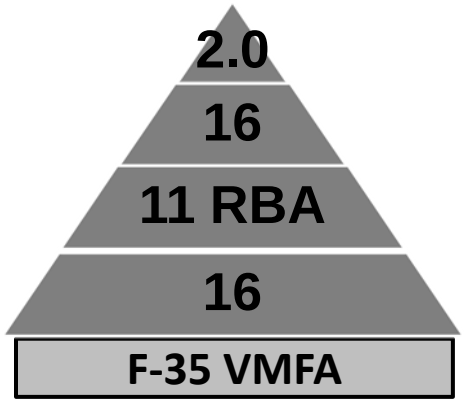
Transition Plan

The F-35B and F-35C will replace F/A-18, AV-8B and EA-6B. The Marine Corps will procure a total of 353 F-35Bs and 67 F-35Cs in the following squadron bed down:

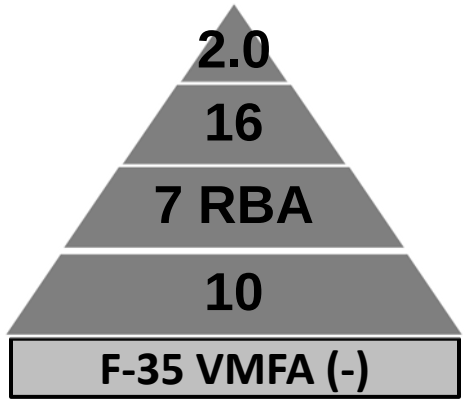
1) 9 Squadrons x 16 F-35B
2) 5 Squadrons x 10 F-35B
3) 4 Squadrons x 10 F-35C
4) 2 Squadrons x 10 F-35B reserve
5) 2 Squadrons x 25 F-35B FRS

The Marine Corps declared F-35B initial operational capability in July of 2015, five months ahead of the December threshold date. At IOC, the squadron underwent an operational readiness inspection proving that it met the requirements with ten aircraft in the Block 2B configuration. The squadron demonstrated the capability to execute CAS, limited offensive and defensive counter-air, air interdiction, air support escort, armed reconnaissance, and limited suppression of enemy air defenses.

The aircraft is currently tracking to reach its full program-of-record operational capability (Block 3F) in Q4 of CY 2017. The full transition from legacy to F-35 will complete with the transition of the second reserve squadron in 2031.



16- plane F-35B squadron



10- plane F-35B squadron

2.4 F-35B AND 35C LIGHTNING

USMC F-35C INITIAL OPERATIONAL CAPABILITY (Expeditionary Operations):

The F-35C IOC is defined as:

1) One squadron with a threshold of 6 F-35C and an objective of 10 F-35C aircraft with required spares, support equipment, tools, technical publications, and a functional Autonomic Logistic Information System (ALIS V2) including enabling peripherals.

2) Squadron manned with trained and certified personnel capable of conducting autonomous operations.

3) Aircraft in a Block 3iP6.21 software configuration or better with the requisite performance envelope, mission systems, sensors, and weapon clearances.

4) Home base supporting infrastructure and facilities ready and capable of supporting and sustaining operations.

5) Qualifications and certifications for deploying the F-35C to austere expeditionary sites and conducting landings using M-31 Expeditionary Arresting Gear.

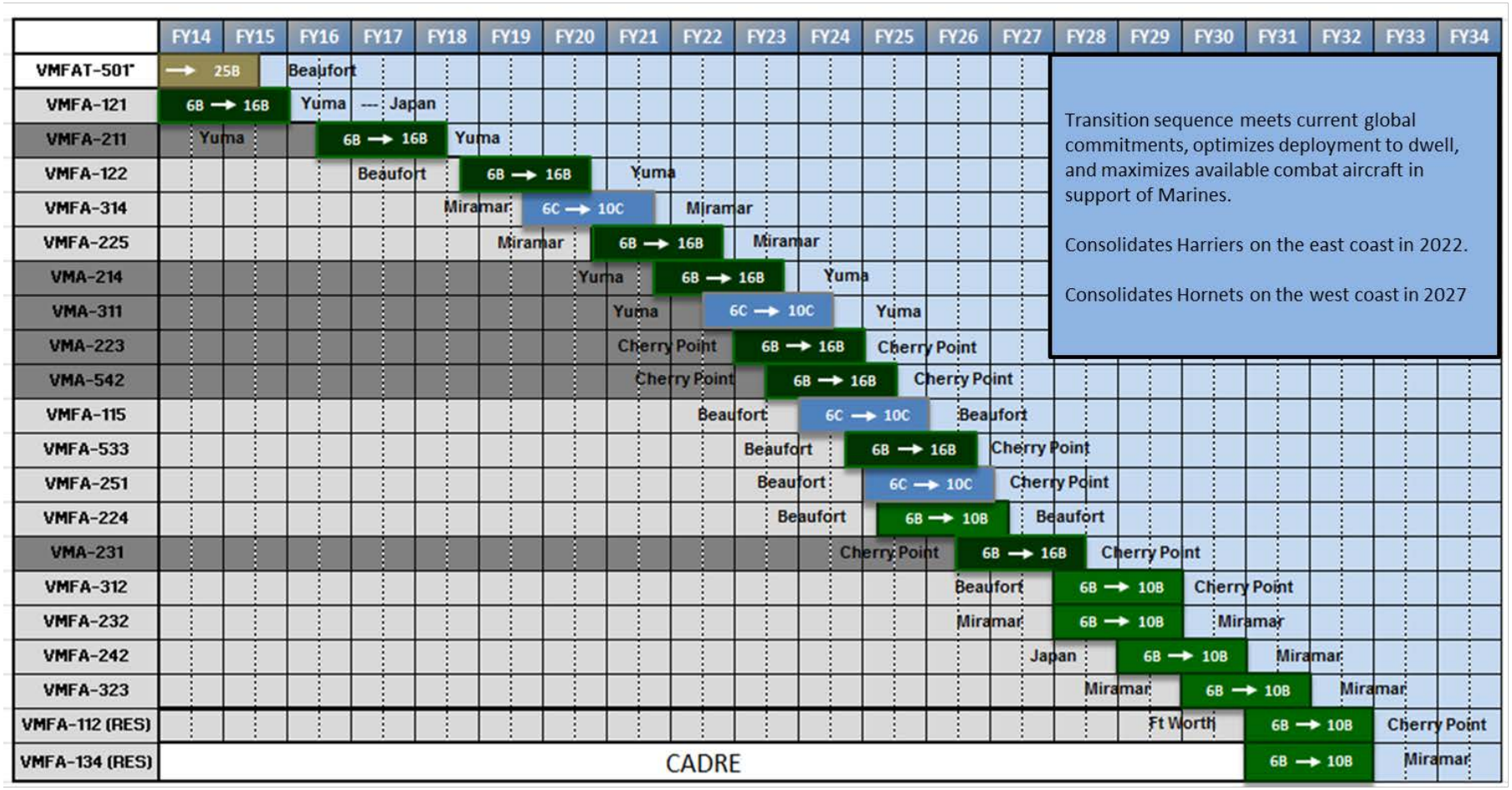
6) Ability to execute close air support, offensive and defensive counter air, air interdiction, assault support escort, armed reconnaissance, and suppression of enemy air defense missions in concert with Marine Air Ground Task Force resources and capabilities within the performance envelope, mission systems, sensors, and weapon clearances provided by the Block 3iP6.21 fleet release or better.

7) Naval aviation enterprise (NAE), Joint Program Office (JPO) and contractor procedures, processes, and infrastructure capable of sustaining operations of the IOC squadron.

FY17 TACAIR LEGACY TO JSF TRANSITION PLAN

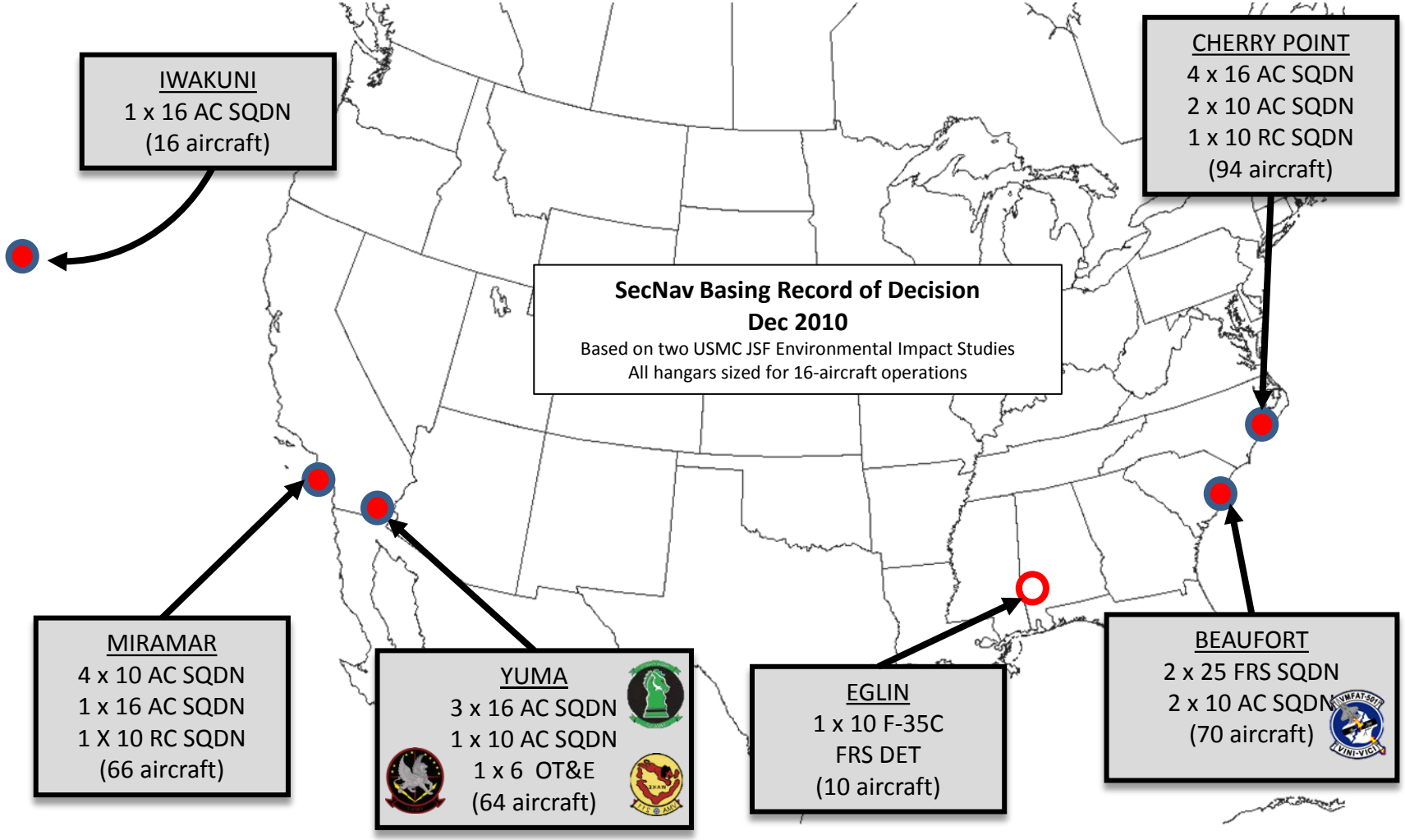
CURRENT FORCE PAA:
7 AC VMFA SQDN x 12 F/A-18 a++/C
4 AC VMFA(AW) SQDN x 12F/A-18D
2 AC VMFA SQDN x 16 F-35B
1 RC VMFA SQDN x 12 F/A-18A++
5 AC VMA SQDN x 14 AV-8B

FORCE GOAL PAA:
9 AC VMFA SQDN x 16 F-35B
5 AC VMFA SQDN x 10 F-35B
4 AC VMFA SQDN x 10 F-35C
2 RC VMFA SQDN x 10 F-35B
2 FRS SQDN x 25 F-35B



NOTES:
-MILCON at MCAS Miramar not required until 1st Qtr FY20
-VMAT-203 shutdown in FY21, VMA-231 FRD mission through FY25
-VMFAT-101 shutdown in FY23, VMFA-323 FRD mission through FY29

F-35 BASING PLAN



DISTRIBUTED AVIATION OPERATIONS

Strategic Context

Potential adversaries are equipped with advanced anti-access / area denial (A2/AD) long-range precision strike capabilities that threaten traditional US power projection through fixed infrastructure and naval strike groups. The MAGTF is challenged with developing asymmetric operating concepts which counter an enemy A2/AD strategy, thereby allowing access for the joint force.

Distributed Aviation Operations

The future ACE will have the ability to operate effectively in the absence of traditional fixed infrastructure and supply lines for short periods of time. There are several drivers for Distributed Aviation Operations (DAO), including:

1) to respond to a threat
2) to capitalize on surprise and flexibility, and
3) to overcome the challenge of distance.

The proliferation of long-range, precision conventional threats, such as cruise missiles and armed UAVs, has contested the use of traditional bases and methods of operations. While advances have been made to counter such threats, such as interdiction, interception, and base hardening, the complexity of the problem and the sheer number of threats means that more needs to be done; while in traditional warfare mass can be seen as an asset, in this case mass, coupled with predictability, is also a liability.

DAO will also allow the MAGTF to extend its operational reach and enable maneuver at longer ranges. The use of aviation-delivered ground refueling and support will allow the ACE to support the MAGTF and operate at distances and in areas beyond the immediate coastline, extend the reach and maneuver capability several hundred miles beyond the shore, and do so for greater periods of time.

Scalable, pre-planned force packages that balance the need for logistics, maintenance, and ordnance with the ability to maintain a light footprint and ability to move on short notice will be key to operating from austere bases. These force packages can be tailored and used for any aircraft in the Marine Corps inventory, and will be enabled by dedicated support from the aviation ground support and command, control and communication communities.

DAO Characteristics

Can be executed with sea-based or land-based logistics and land sites; shared logistics assets (whether from ships or main bases) support numerous dispersed M-FARPs through mobile distribution sites.

Austere M-FARPs enable deployment at time of crisis rather than requiring years of infrastructure preparation.

DAO can rely on a passive defense if not operating in the vicinity of a main base or from a damaged main base airfield. M-FARPs are only active for a limited period of time to operate inside of an enemy's targeting cycle (24-72 hrs). Deception and decoys further increased efficacy.

Scalable in size, DAO can range from MEU-sized F-35B divisions supported by KC-130Js/MV-22s/CH-53s to MEB-sized multiple squadron packages. The specific footprint ashore is scenario based for designated M-FARPs.

The concept has been the subject of a feasibility study and wargame-informed CONOPS development process. It has been shown to be logistically feasible, using organic MEU/MEB air and surface connectors along with maritime prepositioning ship squadron (MPSRON) and combat logistics force (CLF) ships. Additionally, we have the opportunity to employ to and from allied STOVL carriers such as the 34 jet capable Queen Elizabeth or Prince of Wales, the Garibaldi, and an assortment of amphibious carriers.

Scheduled aircraft maintenance will be conducted on sea base (LHA, LHD or a coalition carrier, such as the UK's Queen Elizabeth II) or at main base away from threat. DAO provides high sortie generation through fuel and ordnance reload inside of the threat WEZ.

1. F-35B launch from a sea base or land-base and conduct multiple missions

2. Logistics moved from source via various connectors, dependent on threat, location, distance, quantities

3. Fuel and ordnance resupply is conducted at mobile forward arming and refueling points (M-FARPs)

4. Aircraft provide support forward, then return to the sea or land base at the conclusion of each flight day

Air-Connected and Surface-Connected FARP operations

2.5 MARINE FIXED-WING AVIATION PLAN

2.5 MARINE FIXED-WING AVIATION PLAN

TOTAL SQUADRONS	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27
FA-18A+/C	8	7	6	6	6	6	6	4	3	3	3
FA-18D	4	4	4	3	3	3	3	2	1	1	1
AV-8B	5	5	5	5	4	3	1	1	1	0	0
EA-6B	3	2	1	0	0	0	0	0	0	0	0
F-35B	2	3	3	4	5	5	7	8	9	10	10
F-35C	0	0	1	1	1	2	2	3	4	4	4
FA-18 FRS/FRD	1	1	1	1	1	1	1	1	1	1	1
AV-8B FRS/FRD	1	1	1	1	1	1	1	0	0	0	0
F-35B FRS	1	1	1	1	2	2	2	2	2	2	2
F-5N/F	1	1	1	1	1	1	1	1	1	1	1
PAI PLAN	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27
AC/RC PMAA											
FA-18A+/C	96	84	72	72	72	72	72	48	36	36	36
FA-18D	48	48	48	36	36	36	36	24	12	12	12
AV-8B	80	80	80	80	64	48	16	16	16	0	0
F-35B	29	38	54	73	82	89	108	122	137	156	174
F-35C	0	0	5	10	10	15	20	30	39	40	40
EA-6B	18	18	12	6	0	0	0	0	0	0	0
F-5N/F	12	12	12	12	12	12	12	12	12	12	12
TOTAL AC/RC TACTICAL	**283**	**280**	**283**	**289**	**276**	**272**	**264**	**252**	**252**	**256**	**274**
FRS/FRD PTAA											
FA-18A/C	18	18	18	21	21	20	18	16	16	14	14
FA-18B	4	4	4	0	0	0	0	0	0	0	0
FA-18D	19	19	19	20	20	19	16	14	14	12	12
AV-8B	13	13	13	13	10	0	0	0	0	0	0
TAV-8B	13	13	13	10	10	4	4	4	4	0	0
EA-6B	0	0	0	0	0	0	0	0	0	0	0
F-35B	20	20	25	25	41	41	44	46	50	50	50
F-35C	8	10	5	5	5	5	5	5	5	5	10
TOTAL FRS/FRD PTAA	**95**	**97**	**97**	**94**	**107**	**89**	**87**	**85**	**89**	**81**	**86**
TOTAL PAA	**378**	**377**	**380**	**383**	**383**	**361**	**351**	**337**	**341**	**337**	**360**

* Operational commitments, contingency plans, and service life expenditure rates may change T/M/S turnover sequence

2.5 MARINE FIXED-WING AVIATION PLAN

MISSIONS

MARINE FIGHTER/ATTACK SQUADRON (VMFA);MARINE ATTACK SQUADRON (VMA):

Support the MAGTF commander by destroying surface targets and enemy aircraft and escort friendly aircraft, day or night, under all weather conditions during expeditionary, joint or combined operations.

MARINE ALL-WEATHER FIGHTER/ATTACK SQUADRON (VMFA-AW);

Support the MAGTF commander by providing supporting arms coordination, conducting multi-sensor imagery, and destroying surface targets and enemy aircraft day or night, under all weather conditions during expeditionary, joint or combined operations.

MARINE FIGHTER/ATTACK TRAINING SQUADRON (VMFAT):

Conduct combat capable fighter/attack training for selected aircrews in the Joint Strike Fighter F-35B aircraft and the legacy F/A-18 aircraft, and provide technical training for aviation maintenance personnel.

MARINE ATTACK TRAINING SQUADRON (VMAT):

Conduct combat capable attack training for selected aircrews in the AV-8B and provide technical training for aviation maintenance personnel.

MARINE REFUELING TRANSPORT SQUADRON (VMGR):

Support the MAGTF commander by providing aerial refueling, assault support, conducting intelligence, surveillance, reconnaissance, target acquisition, indirect and direct fires adjustment, battlefield damage assessment and destroying surface targets day or night under all weather conditions during expeditionary, joint, or combined operations.

MARINE TACTICAL ELECTRONIC WARFARE SQUADRON (VMAQ):

Support the MAGTF commander by conducting airborne electronic warfare, day or night, under all weather conditions during expeditionary, joint, or combined operations.

MARINE UNMANNED AERIAL VEHICLE SQUADRON (VMU):

Support the MAGTF commander by conducting electromagnetic spectrum warfare, multi-sensor reconnaissance and surveillance, supporting arms coordination and control, and destroying targets, day or night, under all-weather conditions, during expeditionary, joint, and combined operations.

MARINE UNMANNED AERIAL VEHICLE TRAINING SQUADRON (VMUT):

Conduct core skill Introduction training for VMU aircrews in accordance with the T&R syllabus.

MARINE FIGHTER TRAINING SQUADRON (VMFT):

Provide fixed-wing adversary support to Marine aviation and ground units to enhance Marine Corps combat readiness with a focus on increasing Marine aviation's core capability in air-to-air combat.

MARINE TRANSPORT SQUADRON (VMR):

Support the MAGTF commander by providing time sensitive air transport of high priority passengers and cargo between and within a theater of war, day or night, under all weather conditions, during expeditionary, joint or combined operations.

TACAIR 2030 ROADMAP

The updated FY17 TACAIR transition meets current global commitments, optimizes deployment to dwell, and assists Hornet inventory recovery in order to maximize available Marine Corps combat power and TACAIR readiness.

F/A-18s remain the primary bridging platform to F-35B/C with a planned sunset of 2030. Hornets will consolidate on the west coast by 2027 with the exception of maintaining VMFA (AW)-242 assigned to the western Pacific at MCAS Iwakuni until the scheduled F-35B transition in 2028.

AV-8B Harriers consolidate on the east coast by the end of 2022 and continue to support east coast MEUs and squadron(-) deployments through scheduled sundown in early 2026.

*The Marine Corps and US Navy have synchronized a ten- year operational deployment plan across all L class carrier, CVN aircraft carrier, and land based TACAIR assets.

The TACAIR transition will remain flexible with regards to VMA/VMFA transition order based on F-35 program progress and legacy readiness. In 2017 1stMAW will have VMFA-121 and VMFA(AW)-242 assigned as forward-deployed forces at MCAS Iwakuni. This is critical to meeting current deployed requirements, recovering TACAIR readiness, and achieving a deployment to dwell of 1 to 2 for the TACAIR community.

1) By the end of FY17, VMFA-121 will fill both the 31st MEU and forward deployed land-based requirements as a 16-aircraft F-35B squadron.

2) VMFA-122 will transition from F/A-18 to F-35B and relocate to MAG-13 in FY18.

3) West coast MEUs are sourced solely with F-35B by end of FY19.

4) In FY19 VMFA-314 will be the first Marine Corps squadron to transition to the F-35C.

5) 31st MEU will be sourced with F-35B beginning late FY17.

*VMAT-203 shuts down FY21; VMA-231 FRD mission through FY25

*VMFAT-101 shuts down FY23, VMFA-323 FRD mission through FY29

F/A-18 PLAN : PROGRAMMATICS, SUSTAINMENT AND FUTURE

F/A-18A-D:

The F/A-18A-D community continues combat operations for the fifteenth straight year as Hornets support OPERATION INHERENT RESOLVE from both land-based SPMAGTF-CR and the aircraft carrier.

The USMC fleet currently has eleven active squadrons and one reserve squadron. In recent years there has been an aircraft inventory shortage due to In Service Repairs (ISR) and depot maintenance backlog. HQMC has reset the force by temporarily reducing squadron flight line entitlement (FLE) to 10 aircraft to preserve future combat readiness while meeting today's current operational requirements. As inventory continues to recover we will return to a community FLE of 12 with deploying squadrons beginning in 3rd quarter of FY17. VMFAT-101 will shut down in FY23, with VMFA-323 assuming the FRD mission through FY29

SUSTAINMENT:

The F/A-18 Service Life Management Program (SLMP) consists of the Center Barrel Replacement Plus (CBR+) and High Flight Hour (HFH) inspection programs. The CBR+ has extended the service life of 210 Lot 17 and below aircraft and the HFH inspection has extended the life of more than 160 DoN F/A-18A-D aircraft beyond 8000 hours.

In parallel to HFH and CBR+ maintenance, the Service Life Extension Program (SLEP) incorporates a combination of inspections, repairs and a number of Engineering Change Proposals to extend additional F/A-18 A/C/D to 10,000 Flight Hours. In FY15 the first Marine Hornet was authorized to 10,000 hours.

FUTURE:

In FY15 the USMC F/A-18 program, PMA-265, and industry began integration of the Advanced Capabilities Mission Computer (ACMC) for the F/A-18C/D that will run High Order Language (HOL) based on FA-18E/F Super Hornet Operational Flight Program software. The ACMC and upgraded displays will posture Marine F/A-18s as a fully digital interoperable platform to support the MAGTF and ensure tactical relevance as a lethal, interoperable, and survivable TACAIR aircraft.

TACAIR Integration (TAI): Currently the Marine Corps has two TAI squadrons allocated to USN CVWs. The Navy and Marine Corps will increase TAI levels to three, and eventually four, with the F-35C. The Marine Corps is committed to TAI and the F-35C program with IOC of the F-35C expected in August 2018. VMFA-314 will transition in FY19 and execute the first USMC F-35C deployment in FY21 with CVW-11.

F/A-18 PLAN : PROGRAMMATICS, SUSTAINMENT AND FUTURE

***Note: throughout this document, items denoted in red are unfunded per current budgeting**

Final Fit:

Survivability Upgrade Roadmap:

1) ALR-67 v3 - 2017
2) ALQ-214 v5 - 2017

Interoperability Upgrade Roadmap:

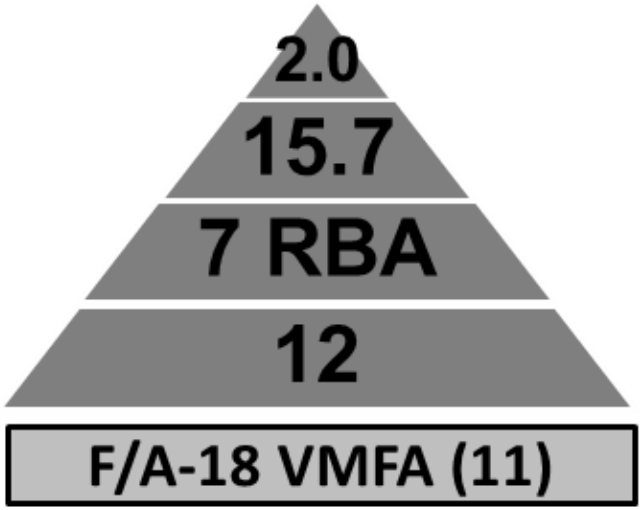
1) High Order Language mission computers - 2020
2) DACAS / Gen 5 radios (software reprogrammable) - scheduled to field in 2017
3) MIDS JTRS (CMN-4/ TTNT 7.0) - scheduled to begin fielding in 2017

Lethality Upgrade Roadmap:

1) AIM-120D – 2016
2) Litening Air to Air functionality – 2016
3) AIM-9X Block II – 2017
4) Upgraded displays – 2021
5) Intrepid Tiger II V 1 Block X
6) JDAM-ER
7) APKWS
8) Stand-off net-enabled weapons: SDBII / JSOW-C1

Reliability Upgrade Roadmap:

1) Solid-state recorders – 2016



AV-8B PLAN : PROGRAMMATICS, SUSTAINMENT AND FUTURE

AV-8B II:

Recent operations ODYSSEY DAWN (Libya), ENDURING FREEDOM (Afghanistan), INHERENT RESOLVE (Iraq and Syria), and Marine Expeditionary Units (MEUs) conducting national tasking in CENTCOM demonstrate the versatility of short takeoff / vertical landing (STOVL) Marine tactical aircraft. The AV-8B equipped with advanced precision weapons, the LITENING targeting pod (with streaming video downlink), and beyond visual range air-to-air radar missiles provides relevant and lethal capability to the Marine Air-to-Ground Task Force (MAGTF).

The USMC currently maintains 5 active operational VMAs comprised of 16 AV-8B aircraft each. This allows them to deploy as a full 16-plane squadron, a 10-plane and 6-plane (MEU) squadron, or an 8 and 8-plane (MEU) squadron. The most recent TACAIR transition plan maintains these 5 squadrons until 2020; all of the West Coast VMAs transition to the F-35B by 2022, and the East Coast VMAs maintain operations until 2026. VMAT-203 will continue training AV-8B pilots until 2022, at which point responsibility will transition to the VMA-231 FRD through FY25.

SUSTAINMENT:

As an out-of-production aircraft, the AV-8B program will continue to focus on readiness by solving chronic material shortfalls.

In the first half of 2015 the AV-8B received the H6.1 Operational Flight Program (OFP) enabling full integration of the Generation 4 LITENING targeting pod, as well as correcting noted software deficiencies to smart weapon employment and targeting. H6.1 also integrated a Common OFP for LITENING to the AV-8B, enabling the LITENING pod to be interchanged between F/A-18s and AV-8Bs without software reloads. Airborne Variable Message Format (VMF) terminals will be installed in the AV-8B, enabling the AV-8B to have the joint standard digital-aided close air support (DACAS) technology. Other integration efforts include the digital video recorder, BRU-70/A digital improved triple ejector rack (DITER), expanded carriage of the AIM-120, and the introduction of the Deployable Mission Rehearsal Trainer which will enable deployed forces to continue to train and retain proficiency with the aircraft's advanced systems.

Then next major program update occurs In 2018. The program plans to field the H6.2 OFP which will integrate Link 16 Positive Position Location and Identification (PPLI) capability, FAA-compliant Required Navigation Performance / Area Navigation capability, and will correct additional software deficiencies identified through combat operations.

FUTURE:

The next major step for the aircraft will be OFP H7.0, which will provide Link 16 full integration into all AV-8B II+ Radar aircraft, as well as AIM-9X . Additionally, the program intends to integrate SRP into the airframe. This effort will include hardware installation and an OFP upgrade to enable the aircraft to be digitally interoperable with the current and future network infrastructure.

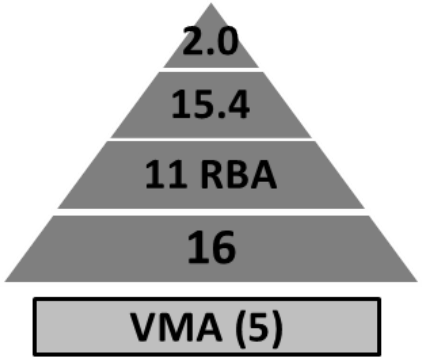
Final Fit:

Interoperability Upgrade Roadmap:

1) DACAS VMF terminals
2) TPOD ADL
3) Link 16
4) SATCOM
5) Software Reprogrammable Payload (SRP) radio replacement

Lethality Upgrade Roadmap:

1) 1760 Wiring on Station 1 and 7
2) AIM-120 C
3) AIM-9X block II
4) Intrepid Tiger II V 1 Block X



Reliability Upgrade Roadmap:

1) Digital Video Recorder
2) RNP / RNAV (GPS Approach capable)
3) IFF Mode 5/S

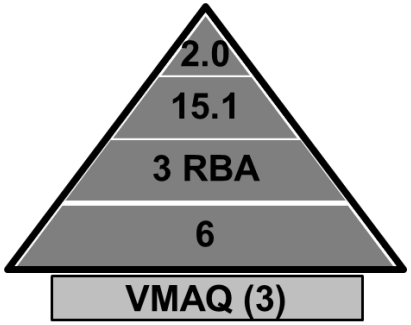
EA-6B PLAN : PROGRAMMATICS, SUSTAINMENT AND FUTURE

EA-6B

The USMC currently has three operational squadrons, each operating the Improved Capabilities (ICAP) III version of the EA-6B Prowler. This variant will support Marine and joint operational requirements through 2019. ICAP III Block 7 upgrades to software and hardware will improve EW performance and interoperability through the end of service life.

SUSTAINMENT

1) 3 operational squadrons of 6 aircraft
2) Transition to ICAP III completed in 2012
3) Program of Record until 2019



FUTURE:

The sundown of Marine Prowlers began in May of FY16 with the FRS (VMAQT-1). The sundown will continue with the one operational squadron decommissioning each year until complete at the end of FY19.

1) Combat Radius – 30 min. out; 1 hr. 45 min. TOS - 30 min RTB; 20 min. reserve
2) Weapons Stations - 5
3) Top Speed – Subsonic
4) Empty Weight – 34,000 pounds
5) Max Gross Weight & Use Payload – 61,500 pounds
6) Cruise Speed w/ Attack Payload – 0.86 IMN with Stores
7) Offensive Systems –ICAP III ALQ-218 Receiver and ALQ-99 pods; USQ-113 Communications Jammer; AGM-88 HARM; LITENING Pod; ALE-43 Bulk Chaff Pod
8) Defensive Systems – ALE-47
9) Network Systems - Multi-functional Info
10) Distribution System (MIDS) with Link 16; Integrated Broadcast System (IBS)

EA-6B ROADMAP: SUNDOWN PLAN

CURRENT FORCE: 3 AC SQDN X 6 EA-6B

FORCE GOAL: Electronic Warfare System of Systems

		FY17				FY18				FY19				FY20				FY21				FY22				FY23				FY24				FY25				FY26			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
UNIT/LOCATION	PMAI/PTAI																																								
CHERRY POINT																																									
VMAQ-4	6 EA-6B																																								
VMAQ-3	6 EA-6B																																								
VMAQ-2	6 EA-6B																																								

VMAQ squadron deactivation began in FY16 with VMAQT-1 (FRS) and is completed in FY19.

F-5 PLAN : PROGRAMMATICS, SUSTAINMENT AND FUTURE

F-5E/F, N:

The F-5 fleet consistently meets readiness goals while supporting as many MAGTF adversary commitments as possible based on limited structure. USMC adversary requirements have grown significantly over the past thirteen years of combat operations. Today, the adversary capacity gap is growing, with VMFAT-501 (F-35B FRS) requiring more than 1,500 per year and MAWTS-1 requiring more than 420 annually from VMFT-401. Some of the additional requirements that have increased adversary demands are:

1) FY10 MAWTS-1 reconstitutes Marine Division Tactics Course for the F/A-18 fleet
2) FY13 AV-8B training and readiness manual increases focus on additional air defense capabilities
3) FY15 Continued transition of legacy TACAIR to F-35
4) TBD VMFAT-502 (2nd F-35 FRS) stand-up at MCAS Beaufort

F-5 SERVICE LIFE MANAGEMENT

The F-5 fleet is funded for life limited components of upper cockpit longerons, wings, horizontal stabilator pairs, and vertical stabilators that will enable the F-5 to achieve its 8000 hour life. This extends the Department of the Navy's 44 F-5 airframes to 2025 and at least 12 aircraft to approximately 2028 in support of fleet training.

CAPABILITY

The current configuration of the F-5 meets all MAGTF requirements except for F-35 and F/A-18.

Upgrades to provide improved beyond visual range situational awareness, as well as passive weapon systems are being studied. Advanced electronic attack capabilities will continue to be fielded.

ACCESSIBILITY

Further desired expansion of the F-5 program, to potentially include a permanent footprint at MCAS Beaufort in FY18, and conceptual plans for adversary elements at MCASs Miramar, Yuma, and Cherry Point are being explored. Efficiently co-locating adversary support with the operational forces generates the most readiness for our operational forces at the least cost. Composite training squadrons beneath 4th MAW will also leverage on extensive TACAIR experience and contribute to enhanced Reserve integration across aviation.

F-5 PROGRAM CAPACITY, CAPABILITY AND ACCESIBILITY

Current USMC inventory is 12 F-5s assigned to VMFT-401 at MCAS Yuma. Based on the low cost per flight hour and ease of maintenance of the F-5, plans to expand the adversary capacity and capability while improving accessibility are being sought.

FUTURE

Procurement of numerous F-5s with significant service life remaining would allow the USMC to meet, with organic assets, most requirements for adversary training. The first phase of expanded adversary capacity will be to establish a detachment on the East Coast in support of VMFAT-501 at MCAS Beaufort, S.C. for F-35 pilot production requirements.

KC-130J HERCULES

KC-130J DESCRIPTION:

The KC-130J is a new production aircraft that supports the Marine Air-Ground Task Force commander by providing air-to-air refueling, aviation delivered ground refueling, and assault support airlift, day or night in all weather conditions during expeditionary, joint, or combined operations.

The KC-130J carries up to 92 ground troops or 64 paratroops plus equipment. It can be configured as a medical evacuation platform capable of carrying 74 litter patients plus attendants.

The KC-130J is capable of operating from austere airfields in forward operating areas and can provide mission support in emergency evacuation of personnel and key equipment, advanced party reconnaissance, tactical recovery of aircraft and personnel, and special warfare operations.

Transition Plan:

The transition is complete for the active component and is underway for the reserve component. This AVPLAN provides the roadmap for completion of the transition, presents known operational commitments, and highlights future improvements:

1) Enhanced aircraft survivability equipment beginning in FY16.
2) Enhanced Harvest HAWK systems beginning in FY18.
3) Enhanced enlisted aircrew training devices deliver in FY17-FY19
4) VMGR-234 projected to reach full operational capability (FOC) in FY24 with 12 Primary Mission Aircraft.
5) VMGR-452 will begin transition to the KC-130J in FY19 and reach FOC in FY26.
6) Planned EW / digital interoperability capabilities.
7) Backup aircraft procurement deferred until Reserve Component reaches FOC.

As the KC-130J evolves through its block upgrade program, the incorporation of digital interoperability via Link 16 will enhance MAGTF command and control agencies' intelligence collection and targeting capability across the force.

KC-130T (Reserve only):

USMCR KC-130T squadrons began their transition to the KC-130J in FY14. KC-130T aircraft will be divested incrementally as KC-130J aircraft are delivered to 4th MAW VMGR squadrons.

Divested KC-130T aircraft will be sold via foreign military sales in order to offset the cost of procuring KC-130J replacement aircraft.

KC-130 J AND T PLAN : PROGRAMMATICS, SUSTAINMENT, AND FUTURE

KC-130J

HARVEST HAWK: The USMC fielded a bolt-on/bolt-off ISR/weapon mission kit for use on existing KC-130J aircraft. A total of 10 aircraft are modified to employ the Harvest HAWK kits with 5 modified aircraft in 2d MAW and 5 modified aircraft in 3d MAW. The Marine Corps intends to outfit all KC-130J aircraft with the Harvest HAWK system.

This mission kit enables the KC-130J aircraft into a platform capable of performing persistent targeting ISR and delivering precision fires using Hellfire or SOPGM family munitions such as the Griffin. This mission kit is a complementary capability taking advantage of the aircraft's endurance and/or range.

First deployed in October 2010, Harvest HAWK missions resulted in success in theater. With the Harvest HAWK ISR / Weapon Mission kit installed, the KC-130J provides the MAGTF commander with a platform capable of extended endurance multi-sensor imagery reconnaissance and on-call close air support in low threat scenarios.

Throughout 2017, the mission kit will continue installation and testing of sensor and fire control system upgrades to address system obsolescence and eliminate deficiencies, while sustaining relevancy through transition from P2A Hellfire to the P4 Hellfire, and eventually JAGM. The VMGR Fleet utilization of the new modifications to the Harvest HAWK aircraft are anticipated in FY18.

KC-130 J AND T PLAN : PROGRAMMATICS, SUSTAINMENT, AND FUTURE

KC-130J

Active component VMGR squadrons completed the transition to KC-130J in 2009 and have consistently met readiness and operational commitments. Since IOC in 2005, USMC KC-130Js have provided air-to-air refueling, aviation delivered ground refueling, battlefield illumination, and aerial delivery and air-landed transportation of cargo and personnel in support of our troops engaged in ground combat in multiple theaters of operation.

RESERVE COMPONENT KC-130J TRANSITION

In March 2014 the reserve component began the transition to the KC-130J with IOC for VMGR-234 declared in August 2015. FOC for VMGR-234 is projected to occur in 2024. VMGR-452 will begin transition to KC-130J in FY19 and reach FOC in FY26.

KC-130J BLOCK UPGRADE PROGRAM

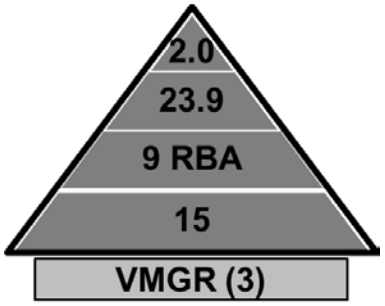
The USMC participates in a joint users group with the USAF and seven international partner nations, to reduce costs associated with the development and fielding of updated baseline configurations resulting from emerging requirements and diminishing manufacturing sources. These new configurations include system and safety improvements and satisfy known CNS/ATM mandates. Block 7.0/8.1 is the new baseline for all DoD and international C-130J users, which includes Link 16, Mode 5 IFF, GPS approach capability, ADS-B (out), RNP/RNAV, and includes a new flight management system.

KC-130T

Legacy KC-130T aircraft will continue operation in 4th MAW until VMGR-452 reaches KC-130J IOC planned for FY20. Efforts are currently underway to replace the hydraulic propeller valve housing with an Electronic Propeller Control System and the analog engine instruments with an electronic Engine Instrument Display System. The TACAN and RADAR systems are also being replaced due to obsolescence.

Additionally, Diminishing Manufacturing Sources and Material Shortages (DMSMS) as well as CNS/ATM mandates will need to be addressed in order to sustain and maintain relevance through 2020. KC-130T Tactical Systems Operators and Flight Engineers will continue to be required until KC-130J IOC at VMGR-452 in FY20.

Final Fit:



Survivability Upgrade Roadmap:

1) AAQ-24B(V)25 DoN LAIRCM/ATW –
2) Fleet retrofit beginning in FY16.

Lethality Upgrade Roadmap:

1) Intrepid Tiger II V 1 : FY18, pending UNS approval

Interoperability Upgrade Roadmap:

1) Dual Vortex – 2016 (TKI/Test) – Harvest HAWK retrofit beginning in 2016.
2) Block 7.0/8.1 with Link 16 - Fleet retrofit beginning in FY18.
3) Software Reprogrammable Payload (SRP) radio replacement – FY20
4) Common EO/IR Sensor – FY23

Harvest HAWK Lethality Upgrade Roadmap:

1) Hellfire P+/P4 – 2018
2) TSS to MX-20 transition – 2018
3) Fire Control Station to Mission Operator Pallet transition – 2018
4) JAGM – 2020

MARINE AERIAL REFUELER / TRANSPORT (VMGR) PLAN

	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27
KC-130J/T TOAI PLAN											
AC/RC KC-130J TOAI	**53**	**54**	**58**	**59**	**61**	**63**	**65**	**67**	**69**	**71**	**73**
AC KC-130J PMAI	45	45	45	45	45	45	45	45	45	45	45
RC KC-130J PMAI	7	8	12	13	15	17	19	21	23	24	24
AC KC-130J BAI	0	0	0	0	0	0	0	0	0	1	3
RC KC-130J BAI	0	0	0	0	0	0	0	0	0	0	0
VX KC-130J PDAI	1	1	1	1	1	1	1	1	1	1	1
KC-130J SHORTFALL	26	25	21	20	18	16	14	12	10	8	6
RC KC-130T TAI	14	14	9	5	0	0	0	0	0	0	0
KC-130J/T TOAI	**67**	**68**	**67**	**64**	**61**	**63**	**65**	**67**	**69**	**71**	**73**

NOTES:

1) TOTAL OVERALL AIRCRAFT AUTHORIZED (TOAA) PROGRAM OF RECORD IS 79 KC-130J AIRCRAFT. MARINE CORPS WILL BE COMPLETE 2030
2) PMAI FOR EACH ACTIVE COMPONENT VMGR SQUADRON IS 15 AIRCRAFT AND PMAI FOR EACH RESERVE COMPONENT VMGR SQUADRON IS 12 AIRCRAFT.
3) KC-130J BAI AIRCRAFT DELIVERIES BEGIN FY26 (POST RC FOC DELIVERY COMPLETION).
4) KC-130T RETIREMENT SCHEDULE IS A PROJECTION AND REQUIRES CONTINUED ADJUSTMENT UNTIL THE RESERVE KC-130J TRANSITION IS COMPLETED.

MARINE AERIAL REFUELER / TRANSPORT (VMGR) PLAN

KEY
J = KC-130J TRANSITION BEGINS
V = KC-130J IOC (5) KJs

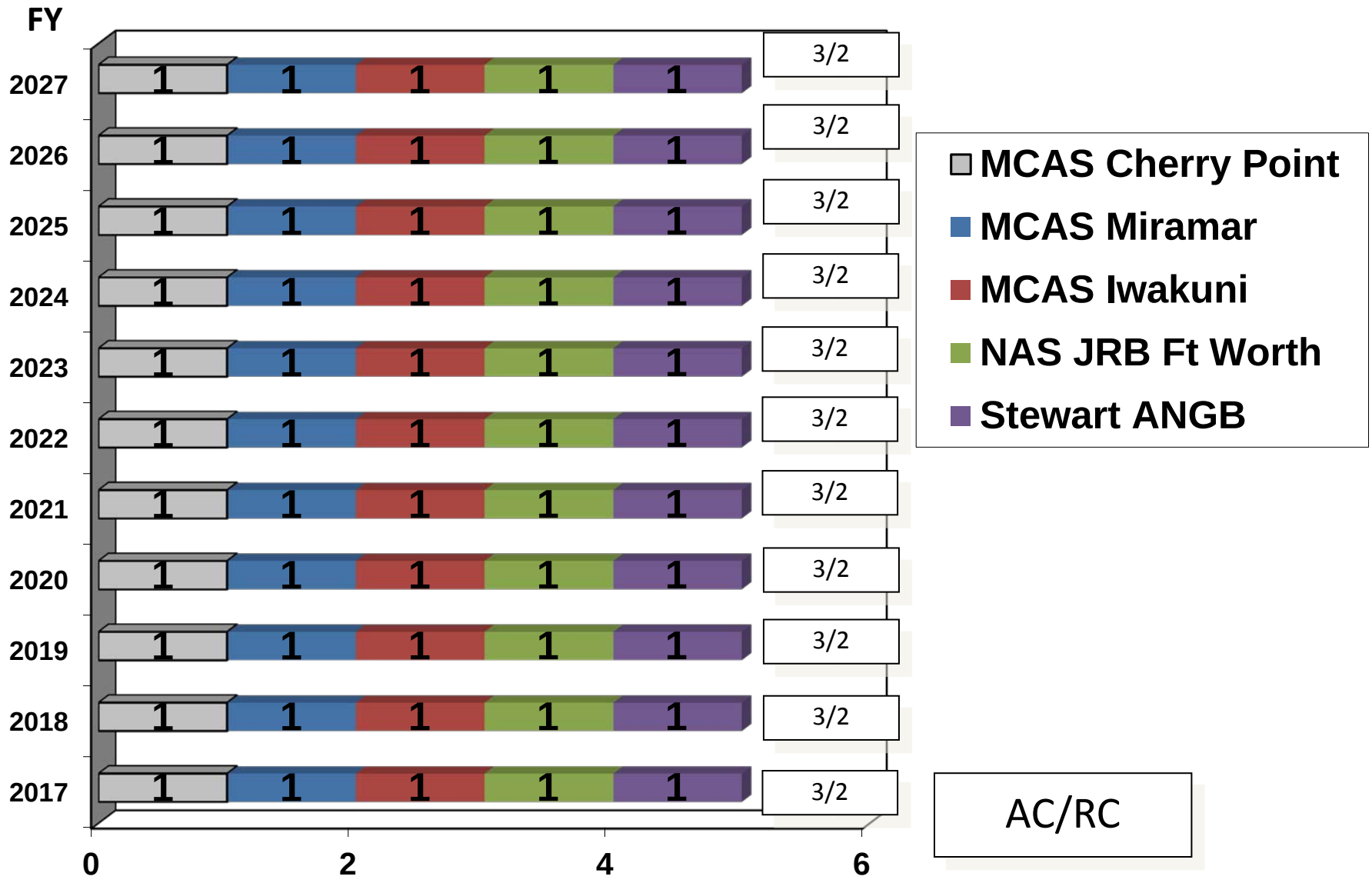
CURRENT FORCE:
3 AC SQDN X 15 KC-130J
1 RC SQDN X 6 KC-130J
1 RC SQDN X 12 KC-130T

FORCE GOAL:
3 AC SQDN X 15 KC-130J
2 RC SQDN X 12 KC-130J

		FY17				FY18				FY19				FY20				FY21				FY22				FY23				FY24				FY25				FY26				FY27			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
UNIT/LOCATION	PMAI																																											
MAG-11/MIRAMAR, CA																																												
VMGR-352	15 KC-130J																																											
WEST COAST MEU PTP																																												
RFF SUPPORT																																												
I MEF GENERAL SUPPORT																																												
MAG-12/IWAKUNI, JA																																												
VMGR-152	15 KC-130J																																											
WESTPAC MEU																																												
MRF-D/MRF-G/TSC																																												
III MEF GENERAL SUPPORT																																												
MAG-14/CHERRY POINT, NC																																												
VMGR-252	15 KC-130J																																											
EAST COAST MEU PTP																																												
RFF SUPPORT																																												
II MEF GENERAL SUPPORT																																												
MAG-41/FORT WORTH, TX																																												
VMGR-234	12 KC-130J (FY24)																																												
RFF SUPPORT																																												
I/II/III MEF GENERAL SUPPORT																																												
MAG-49/NEWBURGH, NY																																												
VMGR-452	12 KC-130J (FY26)									J				V																															
RFF SUPPORT																																												
I/II/III MEF GENERAL SUPPORT																																												

NOTES:
1) VMGR SOURCING IS UPDATED DURING QUARTERLY FORCE SYNCH CONFERENCES.
2) THE ABOVE DEPICTED REQUIREMENT RESULTS IN LESS THAN A 1:2 DEPLOYMENT TO DWELL.
3) VMGR SQUADRONS ARE STRUCTURED TO SUPPORT A CORE ELEMENT AND TWO (3) PLANE DETACHMENTS EACH.
4) DETACHMENT SIZE IS SCALABLE TO MEET THE ASSIGNED MAGTF MISSION.
5) MEU PTP SUPPORT REMAINS A REQUIREMENT, BUT NOT SOURCED WITH DEDICATED DETACHMENT UNTIL FUTURE FORCE SOURCING RELIEF IS REALIZED.

MARINE AERIAL REFUELER / TRANSPORT SQUADRON GEO-LOCATION



2.6 MARINE CORPS TILTROTOR AVIATION PLAN

2.6 MARINE MEDIUM TILTROTOR(VMM) PLAN

MV-22 DESCRIPTION:

The MV-22 Osprey is the world's first production tiltrotor aircraft and the medium lift assault support platform for the Marine Corps. It blends the vertical flight capabilities of helicopters with the speed, range, altitude, and endurance of fixed-wing transport aircraft. Since the first deployment in 2007, the MV-22B's revolutionary capability has been a cornerstone of the Marine Air-Ground Task Force.

Due to the increasing demand for the Osprey, a detachment capability is being built into the VMMs. Staffing began in 2014 for detachment capability in two East Coast squadrons. Sixteen additional squadrons will receive the increased staffing in FY17. The 17th and 18th VMMs will stand-up with a detachment capability. Efforts are underway to adjust the spares, tools, and support equipment to match the unit requirements of the detachment capability.

Current inventory of MV-22's consist of over 70 different hardware configurations and 7 different software configurations. These different configurations account for more maintenance man hours and reduced RBA aircraft. A new plan targeting 2019 to start is the Common Configuration Readiness and Modernization (CCRAM) Plan. This concept would first bring the entire fleet to a single common configuration and then start improvements leveraging technologies from joint multi-role (JMR), future vertical lift (FVL), and other emerging technology initiatives. These will provide a capability leap to ensure relevance and improved readiness at a lower cost for decades, will improve reliability and decrease direct maintenance man-hours per flight hour.

Transition Plan:

The MV-22B has replaced the CH-46E and CH-53D. The Marine Corps will procure a total of 360 MV-22B's in the following squadron beddown:

1) 18 active squadrons x 12 MV-22B
2) 2 reserve squadrons x 12 MV-22B
3) 1 fleet replacement squadron x 20 MV-22B

The Marine Corps is 75% complete with the medium lift transition. There are fourteen FOC squadrons in the active fleet. The units in Okinawa are complete with the transition, leaving the West Coast, Hawaii, East Coast, and the reserve component to complete. Two active component squadrons are scheduled to relocate from Southern California to Hawaii in FY17 and FY18.

The transition of the two reserve squadrons began in the third quarter of FY13. VMM-764 relocated from Edwards Air Force Base to MCAS Miramar in 2013 and attained initial operational capable (IOC) in June 2014. The unit reached FOC in the third quarter of FY16.

In the beginning of FY17, VMM-268 will relocate to Kaneohe Bay. They will be followed by VMM-363, beginning in the first quarter of FY18. A 17th active component squadron, VMM-362, will stand-up beginning in FY18 in Miramar, CA. In FY19, VMM-212 will stand -up in Jacksonville, NC to complete the active component transition.

2.6 MARINE MEDIUM TILTROTOR(VMM) PLAN

MISSIONS

MARINE MEDIUM TILTROTOR SQUADRON (VMM):

Support the MAGTF commander by providing assault support transport of combat troops, supplies and equipment, day or night under all weather conditions during expeditionary, joint or combined operations.

MARINE MEDIUM TILTROTOR TRAINING SQUADRON (VMMT)

Conduct combat capable assault support tiltrotor training for selected aircrew in the MV-22B and provide technical training for aviation maintenance personnel.

1) Additional future MV-22 mission sets will include aerial refueling of fixed wing, tiltrotor, and rotary wing; command and control; and intelligence, surveillance, and reconnaissance (ISR). The VMM, through Link 16 and Software Reprogrammable Payload, will be digitally linked to the MAGTF, enhancing interoperability of ground and air forces during long range operations.

MV-22B PLAN : PROGRAMMATICS, SUSTAINMENT AND FUTURE

MV-22

Since the first deployment in 2007, the MV-22's revolutionary capability has been a cornerstone of the Marine Air-Ground Task Force. MV-22s provided essential medium lift assault support to ground forces in multiple theaters of operation.

MV-22 readiness has been stressed due to accelerated deployments, accelerated squadron standups, continuous combat use since 2007 and emergent operational tasking. This OPTEMPO has been sustained in parallel with the medium lift transition from legacy assets which is only 75% complete. Additionally, the Special Purpose MAGTF construct has driven the requirement to adjust the VMM T/O in order to support detachment operations. As MV-22 employment grows and evolves to meet CCDR demand, the industrial and logistics support base is working to keep pace.

The MV-22 is a maturing platform that is scheduled to reach FOC in 2020; the support base is maturing in parallel. This base, both industrial and organic, has been challenged to meet established repair timelines and required depot throughput. Across the enterprise, changes to manning are being made to support detachment operations, organic depot facilities are expanding, contracting strategies are evolving to support timely delivery of long lead items, and industry continues to grow their support capability. These and other adjustments are being made to ensure the support base is able to meet logistical requirements driven by current and future MV-22 operational requirements.

SUSTAINMENT:
TIME ON WING IMPROVEMENTS

Readiness initiatives remain a focus of the MV-22 program in order to increase mission capable rates and decrease operating cost. Improvements have been achieved through team execution of a comprehensive plan which includes implementation of R&M improvements, maintenance concept changes, repair capability standup, and contract strategy changes.

ASSAULT SUPPORT INTEGRATION

In the years ahead, the Osprey will remain the nation's crisis response platform of choice in support of the "new normal." Due to the increasing demand for the Osprey, a detachment capability is being built into the VMMs. Staffing began in 2014 for detachment capability in two East Coast squadrons. An additional sixteen squadrons will receive the increased staffing in FY17. The 17th and 18th VMMs will stand-up with a detachment capability. Efforts are underway to adjust the spares, tools, and support equipment to match the unit requirements of the detachment capability.

MV-22B PLAN : PROGRAMMATICS, SUSTAINMENT AND FUTURE

Final Fit:

Survivability Upgrade Roadmap:

1) UUNS DON LAIRCM – 2016 (SPMAGTF)
2) JUONS DON LAIRCM – 2017 (MEU)
3) Intrepid Tiger II V1 Block X (2019-21)

Interoperability Upgrade Roadmap:

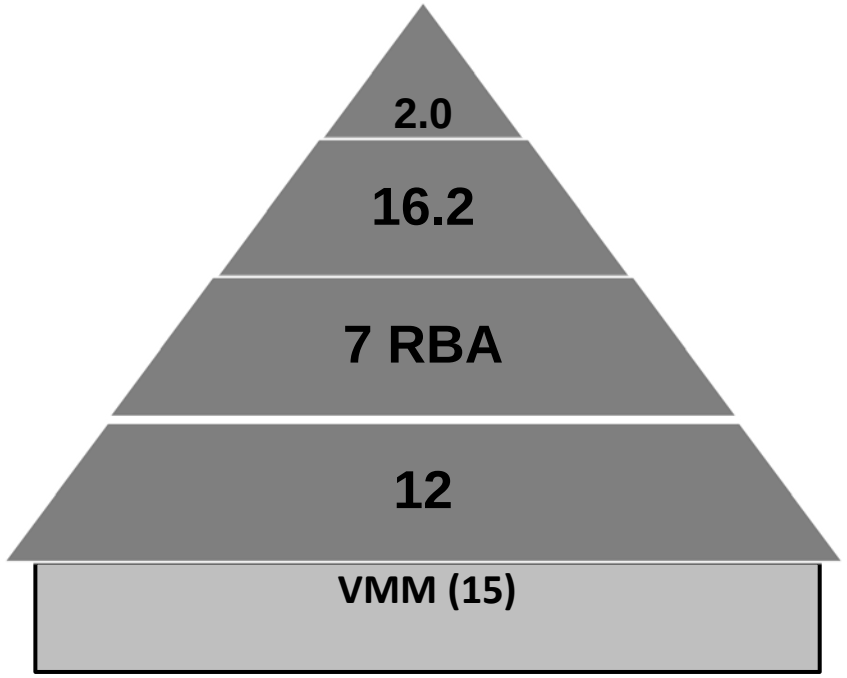
1) Iridium SATCOM in FY16 to provide Beyond Line Of Sight (BLOS) C2 capabilities.
2) C-4 UUNS – 2018 (SPMAGTF) Iridium, Link-16, ANW2, TTNT, CDL, and Ku
3) FY19 – MAGTF Agile Network Gateway Link (MANGL) consolidates the Software Reprogrammable Payload (SRP) / Airborne Gateway / and tablet into a Program of Record fielding on MV-22, CH-53, KC-130. MANGL is the overarching system of systems including waveforms such as ANW2, Link-16, BE-CDL, and TTNT.
4) Radio frequency identification (RFID) of cargo and personnel to be fielded with SRP

Lethality Upgrade Roadmap:

1) V-22 Aerial Refueling System (VARS)
2) Traffic Collision and Avoidance System (TCAS)
3) TFLIR; Advanced Targeting Sensor (ATS) with EO/IR optics, Laser Target Designator and Ranging (LTD-R), IR Marker, and Video Data Link (VDL)
4) Enhanced Weapon System; Medium range immediate suppression

Reliability Upgrade Roadmap:

1) Open Architecture / Modular Avionics
2) Nacelle Wiring / Blade Nickle Cap/ Electrical System)
3) Swashplate Actuator (SPA) / Infrared Suppressor (IRS)



2.6 MARINE MEDIUM TILTROTOR (VMM) PLAN

MV-22 Aircraft Test and Evaluation Updates

DEVELOPMENTAL TEST (DT): Ongoing DT efforts include:

1) Fleet sustainment – Vehicle Management System (VMS) and JVX Application System Software (JASS) software drops
2) Nacelle sails for increased range
3) Envelope expansion for shipboard operations
4) High altitude operations and defensive maneuvering
5) Strategic tanker envelope expansion

OPERATIONAL TEST AND EVALUATION (OT&E): Ongoing OT efforts include:

1) Support of integrated test for aircraft and mission planning software development
2) Operational assessments of flare effectiveness and Blue Force Tracker (BFT) Phase IV
3) Defensive weapon system envelope expansion
4) Digital interoperability
5) Integrated Aircraft Survivability Equipment
6) Future Capabilities

Strategic Air-to-Air Refueling (AAR)

The V-22 and KC-130 are a formidable tandem for the MAGTF commander. The addition of joint and coalition strategic tankers will increase the flexibility of the combatant commander to utilize the V-22. In 2014, a flight clearance was completed for the V-22 to conduct air-to-air refueling from the Air Force KC-10. Further testing and flight clearances are planned for the KC-46. OMEGA-707 test was completed in July 2016 and a flight clearance is expected by FY17.

V-22 Aerial Refueling System (VARS)

Planned to have the initial capability in mid FY18 being able to refuel fixed wing, tiltrotor and rotary wing aircraft. Fielding of the full capable system will be in FY19. This system will be able to refuel all MAGTF aerial refuel capable aircraft with approximately 10,000 pounds per VARS-equipped V-22.

Enhanced Weapon System

Enhanced weapon systems is in early development to increase all-axis, stand-off, and precision capabilities.

Integrated Aircraft Survivability Equipment (IASE)

An IASE urgent universal needs statement (UUNS) was approved in FY14. Delivery of the first 24 sets will be in FY16. Upgrading the remaining fleet will begin in FY17.

2.6 MARINE MEDIUM TILTROTOR (VMM) PLAN

The next MV-22

The V-22 has proven its worth by transforming rotorcraft operations across the globe. The operational reach and versatility of this remarkable platform has created tactical and strategic options where there previously were none. Building on this success is key to ensure the platform's relevance and capability for the future force.

Initial planning has begun to map the next upgrade to the MV-22B, which will achieve a single configuration by the mid 2020s. This concept will take the reliability upgrades in the current Block C and integrate them into fielded Block B aircraft. It will also be the initial step in the CCRAM Plan that will drive a capability leap to ensure relevance and improved readiness at a lower cost for decades. New capabilities, such as open architecture, will allow the V-22 to remain lethal on the evolving modern battlefield. Additionally, the modernization of the aircraft will increase its readiness and cost efficiency. The procurement of a new sensor, that can off-board IASE and DI gathered threat information to friendly attack platforms, will reduce the steps in the kill chain.

Upgrades will take advantage of maturing technologies as well as incorporate improvements realized since the platform's introduction to the fleet. The single configuration aircraft will increase operational effectiveness, reliability and maintainability. It will also sustain the downward trend in operating costs while increasing readiness, which are hallmarks of the platform's overall performance to date.

2.6 MARINE MEDIUM TILTROTOR (VMM) PLAN

	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27
TOTAL SQUADRONS / PRIMARY MISSION AIRCRAFT AUTHORIZED (PMAA) - REQUIREMENT											
Active Component											
12 MV-22B	16	17	18	18	18	18	18	18	18	18	18
Reserve Component											
12 MV-22B	2	2	2	2	2	2	2	2	2	2	2

	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27
PRIMARY AIRCRAFT INVENTORY (PAI) PLAN - INVENTORY											
AC/RC PMAI											
MV-22B	216	216	228	240	240	240	240	240	240	240	240
FRS PTAI											
MV-22B BLOCK A	2	0	0	0	0	0	0	0	0	0	0
MV-22B BLOCK B	18	20	20	20	20	20	20	20	20	20	20
HMX-1 PMAI											
MV-22B	12	12	12	12	12	12	12	12	12	12	12
PDAI / POAI											
MV-22B	8	8	8	8	8	8	8	8	8	8	8
BAI/PIPE											
MV-22B	37	37	37	37	37	37	37	37	37	37	37
PROGRAM OF RECORD	**360**	**360**	**360**	**360**	**360**	**360**	**360**	**360**	**360**	**360**	**360**

GENERAL NOTES:

1) TOTAL PROCUREMENT OBJECTIVE IS 360 MV-22B. A REQUIREMENTS-BASED ANALYSIS IS UNDERWAY TO INCREASE THE PROGRAM OF RECORD TO 380 WITH THE INTRODUCTION OF VMM-362 and VMM-212 IN FY18 AND FY19.

2) FLEET SQUADRONS WILL CONTAIN A MIX OF BLOCK B AND BLOCK C. THE MIX WILL MOVE FROM 8 BLOCK B AND 4 BLOCK C TO A 6 AND 6 MIX.

3) VMMT-204 WILL CONTAIN BLOCK A AND BLOCK B AIRCRAFT UNTIL FY18.

18 AC SQDN X 12 MV-22B
2 RC SQDN X 12 MV-22B
FRS x 20 MV-22B
HMX-1 x 12 MV-22B

KEY
M = TRANSITION BEGINS
V = TRANSITION COMPLETE

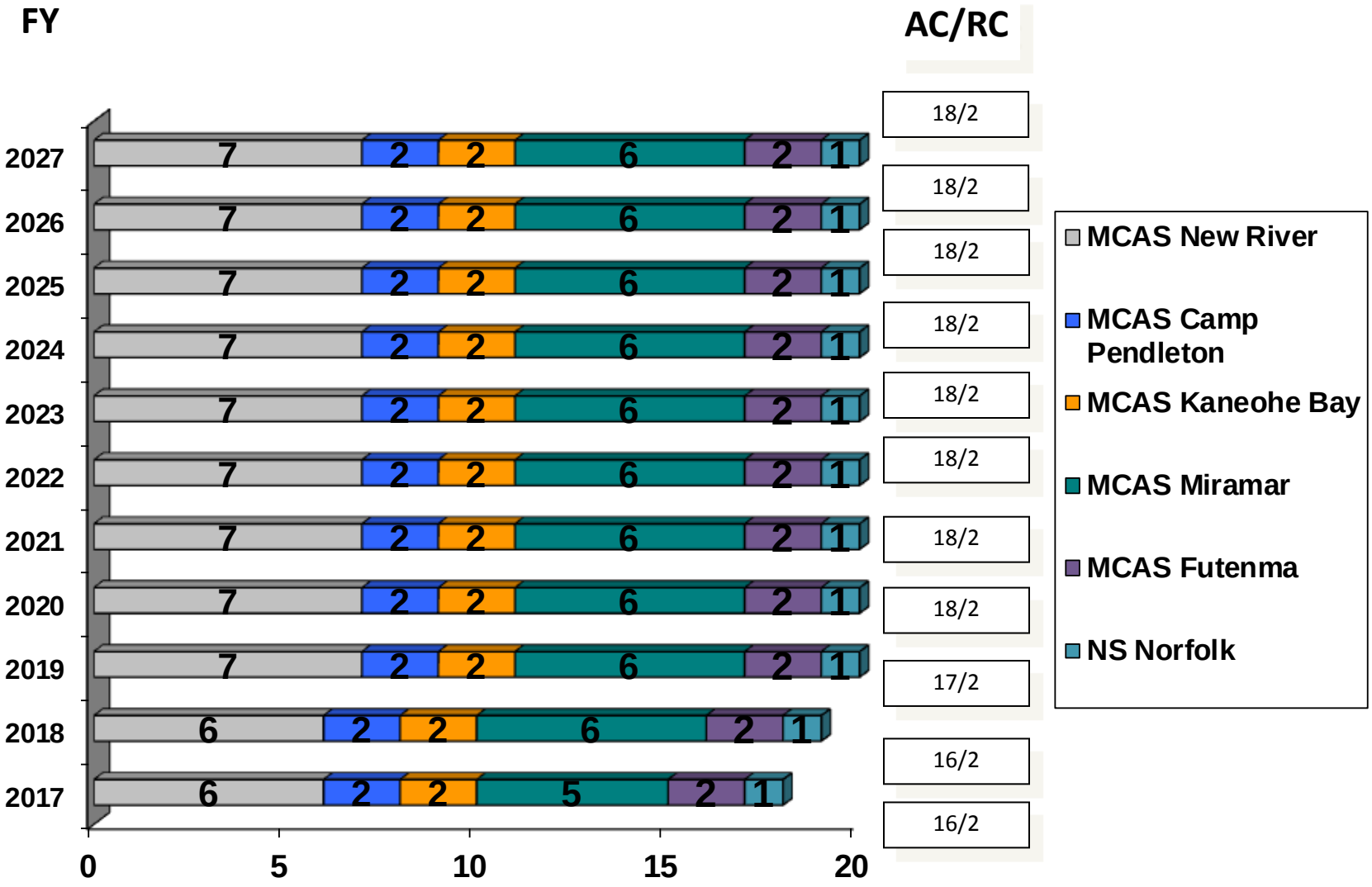
2.6 MARINE MEDIUM TILTROTOR(VMM) PLAN

UNIT/LOCATION	PMAI	FY17				FY18				FY19				FY20				FY21				FY22				FY23				FY24				FY25				FY26				FY27			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
MAG-16																																													
VMM-161	12 MV-22B																																												
VMM-163	12 MV-22B																																												
VMM-165	12 MV-22B																																												
VMM-166	12 MV-22B																																												
VMM-268 (1)	12 MV-22B	MOVE TO MAG-24																																											
VMM-363 (2)	12 MV-22B					MOVE TO MAG-24																																								
VMM-362 (3)	12 MV-22B					M				V																																			
West Coast MEU		3		1		5		3		1		5		3		1		5		3		1		5		3		1		5		3		1		5		3		1		3		1	
MAGTF Tasking		A		B		A		B		A		B		A		B		A		B		A		B		A		B		A		B		A		B		A		B		A		B	
MILCON		HANGAR				CORROSION CONTROL FACILITY																																								
MILCON		AIRFIELD TAXIWAY																																											
MILCON		LHD PAD																																											
MAG-24																																												
VMM-268	12 MV-22B																																												
VMM-363	12 MV-22B																																												
MAGTF Tasking										A		B		A		B		A		B		A		B		A		B		A		B		A		B		A		B		A		B	
MILCON		LHD PAD AND LZ IMPROVEMENTS																																											
MILCON		V-22/H-1 WAREHOUSE																																												
MILCON		MAG-24 ARMORY EXPANSION																																												
MILCON		HANGAR																																											
MAG-26																																												
VMMT-204	20 MV-22B																																												
VMM-162	12 MV-22B																																												
VMM-261	12 MV-22B																																												
VMM-263	12 MV-22B																																												
VMM-264	12 MV-22B																																												
VMM-266	12 MV-22B																																												
VMM-365	12 MV-22B																																												
VMM-212 (4)	12 MV-22B									M				V																															
East Coast MEU		6		2		4		6		2		4		6		2		4		6		2		4		6		2		4		6		2		4		6		2		6		2	
MAGTF Tasking		A		B		A		B		A		B		A		B		A		B		A		B		A		B		A		B		A		B		A		B		A		B	
MILCON		SQUADRON WAREHOUSE																																											
MILCON																																													
MAG-36																																												
VMM-262	12 MV-22B																																												
VMM-265	12 MV-22B																																												
31ST MEU		A		B		A		B		A		B		A		B		A		B		A		B		A		B		A		B		A		B		A		B		A		B	
MILCON																																													
MAG-39																																												
VMM-164 (5)	12 MV-22B	V																																										
VMM-364 (6)	12 MV-22B	V																																										
SOCAL MEU		3		1		5		3		1		5		3		1		5		3		1		5		3		1		5		3		1		5		3		1		3		1	
MILCON														CONVERT LHA DECK TO CONCRETE																															
MILCON														LHD PAD MODERNIZATION																															
MILCON														VTOL PAD MODERNIZATION																															
MILCON		SIMULATOR																																											
MAG-41																																												
VMM-764 (7)	12 MV-22B																																												
MAG-49																																												
VMM-774 (8)	12 MV-22B					V																																						
WHMO																																												
HMX-1	12 MV-22B																																												

NOTES:

1) VMM-268 FOC Q1 FY16. RELOCATE TO MAG-24 DURING Q1 FY17.
2) VMM-363 RELOCATE TO MAG-24 DURING Q1 FY18.
3) VMM-362 WILL BEGIN STAND UP IN FY18 IN MIRAMAR.
4) VMM-212 WILL BEGIN STAND UP IN FY19 IN NEW RIVER.
5) VMM-164 IOC Q2 FY16. FOC Q3 FY17.
6) VMM-364 FOC Q1 FY17.
7) VMM-764 FOC Q2 FY16.
8) HMM-774 TRANSITION WILL BE CONDUCTED AT NS NORFOLK. IOC Q3 FY16. FOC Q4 FY18

2.6 MARINE MEDIUM TILTROTOR(VMM) GEO-LOCATION



Basing plans are subject to change

2.7 MARINE CORPS ROTARY-WING AVIATION PLAN

2.7 MARINE CORPS ROTARY-WING AVIATION PLAN

Missions

MARINE HEAVY HELICOPTER SQUADRON (HMH):

Support the MAGTF commander by providing assault support transport of heavy equipment, combat troops, and supplies, day or night under all weather conditions during expeditionary, joint or combined operations. Conduct intelligence, surveillance and reconnaissance missions and MAGTF electronic warfare missions.

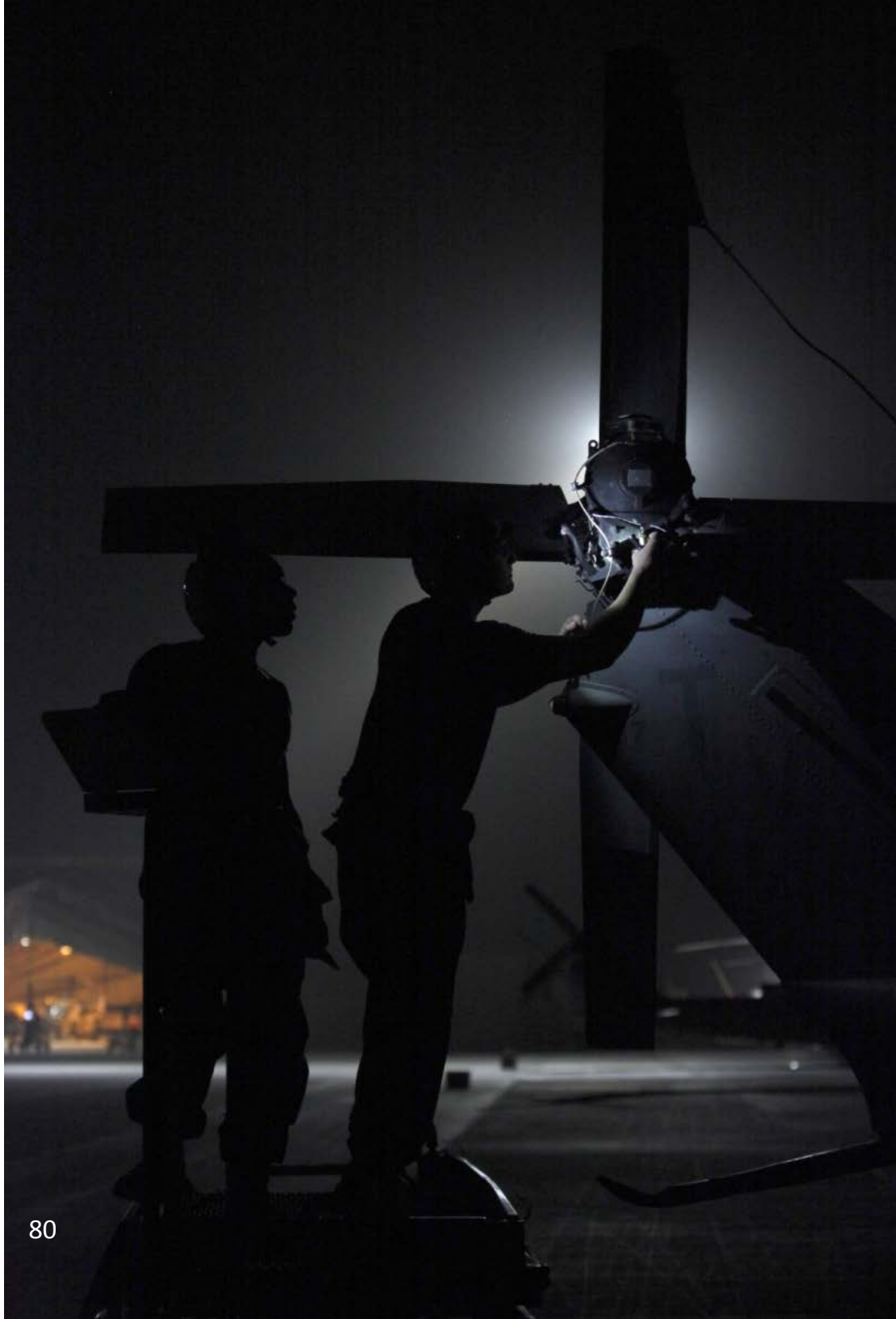
MARINE HEAVY HELICOPTER TRAINING SQUADRON (HMHT):

Conduct combat capable assault support heavy lift helicopter training for selected aircrews in the CH-53E aircraft and provide technical training for aviation maintenance personnel.

MARINE LIGHT ATTACK HELICOPTER SQUADRON (HMLA):

Support the MAGTF commander by providing offensive air support, utility support, armed escort and airborne supporting arms coordination, day or night under all weather conditions during expeditionary, joint or combined operations. Conduct intelligence, surveillance and reconnaissance missions and MAGTF electronic warfare missions.

MARINE LIGHT ATTACK HELICOPTER TRAINING SQUADRON (HMLAT) Conduct combat capable attack training for selected aircrews in the UH-1Y, AH-1W and AH-1Z aircraft, and provide technical training for aviation maintenance personnel.



MARINE HEAVY HELICOPTER (HMH) PLAN

CH-53K King Stallion:

DEVELOPMENTAL TEST:

1st Qtr FY14 to 2nd Qtr FY18

OPERATIONAL TEST/OPEVAL:

OT-B1 testing in support of Milestone C Decision begins 1st Qtr FY17. Integrated Operational Test and Evaluation (IOT&E) commences in FY19 in support of Initial Operational Capability (IOC) / Full Rate Production (FRP).

INITIAL OPERATIONAL CAPABILITY:

Scheduled for 2019.

IOC shall be achieved when the first squadron receives four CH-53K aircraft with required personnel suitably trained and certified, required primary and support equipment and technical publications, to include initial spares with interim repair support and initial training in place, ready to deploy in accordance with USMC standards.

CH-53K programmatic IOC is currently on track for end of 2019. IOC will be achieved when the first operational squadron (HMH-366) receives four CH-53K aircraft with required personnel suitably trained and certified, required primary support equipment and technical publications, to include spares with interim repair support and initial training in place, ready to deploy in accordance with USMC standards.

Currently the CH-53K has four Engineering Developmental Models (EDMs) conducting Developmental Test (DT) in West Palm Beach, FL. The CH-53K T&R conference was conducted during the summer of 2016 ensuring VMX-1 can evaluate the T&R while conducting operational test ensuring an effective and comprehensive training plan for conversion and initial accession pilots and aircrew.

Operational Test (OT) B1 with all Marine aircrew beginning fall of 2016 will wrap up in December 16 executing the envelope of 120kts, 30deg angle of bank/1.5g, 27,000lb external hover out of ground effect, and 12,000lb external lift 110nm drop off and return in preparation for a Milestone C decision 2QFY17 to approve Low Rate Initial Production (LRIP). These 4 EDM test assets will move to Pax River, MD summer of 2017 to continue DT. Four System Demonstration Test Articles (SDTAs) will deliver in FY17 in order to support operational test (OT).

Tech Evaluation is scheduled to complete in January 2019 with Initial Operational Test and Evaluation (IOT&E) complete by August of 2019 in support of IOC.

CH-53E PLAN: PROGRAMMATICS, SUSTAINMENT AND FUTURE

CH-53E SUPER STALLION:

The CH-53E entered service in 1981 and is the only heavy lift helicopter in the DoD rotorcraft inventory. Current force construct is eight active component HMHs and one reserve component HMH(-). The Super Stallion fleet has enabled heavy lift assault support operations in OEF, OIF, HOA, and is forward deployed in support of MEUs, UDP Okinawa, MRF-Darwin and SPMAGTFs. The past 14 years of combat operations and various humanitarian crises have validated the relevance of vertical heavy lift by both MAGTF and joint force commanders alike.

The current CH-53E inventory is 146 aircraft. Replacement production capacity does not exist nor are there CH-53Es available in war storage. Low aircraft inventory is accentuated by pipeline aircraft (aircraft receiving modifications, depot level repairs, and standard depot-level maintenance), obsolescence issues and a supply posture associated with an aging airframe. The result is a lack of physical assets ready for tasking on the flight line. Due to this shortfall a squadron's Primary Aircraft Inventory (PAI) is 12 aircraft. Transition to the CH-53K will enable re-distribution of CH-53E aircraft, allowing squadrons to return to 16 aircraft.

CH-53E SUSTAINMENT:

CH-53E Readiness Recovery Effort is a continuous process addressing recommendations from the Super Stallion Independent Readiness Review (SSIRR) conducted in order to assist the CH-53E community to achieve and maintain T-2.0 until Full Operational Capability (FOC) of the CH-53K in 2029. The recovery plan is expected to be a three year process extending through FY19.

The reset of all 146 aircraft is the main effort. Reset specification consists of all Maintenance Requirement Cards (MRC) including phase cycle and calendar/special inspections improving serviceability and material condition of the aircraft. Upon completion, a full FCF will be conducted by the squadron to ensure the aircraft is returned Full Mission Capable (FMC) with zero outstanding Awaiting Maintenance Discrepancies (AWM). At any given time, 16 aircraft will be in reset. By 2020 all 146 CH-53Es will be reset.

Other readiness recovery efforts include procurement of the correct amount of Individual Material Readiness List (IMRL) and Support Equipment (SE), Functional Check Flight (FCF) training for pilots and crew chiefs, procure 5 Portable Electronic Maintenance Aids (PEMAs) per aircraft, fix all Technical Publication Discrepancy Reports (TPDRs), AMARG MH-53E reconstitution for stick and rudder aircraft at

HMHT-302, Contract Maintenance Field Teams, and fully fund Program Related Logistics (PRL).

In the realm of Performance Based Logistics (PBL), the CH-53E currently has 10 components on contract. By summer of 2017 it is expected to have another 65 components with efforts to pursue additional components in the near future.

CH-53E PLAN: PROGRAMMATICS, SUSTAINMENT AND FUTURE

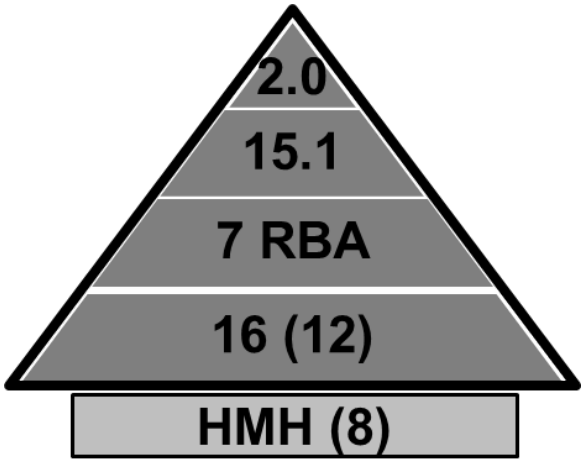
Future:

The CH-53E will continue to support the full spectrum of assigned combat operations and scheduled deployments. It is imperative to sustain the current CH-53E fleet throughout the transition to the CH-53K (IOC 2019 / FOC 2029).

Final Fit:

Survivability Upgrade Roadmap:

1) AAQ-24 DIRCM(V25)
2) Dual Pod/Forward Firing Chaff and Flare Dispensers
3) Hostile Fire Indication (HFI)
4) Advanced Threat Warner/Missile Warner/Laser Warner
5) Integrated Aircraft Survivability Equipment (ASE)
6) Interoperability Upgrade Roadmap:
7) Software Reprogrammable Payload (SRP) radio replacement



LINK 16

Reliability Upgrade Roadmap:

1) 419 Engine Upgrade (increases payload by 5 to 8K pounds)
2) Prognostic/Diagnostic Based Maintenance
3) Engine Nacelles
4) Kapton Wiring Replacement

Critical Systems Upgrade:

1) Mode V IFF, Master Zeroize Switch, GPS Inertial Navigation System (INS), Brown Out Symbology Set (BOSS), Embedded SATCOM
2) Smart Multifunction Color Display (SMFCD)
3) APX-123 for ADSB-out FAA mandate
4) Degraded Visual Environment (DVE) Phases 2 and 3

MARINE HEAVY HELICOPTER (HMH) PLAN CH-53K

CH-53K KING STALLION DESCRIPTION:

On 27 October 2015, the CH-53K King Stallion flew for the first time and developmental flight test continues with 4 Engineering Developmental Model (EDM) aircraft. OT-B1 testing is being conducted in order to support a Milestone C decision in 2nd QTR FY 17.

The CH-53K is a critical airborne connector which will enable ship to objective maneuver and seabasing . The CH-53K will be capable of carrying a 36,000lb load but has a Threshold Key Performance Parameter (KPP) to externally transport 27,000lbs 110 NM under high/hot conditions, loiter for 30 minutes and return. This provides nearly three times the capability of the CH-53E under similar environmental conditions. Major system improvements of this new build helicopter include: fly-by-wire flight controls; a composite airframe housing more capable and fuel efficient engines and a split torque main gearbox to enable increased gross weight; advanced fourth-generation composite main rotor blades; modern interoperable glass cockpit; internal cargo handling systems compatible with USAF 463L pallets; triple hook external cargo system; and fourth- generation aircraft survivability equipment. Additionally, the CH-53K will be supported by the fleet common operating environment (FCOE) which will facilitate condition based maintenance.

The CH-53K helicopter provides JTF and MAGTF commanders with a vertical heavy lift capability to project, sustain and reconstitute combat forces. The CH-53K operates at distances, airspeeds, and gross weights sufficient to support the full range of military operations, expeditionary maneuver warfare, operational maneuver from the sea and seabasing concepts. The aircraft affordably optimizes performance, survivability, maintainability and supportability in a “best value” solution to provide an effective heavy lift assault support platform.

Unique in aviation build and test history, the CH-53K program has a dedicated Ground Test Vehicle (GTV) on which to test dynamic components, airframe fatigue, systems and flight surfaces and controls. A separate, static test article, used to measure strain and critical loads under several thousand load conditions , allows a rigorous testing program in a safe environment, and data from these two systems are implemented into the program far more quickly than if this were a flying aircraft. The GTV, by discovering issues inherent in any helicopter test program, bought down risk and made flight test safer and more efficient.

The program entered Development Test 1st QTR FY 14 with the successful light off of the ground test vehicle. The first of four Engineering Demonstration Models (EDM) were delivered in the first quarter of FY 14. EDM 1’s first flight was conducted on 27 Oct 15 with follow on EDMs 2-4 conducting their first flights supporting developmental test.

The first external was conducted with a 12,000lb load on 19 Apr 2016, followed by a 20,000lb load on 27 May 16, and a 27,000lb load 17 June 16.

Following the Advance Procurement Acquisition Decision Memorandum (ADM) approval by Mr. Kendall, the long lead item contract was awarded in Apr 2016, approving the purchase of the long lead items for the first Low Rate Initial Production (LRIP) Lot of (2) CH-53Ks in FY17. In FY16 the first Marine Developmental test pilot and Operational test pilot flew the CH-53K marking a major milestone in the program with Integrated Test. System Demonstration Test Articles (SDTAs) 1-4 are in assembly, with follow on contracts pending for SDTAs 5 and 6.

MARINE HEAVY HELICOPTER (HMH) PLAN CH-53K

Transition Plan:

The Marine Corps will procure a total of 200 airframes, fielding eight active component squadrons, one fleet replacement squadron, two HMH(-) reserve component squadrons, and developmental / operational test squadrons.

The CH-53 transition begins in earnest in FY-19, when HMH-366 and HMHT- 302 enter transition. HMH-366 will be the first tactical squadron to deploy a detachment of CH-53K King Stallions. Transition timelines are as follows:

1) 2nd MAW FY 19-25
2) 1st MAW FY 25-26
3) 3rd MAW FY 26-30
4) 4th MAW FY 29-31.

In FY 23, 4th MAW will restructure its single HMH into two separate HMH(-)s with the reactivation of HMH-769 at MCAS Miramar. CH-53K FOC will be achieved in 2029 with the transition of the last active component squadron. Backup aircraft inventory / attrition reserve deliveries will complete in FY31 when the program of record reaches 200 aircraft.

MARINE HEAVY HELICOPTER (HMH) PLAN

	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27
TOTAL SQUADRONS / PRIMARY MISSION AIRCRAFT AUTHORIZED (PMAA) - REQUIREMENT											
Active Component											
16 CH-53E	8	8	7	7	7	7	6	5	4	3	2
16 CH-53K	0	0	1	1	1	1	2	3	4	5	6
Reserve Component											
8 CH-53E	1	1	1	1	1	1	2	2	2	2	2
8 CH-53K	0	0	0	0	0	0	0	0	0	0	0

	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27
PRIMARY AIRCRAFT INVENTORY (PAI) PLAN - INVENTORY											
AC/RC PRIMARY MISSION AIRCRAFT INVENTORY (PMAI)											
CH-53E	104	104	104	104	104	104	108	96	80	64	48
CH-53K	0	0	4	4	5	14	28	43	55	74	96
FRS PRIMARY TRAINING AIRCRAFT INVENTORY (PTAI)											
CH-53E	10	10	10	10	10	10	8	8	6	4	0
MH-53E	2	2	2	2	2	2	0	0	0	0	0
CH-53K	0	0	0	2	6	7	8	8	10	12	14
TOTAL PTAI	**12**	**12**	**12**	**14**	**18**	**19**	**16**	**16**	**16**	**16**	**14**
PRIMARY DEVELOPMENTAL/TEST AIRCRAFT INVENTORY (PDAI)											
CH-53E	2	2	2	2	2	2	2	0	0	0	0
CH-53K	8	8	4	4	4	4	4	4	3	3	3
HX-21 CH-53K	4	4	2	2	2	2	2	2	1	1	1
VMX-22 CH-53K	4	4	2	2	2	2	2	2	2	2	2
TOTAL PDAI	**10**	**10**	**6**	**6**	**6**	**6**	**6**	**4**	**3**	**3**	**3**
BACKUP AIRCRAFT INVENTORY (BAI)/PIPELINE											
CH-53E	31	31	31	31	31	31	29	23	19	19	19
CH-53K	0	0	0	0	0	0	0	0	0	0	0
TOTAL BAI	**31**	**31**	**31**	**31**	**31**	**31**	**29**	**23**	**19**	**19**	**19**
TOTAL PAI	**157**	**157**	**153**	**155**	**159**	**160**	**159**	**139**	**118**	**102**	**84**

GENERAL NOTES:

1) FOUR CH-53K ENGINEERING DEMONSTRATION MODELS (EDM) , NONPRODUCTION AIRCRAFT, WILL BE UTILIZED FOR DEVELOPMENTAL TEST AND RETAINED AT HX-21. IN FY19 (2) EDMs WILL BE REMOVED FROM HX-21 TO BE CONVERTED TO PRACTICAL JOB TRAINERS (PJTs) FOR UTILIZATION AT CNATT NEW RIVER FOR INITIAL ACCESSION TRAINING. EDM AIRCRAFT DO NOT COUNT AGAINST THE PROGRAM OF RECORD.

2) PROGRAM OF RECORD IS 200 CH-53K.

3) TWO AMARG MH-53Es CONVERTED TO HMHT-302 FAMILIARIZATION FLIGHT TRAINERS WITH EST DELIVERY IN FY17

CURRENT FORCE:
8 AC SQDN X 12 CH-53E (1)
1 RC SQDN X 6 CH-53E (2)
1 FRS SQDN X 12 CH-53E (10 CH-53E / 2MH-53E) (3)

MARINE HEAVY HELICOPTER (HMH) PLAN

FORCE GOAL:
8 AC SQDN X 16 CH-53K
2 RC SQDN(-) X 8 CH-53K
1 FRS SQDN X 21 CH-53K

		FY17				FY18				FY19				FY20				FY21				FY22				FY23				FY24				FY25				FY26				FY27			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
UNIT/LOCATION	PAI																																												
MAG-16																																													
HMH-361	12 CH-53E																	16 CH-53E																				K								
HMH-462	12 CH-53E																	16 CH-53E																								K			
HMH-465	12 CH-53E																									16 CH-53E																	K	
HMH-466	12 CH-53E																									16 CH-53E																		
West Coast MEU		3	1	5	3	1	5	3	1	5	3	1	5	3	1	5	3	1	5	3	1	5	3	1	5	3	1	5	3	1	5	3	1	5	3	1	5	3	1	5	3	1	5
MAG-24																																													
HMH-463	12 CH-53E																	16 CH-53E																	K							V			
31st MEU		A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
MILCON		MALS MAINT EX																																											
MILCON		MAG-24 ARMORY EXPANSION																																											
MILCON		HANGAR 102 MODERIZATION																																											
MAG-29																																													
HMHT-302 (3)	12 CH-53E									K																																			
	2 MH-53E (4)	2 MH-53E																																											
HMH-366	12 CH-53E									K																			V																
HMH-461	12 CH-53E																												K				V											
HMH-464	12 CH-53E																															K				V								
East Coast MEU		6	2	4	6	2	4	6	2	4	6	2	4	6	2	4	6	2	4	6	2	4	6	2	4	6	2	4	6	2	4	2	4	6	2	4	6	2	4	6	2	4	6
MAGTF Tasking																																													
MILCON																																													
MILCON		53K MAINT TRAINING																																												
MAG-41																																													
HMH-769 (-) (5)	8 CH-53E																											A																	
MAG-49																																													
HMH-772 (-)	6 CH-53E	8 CH-53E																																											
MILCON		53K TRAINER FACILITY																																											

A=ACTIVATE
K=ENTERS CH-53K TRANSITION
V=TRANSITION COMPLETE

NOTES:

1) SQUADRONS ARE TEMPORARILY RESOURCED TO A PRIMARY AIRCRAFT INVENTORY (PAI) OF 12 A/C PER SQUADRON DUE TO INVENTORY SHORTFALLS WHICH DO NOT SUPPORT PRIMARY AIRCRAFT AUTHORIZATION OF 16 A/C. ONCE CH-53K TRANSITION BEGINS, CH-53E AIRCRAFT WILL BE CAPITALIZED FROM TRANSITIONING SQUADRONS TO FACILITATE THE RETURN TO 16 A/C SQUADRONS.

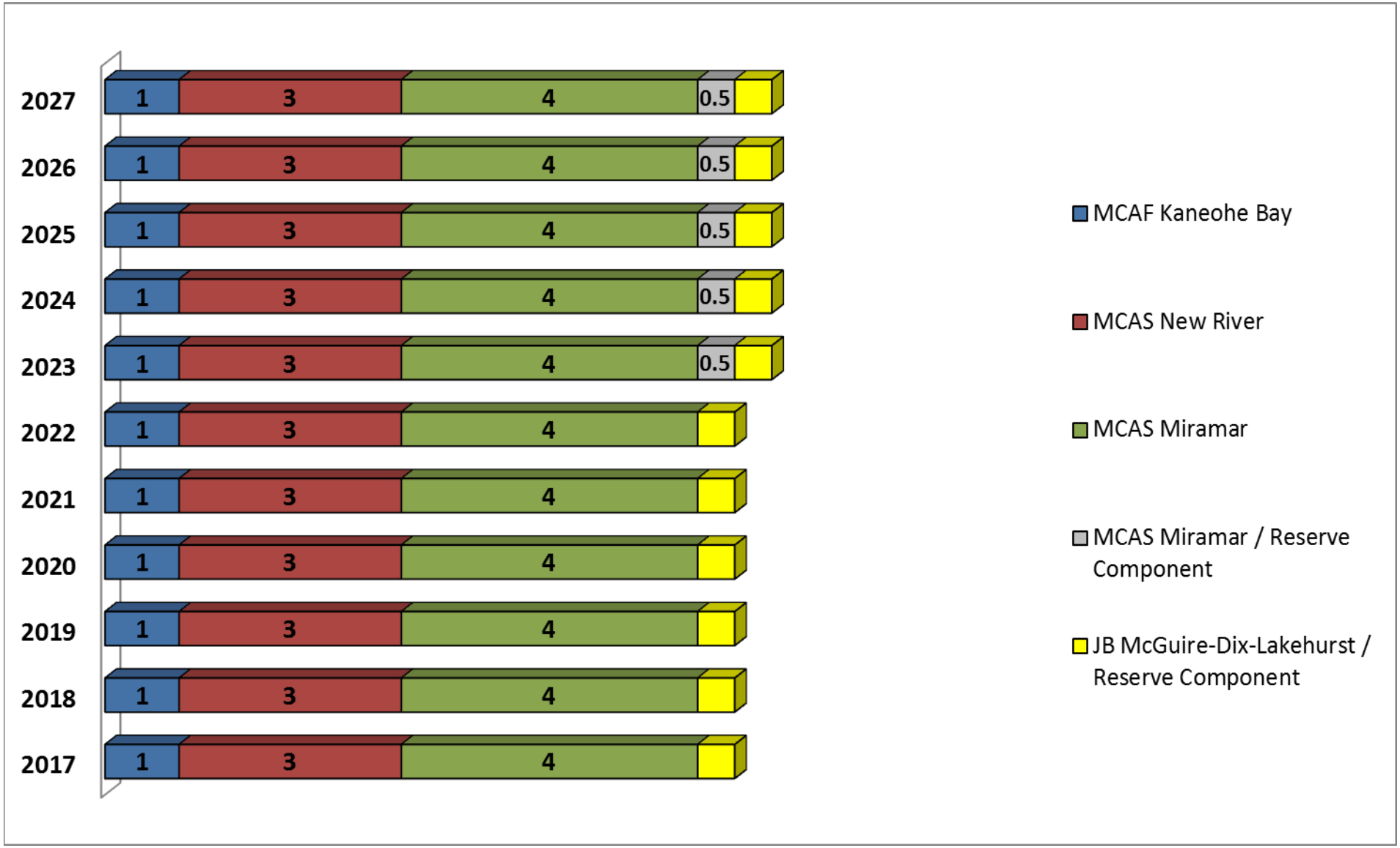
2) PAI OF 6 A/C PER SQUADRON UNTIL TOTAL INVENTORY SUPPORTS 8 A/C SQUADRON FACILITATED BY CH-53K TRANSITIONING SQUADRONS.

3) HMHT-302 WILL BECOME A DUAL T/M/S (CH-53E/CH-53K) THROUGHOUT THE DURATION OF THE CH-53K TRANSITION.

4) TWO AMARG MH-53Es ADDED TO INVENTORY IN FY15 FOR HMHT-302 FAMILIARIZATION AIRCRAFT CONVERSION, EST DELIVERY DATE OF FY17

5) SQUADRON (-) ACTIVATES, LOCATION MCAS MIRAMAR FY23

MARINE HEAVY LIFT SQUADRON GEO-LOCATION



MARINE LIGHT ATTACK HELICOPTER (HMLA) PLAN

This AVPLAN represents a shift for the HMLA community in several key areas:

The end of the NATO mission in Afghanistan defines a transition point in the USMC's reset to the Pacific, and the return of HMLAs to the Unit Deployment Program (UDP). The USMC Pacific reset plan is a crossroads that represents both an operational shift and a pivotal point within the AH-1Z conversion. This period of transition is an opportunity to align the resourcing and operational employment of the H-1 community based on mass and mutual support. The 2017 AVPLAN maximizes mutual support within the HMLA community by changing the sequence and pace of the H-1 transition.

In order to mitigate fires risk within the MAGTF, an additional reserve component HMLA, HMLA-775(-), will be re-activated in Q1 FY17. The sequence of AH-1Z conversion is now 3D MAW, 1st MAW, 2D MAW, then 4th MAW. The conversion of 1st MAW ahead of 2d MAW accelerates TMS mutual support by aligning 1st MAW and 3d MAW to the AH-1Z, while 2d MAW and 4th MAW remain aligned to the AH-1W. This allows the last active component AH-1W squadron to be collocated with robust HMLA support structure, thereby eliminating the challenges created by isolating the last AH-1W squadron on Hawaii.

Once each active component MAG fields to 15 AH-1Z aircraft per squadron, the AH-1Z conversion begins in the next MAG. The reserve component will begin AH-1Z conversion when the active component is complete. The result of these changes is an acceleration of T/M/S alignment within MARFORPAC and increased mutual support for all HMLAs, while mitigating the delay of the 2D MAW AH-1Z conversion.

Employment of these new aircraft systems will include updated missile technology. The JAGM program will implement a three-step incremental approach. The first increment will provide a dual-mode semi-active laser (SAL) and millimeter wave (MMW) seeker. The MMW guidance can be activated while the weapon is still on the aircraft, giving the operator a fire-and-forget missile. The second increment will increase the maximum range to twelve kilometers and add an imaging infrared (IIR) mode to the seeker providing improved lethality, flexibility in modes of fire, advanced countermeasures capability, and additional capability in an obscured battlefield. The third increment will expand the missile envelope to sixteen kilometers. Marine Corps integration on the AH-1Z began in FY15 with an expected IOC in FY19.

The H-1 program plans to execute a block upgrade that will encompass readiness and configuration management approach to integrate these airframes into the larger digitally interoperable MAGTF electronic warfare concept. H-1 program is leveraging earlier success of other programs and conducting an Independent Readiness Review. This effort will be complete in Q3FY17.

AH-1W : PROGRAMMATICS, SUSTAINMENT AND FUTURE

AH-1W:

The AH-1W SuperCobra is a combat-proven force multiplier for the MAGTF. The SuperCobra provides close air support, strike coordination and reconnaissance, armed reconnaissance, escort, forward air controller airborne, and air interdiction.

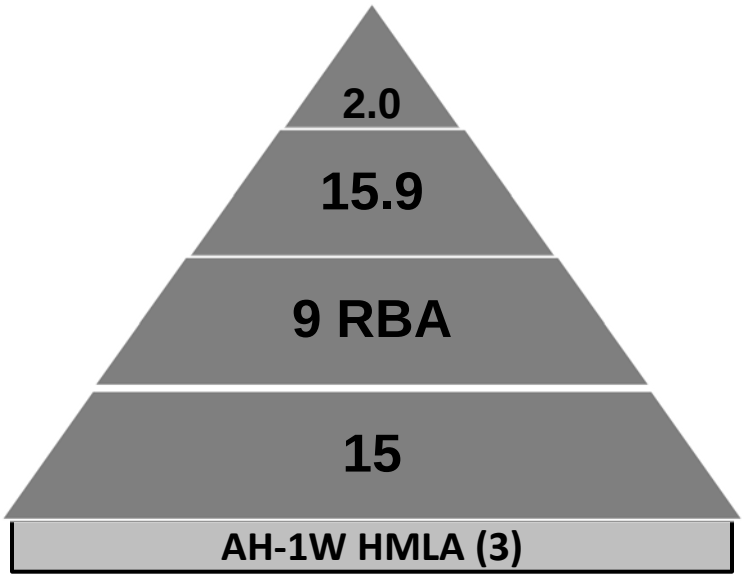
AH-1Ws are outfitted with the Night Targeting System Upgrade (NTSU), a third-generation targeting FLIR with laser designator / rangefinder and color TV camera.

Ninety AH-1Ws have been outfitted with the Tactical Video Data Link (TVDL) system, enabling aircrews to send and receive sensor video in C, L, and S bands in support of reconnaissance and close air support missions.

The AH-1W employs the Advanced Precision Kill Weapon System (APKWS) laser-guided rocket system. The 20mm linkless feed system is compatible with both the legacy and upgrade platform recently deployed, showcasing a marked increase in gun reliability.

SUSTAINMENT:

Program management and supply support agencies continue to work with our industry partners ensuring a sustainment strategy in place to provide a high state of readiness for the platform. Major current government and industry initiatives include improving component reliability and optimizing the production of spare and repair components.



Final Fit:

Interoperability Upgrade Roadmap:

1) Tactical Video Data Link

Lethality Upgrade Roadmap:

1) Advanced Precision Kill Weapon System

Reliability Upgrade Roadmap:

1) Night Targeting System Upgrade
2) Helmet Display and Tracker System
3) Linkless Feed System

AH-1Z : PROGRAMMATICS, SUSTAINMENT AND FUTURE

AH-1Z:

The H-1 program replaces the AH-1W aircraft with the AH-1Z Viper. The H-1 Upgrades Program is a single acquisition program which leverages 85% commonality of major components, whereby enhancing deployability and maintainability.

The Viper is the next generation of attack aircraft. Speed, range, and payload have been increased significantly, while decreasing maintenance workloads, training timelines, and total ownership cost. The advanced cockpit, common to both aircraft, not only reduces operator workload and improves SA but also provides growth potential for future weapons and joint digital interoperability enhancements. The cockpit systems assimilate onboard planning, communications, digital fire control, all weather navigation, day/night targeting, and weapons systems in mirror-imaged crew stations.

1) The procurement objective is 189 AH-1Zs; 152 are build new aircraft (ZBN).
2) Three of the eight active component HMLAs have completed their Z conversion and are currently building inventory towards their full authorization of 15 aircraft.
3) 120 AH-1Zs (Lots 1-13) are currently on contract.
4) 54 AH-1Zs have been delivered to date.

SUSTAINMENT:

Program management and supply support agencies continue to work with our industry partners ensuring a sustainment strategy is in place to provide a high state of readiness for the platform. Major current government and industry initiatives include improving component reliability, optimizing repair facility output, and establishing organic repair capability, and moving towards a performance-based approach to logistics support.

PLANS:

The details of unit conversion timelines will adjust with real time production delivery schedule updates. These forecast dates reflect the current delivery schedule.

3d MAW:

1) AH-1Z conversion complete in July 2017

2d MAW:

1) AH-1Z conversion begins 2018, complete by 2019

1st MAW:

1) HMLA 367 AH-1Z conversion begins in 2017, complete by 2018
2) UDP / 31st MEU conversion in 2016

AH-1Z : PROGRAMMATICS, SUSTAINMENT AND FUTURE

Final Fit:

Survivability Upgrade Roadmap:

1) Advanced Hostile Fire Indicator (HFI), Missile, and Laser Warning System
2) Upgraded Navigation and Situational Awareness
3) Degraded Visual Environment solution

Interoperability Upgrade Roadmap:

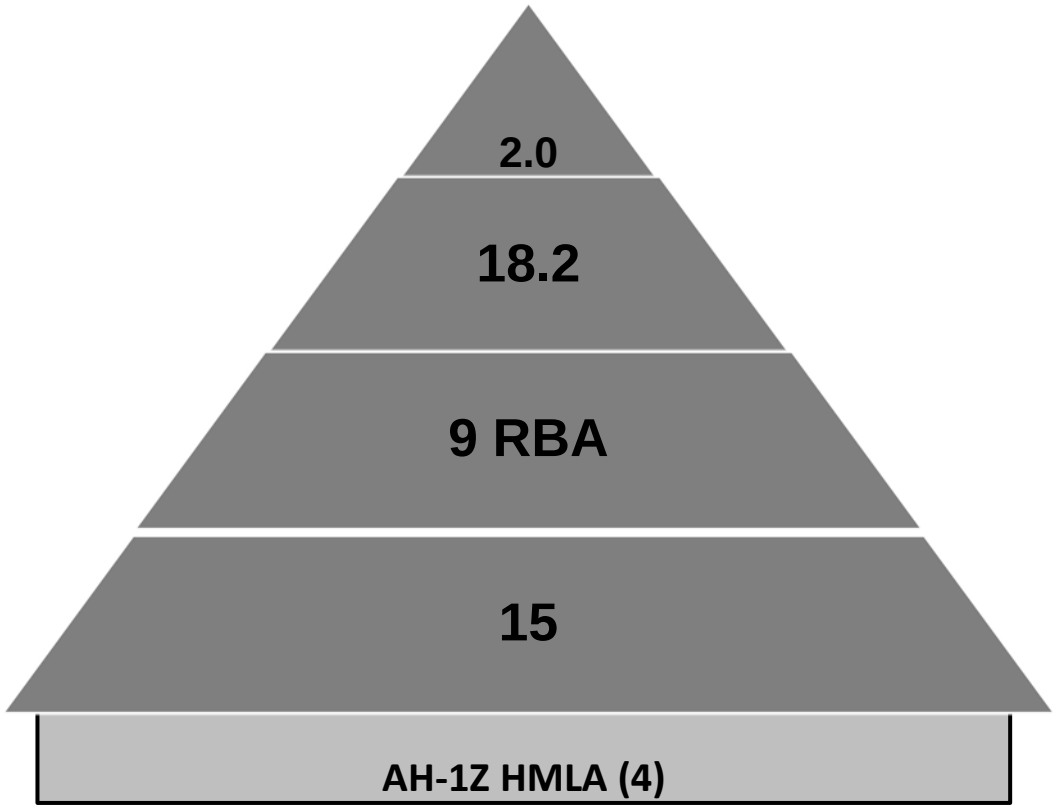
1) DI FMV
2) Adaptive Networking Wideband
3) Waveform (ANW2)
4) LINK 16
5) Variable Message Format (VMF)
6) Intrepid Tiger 2 (V3)

Lethality Upgrade Roadmap:

1) APKWS Penetrator
2) Targeting Sight System (TSS) w/Laser Spot Tracker
3) JAGM
4) AIM-9X
5) Digital Rocket Launcher

Reliability Upgrade Roadmap:

1) Electrical Power Improvement
2) Dynamic Component Improvement



UH-1Y : PROGRAMMATICS, SUSTAINMENT AND FUTURE

UH-1Y:

The H-1 program replaces the UH-1N aircraft with the UH-1Y Venom. The H-1 Upgrades Program is a single acquisition program which leverages 85% commonality of major components, whereby enhancing deployability and maintainability.

The Venom is the next generation of utility aircraft. Speed, range, and payload have been increased significantly, while we have decreased supportability demands, training timelines, and total ownership cost. The advanced cockpit, common to both aircraft, not only reduces operator workload and improves SA but also provides growth potential for future weapons and joint digital interoperability enhancements. The cockpit systems assimilate onboard planning, communications, digital fire control, all weather navigation, day/night targeting, and weapons systems in mirror-imaged crew stations. The UH-1Y employs the Advanced Precision Kill Weapon System (APKWS).

1) Procurement objective is 160 UH-1Ys, with FY16 planned as the last year of USMC UH-1Y procurement.
2) 160 UH-1Ys (Lots 1-13) are currently on contract.
3) 136 UH-1Ys have been delivered to date.

SUSTAINMENT:

Program management and supply support agencies continue to work with our industry partners ensuring a sustainment strategy is in place to provide a high state of readiness for the platform. Major current government and industry initiatives include improving component reliability, optimizing repair facility output, and establishing organic repair capability, and moving towards a performance-based approach to logistics support.

PLANS:

All active and reserve squadrons have completed their initial UH-1Y conversion and now have their full authorization of 12 UH-1Ys.

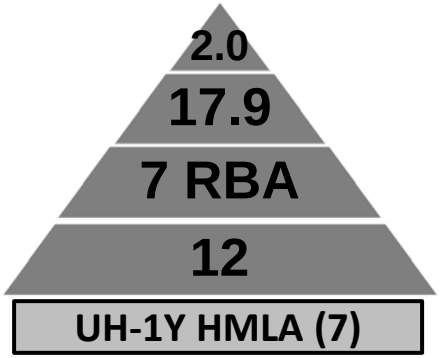
Final Fit:

Survivability Upgrade Roadmap:

1) Advanced Hostile Fire Indicator (HFI), Missile, and Laser Warning System
2) Upgraded Navigation and Situational Awareness
3) Degraded Visual Environment solutions

Interoperability Upgrade Roadmap:

1) DI FMV
2) Intrepid Tiger 2 (V3)
3) Adaptive Networking Wideband
4) Waveform (ANW2)
5) LINK 16
6) Variable Message Format (VMF)



Lethality Upgrade Roadmap:

1) APKWS Penetrator
2) BRITESTAR Block II w/Laser Spot Tracker
3) Digital Rocket Launcher

Reliability Upgrade Roadmap:

1) Structural and Electrical Power Improvement
2) Dynamic Component Improvement

MARINE LIGHT ATTACK HELICOPTER (HMLA) PLAN

	FY17	FY18	FY19	FY20	FY21	FY23	FY24	FY25	FY26
TOTAL SQUADRONS / PRIMARY MISSION AIRCRAFT AUTHORIZED (PMAI) - REQUIREMENT									
Active Component									
18 AH-1W / 12 UH-1Y	2	1	0	0	0	0	0	0	0
15 AH-1Z / 12 UH-1Y	5	6	7	7	7	7	7	7	7
Reserve Component									
18 AH-1W / 12 UH-1Y	2	2	2	0	0	0	0	0	0
15 AH-1Z / 12 UH-1Y	0	0	0	2	2	2	2	2	2

	FY17	FY18	FY19	FY20	FY21	FY23	FY24	FY25	FY26
PRIMARY AIRCRAFT INVENTORY (PAI) PLAN - INVENTORY									
AC/RC PMAI									
AH-1W	66	48	36	6	0	0	0	0	0
AH-1Z	64	78	103	130	135	135	135	135	135
UH-1Y	108	108	108	108	108	108	108	108	108
TOTAL AH PMAI	**130**	**126**	**139**	**136**	**135**	**135**	**135**	**135**	**135**
TOTAL UH PMAI	**108**	**108**	**108**	**108**	**108**	**108**	**108**	**108**	**108**
FRS PTAI									
AH-1W	10	0	0	0	0	0	0	0	0
AH-1Z	14	15	15	15	15	15	15	15	15
UH-1Y	13	13	13	13	13	13	13	13	13
TOTAL AH PTAI	**24**	**15**	**15**	**15**	**15**	**15**	**15**	**15**	**15**
TOTAL UH PTAI	**13**	**13**	**13**	**13**	**13**	**13**	**13**	**13**	**13**
PDAI									
AH-1W	3	3	3	0	0	0	0	0	0
AH-1Z	5	5	5	5	5	5	5	5	5
UH-1Y	4	4	4	4	4	4	4	4	4
TOTAL AH PDAI	**8**	**8**	**8**	**5**	**5**	**5**	**5**	**5**	**5**
TOTAL UH PDAI	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**
BAI/PIPE									
AH-1W	10	7	5	1	0	0	0	0	0
AH-1Z	0	0	0	0	25	34	34	34	34
UH-1Y	0	29	30	31	31	31	31	31	31
TOTAL AH BAI	**10**	**7**	**5**	**1**	**25**	**34**	**34**	**34**	**34**
TOTAL UH BAI	**0**	**29**	**30**	**31**	**31**	**31**	**31**	**31**	**31**
PMAI PER HMLA (W)	**17**	**16**	**18**	**0**	**0**	**0**	**0**	**0**	**0**
PMAI PER HMLA (Z)	**13**	**13**	**15**	**14**	**15**	**15**	**15**	**15**	**15**
PMAI PER HMLA (Y)	**12**	**12**	**12**	**12**	**12**	**12**	**12**	**12**	**12**
AH PAI	**162**	**149**	**162**	**156**	**155**	**155**	**155**	**155**	**155**

GENERAL NOTES:

1) TOTAL PROCUREMENT OBJECTIVE IS 160 UH-1Y AND 189 AH-1Z, FOR A TOTAL OF 349 H-1 AIRCRAFT.

2) THE PMAA CHANGE FROM 18 AH-1W / 9 UH-1Y TO 15 AH-1Z / 12 UH-1Y WILL BE COINCIDENT WITH THE DIVESTITURE OF THE LAST AH-1W DURING A SQUADRON'S AH-1Z CONVERSION.

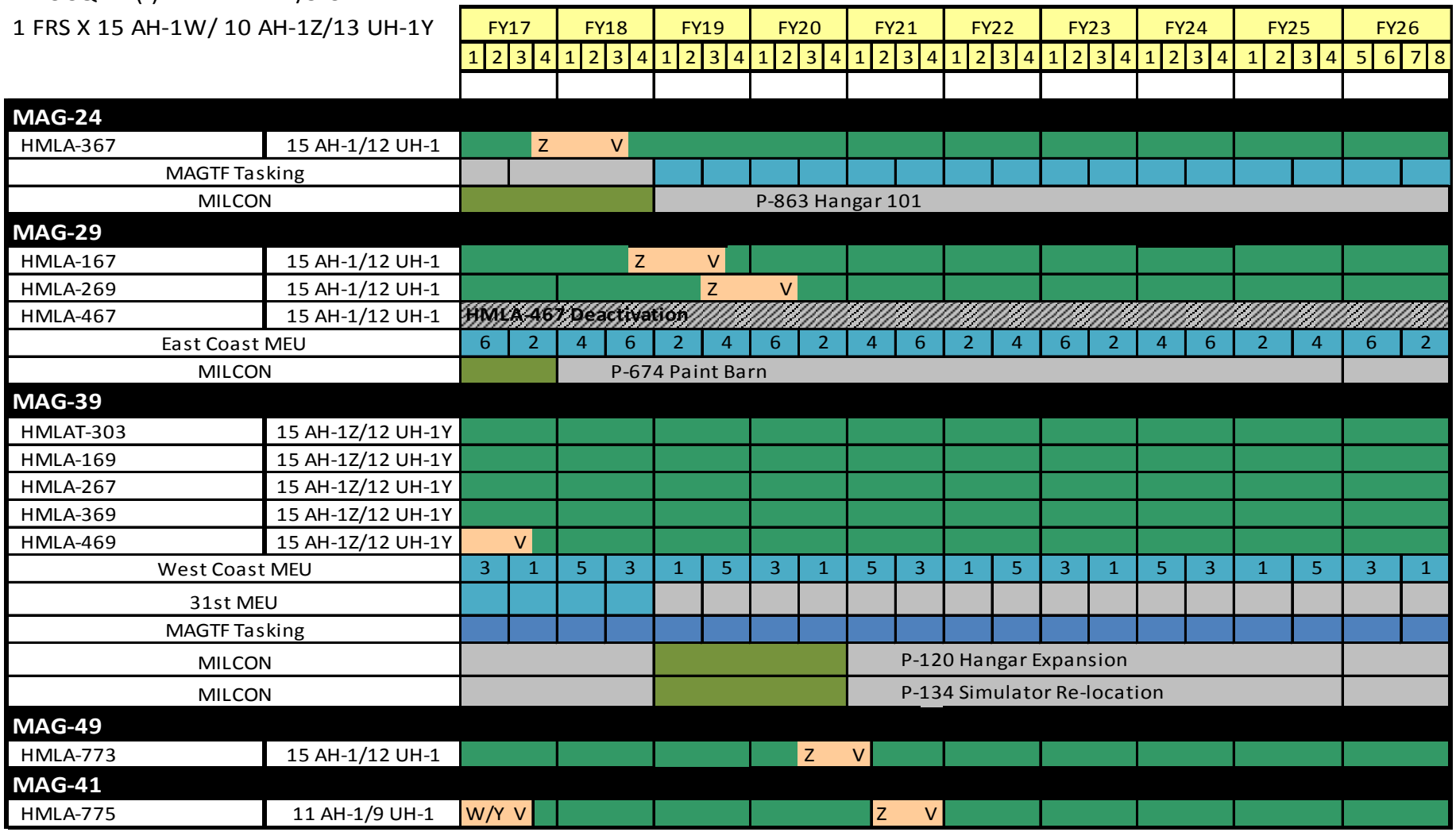
3) PMAI WILL ADJUST WITH REAL TIME PRODUCTION DELIVERY SCHEDULE UPDATES. TIMELINES DEPICTED ABOVE REFLECT THE CURRENT DELIVERY SCHEDULE.

CURRENT FORCE:

5 AC SQDN X 15 AH-1W/12 UH-1Y
3 AC SQDN X 15AH-1Z/12 UH-1Y
1 RC SQDN X 15 AH-1W/12 UH-1Y
1 RC SQDN (-) X 11 AH-1W/9 UH-1Y
1 FRS X 15 AH-1W/ 10 AH-1Z/13 UH-1Y

MARINE LIGHT ATTACK HELICOPTER (HMLA) PLAN

Y = YANKEE TRANSITION BEGINS
Z = ZULU TRANSITION BEGINS
X = TRANSITION TO USCG BEGINS
V = TRANSITION COMPLETE



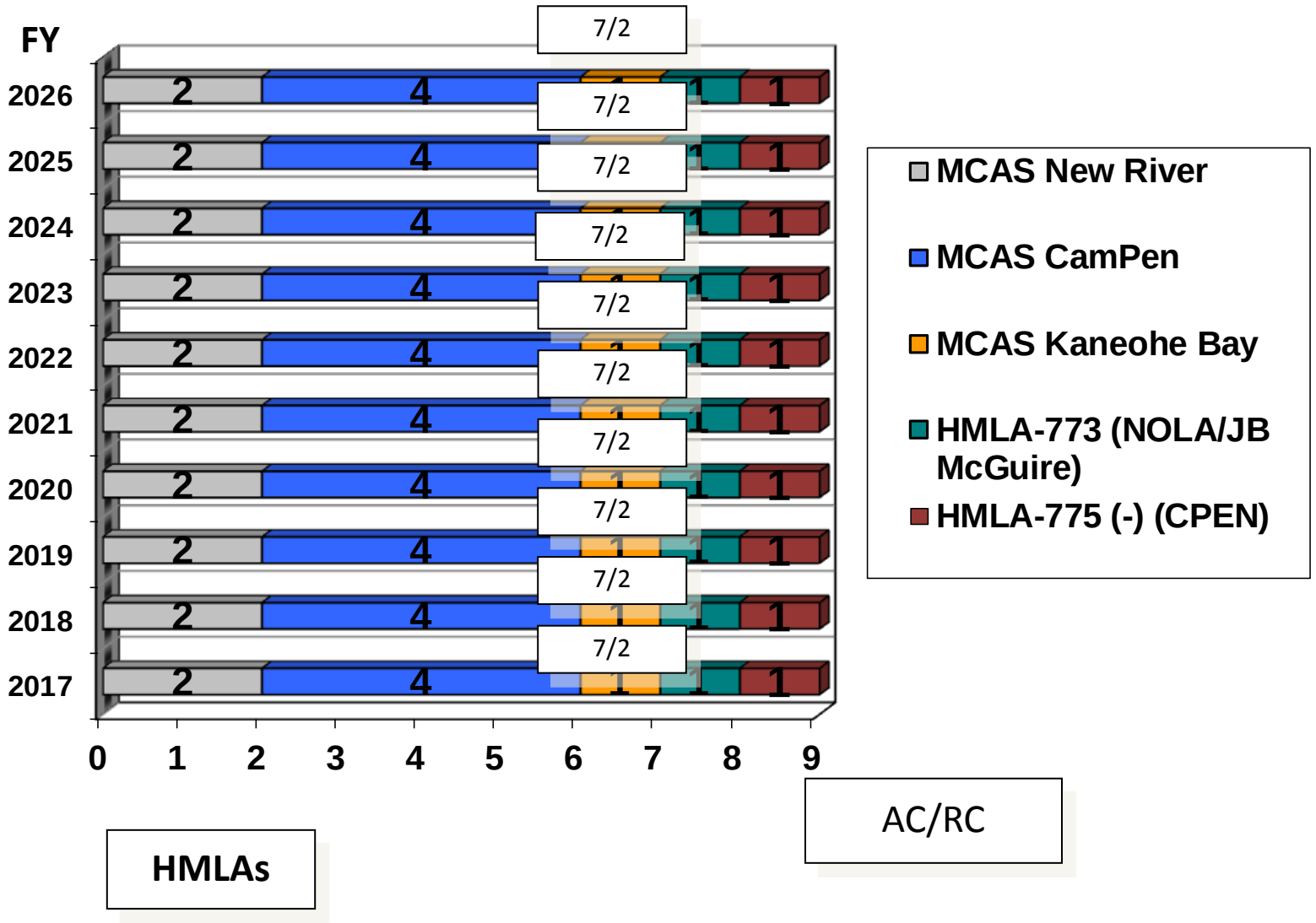
NOTES:

1) HMLA-775 BASED AT CAMP PENDLETON.

2) MRF-D REQUIRMENTS FILLED BY HMLA-367 STARTED IN FY-15 WITH GUAM DETS SOURCED WITHIN MFP SCHEDULED TO BEGIN FY22.

3) THE DETAILS OF UNIT CONVERSION TIMELINES WILL ADJUST WITH REAL TIME PRODUCTION DELIVERY SCHEDULE UPDATES. TIMELINES DEPICTED ABOVE REFLECT THE CURRENT PRODUCTION-DELIVERY SCHEDULE.

MARINE LIGHT ATTACK SQUADRON GEO-LOCATION



Basing plans are subject to change and further environmental analysis

MARINE SEARCH AND RESCUE (SAR) PLAN

Marine aviation completes its divestiture of organic SAR capability at MCAS Yuma.

1) The Search and Rescue Unit (SRU) in Yuma will cease operations in FY17.

2) The retirement of the HH-1N in FY-17 marks the completion of a SAR divestiture action the USMC and USN began in 1996.

3) Upon sundown of the HH-1N in MCAS Yuma, the Marine Corps will transition to contract SAR services.

CURRENT FORCE: **FORCE GOAL:** No USMC Assets, Contract

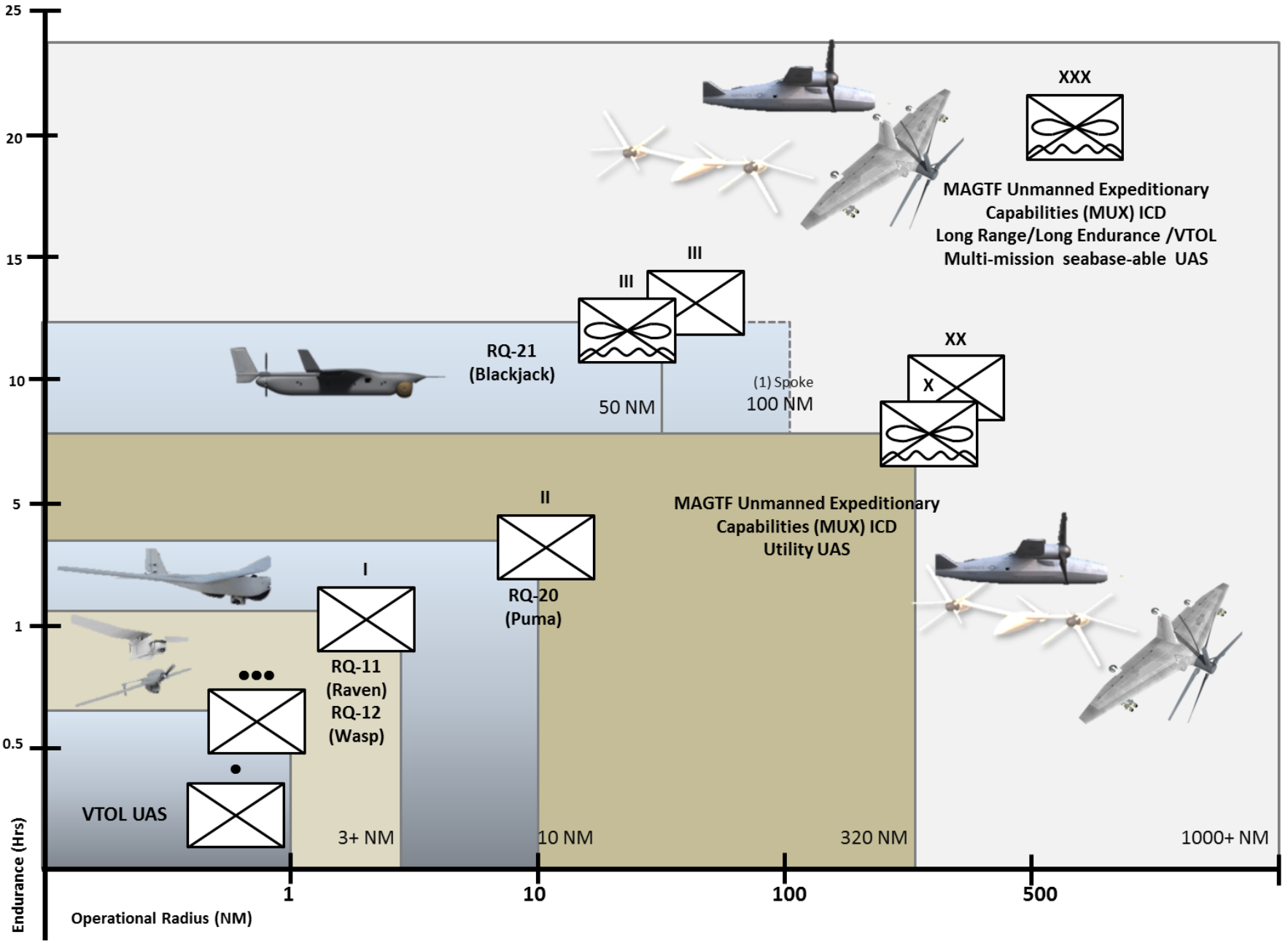
		FY17				FY18				FY19				FY20				FY21				FY22				FY23				FY24				FY25			
		1	2	3	4	1	2	3	4	1	2	3		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
UNIT/LOCATION	POAA																																				
MCAS YUMA	4 HH-1N																																				
CONTRACT						C																															

C = PLANNED CONTRACTUAL COVERAGE

	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25
SAR PAI PLAN									
SAR POAI									
HH-1N	4	0	0	0	0	0	0	0	0
TOTAL USMC SAR PAI	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

2.8 MARINE UNMANNED AIRCRAFT SYSTEMS

2.8 MARINE UNMANNED AIRCRAFT SYSTEMS



2.8 MARINE UNMANNED AIRCRAFT SYSTEMS

VMU Mission Statement

The VMU mission statement was updated in April 2014 to read:

"Support the MAGTF commander by conducting electromagnetic spectrum warfare, multi-sensor reconnaissance and surveillance, supporting arms coordination and control, and facilitating the destruction of targets, day or night, under all-weather conditions, during expeditionary, joint, and combined operations."

The current mission statement more accurately reflects the VMU's role in the MAGTF. It lays the foundation for the incorporation of a persistent, digitally interoperable architecture for the MAGTF and the execution of full spectrum offensive air support.

Operations

In the 2017-2030 timeframe, the family of unmanned aircraft systems (FoUAS) provides support to any sized MAGTF for influence of the electromagnetic spectrum, battlespace awareness, offensive air support, target acquisition, force protection, and digital communication backbone. Marine Corps UAS employment will continue to enhance and extend the lethal and non-lethal capabilities of MAGTF and joint force commanders, facilitating advancements in observation, understanding, and influence on the battlefield. The FoUAS will play a key role in all USMC missions across the range of military operations to include forward presence, security cooperation, counterterrorism, crisis response, forcible entry, prolonged operations, and counterinsurgency.

Marine Unmanned Aircraft Squadrons Alignment

The VMUs operate and maintain Group 3 and above UAS. The realignment of VMUs from the Marine Aircraft Control Group (MACG) to the Marine Aircraft Group (MAG) was completed in 2015. This command structure aligns the VMU community with manned aviation units and enables a seamless relationship with the Marine Aviation Logistics Squadrons (MALS). Other benefits include NAE advocacy and the inculcation of over 100 years of naval aviation operating procedures and safety practices.

Marine aviation has deliberate plans to locate each VMU aboard a Marine Corps Air Station. Alignment aboard an air station will facilitate future UAS fielding and provide the necessary infrastructure for the VMUs to establish habitual relations with MALS and their Group headquarters.

In January 2016, VMU-2 successfully completed an Operational Readiness Inspection (ORI) and was declared Initial Operations Capable (IOC) in the RQ-21A Blackjack system. As the fifth RQ-21 system arrives in September 2016, VMU-2 will cease operations of the RQ-7Bv1 Shadow.

In June 2016, the first RQ-21A system arrived at VMU-1 aboard MCAS Yuma. As the RQ-21A Blackjack systems arrive over the next year, VMU-1 will taper RQ-7Bv2 flights, suspending Shadow operations by 1 October 2017.

VMU-3 aboard MCAS Kaneohe Bay will transition last after VMU-1 and VMU-2 achieve Full Operational Capability (FOC). VMU-3 will operate the RQ-7Bv2 until three systems (IOC) can be fielded to VMU-3 anticipated in FY20.

VMU-4 will undergo new equipment training with the RQ-7Bv2 and transition from RQ-7Bv1 to the RQ-7Bv2 in 2017. At this point, the USMC will conclude RQ-7Bv1 operations.

Squadron	Marine Aircraft Group	Air Station
VMU-1	MAG-13 (RQ-21)	MCAS Yuma, AZ
VMU-2	MAG-14 (RQ-21)	MCAS Cherry Point, NC
VMU-3	MAG-24 (RQ-7)	MCAS Kaneohe Bay, HI
VMU-4 (-)	MAG-41 (RQ-7)	Camp Pendleton, CA
VMX-1	(RQ-21 / CQ-24)	MCAS Yuma, AZ
VMUT (FRS)	MAG-14 (RQ-21)	MCAS Cherry Point, NC
VMU-5 (-)	MAG-41 (CQ-24) TBD	TBD

2.8 MARINE UNMANNED AIRCRAFT SYSTEMS

Reserve Component VMUs and Training Squadron

The reserve VMU exists to augment, reinforce, and sustain the active component VMU mission. To this end, VMU-4 (-) will field RQ-7Bv2 in FY17 and this will provide operational depth to the active component. The VMUT Fleet Replacement Detachment (FRD) currently at MCAS Cherry Point will become a fully operational Fleet Replacement Squadron.

MAGTF Unmanned Expeditionary Capabilities (MUX) ICD – MEF Level Support

Recognizing our current recapitalization toward a more diverse, lethal, amphibious and middleweight expeditionary force, the Marine Corps requires a UAS that is network-enabled, digitally interoperable, and built to execute responsive, persistent, lethal, and adaptive full-spectrum operations. The MUX ICD will inform a system that provides the MEF/MEB-sized MAGTF with an advanced multi-mission platform.

In accordance with the Department of Defense Unmanned Systems Integrated Roadmap (FY2013-2038), the Marine Corps will seek opportunities to achieve affordable and cost-effective technical solutions for MUX. The concept of employment will be shipboard capable and expeditionary. It will be a multi-sensor, electronic warfare, C4 bridge, AAW and strike capability at ranges complementary to MV-22 and F-35, giving MAGTF commanders flexible, persistent, and lethal reach. It will provide scalable MAGTF support deploying as detachments or squadrons supporting commanders at the tactical, operational, and strategic levels.

The MUX solution is envisioned as a USMC and USN program of record based on leveraging technology maturation of programs and industry prototypes. Marine Aviation will continue to pursue opportunities to inform programmatic decisions, such as field users' evaluations, science & technology (S&T) projects, and tactical demonstrations (TACDEMOS) in conjunction with large force exercises (LFE). The DARPA Tern demonstrator system is planned to make its first flight in FY-18 as are several of the industry prototypes.

VMX-1 and MAWTS-1 ADT&E teams will continue to conduct testing and evaluation of UAS and UAS Payloads. The intent of these opportunities is to put emerging UAS technologies into Marines' hands and allow them to employ the systems in various training or real-world scenarios.

Additionally, during these iterative development processes UAS will be utilized to evaluate software defined radios to support multiple waveforms serving as key persistent nodes in distributed network concepts.

2.8 MARINE UNMANNED AIRCRAFT SYSTEMS

MAGTF Unmanned Expeditionary Capabilities (MUX) ICD – Utility

The Cargo Resupply UAS (CRUAS) effort began as a Military Utility Assessment (MUA) in response to a 2009 JUONS and has enhanced the Marine Corps' assault support capabilities. It has reduced the vulnerability of logistics convoys supporting Marines stationed at remote combat outposts. The Marine Corps operated the Lockheed Martin K-MAX in OEF since December 2011. With a range of 84 miles and a payload capacity of 4500 pounds, it flew over 2000 sorties and delivered over 4.4 million pounds of cargo from December 2011 to May 2014. It demonstrated a consistent 95% readiness rate and 1.5 maintenance man-hours per flight hour.

At the conclusion of OEF the K-MAX system returned to CONUS and underwent repair and reset at the OEM. The system is based with VMX-1 in MCAS Yuma. Several incremental upgrades to include external fuel tanks, high definition EO/IR sensor ball and through-the-rotor beyond line of sight datalink will allow the KMAX to expand the Group 4 CONOPS envelope and continue to refine MUX experimentation and risk reduction.

2.8 MARINE UNMANNED AIRCRAFT SYSTEMS

RQ-7Bv2 Shadow – MEF/MEB Level Support

The RQ-7B Shadow replaced RQ-2 Pioneer in 2007. The Marine Corps has continued to leverage interoperability and commonality with Army Shadow units conducting similar missions. The systems currently fielded among the VMUs are progressing with upgrades to be in compliance with DoD mandates for type 1 encryption on UAS. The RQ-7B is a rail launched aircraft that is dependent on a short runway for landing. The RQ-7B remains a key component to the VMUs current readiness and continued ability to support the MAGTF. As of December 2015 VMU-3 has completed its conversion to the RQ-7Bv2. VMU-4 is planned to complete conversion to RQ-7Bv2 in 2017.

RQ-21A Blackjack – MEU/Regimental Level Support

RQ-21A provides UAS support to the Marine Expeditionary Unit, regiments, and MARSOC. RQ-21A enhances the capabilities of MEU and regimental-sized units by providing a long endurance, expeditionary, multi-mission platform that is shipboard capable. RQ-21A is also able to operate from land based forward operating bases. Characterized by its runway independence, multi-sensor, and EMS capabilities RQ-21A will enhance the MAGTF commander's battlespace awareness and influence of the electromagnetic spectrum.

With its multiple payload capacity, the RQ-21A will continue to evolve to meet the shifting priorities of the MAGTF commander. Several payloads with the appropriate size, weight, and power (SWaP) are being developed for integration on the Blackjack. Hyperspectral payloads capable of detecting explosives; EMS payloads capable of monitoring spectrum; synthetic aperture radar (SAR) / ground moving target indicator (GMTI) capable of detecting targets through clouds and tree cover; miniature precision weapons and quadcopter launch and recovery systems…these are examples of payloads in either research or development for RQ-21A.

A key enabler for realizing the full capability of the RQ-21A is its L-class amphibious carrier shipboard capability. Currently, ship installs are complete for LPD-17 thru 25 class ships with LPD-20/26 planned for late FY17. Additionally, one LHD install will be completed in FY17 and one in FY18. Marine Aviation is pursuing RQ-21A compatibility for all ARG shipping in order to provide maximum employment flexibility for the MAGTF commander both afloat and ashore.

Initiatives are underway to increase the RQ-21A performance and capabilities. The four highest priorities for Blackjack improvements are improved sensor with laser designator, a high-reliability engine, a beyond-line-of-sight (BLOS) control capability, and an increased launch weight.

These initiatives will expand the capability and persistence of the Blackjack in the battle space and are integral to realizing the future potential of the system. We have already purchased a high reliability (GFE) engine and will integrate it in FY-18.

The RQ-21A Blackjack achieved Initial Operational Capability in January of 2016. VMU-2 currently has (5) RQ-21A systems and is planning to support the 24th MEU in 2017 with one system and detachment of Marines. VMU-1 currently has (3) RQ-21A systems and is planning to support the 15th MEU in 2017.

2.8 MARINE UNMANNED AIRCRAFT SYSTEMS

UAS Payloads & Capabilities

Acquisition paths for payloads will be defined by three (3) phases and each marked by a decision gate. Phase I establishes the preliminary integration design concept and conduct of technology demonstration with validation of a Technology Readiness Level (TRL) 5/6. Phase II establishes full payload-to-UAS integration and achievement of TRL 7 or higher constitute the decision gate for Phase III. Phase III is program of record transition, which supports a production decision based on the exit criteria from Phase II.

For SIGINT (Spectral Bat):

In FY17 we will be deploying our second series of SIGINT/ES payloads to the MEU as a Field User Evaluation (FUE). In FY17 we move into a Phase 4 SIGINT effort and will make the POR transition which will create an EW capability for the VMU.

For RADAR (Split Aces):

In FY17 we will be continuing field user evaluation on the first series of AESA RADAR payloads for RQ-21. Venues for FUEs will be aboard deployed MEUs to formulate CONOPS and TPP development as well as refined hardware and software designs. Additionally, in FY17 we will move into a version 2 RADAR effort that increases RADAR payload capability and include key enablers such as inflight selectable communications.

Others:

In FY17, we begin work on a Wide Area Persistence Surveillance capability. These are POM-18 efforts for the USMC but are currently being supported but Office of Naval Research (ONR) and Defense Advanced Research Projects Agency (DARPA).

Tactical ISR Processing, Exploitation, and Dissemination System (TIPS) Block 3

A key enabler for realizing the full capability of the regimental to MEF level family of UAS is TIPS Block 3. Currently in development, TIPS Block 3 will fuse information collected from the unmanned aircraft with information from other off board data systems. It will allow the UAS pilot to control the aircraft while fusing , displaying , and disseminating common operational picture data starting with Link 16, Simplified Electronic Warfare System Interface (SEWSI), Raptor-X, full-motion video, and other software applications. The ability to display friendly, enemy units, aircraft, targets, and signals of interest to various disadvantaged users from the squad to MEF level will be an instrumental definition of this system. All of the above listed kill-chain, digitally interoperable, and battle space awareness applications are critical to the MAGTF commander's ability to influence the EMS, integrate fires, maneuver, and shorten kill chains. TIPS Block 3 will be the interface for the fusion.

Additionally, TIPS Block 3 will significantly augment the ability of the VMU to efficiently execute the task, collect, process, exploit, and disseminate (TCPED) cycle. As the number and capability of airborne sensors on the battlefield increases, so will the amount of data that is collected. TIPS Block 3 will act as a digitally interoperable hub for the collection, cataloguing and storage of full motion video, multi-intelligence sensor data, topological data, and target information.

TIPS Block 3 will be able to measure the available bandwidth and determine the optimal means to disseminate intelligence products. Future iterations of TIPS Block 3 will use advanced algorithms to analyze the vast amount of data as it is collected and autonomously cue operators to defined areas of interest. TIPS Block 3 completes the full capability of the digitally interoperable VMU. Incorporating TIPS Block 3 into a program of record is an imperative for the UAS community.

Headquarters Marine Corps Aviation is working with PMA-263, PMA-234, and C2CEWID for this requirement.

2.8 MARINE UNMANNED AIRCRAFT SYSTEMS

Small Unit Remote Scouting System (SURSS) Family of Small UAS (FoSUAS) – Battalion/Company/Platoon Level of Support

To out-think, out-maneuver and outpace the enemy, effective leadership and decision-making at the lowest level requires decision-speed and decision-space. To build speed and space before the pivot point, small unit leaders need the most current and accurate battlespace information at their disposal.

The aim of USMC SURSS FoSUAS is to equip the squad/platoon/company/battalion level operating force maneuver units with a capable, responsive, and organic airborne battle space awareness and kinetic capability.

SURSS are man portable, all-environment, ruggedized, low-cost, and simple to operate. Ideally, SURSS shall be able to operate across the full spectrum of conflict, in every environment and in the same conditions as the front line operating forces that they support. Technology solutions that support a single-operator, multi-mission, and multi-intelligence capable platform shall be pursued whenever practicable. Additionally, Marine Aviation will pursue a VTOL, nano-VTOL and Lethal Miniature Aerial Munition System (LMAMS) capability. An open architecture common SURSS controller is envisioned for the entire small unmanned sensor portfolio; which may interface with target location, designation and hand-off systems (TLDHS) to reduce the combat load of the infantryman while facilitating responsive fires and MAGTF command and control. The current SURSS FoSUAS is made up of three UAS platforms: RQ-11B Raven, RQ-12A Wasp, and RQ-20A Puma. Headquarters Marine Corps Aviation, working with FMID, FAA, Marine Corps Installations, MARSOC, and PMA-263, will continue to streamline and identify policy, training, and innovation necessary to address these burgeoning future SURSSs requirements.

RQ-11B Raven

Raven have a mini-gimbaled payload, can be manually operated or programmed for autonomous operation, and use an enhanced digital data link. With a wingspan of 4.5 feet and a weight of 4.7 pounds, the hand-launched Raven provides aerial observation, day or night, at line-of-sight ranges up to 10 kilometers. It is equipped with color electro-optical; black and white low light; and infrared (IR) payloads, and provides small units with day/night full motion video and laser illuminator capability via a laptop-based ground control station (GCS). The rechargeable batteries in the Raven provide an endurance of up to 90 minutes.

RQ-12A Wasp

The micro sized Wasp is a ruggedized, lightweight, portable UAS ideal for platoon and squad operations. Its small size and quiet battery-driven propulsion system makes Wasp nearly undetectable. The system is fully waterproofed, has a high tolerance to wind, and is well suited for amphibious operations. The Wasp was designed for front-line day/night reconnaissance and surveillance with a weight of 2.75 pounds, wingspan of 3.3 feet, and up to 50 minutes endurance. Wasp uses the same advanced technology found in the RQ-11B, is controllable through a common GCS, and video may be viewed from RVT devices.

RQ-20A Puma

The Puma is the largest platform in the FoSUAS and is capable of integrating supplemental payloads such as communications/data relay and SIGINT devices. Puma also uses a DDL communications link and carries an electro-optical (EO) camera, infrared (IR) camera and laser illuminator on a lightweight mechanical gimbaled payload. The system is hand-launched, launchable from a vehicle while on the move, and has an optional tactical launcher for reducing launch mishaps with heavier payloads. The Puma GCS is also compatible with the Raven and Wasp GCS. The system is fully waterproof, capable of recovery on land or water (supplemental payload dependent). It weighs 13.5 pounds with an 9.2 foot wingspan and has an endurance of over 3.5 hours.

VTOL and Nano-VTOL SUAS

Future SURSS procurement strategy will move towards a more modular approach with an eye towards cost reduction and more rapid capability introduction. Development of a common ground control station (GCS) will eliminate the need to procure a GCS with every system, and allow one GCS to control multiple types of SURSSs. By moving towards standardized interfaces, the rapid technology development cycle for payloads can be capitalized upon without requiring more costly replacements of the entire system.

VTOL and nano-VTOL SURSSs will complement the capabilities of the current family of SUAS in areas where vertical obstructions or confined operations create unique challenges. Lethal Miniaturized Aerial Munitions Systems will provide an unprecedented organic precision low-yield precision strike and defensive fires capability that can be widely distributed to front line, forward deployed, and isolated/independent units. VTOL quadcopters also offer exceptional promise as expeditionary launch and recovery systems for Group 3 UAS.

2.8 MARINE UNMANNED AIRCRAFT SYSTEMS

UAS Training

The VMU community, Headquarters Marine Corps Aviation, and PMA-263 are currently in the process of standing up a Fleet Replacement Detachment (FRD) for RQ-21.

RQ-21A aircrew and maintainers require an MOS producing curriculum and school-house. Mobile Training Teams (MTT's) have been the interim solution for RQ-21A training. As RQ-21A fielding progresses, MAG-14, as the T/M/S lead, will manage the Blackjack 1000-level T&R curriculum development and training. This 1000-level training will migrate from contractor provided Mobile Training Teams (MTTs) to the VMUT FRD. PMA-263 and CNATT will support MAG-14 with curriculum development and training execution.

The current simulator program of record for RQ-21A are not funded to a level commensurate with a high fidelity simulation based syllabus. A robust, networked, high fidelity simulation solution is required for RQ-21A curricula in order to realize Marine Aviation's vision for the VMU FRD. To this end UAS simulators and training systems will be included in the Aviation Training Systems (ATS) plan.

The VMU FRD will evolve to a squadron (FRS) unit manned with instructors and staff from across the VMU community. It will ensure the 1000 level training of the VMUs is efficiently and effectively accomplished.

Training and Logistics Support Activity (TALSA)

Training and Logistics Support Activities(TALSAs) to support SURSSs has been established at Camp Pendleton, CA and Camp Lejeune, NC. TALSAs reduce training costs by 70% and are responsive to operating forces' dynamic SURSS training requirements. TALSAs were also established to reduce operations and maintenance costs for fielded systems by providing a consolidated activity to manage each MEF's requirements. SURSS training and logistics support is an enduring USMC capability and requires transition from OCO to base funding. This initiative maintains Mobile Training Teams (MTT) funding for units not co-located with TALSAs.

As the role of SURSSs expands, TALSAs will increase training throughput to meet MAGTF demands by integrating military personnel with the current contractor staff. Forward Air Controllers (FACs) and Joint Terminal Attack Controllers (JTACs) will attend training as SURSSs capabilities increase. TALSAs will support the MAWTS-1 Air Officer Course in order to ensure Air Officers are aware of the latest capabilities and emerging trends with SURSSs.

FUTURE PLANS

Experimentation and Innovation

Led by MAWTS-1 and VMX-1, and in close coordination with MCTOG, MCLOG, MCWL, MARSOC, national laboratories, and industry, Aviation will continue tactical demonstrations to validate innovative uses for existing and emerging UAS technologies. The lessons learned from this experimentation will inform programmatic and employment decisions across Marine Aviation's FoUAS.

2.8 MARINE UNMANNED AIRCRAFT SYSTEMS

Joint Research and Collaboration

Programs such as the DARPA TERN, DARPA Aerial Reconfigurable Embedded System (ARES), and ONR Autonomous Aerial Cargo Utility System (AACUS) will inform future UAS capability decisions. Technologies developed in these, and other, research programs will be critically evaluated to assess feasibility for transfer to existing or future programs of record. The Marine Corps is working closely with the Navy on MUX, with TERN as a potential solution, and is a co-sponsor of the ARES effort with the Army.

Key Technology Development.

Aviation will pursue the following key technology areas:

Digital Interoperability.

Because of their persistence, unmanned systems are perfectly suited to serve as airborne data network relays and gateways. Emerging technologies, such as SRP, will be integrated onto unmanned platforms at the earliest opportunity.

Electronic Warfare (EW).

UAS are a component of the MAGTF EW concept. Coupling new UAS employment concepts with emerging payloads provides the Marine Corps the ability to influence the EM Spectrum--providing additional critical advantages in the battle space. UAS provide the MAGTF commander with a persistent lethal and flexible capability.

National Airspace (NAS) Integration.

The Marine Corps has taken a key role in ground based sense and avoid (GBSAA) systems for UAS. It operated the first certified GBSAA system at MCAS Cherry Point. In conjunction with DoD, NASA, and the FAA, the VMU community will continue to develop standards and procedures for UAS integration in the NAS as well as field similar systems to the rest of the MCASs that have VMU squadrons.

2.8 MARINE UNMANNED AIRCRAFT SYSTEMS

UAS SUSTAINMENT

Naval Aviation Enterprise (NAE) Inclusion

The RQ-7 is in the NAE briefing cycle, while the RQ-21A is being incorporated into the NAE and moving forward towards full NAE incorporation. RQ-21A will be fully integrated in the NAE no later than FY2017.

Current projects include:

Naval Aviation Maintenance Program (NAMP):

In an effort to bring UAS into compliance with Naval Aviation Maintenance Program (NAMP), a 2014 comprehensive NAMP review was completed by HQMC Aviation and NAVAIR. This was done in order to determine which aspects of the NAMP require modification, deviation, or change so that UAS can be in compliance with established Commander, Naval Air Forces (CNAF) policy (COMNAVAIRFORINST 4790.2B). Out of this review came several recommended updates to the NAMP. The recommended updates have been processed by Commander, Naval Air Forces (CNAF) and will be reflected in the next NAMP update CY2016.

Common Maintenance Reporting System for UAS:

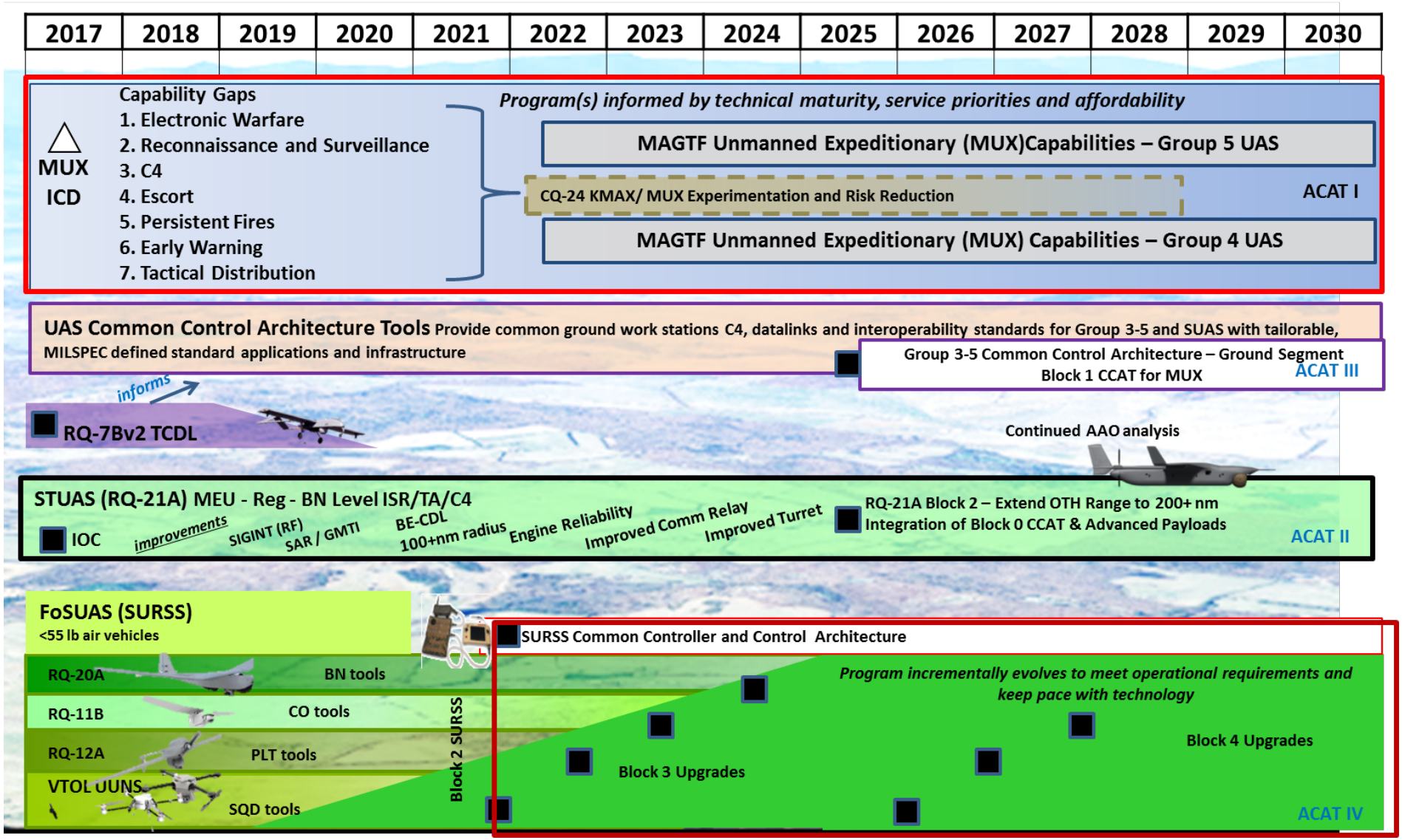
Since the fielding of UAS to the Marine Corps, UAS have not been able to utilize Naval Aviation Logistics Command Management Information System (NALCOMIS) Optimized Organizational Maintenance Activity (OOMA). The Marine Corps in this community has established MCC for maintainer proficiency and tracking.

With the fielding of RQ-21A, a way forward has been established to move UAS onto NALCOMIS OOMA for NAMP compliance readiness reporting and tracking. As RQ-21A is fielded to the VMUs, it will allow NAVAIR, working with HQMC Aviation and SPAWAR, to baseline RQ-21A into NALCOMIS OOMA. The goal is to baseline RQ-21A into NALCOMIS OOMA for all VMUs by FY-17.

UAS Equipment Optimization

HQMC Aviation and the MARFORs conducted a comprehensive review of all ground equipment used for UAS operations. The review identified excess ground gear for a proposed Table of Equipment (T/E) allowance reduction. Moreover, certain RQ-21A Program Procured Equipment (PPE) items will not be fielded or fielded at a reduced quantity based upon the results of a thorough analysis of required equipment sets to support UAS operations. Finally, as the VMUs are aligned under the MAG, the Marine Wing Support Squadrons (MWSS) and Marine Aviation Logistics Squadrons (MALS) will provide an increased level of aviation ground support to the UAS squadrons that is commensurate to the level of support provided to fixed and rotary wing squadrons. MWSS and MALS aviation support to the UAS squadrons will be an critical enabling factor in the squadrons' ability to conduct expeditionary operations.

2.8 FAMILY OF UNMANNED AIRCRAFT SYSTEMS (FOUAS) ROADMAP



SURSS FIXED WING FIELD PLAN

Organization	RQ-12 Wasp					RQ-11 Raven					RQ-20 Puma				
	FY17	FY18	FY19	FY20	FY21	FY17	FY18	FY19	FY20	FY21	FY17	FY18	FY19	FY20	FY21
I MEF	30	30	30	30	30	48	44	44	44	44	13	20	23	23	23
II MEF	24	24	24	24	24	42	38	38	38	38	13	20	20	22	22
III MEF	8	8	8	8	8	18	14	14	14	14	2	14	14	14	14
MARFORRES	24	24	24	24	24	32	30	30	30	30	0	5	10	14	14
MARSOC	50	50	50	50	50	0	0	0	0	0	22	22	22	22	22
Support Est.	5	5	5	5	5	20	18	18	18	18	2	6	6	6	6
DMFA	2	2	2	2	2									4	4
TOTALS	143	143	143	143	143	160	144	144	144	144	52	87	95	105	105

SURSS VTOL FIELD PLAN

Organization	Nano UAS					VTOL UAS				
	FY17	FY18	FY19	FY20	FY21	FY17	FY18	FY19	FY20	FY21
MARSOC	58	58	58	58	58	22	22	22	22	22
2X MEU	12	12	12	12	12	2	2	2	2	2
2Y MEU	12	12	12	12	12	2	2	2	2	2
2Z MEU		12	12	12	12		2	2	2	2
1X MEU	12	12	12	12	12	2	2	2	2	2
1Y MEU	12	12	12	12	12	2	2	2	2	2
1Z MEU		12	12	12	12		2	2	2	2
31 MEU		12	12	12	12		2	2	2	2
SPMAGTF (4)	48	48	48	48	48	8	8	8	8	8
I MEF			42	84	84					14
II MEF			24	48	48					8
III MEF					24					4
Support Est	12	24	24	24	24	2	4	4	6	6
TOTALS	166	214	280	346	370	40	48	48	50	76

2.9 MARINE AVIATION LOGISTICS PLAN

2.9 MARINE AVIATION LOGISTICS PLAN

The aviation logistics (AVLOG) community will continue to develop and lead operational and strategic level initiatives to improve and sustain Marine aviation material readiness. Initiatives will modernize existing and time-tested AVLOG safety, training, and support strategies, as well as capitalize on emerging capabilities and technologies offered by today's commercial and military industrial base. Collectively, these efforts will enhance the ACE by improving the readiness (e.g. safety, effectiveness, reliability and availability) of Marine Corps aircraft, as well as improve the required depth and capacity of associated weapon systems, personnel and equipment. ASL leadership will pursue these objectives along three primary Lines of Effort (LOEs):

LOE 1: Deliberately target AVLOG professional development

ASL and the AVLOG community are aggressively pursuing and implementing manpower and training related changes that will transform the professional development of our AVLOG community. These initiatives include:

1) Strategically assign officers and enlisted Marines to key billets
2) Facilitate the orderly escalation of experience and development milestones
3) Renew focus reviewing and improving MOS manuals and roadmaps
4) Pre-requisite professional qualifications for promotion to Sergeant and Staff Sergeant
5) Implement industry "exchanges" for selected enlisted maintenance Marines
6) Increase AVLOG influence and representation in contracting officer billets
7) Facilitate and foster increased participation in fleet prioritization processes
8) Capitalize on and improve the newly established T&R program
9) Increase Defense Acquisition Workforce Improvement Act (DAWIA) compliance/overmatch
10) Optimally align DAWIA certifications with key fleet and external support billets

Re-write, improve and standardize existing follow-on training curriculums:

1) Basic organizational structure & key processes
2) Practical application of skills & key processes (basic, intermediate and advanced)
3) Concepts & tools commensurate with squadron level responsibilities
4) Introduction to operational, strategic and joint level concepts
5) Certification and standardization protocols

Non-Traditional Training Opportunities

ASL serves as the lead for MAGTF Logistics Integration for the Deputy Commandant for Aviation. 2016 saw an increase in the exploration of additive manufacturing techniques, such as 3D printing, as well as other non-standard processes. In summer 2016 Marine Aviation sent its first Marine to 3D scanning and printing training for assets usually reserved for science & technology experts at NAVAIR. Marine Aviation, along with Marine Corps ground logistics leadership, continue to explore training opportunities outside of the Marine Corps and Navy to better leverage the creativity and problem-solving ability of our junior Marines.

Avionics Officer and Avionics Chief Course

ASL, in conjunction with TECOM and CNATT, will create a curriculum and formal course for newly promoted Avionics Officers and Avionics Chiefs at the Master Sergeant Rank that addresses proficiency levels required by Commands from the subject matter expert to include Aircraft Survivability Equipment, Electronic Countermeasures Equipment, Electronic Keying Material, Laser System Safety, Digital Interoperability, and 5th Generation Avionics systems.

2.9 MARINE AVIATION LOGISTICS PLAN

Advanced Wire Repair Training

Declining material condition across every T/M/S is impacting all wiring types and severely affecting current readiness. There is inadequate training and familiarity within the maintenance community. Lack of familiarity regarding the importance of wiring systems and apparent lack of focus on funding priorities for wiring at the system level are all contributing factors needing resolution to affect current readiness.

1) Establish funding in order to maintain the Advanced Wiring Just in Time Training currently taught at CNATT New River and expand training to CNATT Camp Pendleton.

2) Implement a 4790 addition to include Electronic Wiring Interconnect System (EWIS) as a formal program.

3) Continue maximum fleet participation in biannual Joint Services Wire Action Group (JSWAG) and Joint Fiber Optic Working Group (JFOWG) events.

Advanced Aviation Management Training (AAMT) Course

The AAMT course is being developed in conjunction with TECOM and will provide instruction to maintenance Staff Non-Commissioned Officers on how to develop long term maintenance, manpower, and materiel planning to improve aviation readiness. Focusing on four critical areas: Maintenance Management, Manpower Management, Training Management, and Advanced Skills Management (ASM).

The challenge for the aviation maintenance manager is to ensure that the maintenance department is to provide safe, mission-capable aircraft to satisfy all mission requirements. The key to the manager's success is to consistently make the right decisions that will result in successful mission accomplishment. The focus is developing skills to understanding aviation management and the complexities of operating an effective maintenance department.

Advanced Maintenance Officers Course (AMOC)

The advanced maintenance officers course for 6002/6004/75XX, is currently in development which will compliment and build upon the highly successful WTI program at MAWTS-1. This course will be taught by MAWTS-1 in conjunction with each WTI class , beginning in class 2-17.

2.9 MARINE AVIATION LOGISTICS PLAN

LOE 2: Increase the depth, capacity and reach of our operations sustainment capability

Marine aviation logistics is critical to the success of the ACE. Accordingly, AVLOG capabilities will be shaped and refined in order to meet today's and tomorrow's Marine Corps aviation (and overall MAGTF) readiness requirements. Specific initiatives aimed at increasing the depth, capacity and reach of our operations sustainment capability include:

Maintenance

1) Aligning maintenance and operations planning process
2) Accurately quantify the training levels across a squadron's maintenance department
3) Identifying and sustaining requisite maintenance core capabilities
4) Building, standardizing and sustaining a highly capable, mission-ready maintenance workforce
5) Ensuring adequate infrastructure to execute assigned maintenance workload
6) Complete IMP/IMC/PMI events on the flight line as near to the squadrons as possible

Avionics

1) Sustain dedicated sea based capability for rapid movement and employment of USMC aviation I-Level maintenance facilities, supply support and personnel to sustain fixed and rotary wing aircraft operations by extending the hull life of the two dedicated Aviation Logistics Support Ships (T-AVB) 10 years beyond 2019 and 2020, or until a suitable replacement is in place to ensure a capability gap does not exist.
2) Ensure similar TAVB-like capabilities are fully exploited to meet USMC AVLOG requirements.
3) Provide interjection during ESC level decisions on right sizing manpower, training and support equipment to sustain the flight-line.
4) Implement I-Level and O-Level cross training.
5) Endorse configuration control, tracking and distribution of pool stock weapons systems and support equipment.
6) Explore opportunities to increase avionics repair capability for all TMS aircraft.
7) Champion distributed laydown ISO rebalance to the Pacific.
8) Explore regionalization of Mobile Facilities for expeditionary use from centralized locations focusing on maintainability and readiness as well as speed of deployment.

2.9 MARINE AVIATION LOGISTICS PLAN

Ordnance

The rapidly changing operational environment, combined with increased operational tempo, poses challenges for the ordnance community that are magnified by the pace of technology, end strength reductions and fiscal limitations. Creative responses are required to meet these challenges. To that end, we will aggressively pursue:

1) TMS Cross Training and strategic pairing of ordnance officers and chiefs
2) Modernize Class V(A) support packages: MCAPP, MPSRON and MCPP-N
3) Maximize efficient use of O&M,N; eliminate funding redundancies
4) Communicate valid and clearly defined requirements to resource sponsors
5) Advocate for automated IT solutions and additive manufacturing solutions
6) Advocate for modern logistics solutions (e.g. additive Manufacturing)
7) Implement CAD/PAD Fleet Returns process at all Marine Corps Air Stations.
8) Reduce Aviation Armament System (AAS) maintenance (Level III preservation, right-sizing the MAGs)
9) Improve upon expeditionary and CONUS explosives safety posture
10) Review, improve and modernize formal schools course curriculum

Supply

1) We are attacking our current unacceptable NMCS rate, and the root causes for it.
2) Continue the roll-out of the Mission Essential Sub-System Matrix Strategy
3) Support and assist DLA/FRC in the effort to improve accuracy of bills of material
4) Support NAVSUP and FRC effort to improve depot component repair performance
5) CWO-2 embedded at DLA to monitor fleet demand for consumables on long-term contracts and ensure vendors receive accurate demand forecasts.
6) Implement MALSP Mod allowancing to H-1, AV8-B, and C-130 in FY17

ALIMS

1) CNA Study to effectively scope responsibilities and manning requirements for I-Level and O-Level aviation information systems
2) Align and synchronize efforts to Marine Corps Enterprise Network Unification Campaign Plan
3) Constant communication of aviation information systems requirements to MITSCs, MCNOSC, C4, OPFOR G6 and Navy IT department
4) Sustaining cybersecurity certifications for ALIMS personnel and improve information assurance for aviation information systems
5) Reformat current MCO 2020.1, ALIMS SOP, to NAVMC and align to CNAF inspection policies

MAGTF Logistics Integration

1) Continue to synchronize the efforts of the cargo UAS proponents in both Aviation and DC, I & L.
2) Identify emerging technologies for use by maintainers closer to the flight line.
3) Initiate efforts to identify and leverage corollaries between aviation logistics and ground logistics to enable increased unity of effort within the MAGTF.

2.9 MARINE AVIATION LOGISTICS PLAN

LOE 3: Modernize AVLOG support strategies and expand operational capability

Today's dynamic global environment demands flexible and scalable capabilities. Increased operational tempo, split and disaggregated operations and constrained resources mandate the modernization of written doctrine and its associated enablers:

Maintenance

1) Achieve an optimally trained, skilled, and ready workforce
2) Improve aircraft readiness, safety, reliability, and availability posture
3) Close the gap between required readiness and associated costs
4) Enhance deployed capacity & capability
5) Maintain minimal logistics footprint
6) Enhance deployed capacity & capability by exploring emerging technologies such as 3D printing and metal coating processes
7) Maintain minimal logistics footprint by utilizing MAGTF Distribution Liaison Teams
8) Power by the Hour and Contract Maintenance Support concepts
9) Organizational, Intermediate, and Depot Level processes
10) Accuracy and consistency of maintenance planning processes
11) Standardize scheduled maintenance stand-downs
12) Consolidate maintenance resources (personnel, equipment, facilities)
13) Eliminate non-productive time of assigned maintenance personnel

Supply

The focused efforts to improve the supply chain that supports Marine Aviation have netted some important improvements. The FY16 AVPLAN spelled out the intent to improve the way we organize spare parts at the tactical level to better support detachments and deployments. MARADMIN 175/16 announced the implementation of MALSP Modernization allowancing methodology, which will help to optimize use of material resources at the tactical level and better support distributed operations. The implementation of MALSP Mod is a significant milestone for Marine aviation.

Another success is the addition of nine AVLOG Marines to DLA Aviation in Richmond, including an aviation logistics Colonel. Management of demand signals and consumable materials will be a critical part of readiness recovery. Accordingly, the Marines assigned to DLA Richmond have been re-organized into a single cell to better focus on providing support directly to Marine Aviation.

Although these recent successes are significant, there are many other challenges that will require concerted effort and coordination across the various commands, supporting agencies, and stake-holders to overcome. The supply chain that supports Marine aviation is fragmented, antiquated, and not optimized to enable the required state of readiness in our current fleet. This fact is clearly evidenced by the low rate of Ready Basic Aircraft (RBA) and unsatisfactory high Non Mission Capable Supply (NMCS) rates across nearly every T/M/S the Marine Corps currently operates.

Each of the Independent Readiness Reviews conducted to date (AV-8B, CH-53E, and V-22) identified systematic shortfalls in the sustainment organizations, processes, and resources of the supply chain that supports Marine Aviation. Accordingly, the focus of effort in FY17 and beyond will be on continuing to aggressively attack these daunting challenges.

The strategy to reduce the NMCS challenge will be focused on the areas of consumables, repairable, and manpower.

2.9 MARINE AVIATION LOGISTICS PLAN

Consumables:

1) HQMC continue teaming with DLA, NAVSUP, and NAVAIR to pursue the MESM inventory strategy.

2) Consumable forecasting is an issue that was identified in by all three IRR's. Lack of consumable material accounts for greater than 80% of non-mission capable supply (NMCS) demands. To address this issue HQMC will assist in developing local MALS stocking procedures to include an enterprise-wide approach to managing consumable demand data. A CW0-3 has been assigned to DLA-Richmond to assist with the effort, and multiple software tools and allowancing parameters are being evaluated to ensure the correct items and quantities are stocked "plane side" at each MALS and included in pack-ups to support detachments and deployments.

Repairables:

1) HQMC will continue the MALSP Moderation effort by implementing AV8-B, H-1 W/Y/Z, and C-130 during FY17.

2) HQMC will champion the effort with DLA, NAVSUP, and NAVAIR to pursue Performance Based Logistics opportunities wherever it makes sense in order to recapture government/industry accountabilities.

Manpower:

1) HQMC is supporting the Center for Naval Aviation Technical Training (CNATT) effort to relocate the Marine Corps Aviation Supply Officer Basic Qualification Course from its current location at NAS Newport RI, to NAS Whiting Field, FL, to be co-located with the Aviation Maintenance Officer and Aviation Ordnance courses. The long-term benefits and synergy created by a single center for Marine Aviation-Ground officer training will be significant.

2) HQMC, in conjunction with the Navy and Fleet, will continue to improve the Training and Readiness Manual that governs the professional development of our Aviation Supply Marines.

2.9 MARINE AVIATION LOGISTICS PLAN

Avionics

Aviation Logistics Support Ship T-AVB

1) Explore alternative exercises for real world training that represents present day and future engagements.

2) Continue to explore Logistics Integration opportunities for MAGTF logistics support, to include integration with Combat Logistics Regiments at the Marine Logistics Group.

3) Coordinate Ship-to-Ship and Ship-to-Shore concepts of employment

4) Certify and modify for MV-22 operations aboard both T-AVBs.

5) Validate future MAGTF requirements and increase support beyond ground and aviation logistics requirements.

6) Improve upon MAGTF DI and CYBER/EW through the fielding, training and utilization of the ALQ-231 Intrepid Tiger II Pod

Align the Mobile Facilities Table of Allowance to meet the needs of changing IMRL inventories and supply pack ups for contingency operations to support the requirements of the MALSP modernization concept. Implement a phased approach to right size the Mobile Facilities inventory and reduce the logistic foot print in support of deployed forces while ensuring our capabilities meet our unique task.

Ordnance

We are working diligently to strengthen our relationships with service partners, resource sponsors, fleet subject matter experts and other common stakeholders in order to develop and implement modern, safe and low cost logistics initiatives. These initiatives are intended to serve as the catalysts to drive immediate training and combat capability force multipliers for the operational community. Specifically, we are seeking to deliver improved depth and capacity in an environment of limited resources and to provide additional capability options to commanders.

1) Ship board and shore based aircraft hot-loading

2) Fixed-wing integration of the Advanced Precision Kill Weapon System

3) Common Weapons Support Equipment (CWSE) enhancements for Distributed Short Take-Off/Vertical Landing (STOVL) Operations.

4) Flight clearances for improved and additional payload combinations

2.9 MARINE AVIATION LOGISTICS PLAN

Collectively these efforts will assist operational commanders with reducing aircraft turnaround times and increase sortie generation. Additional benefits include, but are not limited to the following:

1) Reduces footprint required at Forward Arming & Refueling Points (FARPs)
2) Reduces mechanical problems at FARPs and FOBs
3) Reduces aircraft flight hours when transiting to and from target areas

Improves weapon flexibility, lethality and precision options

Aviation Logistics Information Management Systems (ALIMS)

1) Provide uninterrupted levels of Aviation Information Systems support for Marine Aviation
2) Effectively manage transition to next generation of aviation information systems equipment and personnel
3) Mitigation of Aviation Information Systems transitional shortfalls
4) Manageable incorporation of new aviation information systems

MAGTF Logistics Integration (MLI)

Future operating concepts and fiscal constraints are driving the need to modernize and increase the efficiency of MAGTF Logistics. In the past, the ground and aviation communities embarked on separate modernization efforts, such as Global Combat Support System-Marine Corps and Marine Aviation Logistics Support Program II. Separately, each effort did not necessarily aim for integration of the logistics function into MAGTF future operating concepts. Reviewing current practices and aligning future initiatives towards the integration of internal MAGTF logistics will minimize disparate and overlapping processes. MLI is a critical component for future success of our naval expeditionary forces.

MLI focuses on logistics standardization and optimization across the MAGTF, with specific concentration on convergent practices associated with expeditionary (afloat and/or ashore) operations. When addressing processes, technologies and people, MLI will focus on maintaining the correct balance between combat effectiveness and logistics chain management efficiency, with an ultimate goal of increasing MAGTF readiness.

On 12 September 2014, the Deputy Commandant for Aviation (DCA) and Deputy Commandant for Installations and Logistics (DC I&L) signed a charter that reaffirms the Marine Corps commitment to MLI and re-charters the MLI Group. The MLI Group addresses and prioritizes MAGTF logistics initiatives with a focus on leveraging and applying proven best practices to current logistics improvement initiatives. The MLI Group is empowered to develop specific solutions and approaches to logistics challenges and make recommendations to the DCA and DC I&L. To this end, the MLI Group is guided by four principles:

Partnership: Develop an integrated, enterprise approach to MAGTF readiness that encompasses the entire logistics chain.

Transformation: MAGTF logistics transformation harnesses the power of standardization and integration to develop a logistics enterprise that is focused on warfighter support.

Balance: Ensuring the right balance between effectiveness and efficiency, reducing cost while improving logistics responsiveness and flexibility internal & external to the MAGTF.

Change/ Risk Management: Through effective management of both change and risk, we will challenge the status quo in the areas of science and technology, policy and doctrine, business practices and processes, and training and education.

2.9 MARINE AVIATION LOGISTICS PLAN

Summary

These three lines of effort will serve to focus the efforts of the AVLOG community in FY16 and beyond. The actions and initiatives will enhance readiness through improved institutional alignment, synchronization efforts, continued development of our AVLOG Marines, and a relentless focus on sustainment of our aviation platforms.

The AVLOG community remains focused on strategic and operational objectives that must be accomplished to transform Marine aviation logistics so that we better support ACE operations across the ROMO. ASL continually strives to train AVLOG Marines to be the best in the world at deploying expeditionary AVLOG capabilities that deliver and sustain aircraft readiness. Maintaining current capabilities, smartly planning for the sundown of existing platforms and introducing replacement aircraft are all areas that must be addressed. Keeping Marine aviation ever present in the skies above our Marines on the ground is our single purpose, and all that we do is a means to that end.

2.10 MARINE AVIATION GROUND SUPPORT PLAN

TODAY'S EXPEDITIONARY AVIATION GROUND SUPPORT FORCE

Enabling MAGTF Maneuver, Power Projection, Agility, Depth, and Readiness

The Marine Wing Support Squadron (MWSS) serves as our maneuverable carriers ashore and provides the functional support necessary to enable Marine aviation operations in an expeditionary environment. These capabilities are also relevant to the joint force commander, where forward basing and the rapid build-up and sustainment of aviation combat power are essential. The ability to maneuver the ACE ashore is critical to the Expeditionary Advanced Base concept set forth in the Marine Corps Operating Concept.

Airfield Support Functions

1) Expeditionary Airfield Services (EAF)
2) Expeditionary Rescue and Firefighting (EFR)
3) Aircraft and Ground Refueling
4) Explosive Ordnance Disposal

Air Base Support Functions

1) Essential Engineer Services
2) Internal Airfield Communications
3) Routine/Emergency Sick Call
4) Air Base Commandant
5) Motor Transport
6) Field Messing
7) Airfield Security Operations

Proven Past Performance; presently responsive; poised for the future

Fulfilling their legislated role as the nation's "force in readiness," Marines are frequently called upon to rapidly respond to an emerging crisis or strategic surprise. Even when engaged in "sustained operations ashore," as experienced in operations in Afghanistan and Iraq (OEF/OIF), the Marine Corps must retain its capabilities as an agile expeditionary force. An expeditionary force is characterized by speed and versatility, often in austere conditions; it must be fully capable of engaging across the ROMO. Whether as a supporting component within a joint force or as a supported joint force, the MAGTF will execute operations and campaigns that range from humanitarian operations and crisis response, to limited contingency operations through major combat operation (MCO).

Marine Wing Support Squadrons are meeting and exceeding expectations across the globe. From Special Purpose MAGTF Crisis Response missions in Central Command and Africa Command, to supporting Marine rotational forces – Darwin and Australia. The Marines in Marine Wing Support Squadrons and detachments are in every clime and place performing the functions of AGS and enabling Marine Aviation to complete its assigned mission.

Planning for the future of Aviation Ground Support continues with modernization of equipment, acquisition of new programs, updating training standards and reassessing of core Mission Essential Tasks. Whether it be the reactivation of the Marine Wing Support Groups' HQ element, upgrading training opportunities, establishment of alternative MOSs for AGS Weapons and Tactics Instructors, or the research and development of enhanced equipment and tactics, techniques, and procedures (TTPs) that will enable the MAGTF to maneuver within the littorals to support power projection operations; the aviation ground support units will be ready.

TODAY'S EXPEDITIONARY AVIATION GROUND SUPPORT FORCE

Marine wing support group

We believe that the reactivation of the active duty Marine Wing Support Group (MWSG) HQ is required In order to fill an operational command and control gap. This initiative will place a task organized, effective, and efficient headquarters capable of command and controlling subordinate units with efficiencies gained through logical sharing of personnel and resources. The MWSG will enable increased operational tempo of both the supported and supporting units. The MWSG HQ ensures seamless AGS operations during major combat operations.

Marine wing support squadrons

The MWSS remains the ACEs premier task-organized unit, built specifically to enable Marine aviation to conduct operations at the time and location of the commander's choice. Outfitted with the a specifically tailored table of organization and equipment set, the MWSS maintains the capability to establish, operate and play its role in the security of one main airbase and two forward arming and refueling points simultaneously. FY 17 will see 8 active component MWSSs, an MWSS (-) and 3 reserve component MWSSs manned, trained and equipment for the future fight.

Marine wing support detachments

Marine Wing Support Detachments are task organized to meet the AGS requirement of their supported MAG. They differ in size and capability. There are two standing MWSDs, though the capability to task organize from an MWSS is common practice.

Marine Wing Support Squadron -273 and British Army engineers install a VTOL pad in support of the F-35B at Royal International Air Tattoo, summer 2016

AVIATION GROUND SUPPORT THROUGH 2025

The first step toward the future

The AGS community is actively updating doctrine to meet the rapidly changing future operational environment. The capstone to the effort is the MCWP 3-21.1, Aviation Ground Support, which is near completion and should be published in 2017. In addition, to accurately reflect the capabilities of an MWSS, the Mission Essential Task List and the MWSS Training and Readiness Manual are being updated.

Remaining responsive and relevant as an aviation combat multiplier

In close coordination with MAWTS-1 and the AGS executive steering committee, the AGS community continues to align AGS TTPs with existing and emergent Marine aviation platforms such as the F-35, MV-22, MQ-21, and CH-53K. Currently there are several significant efforts underway :

1) Enabling the concept of distributed operations. By continually testing and working with T/M/S leads, HQMC and MAWTS-1 continue to refine the required support for this distributed operation template.

2) Development of a new concept of employment for Airfield Damage Repair (ADR) which will increase repair cycle times and improve the quality of repairs-in order to ensure faster sortie generation. With the development of this new concept comes an upgrade to the current ADR kit. The new ADR kit will be augmented by a mobile mixer, upgraded tools, new Foreign Object Debris cover, and rapid setting crater fill material.

3) Creation of the AGS WTI MOS (7077). This MOS will allow HQMC Aviation to track and then properly align Marines with the skillsets and knowledge required to plan and employ AGS units. This initiative will align the AGS Marines with students from MCLOG, MCTOG and others from MAWTS-1.

4) Refinement of the AGS input and participation as a training unit at service level exercises including WTI and ITX is imperative and an ongoing effort. An OAG appointed OPT is leading this effort.

5) Integration of an AGS training cell at MAGTF-Training Command/Tactical Training and Exercise Control Group will occur in 2016. Four AGS Coyotes will be put in place to train and evaluate AGS units.

6) Initial Capabilities Documents for EFR and EAF have been completed that will lead to Capabilities Description Documents (CDD) development, based from community CBAs , that will potentially lead to material programs used to alleviate gaps within the EFR and EAF MOSs.

7) DOTmLPF-P Change Requests continue in the EFR and EAF MOSs to ensure capabilities (doctrine, training, manpower, etc.) are in place to support the MAGTF when conducting interrelated military activities involving combat, security, engagement, and relief/reconstruction activities in a distributed operations environment.

8) Significant progress in the testing of a lightweight matting solution continues. This effort will enable the ACE to project power and gain access to the littorals in support of the MAGTF.

AVIATION GROUND SUPPORT MATERIEL INITIATIVES

P-19R (P-19A replacement) (Fielding FY17-FY20)

This initiative replaces the A/S32P-19A Aircraft Crash and Structure Fire Fighting Truck, known as the P-19A. The P-19A was introduced in 1984 with a service life of 12 years and has undergone two depot level rebuilds.

1) The P-19A is the Marine Corps' only major aircraft fire fighting vehicle utilized at Marine Corps Air Stations and Forward Operating Bases for immediate response to aircraft emergencies (primary) and structural fires (secondary).

2) The new vehicle is compliant with current National Fire Protection Association (NFPA) standards for aircraft rescue and fire fighting vehicles, resulting in a vehicle optimized for operator and crew safety.

3) Equipment updates and enhancements will significantly enhance the ability of ARFF Marines to fulfill their secondary mission by providing more effective base camp structural firefighting support.

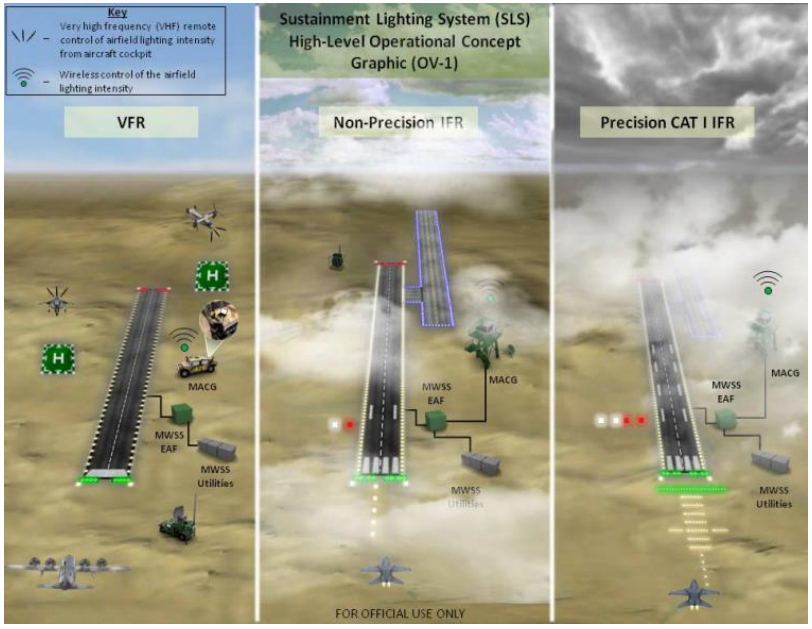
4) The level of drivetrain and power-pack commonality (up to 75%) with current USMC tactical vehicles (MTVR and LVSR) will result in more efficient supply and maintenance supportability. Commercial Off The Shelf (COTS) fire fighting components will increase parts availability and sustainability. The addition of an Integral Auxiliary Power Unit (APU) will greatly reduce engine idle time during standby, resulting in increased fuel efficiency and engine longevity. The off road capability will ensure operations in austere locations-such as those supporting distributed short take-off, vertical land (STOVL) operations (DSO)-will be supported.

EAF Sustainment Lighting System (SLS) (FY19-FY20)

Current EAF hard-wire lighting system utilizes 1960-era technology, is maintenance intensive, and consistently encounters logistical challenges due to parts obsolescence.

1) SLS will fill a capability gap by providing mandatory runway lighting required for Category I, precision Instrument Flight Rules (IFR) approaches. This will serve to effectively integrate Air Traffic Control (ATC) and EAF capabilities to provide a safer operational environment in degraded or reduced visibility landing environments.

2) All available modern energy efficiency technology (Improved batteries, solar capability) will be leveraged to increase performance and sustainability. In addition, the new lighting system will be lighter, easily adaptable to various airfield configurations, and heat-resistant to support MV-22 and F-35 operations.



AVIATION GROUND SUPPORT MATERIEL INITIATIVES

MV-22 Capable light-weight matting

This initiative will develop and field, to the MWSS Expeditionary Airfield Platoon, a light-weight matting solution that will withstand the heat signature produced by the MV-22 aircraft. There are possible COTS solutions available that are currently undergoing testing at Engineer Research and Development Center (ERDC) as part of an Expeditionary Airfield (EAF) Congressional plus-up. A gap was identified in the EAF 2014 Capabilities Based Assessment (CBA) for MV-22 capable light-weight matting, subsequently, an EAF Initial Capabilities Document (ICD) has been staffed and a light-weight matting Capabilities Description Document (CDD) is slated to kick-off in late June 2016.

Replacement lightweight mat will is being tested to meet the following Key Performance Parameters (KPP) and Key System Attributes (KSA):

1) The system shall support the operations of both aircraft and ground support vehicles
2) The matting shall withstand the heat/flux duration of MV-22 air and ground operations with degradation of structural integrity
3) The system should require minimum ground preparation, minimum CBR of four
4) EAF Marines should be able to install the matting at a rate of 600 square feet per man-hour using a four man crew
5) The matting system must contain a non-skid surface and mate with AM-2 medium duty matting system
6) Matts shall be recoverable and suitable for reuse after being subject to a conditional inspection, cleaned, and repackaged
7) The matt shall be able to withstand exposure to all POLs without degradation to performance or structure

AVIATION GROUND SUPPORT MATERIEL INITIATIVES

Airfield Damage Repair

The Marine Corps requires an Airfield Damage Repair (ADR) Kit capable of creating useable landing surfaces by new construction or repair of existing surfaces. This mission has been repeatedly tested during recent operations in Afghanistan and Iraq. The ADR Kit must take advantage of modern developments in construction equipment and materials, must be easily deployable, flexible enough to work in all geographic locations and environments, and provide the capability to quickly repair craters and spalls of all sizes. The required capability for one ADR Kit is to provide the tools and materials to repair six 10-foot diameter craters, in a concrete surface, and/or fifteen 10-foot diameter craters, in an asphalt surface, in less than 92 minutes plus (+) a two hour curing period. One ADR Kit must also contain the materials to repair 45 spalls in a concrete surface.

Concept of Employment

With the ever-changing face of future expeditionary operations, there will be an increasingly significant reliance on the air component of the MAGTF. An airfield damage repair capability that takes advantage of modern developments in construction equipment and materials is key to any expeditious preparation and/or rehabilitation of existing airfields. With the current technology and updated engineering methods that have improved in the past 15 years, the Marine Wing Support Squadrons (MWSS) and Engineer Support Battalions (ESB) will possess and maintain a core capability that will enable the Marine Corps to take advantage of existing airfields despite damage.

Attributes

Based on requirements, the ADR Kit should contain all the tools and equipment necessary to provide expedient repairs using established repair techniques covered by an upgraded Foreign Object Debris (FOD) cover or more durable temporary repairs using flowable fill and rapid setting cementitious products. Key upgrades include:

1) Improved lightweight and scalable FOD cover system
2) Upgraded tracked skid steered/loader with concrete cutting saw and additional attachments
3) Self-contained volumetric mixer

AERIAL PORT DAMAGE REPAIR

The USMC recently participated in a Joint Services Capabilities Based Assessment on Aerial Port Damage Repair (APDR). As a result, the Marine Corps is pursuing updated DOTMLPF-C solutions. These solutions include the modernization of the current B0039 Airfield Damage Repair kit and an update to the tactics, techniques and procedures for conducting airfield damage repair.

Aerial Port Damage Repair

Aerial Port Damage Repair (APDR) comprises the activities required to fix, restore, replace, or rebuild damaged or disabled infrastructure or equipment at an air operating location (landing zone, airfield, aerial port, or air base) in order to meet the commander's requirements. APDR activities can occur across the range of military operations and during any phase of a campaign. These activities can occur at locations that span degrees of development from austere landing zones, to established air bases. APDR activities can provide four operational effects:

1) Contribute to countering anti access and area denial effects;
2) Ensure inter- and intra- theater logistics, and combat power for the commander;
3) Repair damage caused by natural disaster or catastrophic failure; and
4) Support the economic development of a region
5) APDR actions decompose to three primary tasks: Planning, Execution, and Maintenance of repairs.

Planning

Planning for damage repair begins before damage occurs with the development of contingency plans that can be adapted to specific situations. When damage occurs, engineer forces contribute to crisis action planning by including APDR considerations in plans. Planning extends through the execution and maintenance phases as engineering forces respond to changing conditions and complete repairs.

Execution

Execution of APDR requires the seamless integration of forces and means conducting combat, general, and geospatial Engineering missions, as well as other activities supporting Engineering work. A technical reconnaissance of damage provides the detailed information necessary to execute repair operations. Initial repair priorities include mitigating hazards on, and repairs to the minimum aircraft operating surfaces. Once initial repair work on the operating surfaces is complete, the priority of effort shifts to other facilities, utilities, and ancillary systems at an air operating location.

Maintenance

Maintenance of repairs begins as soon as the first repair is completed, and extends until responsibility for the repairs is transferred to an appropriate authority. Repairs must be maintained in an acceptable condition in order to ensure continued operations. Repairs can be either periodic, such as repairing surfaces after a set number of passes, or emergent, such as a pipe that bursts after an initial repair was conducted. The APDR mission is completed with the transfer of responsibility and property to a designated authority.

AERIAL PORT DAMAGE REPAIR

The thirteen APDR areas of interest are listed to the right. These areas of interest represent the gaps identified by the Joint Capabilities Based Assessment Team (CBAT). Without accepted Joint standards to measure task performance, distinguishing among gaps, redundancies and shortfalls could not be accomplished. That is one reason why the lack of accepted joint standards became a key finding. Joint standards are required to effectively pursue or develop joint solutions.

Areas of interest provide the joint engineering community and the AF civil engineer community with the opportunity to develop integrated solutions portfolios. By aggregating problems into defined groups, the community can seek the biggest "bang-for-buck" solutions for APDR problems, can identify forms of solutions across DOTmLPF-P, and supports the downstream integration of related Capabilities Based Assessments.

The next steps in the Joint Capabilities Integration Development System (JCIDS) process are the development of formal JCIDS documents such as DOTMLPF-P Change Recommendations (DCR) and Initial Capabilities Documents (ICD). The DOTMLPF-P mapping provides an initial indication of which problems might require a materiel or non-materiel solution, and therefore help to scope subsequent JCIDS documents.

CONCEPT OF EMPLOYMENT FOR USMC

With the ever-changing face of future expeditionary operations, there will be an increasingly significant reliance on the air component of the MAGTF. An airfield damage repair capability that takes advantage of modern developments in construction equipment and materials is key to any expeditious preparation and/or rehabilitation of existing airfields. With the current technology and updated engineering methods that have improved in the past 15 years, the Marine Wing Support Squadrons (MWSS) and Engineer Support Battalions (ESB) will possess and maintain a core capability that will enable the Marine Corps to take advantage of existing airfields despite damage.

Based on identified future requirements, the upgrade ADR Kit will contain all the tools and equipment necessary to provide expedient repairs using established repair techniques covered by an upgraded Foreign Object Debris (FOD) cover or more durable temporary repairs using flowable fill and rapid setting cementitious products.

PRIORITIZED AREAS OF INTEREST

1) Mitigate Explosive Threats
2) Engineering and Technical Recon & Assessment
3) Expedient Air Operating Location Repair
4) "Deployability" of Engineering Assets
5) Configuration and Prepositioning of Materiel
6) Joint Standards for Air Operating Location Repair
7) (tie) – Geospatial Enterprise
8) (tie) – Capability Visibility
9) Command and Control
10) Reachback (Institutional and Technical Support)
11) Planning
12) Targeting and Assessing Engineering Effects
13) Joint Engineer Development

2.11 TACTICAL AIR CONTROL PARTY PLAN

TACP SUPPORT, TRAINING, AND READINESS

The demand for Joint Terminal Attack Controllers (JTAC); Forward Air Controllers (FACs); Forward Air Controllers (Airborne) (FAC(A)s) properly integrated with Joint Fires Observers (JFOs) has increased dramatically over the past decade in support of USMC and joint force operations, and their collective fire support capabilities are projected to be a major component of future force design. As specially qualified and certified service members and aviators who, from a forward position or airborne, direct the action of combat aircraft engaged in close air support and offensive air operations, act as an extension of the TACP, and perform autonomous terminal guidance operations (TGO), the low density, high demand teams are sought after to support the ground fire support plan and have proven absolutely critical to mission accomplishment. Initial certification and refresher training for JTACs, FACs, and JFOs occurs through the period of instruction provided by instructors employed at Expeditionary Warfare Training Group Pacific and Atlantic (EWTGPAC/LANT) . The Training and Readiness (T&R) training continuum is facilitated in the fleet by air officers and SNCOs at the artillery regiments, ANGLICO, and divisions, ideally who have been designated Weapons and Tactics Instructors (8077 MOS) after completing the course at MAWTS-1 (formerly referred to as TACP(I)).

JTAC / FAC PRODUCTION AND SUSTAINMENT

Currently there exists a validated requirement for 354 JTACs and 272 FACs for a total of 626 ground-based controllers. This need translates to a requirement to produce 216 JTACs annually (equal to roughly maximum capacity for EWTGPAC and LANT when fully supported with all required external assets). Air support requirements for certification and qualification has grown and will continue to be more challenging. Initiatives have been and are in work to mitigate this situation; however, demand for JTACs and FACs continues to grow with expectations that the total requirement will increase again. Studies about post-OEF JTAC requirements in support of future force employment and design are on-going; contract close air support (CCAS) providers exist to help offset some of the fleet air training requirements. Commercial Air Services who currently provide CAS to the Marine Corps at times provide up to 50% of the total FW certification requirements. The USMC Terminal Attack Controller Trainer (TAC-T) program is funded and will work to augment fleet air support with contractor-owned, USMC attack pilot flown aircraft for terminal attack controller training. In addition to the fleet air that will directly support collective PTP, surrogate CAS contracted service support, coupled with increased investment in and budget emphasis on high fidelity, linked simulation will yield overall proficiency and combat readiness.

The TACP and JFO curricula must strive to collectively incorporate unmanned aviation platforms to increase proficiency with persistent/simultaneous ISR, CAS, and EW for the MAGTF and joint force.

FUTURE

The USMC TACP, fire support and aviation communities will work together to coordinate and align individual and collective live training opportunities and augment live execution with real-world synergistic simulation. TACP equipment kit continues to be refined and will be driven by innovation tailored to the needs of the warfighter. In addition to the TAC-T and simulation efforts that will advance fire support integration proficiency, serious consideration and steps must be taken to properly align and consolidate the various programs, policies, manning and training efforts for the JTAC-JFO Team. A roadmap that will help define how the USMC will man, train, and equip terminal attack control teams is located at the end of the TACP section and submitted for consideration.

Future Capabilities and Interoperability (JTAC Kit)

COTS tablets + GOTS software

DPSS Project Office located at NAWCWD China Lake

1) 100% government-owned, government civilian software team
2) Creators of PSS-SOF applications and software

KILSWITCH/APASS = Android App for Precision Fires Image Map Engine

1) Users: SOCOM (NSW), MARSOC, HMX-1, DOS, FBI, AZ firefighters, USMC
2) ~5000 tablets fielded since 2012, in widespread use throughout all MAGTFs
3) Application is NGA validated
4) Same algorithms and engines employed in NGA certified PSS-SOF and APASS applications.
5) KILSWITCH capabilities will increase even further with the next generation Target Handoff System version 2 (THSv2), which will integrate KILSWITCH with MAFIA in a Marine Fires Application, fielding in early 2017.

TACP CONCEPTS AND DEFINITIONS

Joint Terminal Attack Controller (JTAC, MOS 8002)

A qualified (certified) service member who, from a forward position, directs the action of combat aircraft engaged in close air support and other offensive air operations. A qualified and current joint terminal attack controller will be recognized across DOD as capable and authorized to perform terminal attack control.

Primary officer feeder MOSs are 0802, 7315, 0302, 1802 and 1803

Primary enlisted feeder MOSs are 0861 and 0321.

Must be E-5 and above.

All these MOSs are listed on Unit TO&Es with a billet MOS of 8002.

Forward Air Controller (FAC, MOS 7502)

An officer (aviator) member of the tactical air control party who, from a forward ground or airborne position, controls aircraft in close air support of ground troops. USMC is the only service that uses the term, therefore in the joint community a FAC is a JTAC. Testing and evaluation into the validity of the 7315 PMOS to augment 75XX aviators as 7502 is underway currently.

Forward Air Controller Airborne (FAC(A))

FAC(A)s are an airborne extension of the Tactical Air Control Party (TACP) which operates as the forward element of the Theater Air-Ground System (TAGS). JP 3-09.3 states that current and qualified FAC(A)s "will be recognized across the DOD as capable and authorized to perform terminal attack control".

As defined in JP 1-02, DOD Dictionary of Military and Associated Terms, a FAC(A) is defined as "a specifically trained and qualified aviation officer who exercises control from the air of aircraft engaged in close air support (CAS) of ground troops."

USMC FAC(A) Platforms: AH-1, UH-1, F/A-18, AV-8, F-35

Joint Fires Observer (JFO)

A JFO is a trained service member who can request, adjust, and control surface-to-surface fires, provide targeting information in support of Type 2 and 3 close air support terminal attack control, and perform autonomous terminal guidance operations.

In conjunction with a FAC, JTAC, or FAC (A), a JFO can facilitate a CAS attack up to the clearance of fires. Clearance must be provided by a FAC, JTAC or FAC (A) who might not be co-located with the JFO but who has situational awareness to control the attack.

The objective is to have at least one (1) JFO at each rifle squad who will act as a key component of the JTAC-JFO terminal attack controller team.

Weapons and Tactics Instructor (WTI, MOS 8077)

Formerly the Tactical Air Control Party Instructor (TACP(I)).

1) A SNCO or officer graduate of the MAWTS-1 Weapons and Tactics Instructor Course.

A WTI has completed the transformation from an individual trained in terminal attack control to an experienced aviation integrator and aviation integration training manager.

Each assigned Regimental and MEU Air Officer and ANGLICO Company Air Officer shall attend the Air Officer Course and be a certified as a WTI.

At the regimental and MEU level, WTIs shall supervise the development and implementation of subordinate unit collective and individual aviation integration training and shall facilitate the training and evaluation of adjacent units. (MCO 1301.25C)

MOS 8077, Air Officer Weapons and Tactics Instructor (AirO WTI)) EMOS. Weapons and tactics instructors provide a capability to fill associated operator force billets to develop and execute a unit training program in accordance with the Weapons and Tactics Training Program (WTTP). This training is focused on achieving individual training and readiness through collective operational unit training.

TACP MANNING PROGRESSION

<table>
<tr><th colspan="4">WTI (8077)</th></tr>
<tr><td colspan="4">A SNCO or Officer graduate of MAWTS-1 Air Officer Department (AOD) WTI. A WTI is an experienced aviation integrator and aviation integration training manager. All assigned Regimental and MEU Air Officers shall attend WTI.</td></tr>
<tr><td colspan="2">JTAC / FAC / AIR OFFICER</td><td>JTAC-E</td><td>JTAC-I</td></tr>
<tr><td>2000 Level</td><td>2100 Level</td><td colspan="2">2500 Level</td></tr>
<tr><td>Core Skill Introduction</td><td>Core Skill Designation</td><td colspan="2">Instructor Training</td></tr>
<tr><td>At the completion of the Core Skill Introduction Phase (2000 - level), TACP members meet the requirements of the JTAC MOA and are certified Joint Terminal Attack Controllers (MOS 7502 or 8002) at EWTGLANT/PAC</td><td>The Core Skill Designation Phase (2100 - level) conducted at the unit level is required to fully prepare individuals to integrate aviation in support of unit operations and is required for designation as a JTAC or FAC by the commanding officer, or designation as [illegible]
<u>Group 1 Small UAS Training (5-10 days)</u>
RQ-11 Raven
RQ-12 Wasp
RQ-20 Puma
TALSA East &West – CLNC and CAMPEN
All POIs include VTOL SUAS Training embed</td><td>JTAC-E: A designated SNCO or Officer who is a close air support SME at the unit level with at least one year of operational experience as a JTAC/FAC(A) who has:
(1) completed an upgrade evaluation by the WTI
or (2) Completed the MAWTS-1 WTI Course successfully and is designated by the unit commander.</td><td>JTAC-I: A JTAC who is designated an instructor of JTAC trainees in order to supervise the Core Skill Introduction Phase (2000) of training JTACs. A JTAC-I requires at least one year of operational experience as a designated JTAC or FAC(A) prior to designation as a JTAC-I, and is designated by the commander of a Marine Corps FLC that conducts JTAC/TACP [illegible]</td></tr>
<tr><td colspan="4">*** To promote better continuity and proficiency for MAGTF fires, M&RA and MSCs should consider implementing manpower staffing guidance that will consider the 8002 EMOS and seek to minimize tours away from JTAC billets that prevent TAC skill and career progression.</td></tr>
<tr><td>2000 Level</td><td>2100 Level</td><td colspan="2">2500 Level</td></tr>
<tr><td>Core Skill Introduction</td><td>Core Skill Designation</td><td colspan="2">Instructor Training</td></tr>
<tr><td>The Core Skill Introduction Phase (2000-level) provides the knowledge and skills required to perform as a basically trained JFO and to certify JFOs in accordance with the JFO MOA.</td><td>The Core Skill Designation Phase (2100-level) builds on the 2000-level events, completes the preparation of individuals for combat at the unit level, and is required for designation as a JFO.
62</td><td>JFO-E: A designated Sergeant, SNCO, or officer who is a joint fires SME at the unit level, has attended the JFO course, and is a designated JTAC.</td><td>JFO-I: A joint fires SME at a JFO-certifying schoolhouse designated to instruct all joint mission tasks (JMT) listed in the JFO MOA. A JFO-I requires a minimum of one year operational experience in a joint fires duty area.</td></tr>
</table>

GCE TACP T&R LIVE CONTROL REQUIREMENTS

TACP (JTAC/FAC) Annual Training Control Requirement: **6048**
Rotary Wing: 2592 / Fixed Wing: **3456**

*USMC must produce approximately 216 JTACs / FACs annually to meet current Table of Organization requirements.

Total FAC/JTAC: 626*	
FAC	272
JTAC	354
Active: 446	
FAC	199
JTAC	247
Reserve: 180	
FAC	73
JTAC	107
Total FAC(A): 130	
FW	52
RW	78

ACE FAC(A) T&R LIVE CONTROL REQUIREMENTS

FAC(A) Annual Training Control Requirement: **2929**
Rotary Wing: 530 / Fixed Wing: **2399**

EWTG Avg CAS Asset Frag Sourcing:	
USMC Fixed Wing:	<35%
USMC Rotary Wing:	30%
Contract CAS:	Up to 50%
Other Joint:	~15%

FW control shortfall: **1676**

The number of fixed-wing controls required exceeds ability to generate the sorties with current organic and contracted platforms in order to maintain a T 2.0 readiness level at the present (and future predicted) JTAC/FAC manning levels.

USMC CAS Rotary and Fixed-Wing Support Capacity: **9431**
Fixed Wing: **4179**
Rotary Wing: 5088

These calculations assume:

1. ***Maximum event chaining with ZERO overhead.***
2. ***All additional JTAC/FAC(A) MOA and ACE and TACP T&R control requirements are conducted via simulation.***

Solutions:

- HQMC Aviation is investigating several options to include incorporating unmanned, armed group UAS platforms.
- Aviation and CD&I are investing in and broadening air-ground sim device linkages IAW TECOM's L-V-C training environment.
- Augmentation from the Terminal Attack Controller Trainer (TACT-T) program will provide additional training assets, will allow USMC attack pilots to conduct OAS training, practice requisite skills and TTPS, and increase fleet pilot flight time while more completely supporting TACP combat proficiency.
- While the USMC TACP Program Order helps to codify manning, training, and equipping requirements, the USMC must formally professionalize a Fire Integrator MOS pipeline to realize the full requisite combat capability of the JTAC/JFO Team.

TACTICAL AIR CONTROL PARTY STRUCTURE (182K)

Current FAC Requirement

Unit Type	Distribution	A/C	R/C
Infantry Bn	24 A/C Bn 9 R/C Bn	72	27
LAR Bn	3 A/C Bn 1 R/C Bn	9	3*
Tank Bn	2 A/C Bn 1 R/C Bn	6	3
Recon	3 A/C Bn 1 A/C Bn	3	1*
Force Recon Co	3 A/C Co 1 R/C Co	3	1*
ANGLICO	3 A/C Co 3 R/C Co	24	33
MARSOC		21	N/A
Artillery Regt	3 A/C 1 R/C	3	1
Higher HQ: Inf Regt MEU	 8 Regt x 2 7 MEU x 2	 16 14	 4* N/A
Other		28	N/A
	TOTAL	**199**	**73**

Current JTAC Requirement

Unit Type	Distribution	A/C	R/C
LAR Bn	1st LAR: 4 2d LAR: 4 3rd LAR: 4	12	4*
Artillery Reg HQ	10th MAR: 8 11th MAR: 6 12th MAR: 3	17	4*
Artillery Bn	10th MAR: 29 11th MAR: 39 12th MAR: 10	78	27*
Recon	1st Recon: 13 2d Recon: 13 3rd Recon: 11	37 (112)	N/A
Force Recon	1st Force: 5 2d Force: 5 3rd Force: 5	15 (51)	N/A
ANGLICO	1st ANG: 16 2d ANG: 16 5th ANG: 16	48	72
MARSOC		31	N/A
Other		9	N/A
	TOTAL	**247 (410)**	**107**

JFO Requirement

Unit Type	Distribution	A/C	R/C
Infantry Bn	27/ Inf Bn	648*	243
LAR Bn	1/Plt	27	18
Tank Bn	1/Plt	10	23
Artillery	3/FO Team	216	42
	2/NGF Liaison Section	12	N/A
	HQ BTRY (LAR/Tanks)	26	N/A
Force Recon/ Recon	1/Team	111	60
ANGLICO	24/ Co	72	108
	TOTAL	**1122**	**494**

FAC(A) Requirement

Unit Type	Distro	CMMR	FAC(A)
HMLA	7 HMLA 4 x W/Y 3 x Y/Z	8 x H-1W 6 x H-1Z 4 x H-1Y	78
VMFA(AW)	4 Sqdn	6 FAC(A) crews per Sqdn	24
VMFA	8 Sqdn	2 FAC(A) per Sqdn	16
VMA	6 Sqdn	2 FAC(A) per Sqdn	12
		TOTAL	**130**

Notes:
- Reserve Component (RC) Table of Organization (T/O) numbers marked with an "*" do not have a Billet Identification Code (BIC) associated with them in Total Force Structure Management System (TFSMS) and represent if MARFORRES was 100% mobilization to mirror the Active Component.
-Numbers in parenthesis represent the proposed Reconnaissance Community T/O increase to one JTAC per team.
- JFO training does not require live aircraft sorties for production or sustainment. JFO total is under review.

TACTICAL AIR CONTROL PARTY FAMILY OF SYSTEMS

Target Handoff System (THS)

THS is in the process of refreshing hardware and software to enable an increase in capability with the SLATE (Smaller Lighter Ancillary TLDHS Equipment) kit and Strikelink software version 1.2, with the goal of providing a better user interface. This capability will be replaced in 2017 by THSv2, which incorporates the Marine Fires Application, a combination of KILSWITCH and the Army's MAFIA application. THS has also assumed responsibility for the hand-held video downlink requirement and began fielding this capability in FY 2013 with the Soldier ISR Receiver (SIR) versions 2.0 and 2.5.

Common Laser Range Finder (CLRF)/Vector 21

The Common Laser Rangefinder - Integrated Capability (CLRF-IC) will combine the components of the current CLRF in to a smaller lighter device. Fielding for the CLRF-IC began in 2016.

Portable Laser Designator Rangefinder (PLDR)

The PLDR replaced the interim laser designator, the Ground Laser Target Designator II. The PLDR provides a laser designation capability out to 5000m at a reduced weight than previous lesser equipment. Redistribution of PLDRs and GLTD IIs is continuous to ensure units have a laser designation capability until production can increase to expected rates.

In October 2011, The Joint Terminal Attack Controller Lightweight Target Designator (JTAC-LTD) was fielded in response to an UUNS. 150 systems have been fielded.

Situational Awareness and Night Vision

AN/PVS-17/14

The AN/PVS-17 provides extended range night vision capability. AN/PVS-14 is issued as a component of the Vector 21.

Thermal Laser Spot Imager (TLSI)

The Kollsman TLSI with Enhanced Targeting Sight provides the capability to see the laser spot generated by the FAC/JTAC's laser designator or a self-lasing aircraft as well as providing thermal imaging capability.

Fielding is complete.

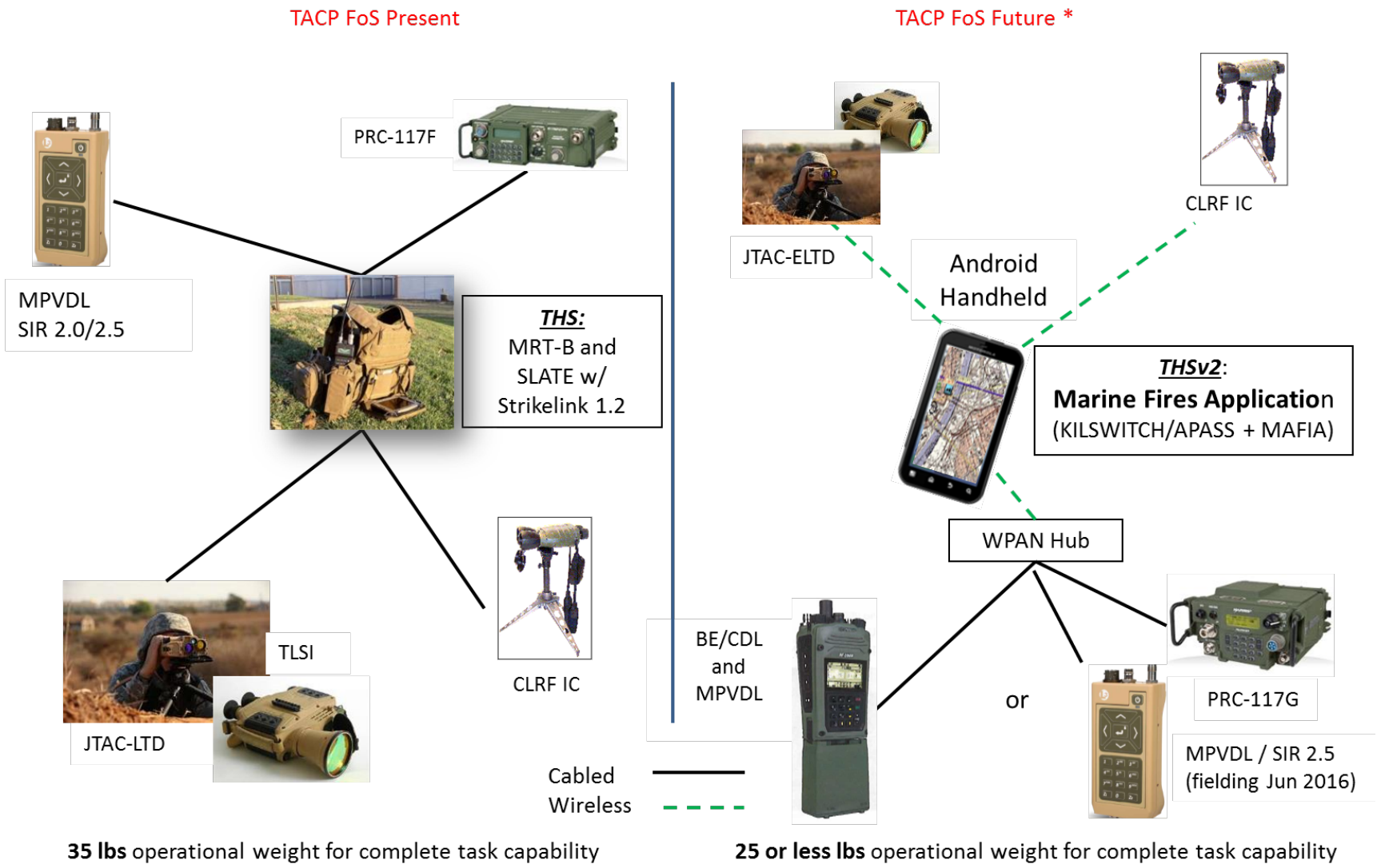
Thermal Imager

The Kollsman Long Range Thermal Imager provides the FAC/JTAC a long range target location capability for both day and night operations. Fielding to the operating forces is complete.

Video Scout (VS)

Video Scout continues to be the standard for COC video downlink operations. The Remote Video Viewing Terminal (RVVT) is undergoing a requirements re-write that will affect the procurement of a COC video receiver capable of allowing multiple users to subscribe to multiple video signals received on a local network. The intent is to maintain a technical family of systems approach for the non-static operator (THS operators) and static operators (COC operators). The Man Portable Video Downlink Receiver, SIR 2.5, started fielding in June 2016 with a total AAO of 384 systems.

TACTICAL AIR CONTROL PARTY FAMILY OF SYSTEMS



1) The Marine Corps continues to evaluate systems and to equip TACPs to this end state. Increased PRC-117G and SIR 2.5 AAOs will help ensure systems critical link in the digitally interoperable MAGTF are fielded to the lowest levels for training and execution;

2) All systems should seek to integrate with joint and airborne systems such as SRP to enable full end-user interface and capability.

DIGITALLY AIDED CLOSE AIR SUPPORT

TACP and Tablets

Android tablets enable situational awareness and Digitally Aided Close Air Support (DACAS), with applications like Kinetic Integrated Lightweight Software Individual Tactical Combat Handheld (KILSWITCH)/Android Precision Assault Strike Suite (APASS) [pictured]. KILSWITCH/APASS is a model example of rapid innovation in support of our warfighting requirements.

Digital and sensor situational awareness (SA) for GCE embarked aboard Assault Support

These are screen captures of the tablet-based SA applications available to troops embarked aboard a KC-130J during the SPARROWHAWK insertion conducted at a recent TALON REACH DI demo – along with PLI data shared via ANW2, sensor SA is provided to the end user on a common operating interface and display – capability currently deployed ISO SPMAGTFs and MEUs.

"We believe that implicit communication—to communicate through mutual understanding, is a faster, more effective way to communicate…We develop this ability through familiarity and trust, which are based on a shared philosophy and shared experience." – MCDP 1

TACTICAL AIR CONTROL PARTY INITIATIVES

Near Term: Group 1 Small UAS Training

FACs and JTACs will complete group 1 small UAS training either:

1) Prior to attending TACP school or

2) During 2100 level training once assigned to unit

Training is conducted by the UAS TALSAs located aboard Camp Pendleton and Camp Lejeune

Marine Terminal Attack Controller and JFO Action Plan/Roadmap

The Action Plan/ Roadmap depicted to the right is required to help consolidate efforts to create and foster properly manned, trained, and equipped JTAC-JFO teams in support of MAGTF and joint force operations.

By examining the problem and endstate desired in support of future force design and CMC strategic service guidance, the action plan indicates actions, efforts, and policies that can be mapped to specific HQMC and fleet agents. It will help to provide action items to various entities and ensure the force maximizes synergy with programming, training, and tactical execution. The endstate is properly trained and equipped JTAC-JFO teams that are capable of holistically integrating digitally interoperable fire support, ISR, and EW.

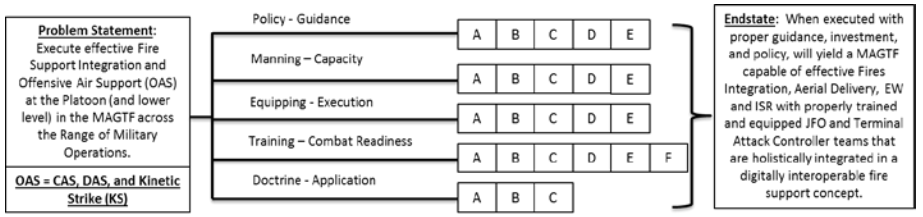
Far Term: UAS Expertise to the TACP

7315 (UAS Officer) infusion into the TACP:

Analysis ongoing to determine best way to gain and maintain UAS expertise at the tactical edge

1) As added member of TACP (requires structure change)

2) 7315s are eligible for 8002 (JTAC) MOS and associated B-billet assignments; manpower analysis ongoing



Policy
A. USMC TACP Program and M&RA Orders
B. DRRS Reporting linked to T&R and MCTIMS
C. JFS ESC JTAC MOA
D. JFS ESC JFAC(A) MOA
E. JFS ESC JFO MOA

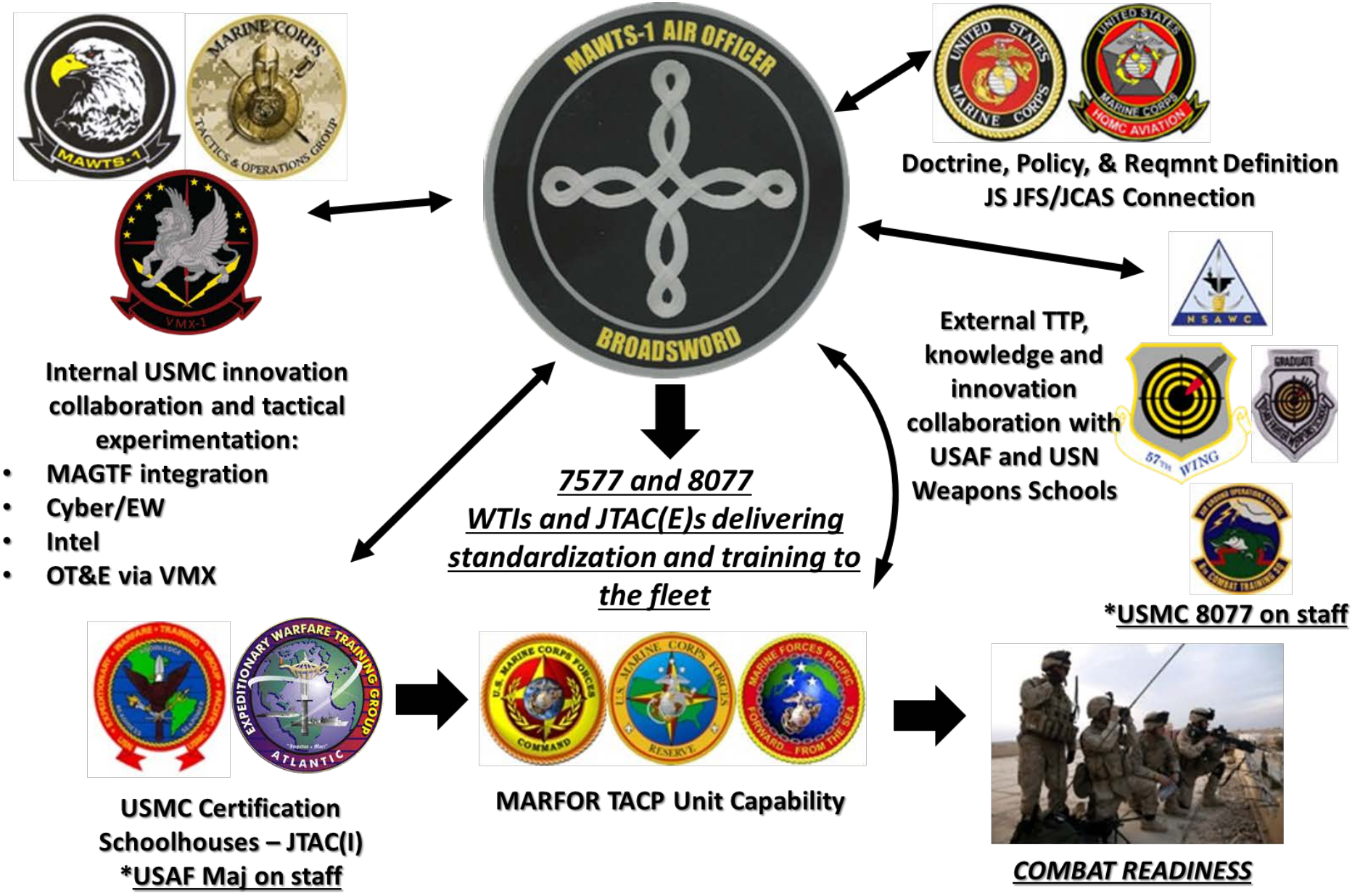
Manning
A. Professionalize/ PMOS 8002
B. MOS career progression assignments policies
C. MSC, FLC, and HQMC T/O fully staffed with the "right/tracked" fills based on experience and MOS
D. JFO-JTAC Msn Essential Taks List Synergy
E. HQMC Track and place 8077

Equipping
A. TACP Optics
B. Lasers / Designators
C. Target Handoff System v2
D. Portable / renewable power supply
E. Digitally Aided Fires (DaFS / DaCAS) Network and Gateway access points and end-user interfaces

Training
A. Protect/invest GCE and ACE simulation
B. Adherence to T&R Execution (based on the JTAC, JFAC(A), and JFO MOA)
C. Live Asset Capacity
   1. Surface-to-surface
   2. FW / RW (manned and unmanned)
   3. ISR / EW
D. MCTIMS – T&R/combat readiness tracking
E. Standardization
   1. Cert &Qual (currency)
   2. Designation
   3. Core Plus and instructor progression
F. Force Synch – formal training TEEP synchronization

Doctrine
A. TACP TACSOP – development and adherence – fleet and FLCs
B. JP 3.09-3 –close air support execution
   1. TAC
   2. TGO
   3. Non-qual'd JTAC
C. JFIRE MTTP – MCRP 3.16

MAWTS-1 AIR OFFICER CERTIFICATION



2.12 MARINE AVIATION SCIENCE AND TECHNOLOGY PLAN

AVIATION SCIENCE AND TECHNOLOGY STRATEGIC GUIDANCE

Introduction

The Marine aviation combat element must leverage S&T to transform into a digitally-interoperable expeditionary force which continues to dominate the air, sea, space, land, and cyberspace domains in support of MAGTF operations. Operating through the electromagnetic spectrum, the ACE must conduct effective missions for anti-air warfare, offensive air and assault support, air reconnaissance, control of aircraft and missiles, electronic /cyber warfare. Leveraging S&T, Marine aviation seeks to identify, influence, and rapidly insert capability into new and legacy airborne systems by upgrading or replacing existing systems at minimum cost. Highlighted Marine aviation S&T focus areas that require continuous S&T investments are electronic warfare (EW); cyber operations; command and control (C2); communication and networks; unmanned aircraft systems (UAS); weapons; and rotorcraft and fixed wing technologies.

Aviation S&T Strategic Guidance

Expanding DoD capability is accomplished by integrating platforms and systems and promoting interoperability to deliver increased lethal or non-lethal effects across the battlefield. By incorporating integration and interoperability tenets, DoD systems with long acquisition development cycles, point-to-point solutions, proprietary, and platform centric solutions will be minimized or eliminated. The results provide increase warfighting effectiveness and produce open architecture, common standards which enable more effective tactical systems.

Aviation S&T Sponsors

Marine aviation S&T strategic guidance describes how Marine Corps aviation must rely on scientific research to meet their current, emerging, and future needs. The Marine Corps Combat Development Command (MCCDC) and Chief of Naval Operations Air Warfare facilitate the programming, budgeting, and resources for Marine aviation programs. The Office of Naval Research (ONR), Naval Aviation Enterprise (NAE) and MCDDC advocate for the S&T funding and solutions for the Marine Corps aviation S&T programs. The Department of Army, Department of Air Force, Office of the Secretary of Defense (OSD) and Defense Advanced Research Projects Agency (DARPA), Federally Funded Research and Development Centers (FFRDCs), National Security Agency (NSA), and Central Intelligence Agency also provide significant S&T support for the future of Marine aviation.

Airborne Electronic Warfare

The Marine Corps is continuing to build an organic and distributed electronic warfare system of systems known as MAGTF EW. MAGTF EW transitions the Marine Corps from a focus on the low-density/high-demand EA-6B, to a distributed, platform-agnostic strategy – where every platform contributes/ functions as a sensor, shooter and sharer – to include EW.

Under MAGTF EW the Marine Corps is leveraging emerging technologies and integrating multiple aviation platforms (unmanned, fixed wing, tiltrotor, and rotary wing assets), payloads, ground-based EW nodes, and cyber capabilities to provide commanders with an organic and persistent EW capability – for every MAGTF – large and small.

Airborne electronic attack (AEA) capabilities post-EA-6B sundown will be provided by EW payloads such as the Intrepid Tiger II EW pod, UAS EW payloads, and the EW capabilities inherent to F-35. This integration of manned and unmanned airborne and ground EW capabilities will provide the MAGTF commander with greater flexibility and control of the electromagnetic spectrum – and in many cases giving that MAGTF commander a capability where previously they had none.

MAGTF EW assets will be modular, scalable, and networked, utilizing an open architecture that is rapidly adaptable and remotely re-programmable at the tactical level to support future Marine Corps warfighting requirements.

Cyber Operations

Marine Corps aviation will operate jointly with allied, coalition, and homeland security forces using information networks, each of which has varying security requirements. USMC fixed, rotary and UAS systems will be employed as information systems conducting intelligence, surveillance, and reconnaissance (ISR), cyber and EW operations over the EM spectrum. The ACE must continue to develop cyber strategy to protect and defend USMC airborne assets against kinetic and non- kinetic threats. The Marine aviation cyber S&T focus areas are:

1) **Cyber Security:** Develop technologies that facilitate rapid and secure information storage and sharing (down to the platform level) across multi-level security in joint and coalition operations during intermittent/limited connectivity, and in restricted and hostile environments.

2) **Full Spectrum Cyber Operations:** Develop situational awareness and visualization tools to understand the extent and status of cyberspace across the air, surface, and land domains in order to plan and execute cyber operations.

3) **Cyber Intrusion:** Develop technologies to protect information infrastructure from malware and other cyber threats by developing algorithms and techniques to detect, deter, or defeat the threats.

4) **Cyber Defense:** Develop technologies to holistically assure information through proactive defensive measures that are not limited to conventional areas such as multi-level security, real-time automated information guards and response, cross domain solutions, inter-domain authentication, encryption, intrusion detection, prevention, and response

Command and Control (C2)

The ACE will assimilate large volumes of information from airborne and ground tactical sensors distributed across air, land, sea, space, and cyber domains. The Common Aviation Command and Control System (CAC2S) is a major initiative for aviation command and control. CAC2S lays the foundation for an open architecture platform to fuse and visualize airborne, ground, logistics, and intelligence data. The ACE command and control capability must evolve to provide the MAGTF commander with the ability to make timely decisions, maintain situational awareness, coordinate and disseminate information to the joint and collation forces. Utilizing reliable tactical communication links, volumes of data will be transported and shared to provide an integrated seamless joint C2 system. The Marine aviation C2 S&T focus areas are:.

1) **Data fusion:** Develop technologies to fuse real, near, and non-real time data from airborne and ground sensors, and intelligence systems to provide operators with visualization tools for full situational awareness.

2) **Information Flow:** Develop technologies to converge service networks to allow information to flow seamlessly and data exchange across classified and unclassified networks and for joint and coalition operations to enable net-centric military operations.

3) **Secure Information:** Develop technologies to provide push/pull data across bidirectional intra-, cross-, and inter-domain authentication, encryption, and information assurance/integrity services.

Communication and Networks

Airborne communication networks provide the backbone to reliably exchange relevant information to/from airborne, ground, ship, and ground platforms. Marine aviation requires communication networks to connect all Marine fixed, rotary, and UAS platforms with joint defense and coalition forces.

Software Reprogrammable Payload (SRP) is a single common payload module that is flexible and reconfigurable to support simultaneous missions making maximum use of available bandwidth and ensuring interoperability within joint standards and protocols providing commonality across platforms. Equipped with SRP, airborne platforms act as communication relays for over horizon missions, and interpret, translate and relay heterogeneous waveforms to platforms distributed throughout the battlefield. Marine aviators in the cockpit or on the ground will operate mobile devices and smartphones over 4G or xG wireless protocols to provide up-to-date situational awareness using advanced visualization aids.

The communications networks S&T focus areas are:

1) **Software reprogrammable/cognitive payload:**
   - Develop an open architecture software programmable platform that supports multiple and emerging advanced tactical datalinks;
   - Develop cognitive technologies that enable payloads to sense the environment, select, and optimize waveforms to accomplish mission effectiveness based on predefined operational objectives.
2) **Advanced Datalinks:** Develop high frequency (HF), millimeter-wave, or laser communication networks to maintain over-the-horizon, air-to-air, and air-to-ground in a SATCOM limited or denied environment.
3) **Bandwidth Compression:** Develop compression or spread spectrum techniques to automatically transport large data files over limited bandwidths or over continuous or unused spectrum.
4) **Survivable Networks:** Develop mobile tactical wireless networks which dynamically self-heal, self-organize in contested, multi-level security, degraded communications and jamming environments.

Unmanned Systems

Marine aviation has successfully deployed and leveraged unmanned air systems (UASs) in combat operations. The demand for dedicated UAS systems will continue to increase. The air vehicle platform and its associated payload directly determine the effectiveness of the UAS system during mission engagements.

Group 1 - small UASs, Pumas, Wasp, and RQ-11 Raven – have excelled at providing ISR and communications relay but are limited in carrying larger and heavier payloads.

Employing larger UASs, such as the Group 3 RQ-21A, allows larger and heavier payloads with increased capability but still limited in providing effective electronic warfare and SIGNIT capability at long distances.

The Marine Corps intends to have its Group 4/5 UAS and unmanned cargo systems carry larger payloads with increase multifunction capability such as EW, cyber, radar, communications, kinetic and non-kinetic payloads and logistics support.

The Marine Corps intends to field a sea-basing Group 5 UAS.

The Marine aviation unmanned systems S&T focus areas are driving toward manned/unmanned teaming:

1) **Platforms:** Develop platform and energy technologies to enable UAS platforms to operate in all-weather environments, high altitudes, and long endurance operations from ship to maneuver.
2) **Payloads:** Develop modular, standards, and open architecture technologies to enable interchangeable UAS payloads such as electro-optical/infrared, electronic warfare, cyber, signals intelligence, synthetic aperture radar, communication relays, and laser designators.
3) **Autonomy:** Develop techniques to provide capabilities to reduce manning requirements, increase the level of autonomous decisions, reasoning, and learning in uncertain operational environments to successfully conduct complex mission tasks.
4) **Communications:** Develop secure communication datalinks to semi or fully control UAS over-the-horizon and line-of-sight with robust encrypted protocols. Develop common control station using iPad technology.

Directed Energy Weapons

The Marine Corps is actively pursuing directed energy weapons (DEW) to provide force protection against ballistic and cruise missile defense; defense against manned and unmanned aircraft; counter-sensor applications; counter-rockets, artillery, and mortar (C-RAM); counter-man portable air defense systems (C-MANPADS); and non-lethal defense. DEW enables speed of light engagement to the targets, provides an extremely lower cost per shot compared to bullets and missiles cost per shot, and provides continuous magazine capacity to defeat hostile UAS, missiles, or mortars. The Marine Corps and the Office of Naval Research are currently investing in a Ground Based Air Defense Capability (GBAD) DEW as a counter-unmanned air systems (C-UAS) role. Mounted on a tactical vehicle, the DEW is envisioned to utilize a combination of guns and missiles, command and control (C2), and radar cueing. Marine aviation is interested in pursuing airborne DEW capability for F35 fixed, V-22, CH53 rotary wing aircraft and unmanned air systems. The Marine aviation DEW S&T focus areas are:

1) **Power Generation and Energy Storage:** Develop power generation and energy storage systems to increase the wall-plug efficiency and reduce wasted heat and improve thermal efficiency.

2) **Laser Systems:** Develop solid-state lasers, fiber laser systems to increase power output by investigation dielectric materials, components, and power combining techniques while reducing the laser system volume, power consumption, and weight for medium to small aircraft.

3) **EM Systems:** Develop technologies to investigate EMP and high-power radio frequency (HPRF) technologies payloads for missile or unmanned air systems. for both offensive and defensive lethal and non-lethal effects.

4) **Integration:** Develop interfaces and techniques to integrate laser systems with existing air platforms, develop automated techniques to coordinate and integrate with kinetic and non- kinetic weapon systems.

Degraded Visual Environment

The Marine Corps is actively pursuing technology to mitigate risk in DVE. There are three critical aspects to reducing mishaps in DVE: hover stability, symbology/cueing and sensors. The ultimate technological solution would provide a stable geo-located hover capability, intuitive cueing to drift and obstacles, and sensors which can detecting and display obstacles (wires), terrain slope, or other hazards on approach, landing, takeoff and en route phases of flight. The intent is a capability that supports multi-ship simultaneous flight operations in obscured conditions (sand, dust, snow, fog, smoke, rain, flat light, night) in a GPS-denied environment.

It will also provide a takeoff, en route, approach and landing capability throughout all operational flight envelopes to include EMCON shipboard operations. The final goal is to significantly reduce pilot and aircrew workload to operate safely in DVE and transform adverse weather conditions into a tactical advantage on the battlefield. Marine aviation continues the evolution from “owning the night” to “owning the weather” in order to support ground operations 24/7/365.

The Marine aviation DVE S&T focus areas are:

1) **Advanced Sensors:** Develop compact light weight millimeter-wave and terahertz radar, and 3D flash or scanning LIDAR sensor technologies that leverage advancements in semiconductor devices and optics.

2) **Flight controls:** Develop advanced techniques that automatically eliminate drift and provide hover stabilization. Develop advanced algorithms that fuse sensor data with stored terrain data to provide a clear operational vision for landing on unpredictable terrain.

3) **Situational Awareness:** Develop visualization tools that provided the crew with clear and accurate symbology and visual aid for situation awareness for all types of brownout conditions.

AVIATION SCIENCE AND TECHNOLOGY STRATEGIC GUIDANCE

Aircraft Enablers

Marine aviation is also interested in pursing additional S&T initiatives for fixed, rotary, and UAS platforms.

1) Tiltrotor/Tiltprop: Develop advanced technologies for rotors/props as components of assault support propulsion as well as tactical UAS. As rotorcraft/helicopters requirements grow in terms of hover load and harsh environments (heat/dust/high altitude), as well as top-end speed (i.e., MV-22 escort), advanced rotor performance enhancement (dynamic blade shaping) will garner performance as well as efficiency (fuel/load savings).

2) Heavy Lift: Develop rotorcraft capability enhancements to sustain performance and improve high altitude operations. Develop lift technologies to provide lift well beyond this ambient pressure/temperature for all potential deployment locations. Develop technology that can increase vertical lift and increase operational radius.

3) Variable-speed air refueling drogue: Develop technologies that enable refueling drogues to refuel fast tactical aircraft as well as slower rotorcraft.

4) Platform Protection & Weapons: Develop technology supporting a family of low collateral damage/low energetic weapons. Existing methods of obtaining low collateral damage munitions include reducing the amount of explosive filler of existing weapons. Develop technologies to improve accuracy thereby reducing the risk of collateral damage when an appropriate lethality warhead and fuse are applied. Develop technologies that ensure weapon fusing and weapon yield is selectable from within the cockpit.

5) Composite materials: Develop technologies for health monitoring of composite structures enabling condition based maintenance and predictive failure of composite structures on aircraft in order to reduce time in depot-level maintenance facilities as well as reducing NDI inspections. The increased use of composite structures requires an enhanced capability to rapidly make repairs to these structures in all environmental conditions (heat, cold, sand, humid, etc.) Marine aviation is committed to high reliability in supply and parts, and to longer-life components.

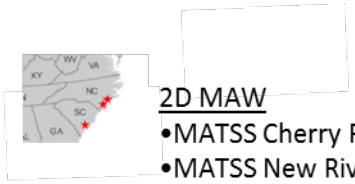
6) Lightweight De-ice/Anti-ice capability for aircraft: Develop technologies to provide a lightweight all de-ice/anti-ice capability for both rotor blades and fuselage that reduces both weight and electrical power requirements. Current de-ice/anti-ice capabilities are heavy due to power requirements for heating and wiring.

7) Manned/Unmanned Teaming : Create aviation options for commanders to use manned, unmanned, or a combination of the two.

8) Artificial Intelligent (AI) Systems: Develop AI technologies to enable optimally piloted aircraft providing commanders flexibility to fully man, partially man, or unman to use an aircraft as a UAS to best suit mission requirements. AI technologies could also provide intelligent cockpit systems increasing pilot effectiveness and enhancing Manned Unmanned Teaming.

2.13 MARINE AVIATION TRAINING SYSTEM (ATS) PLAN

1ST MAW ATS
- MATSS Iwakuni
- MATSS Futenma
- MATSS Kaneohe Bay
- MATSS Guam - TBD

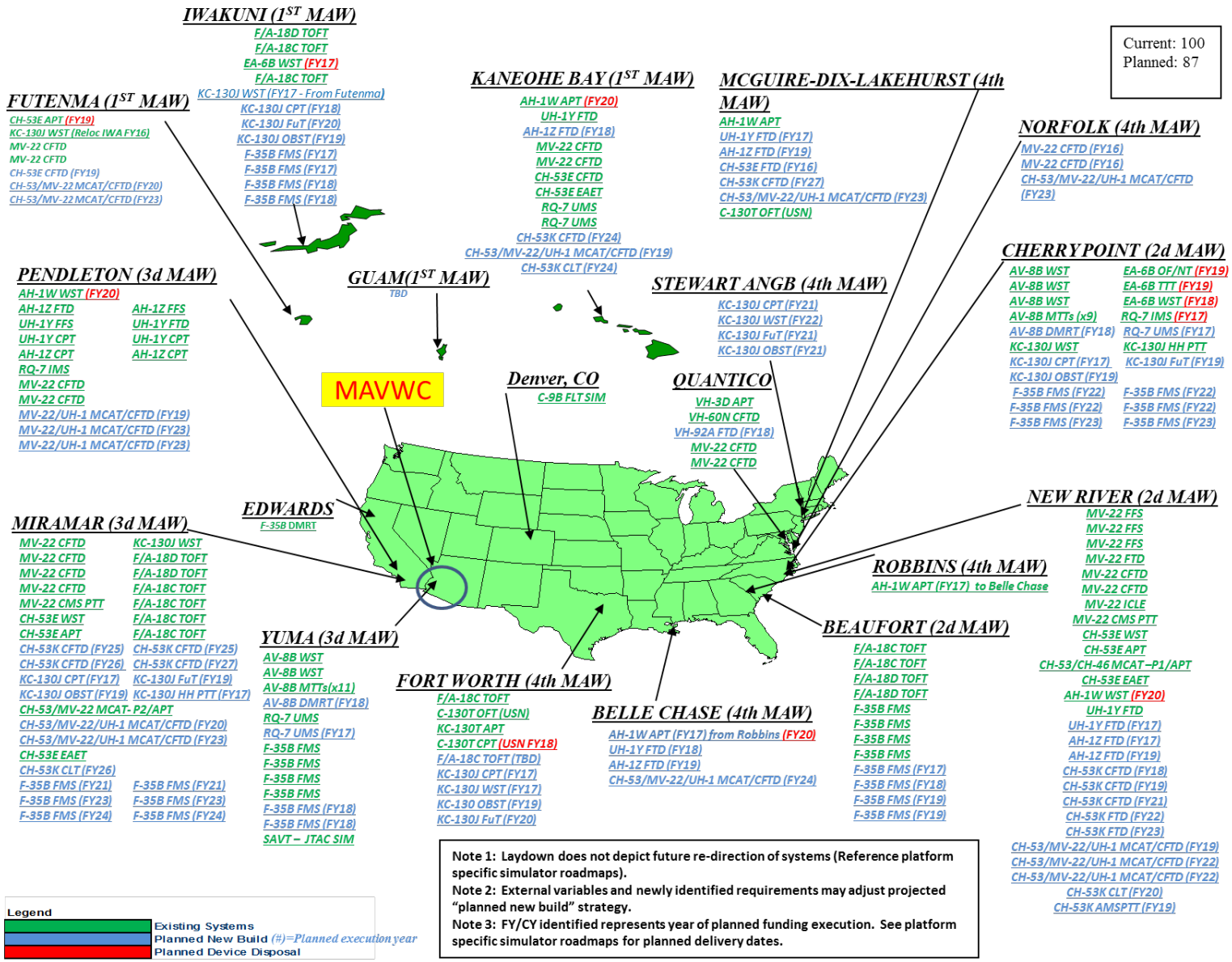


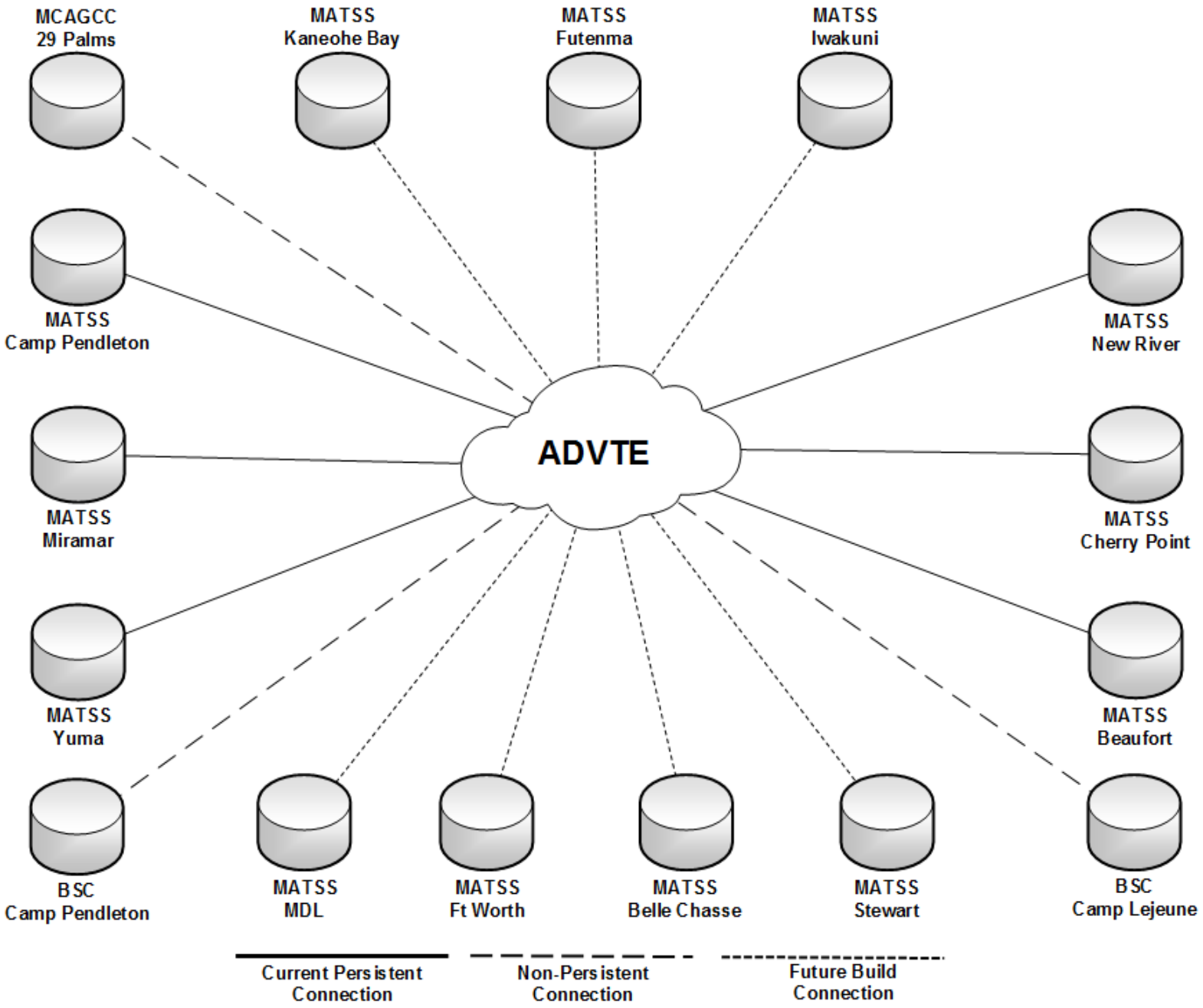
2D MAW
- MATSS Cherry Point
- MATSS New River
- MATSS Beaufort

3D MAW ATS
- MATSS Miramar
- MATSS Camp Pendleton
- MATSS Yuma

4th MAW
- MATSS Ft Worth
- MATSS JB McGuire-Dix-Lakehurst
- MATSS Norfolk

USMC SIMULATOR LAYDOWN




MCAGCC
29 Palms
MATSS
Kaneohe Bay
MATSS
Futenma
MATSS
Iwakuni
MATSS
Camp Pendleton
MATSS
New River
ADVTE
MATSS
Miramar
MATSS
Cherry Point
MATSS
Yuma
MATSS
Beaufort
BSC
Camp Pendleton
MATSS
MDL
MATSS
Ft Worth
MATSS
Belle Chasse
MATSS
Stewart
BSC
Camp Lejeune
Current Persistent Connection
Non-Persistent Connection
Future Build Connection

AVIATION TRAINING SYSTEM (ATS) PLAN

Aviation Training System (ATS) Plan

A combination of challenging operational environments, decreasing training resources and budgets, and a lower deployment to dwell ratio, requires Marine aviation to focus its training more effectively and efficiently to achieve and sustain the highest levels of combat readiness. The USMC Aviation Training System (ATS) integrates Marine aviation training processes and structures into a single, integrated training system; links training costs with readiness; and spans all Marine aviation communities. A properly integrated training system requires evolving institutionalized processes that support our missions and provide on-time delivery of tactically relevant training. With training and readiness (T&R) as its foundation, ATS provides the MAGTF commander with core and mission skill proficient combat ready units. Integrated ATS processes, governed by policy and supported by appropriate resources, provide the catalyst for incremental training system improvements. ATS integrates and coordinates policy, manpower, equipment, and fiscal requirements of post initial accession training for Marine aviation officers and enlisted personnel as well as initial accession aircrew training (Core Skill Introduction) for aviation units that conduct T/M/S specific aviation training (e.g. Fleet Replacement Squadron (FRS) or Fleet Replacement Detachments (FRD)). ATS processes and procedures shall be applicable to all current and future Marine aviation training programs to include naval or joint-level programs in which the USMC participates. ATS is outlined in the governing policy MCO 3710.6B NAVMC 3500.14C. The ATS Systems Approach to Training (SAT) model is depicted in the following figure:

ATS Focus

ATS integrates processes and programs for training that institutionalize "operational excellence" across Marine aviation. "Operational excellence" involves increased combat readiness and preservation of personnel and assets – risk mitigation through reduction in mishap causal factors from supervisory, procedural, and human error. T&R manuals are source documents for implementing ATS. ATS is intended to:

1) Provide operational commanders with a current, responsive and relevant training system for aircrew, aircraft maintenance, aviation ground support and C2 personnel.

2) Develop a holistic training system across every Marine aviation community throughout the training continuum that supports aircrew (pilot/NFO/enlisted), operators and maintainers.

3) Help proliferate standardization within the Marine aviation communities.

4) Develop concurrency management processes to ensure the training system (curriculum, courseware and training devices) remains relevant.

5) Address training and safety issues through SAT derived curricula and improved use of Risk Management (RM) and Crew Resource Management (CRM) principles.

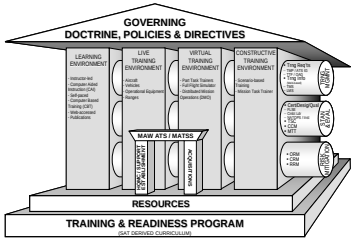
6) Utilize Marine Aviation Training System Sites (MATSS) to facilitate the ATS program.

ATS Processes

ATS is process intensive and includes the following:

Flight/Combat Leadership Standardization and Evaluation: process of training toward and achieving certifications, qualifications and designations consolidated and standardized, under the MAW ATS structure in accordance with platform and community T&R Manuals and the MAWTS-1 governing Program Guides. It is applicable to both flight leadership and non-aircrew certifications, qualifications, designations, contract instructor (CI) certifications, Naval Air Training and Operating Procedures Standardization (NATOPS) Instrument training and evaluation, as well as recurring generic training such as Instrument Ground School (IGS), Crew Resource Management (CRM), Risk Management (RM), and basic Navy Occupational Safety and Health (NAVOSH) or Naval Aviation Maintenance Program (NAMP) training.

Concurrency Management (CCM): process whereby a change in tactics, aircraft/operational systems configuration, publications or procedures is evaluated to identify the impact of the change on T&R requirements. The T/M/S Simulator Essential Equipment Support Matrix (EESM) is an MCO 3500.14 mandated requirement that helps identify, track, and report simulator shortfalls. Once highlighted, appropriate and timely changes are made to curricula, courseware, and devices to ensure alignment with operational systems and doctrine.



AVIATION TRAINING SYSTEM (ATS) PLAN

Training Information Management Systems:

process that integrates the employment of multiple information systems under a training information architecture. Resources that support the management and integration of training information are Training Management Systems (TMS), Learning Management Systems (LMS), and the ATS SharePoint maintained by Aviation Standards Branch (ASB) at TECOM. https://www.intranet.tecom.usmc.mil/hq/branches/atb1/ATS/default.aspx .

The TMS tracks T&R progression and helps commanders ensure that training is conducted in accordance with appropriate orders and regulations; currency and qualification requirements are met; and RM principles are properly applied. The TMS for aircraft maintenance training is the Advanced Skills Management (ASM). Marine Sierra-Hotel Aviation Readiness Program (MSHARP) is the authorized aviation training management system to be used to track all training governed by aviation T&R manuals. The only exception is F-35B, which utilizes the Autonomic Logistics Information System (ALIS). An LMS functions as an electronic repository of specific courseware and technical manuals. The LMS for Marine aviation is the Marine Corps Aviation Learning Management System (MCALMS). The ATS website serves as a CAC enabled portal for access to other resources and training information management systems such as the LMS.

1) **Risk Mitigation:** process that includes risk assessment, risk decision making, and implementation of effective risk controls. Emphasis placed on risk mitigation and aviation fundamentals during all aspects of training is required in developing and fostering a climate that promotes flight discipline and adherence to established procedures and requirements. Such a climate leads to operational excellence and mitigation of mishap causal factors. Training devices allow the control of specific elements in scenarios that enhance the exercise of risk management abilities. Risk mitigation is a by-product of professionalism and safe practices, and must be stressed in all aviation training.

2) **Training Management Process (TMP):** provides an effective forum for the operating forces to identify training issues across the DOTMLPF spectrum as the impetus for requirements generation and training improvement. The TMP helps determine common solutions to aviation training issues, eliminating redundant, "stovepipe", solutions which are wasteful and inefficient. The TMP is focused on the needs of the warfighter through platform and community training management teams (TMT) and supported by Headquarters U.S. Marine Corp, Deputy Commandant for Aviation, Naval Air Systems Command , and industry.

ATS/MATSS MISSIONS:

ATS Mission: Provide resources, processes and policies that deliver a standardized, responsive, cost effective and integrated training system focused on tactically relevant training in order to provide combat ready aviation capabilities to the MAGTF and joint commander.

MATSS: The primary focus of each MAW's ATS is the Marine Aviation Training System Site (MATSS). It directly supports execution of ATS functions for the fleet. While ATS as a whole is process intensive, the MATSS is resource and product intensive. ATS resources available at the MATSS include simulators and training devices, web-based training and learning management systems, academic courseware, electronic classrooms, and the military, civilian and contractor manpower to support, analyze, and provide input to improve training system performance. MATSS contribute the following to the ATS process: 1) simulator and academic resource usage optimization; 2) flight leadership standardization and evaluation (FLSE) support; and 3) aircraft platform and community training management team (TMT) issue advocacy. The MATSS construct has migrated across Marine aviation in the active and reserve components at thirteen sites. ATS products are continually analyzed for ways to improve Marine aviation unit readiness and technically refreshed appropriately to meet the demand for changes in the aviation training continuum with advancing technology. With increased ATS awareness, the ability to leverage common solutions, coordinate and pool critical resources, and support combat leadership development across the various platforms and communities has improved exponentially. The result is two-fold: significant cost savings and cost avoidance by using a robust SAT process by freeing funds for other requirements, and an enhanced training capability that substantively increases reportable combat readiness across Marine aviation and the MAGTF.

Training Future / Summary

For Marine aviation, ATS is risk mitigation that presents a game-changing opportunity. The USMC ATS MATSS shall be staffed with high quality uniformed FLSEs, Weapons and Tactics Instructors, and strike fighter tactics Instructors, as well as GS and contractor civilian support (device operators, fielded training system support personnel, contract instructors in support of all FRS and FRD activities) to ensure the functions of ATS are carried out with success and overall combat readiness is improved across the MAGTF.

MCASMP Requirements

All new simulators function as a system of tactically relevant networked trainers. All new simulator procurements shall be compatible with this Simulator Master Plan at a minimum. The following are standing requirements:

1) CONUS bases: one section of networked simulators

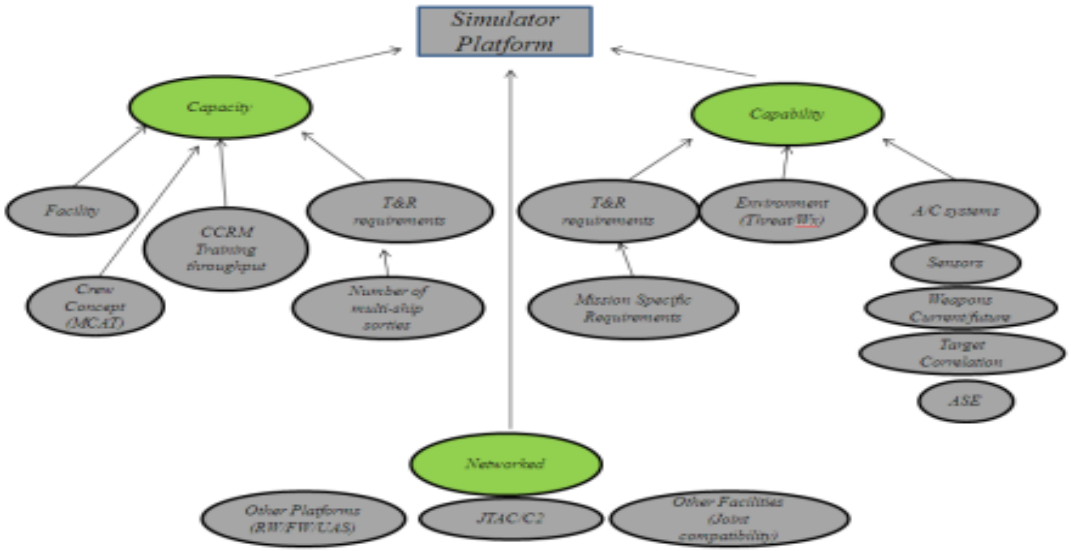
2) OCONUS & reserve bases: minimum of one simulator

3) Marine Corps Common Visual Data Base (MCCVDb) via Navy Portable Source Initiative (NPSI) and in the future be able to run a USMC Common Synthetic Training (CSTA)

4) Tactical Environment (TEn), one per flight device : threat, emitters, emissions, weapon flyouts, USMC and joint air/ground interoperability

5) Common hardware approach across all T/M/S and community simulators to ensure a high fidelity, cross domain, platform and community distributed mission networked training capability is possible with other MAGTF and joint entities.

6) Developed IAW current and/or draft T&R, Maneuver Description Guides (MDG), and NATOPS manuals



The MCASMP is intended to reduce overall procurement and sustainment training costs by procuring training devices and training media (courseware and curricula) with common hardware and software systems. The idea is to avoid the cost of developing new or platform unique type-systems; to pursue only the most promising developmental and mature technologies for training; and mitigate operational risks.

The Marine Aviation simulator strategy outlines an increased reliance on simulation to augment flight training and provide improved readiness. The foundation for simulator key performance parameters will be based on the ability of the training device to provide and support a multi-ship capability for similar and dissimilar platforms, the integration of aircrew training, and the ability for aviation systems to be networked with other aviation, ground, and future C2 systems to support MAGTF level integrated training. At the micro-level, the ability of CONUS and OCONUS systems to satisfy capacity, capability, and networking requirements will be essential for achieving the end state of enhanced pilot and aircrew simulator training (Reference Figure 1.0).

Fully integrated implementation of the MCASMP will foster a tipping point for Marine aviation, whereby the aviation community accepts the full capacity and ity of networked, high fidelity training systems as the “norm”. Its use is NDED as part of complex, persistent, and scalable pre-deployment mission sal training always by every unit in the fleet.

MARINE AVIATION DISTRIBUTED VIRTUAL TRAINING ENVIRONMENT (ADVTE)

Aviation Distributed Virtual Training Environment (ADVTE) is a Marine aviation-specific network

1) ADVTE is an encrypted, closed-loop, persistent, simulation network under USMC administrative and operational control .

2) Enables interoperability between multiple USMC Aviation Training Devices to facilitate distributed mission training.

3) Provides capability to link and train virtually with other services, Joint Training and Experimentation Network (JTEn), Joint Strike Fighter (JSF), and MAGTF GCE Trainers/Equipment

4) ADVTE Wide Area Network simulation data packet traffic moves across Marine Corps Network Operations and Security Command's (MCNOSC) Marine Corps Intranet (MCI) circuits and connects the base ATS training locations.

Designated MCNOSC controlled network = Persistent Wide Area Network (WAN) circuits that all ADVTE data traffic (visual/audio) travels acrossBase

Demarcation Point (DEMARK) = Provides the bridge node to move off station

NODE* = Secondary/Tertiary connection points (nodes) used as required to bridge to DEMARK

A future initiative for ADVTE is to connect and interface with the Joint Information Operations Range.

Network Exercise Control Center (NECC) is the training system connectivity "Hub"

1) Provides instructor/operator and observer stations and Tactical Environment (TEn) functionality

2) Provides 2D/3D visualization from any geographic location or tactical environment entity.

3) Provides simulated tactical radios with the ability to communicate on multiple nets, point to point VTC Capability.

4) Digitally capture data streams from selectable audio and video channels to support joint brief/de-brief requirements.

5) Integrates with existing Deployable Virtual Training Environment (DVTE) capability.

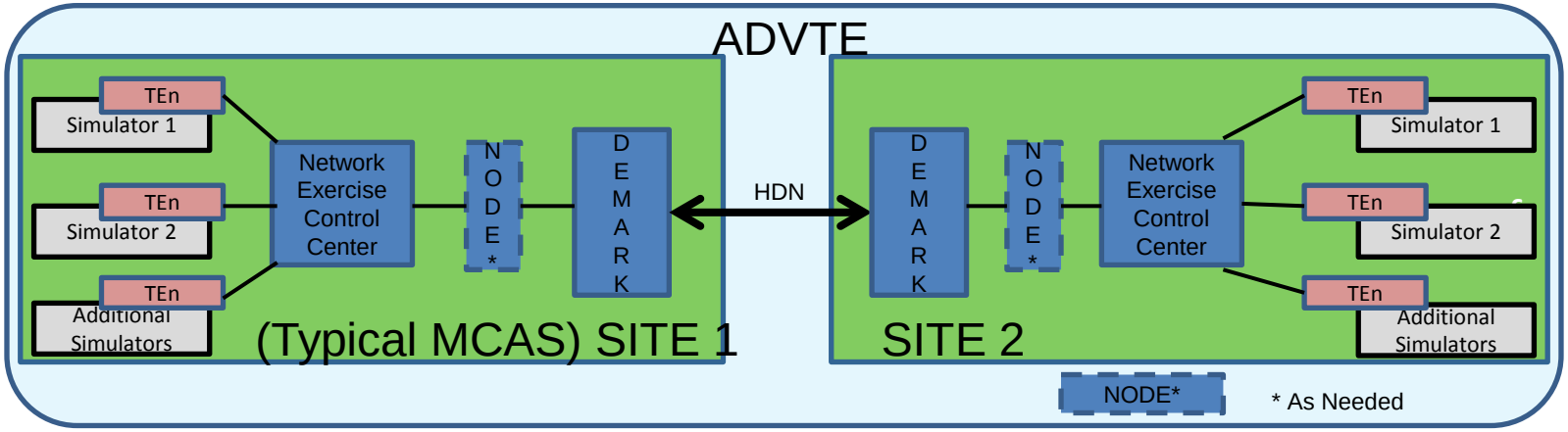
Tactical Environment (TEn) is a non-proprietary software application that models a variety of threat systems, sensors, emissions, and weapons.

1) USMC "owned" TEn provides doctrinally relevant, physics-based, real-time modeling and threat correlation.

2) TEn is an HLA (High Level Architecture) compliant networking gateway with Federation Object Model (FOM) compatibility with both JFCOM and NASMP FOMs.

3) Provides simulators with the capability to link to same site or offsite systems through the NECC.

4) TEn Version 4.0 is currently available and operational; Ten v5.0 is in the installation process.. It will be the new baseline required for ADVTE connectivity (Designed to be backwards compatible with v4.0 to support transition).



MARINE CORPS COMMON SYNTHETIC TRAINING AREA

Concept of the Common Database

The concept of the Marine Corps Common Visual Database originated from the Marine Corps Aviation Simulator Master Plan (MCASMP) policy, which required all newly acquired Marine Corps Aviation Training System simulators to function together as a system of tactically relevant networked trainers, when linked. The first common databases was initially developed for and installed in a series of five Weapon Systems Trainers (WSTs) delivered to the USMC under the MCASMP procurement in the mid-90's. The term common database identified the collective East Coast and West Coast United States visual databases installed in those same five WSTs. Under the MCASMP program, these five trainers were produced by the same contractor and, consequently, included a common visual system solution which included a common image generator (IG), display system, and run-time visual databases. The databases installed in each WST were exact copies of each other and were rendered and displayed by image generators and projectors of the exact same make and model. As a result, the training scenes presented to the trainees across these five training systems were correlated to each other. That was the origin of the common visual database concept.

The common visual database provides ATS simulators with commonality with respect to the following visual/sensor database content and features:

1) Geographic region
2) Terrain surface (terrain mesh and elevation)
3) Imagery (two dimensional surface features)
4) Fixed 3D features (buildings, vertical obstructions, etc.).
5) Landing Zones (LZs, CALs, etc.)
6) Terrain flight (TERF) routes
7) Moving models, ground and aviation
8) Material attribution (not derived from NPSI)

Currently, the MCCVDb is comprised of a set of catalogued stand-alone individual databases corresponding to the following geographic regions:

1) Eastern United States
2) Western United States
3) Western Pacific (Westpac)
4) Afghanistan
5) Iraq and the Gulf
6) Horn of Africa (HOA)
7) Southeast Asia (4 Quadrants)
8) Hawaii (under development)
9) Other regions (small DBs)

MARINE CORPS COMMON SYNTHETIC TRAINING AREA

A common synthetic training area will enable robust, realistic, virtual MAGTF training

Visual database fidelity and content correlation remain key issues to optimize to ensure optimal scene accuracy and interoperability across networked simulators. The introduction of non-aviation training systems into distributed missions operations and networked training increases the complexity to ensuring aviation simulators can be successfully network with simulators designed to train ground forces thereby creating a seamless, virtual, tactically relevant MAGTF training environment and form a robust LVC training construct capable of supporting high value integrated virtual MAGTF training.

Moving forward:

1) Improvements to the current common visual databases, culminating in one common synthetic training area, consisting of new geographic regions, and updated source files, in order to support MAGTF virtual training.

2) This Common Synthetic Training Area will evolve in terms of geographic regions available and improved fidelity and content - specifically with regard to imagery resolution and available database features.

The Goal:

To further develop a single source, common visual database, a USMC Common Synthetic Training Area (CSTA), that will be woven together from existing and future identified source code which is run time corrected for ATS Networked Devices and of sufficient fidelity to enable “fair fight” correlated simulated training environments. This environment will not only be used in the USMC ATS but across the MAGTF and joint services solutions to promote interoperability within ATS, the USMC GCE and Joint Distributed Mission Training (DMT) Circuits. Efforts by HQMC AVN Weapons Requirements Branch, MARCORSYSCOM, NAVAIRSYSCOM, and TECOM will continue to develop an acceptable CSTA solution with the GCE as well as with the joint and multi-national partners. Distributed mission training environments incorporating common arenas will yield a limitless enhanced combat readiness training experience. Initial developmental focus will be in the southwestern United States with synthetic augmented operational environments embedded to represent non-native other terrain and environments with maximum fidelity.

MARINE AVIATION VIRTUAL WARFIGHTING CENTER (MAVWC)

The MAVWC construct will bridge the gaps between live and synthetic training for groups as small as detachments to as large as a Marine Expeditionary Force Air Combat Element. It will support individual and unit collaborative training and mission rehearsal based upon existing aircraft/community T&R manuals . It will leverage existing mandated academics, theoretical application, and weapon systems employment. This will be accomplished by leveraging technology to link or network simulators/training devices together in a classified training environment for the accomplishment of prescribed T&R requirements. The MAVWC will be Marine Aviation's large-scale warfighting center that has the capacity to train numerous units simultaneously using detailed scenario-based missions to achieve the highest possible level of collaborative training and operational integration. It will provide for maneuver space in training and mission rehearsal for Marine Aviation combat units. It will allow for networked similar and dissimilar simulators/training devices, both co-located and geographically separated, in order to support Marine Corps T&R event training/mission rehearsal, ultimately achieving exponentially increased combat readiness.

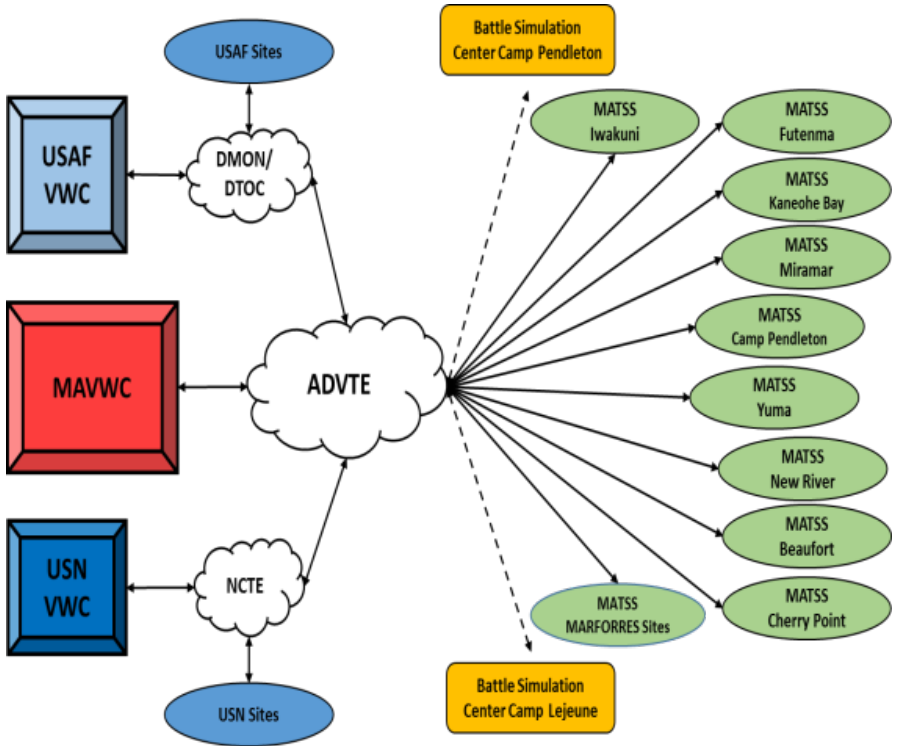
1) Provides a foundation for the integration and interoperability of aviation and ground simulation to achieve true Marine Air Ground Task Force (MAGTF) Live Virtual and Constructive (LVC) training per the United States Marine Corps Commandant's FRAGO 01-2016.

2) Tactics, test, and fleet units will be able to develop new or improve TTPs in which to counter existing or developing threats.

3) System Integration Laboratory (SIL) capabilities co-located with simulators/training devices can assist in the development and testing of future aircraft and weapon system integration and interoperability.

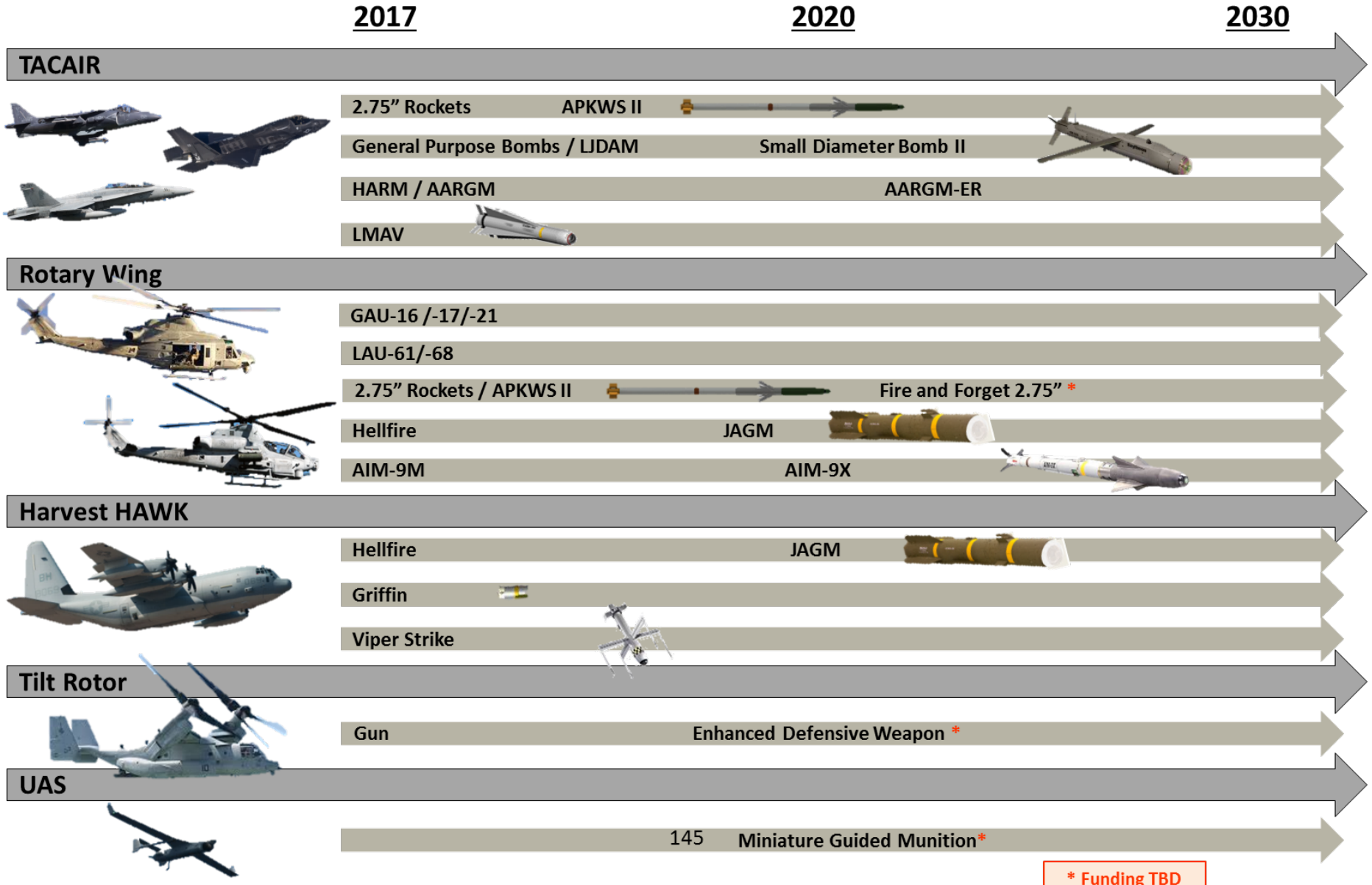
4) Increase current and future readiness at the MAGTF level by increasing repetitions and sets in the most challenging and dynamic environments.

The MAVWC will create a Virtual Warfighting Center on par with the Air Force (Nellis AFB) and the Navy (NAS Fallon). The capability to conduct large-scale (various units) aviation training events to facilitate integrated training will allow the Fleet Marine Force to become more collaborative in T&R training, thereby improving their combat readiness proficiency. It will allow for increased risk taking using aggressive risk management to execute the mission safely, emphasize higher order cognitive processes in complex full spectrum operations, and enable rapid decision-making and effective Command and Control (C2). This will ultimately allow a commander to evaluate a units performance in following commander's intent, mission accomplishment, and the determination of mission critical success factors. Realistic training tools, models, and simulations enable the capability to practice the collaborative planning, decision-making, and execution processes and procedures. MAVWC training will provide high quality realistic, MAGTF level training that is essential to ensure future Marine forces are adequately trained to conduct the six functions of aviation and maintain the highest level of combat readiness.



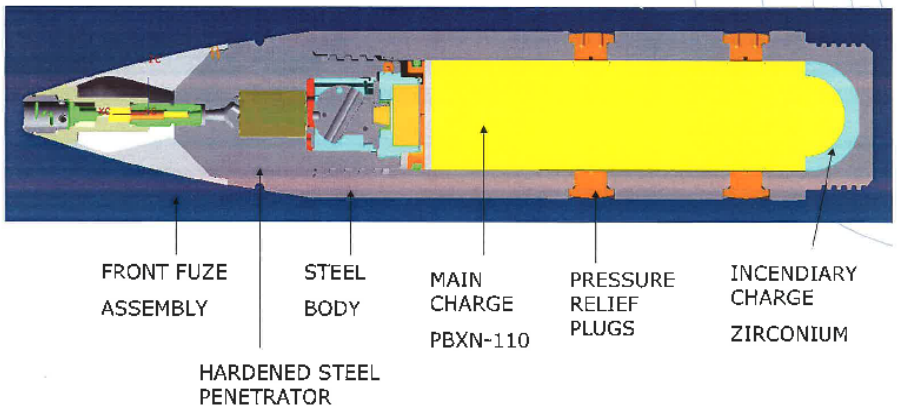
2.14 MARINE AVIATION WEAPONS AND MUNITIONS PLAN

Every platform a shooter



2.14 MARINE AVIATION WEAPONS AND MUNITIONS PLAN

Marine aviation continues to develop and procure weapon systems that will increase lethality and survivability for the warfighter. Our focus of effort is to pace enhancements to the USMC weapons portfolio with platform advances by leveraging technology in order to achieve precision, discrimination, lower weight, increased kills per sortie, and commonality wherever appropriate.



M282 MPP Warhead

Rockets:

The Advanced Precision Kill Weapon System II (APKWS II) combined with the Mk152 warhead in its all-up-round configuration has been designated AGR-19A.

New Initiative

APKWS II integrated with the M282 Multi-Purpose Penetrator (MPP) warhead is a low-cost PGM capable of defeating light-armored vehicles and hardened structures. The M282 MPP warhead is a 2.75-inch 13.7 pound penetrating and incendiary warhead delivering penetration (40" reinforced concrete or 1" of steel), blast (over 1500 fragments), and incendiary effects (2000˚F due to zirconium). APKWS II's nearly 90% hit rate, coupled with the M282 MPP warhead will provide a lower yield and lower cost choice for attacking targets otherwise serviced by Hellfire missiles or guided bombs, and provide more stowed-kills per sortie. HQMC anticipates M282 integration on H-1s with IOC in Summer FY17.

Future Requirement

Marine aviation will continue to leverage APKWS II success by developing APKWS II for TACAIR. The AV-8B was the first TACAIR platform to integrate APKWS II in April 2016 using a Rapid Development Capability during Operation INHERENT RESOLVE. The F/A-18 will also be gaining APKWS II, complementing GBU-12 and Laser Maverick with a lower collateral damage weapon providing more kills per sortie.

Missiles:

New Initiatives

To address TACAIR's operational need for additional forward-firing missiles, more than 500 legacy AGM-65F Infrared (IR) Mavericks are being converted into modernized AGM-65E2 Laser Mavericks. These conversions will nearly double the current inventory of Laser Mavericks. The AGM-65E2 seeker provides F/A-18 and AV-8B with increased self-designation capability, greater chance of laser spot re-acquisition if lost due to obscurants, and a more accurate laser spot scan than the AGM-65E seeker.

2.14 MARINE AVIATION WEAPONS AND MUNITIONS PLAN

The AIM-9X Block II Sidewinder adds a lock-on-after-launch capability with data link, allowing it to be launched and then guided to a target for 360 degree engagements. The Block II+ variant will meet future requirements.

The AIM-120 Advanced Medium Range Air-to-Air Missile (AMRAAM) allows TACAIR platforms the ability for a single aircraft to engage multiple targets simultaneously through the use of its own active RADAR for terminal guidance. The AIM-120D variant will provide further refinements through the inclusion of an internal GPS, an enhanced data link, improved software, and improved range and speed.

Advanced Anti-Radiation Guided Missile – Extended Range (AARGM-ER) will incorporate a new rocket motor onto AARGM in order to improve range and survivability. AARGM-ER is fully-funded for F/A-18E/F and IOC is expected in FY23, with F-35B/C objective platforms.

The Joint Air-Ground Missile (JAGM) program is fully funded and recently passed the Milestone B Defense Acquisition Board. JAGM incorporates a dual-mode semi-active laser (SAL) and millimeter wave (MMW) seeker with a multi-mode fuze (height of burst, delay, and point detonate). The shaped-charge warhead has blast-frag capabilities that increases lethality. Survivability will be improved in JAGM by an increased launch

acceptability region and countermeasure resistance versus HELLFIRE. The MMW guidance can be activated while still on the aircraft giving the operator a fire-and-forget capability. JAGM will replace all variants of HELLFIRE and will be capable of destroying armor, maritime craft, bunkers, and buildings, with an expected IOC on AH-1Z in FY19.

Bombs:

New Initiatives

The AGM-154 Joint Stand-Off Weapon (JSOW) C-1 is a net-enabled weapon that provides a Moving Maritime Target (MMT) capability with stand-off. JSOW C-1 will IOC on F-35C in FY23.

The GBU-53 Small Diameter Bomb II (SDB II) is a 250-pound class, precision-guided, all-weather munition, eight of which the F-35B and C will carry internally. SDB II is a gliding, stand-off, direct-attack weapon suitable against fixed and moving targets in day, night, and adverse weather. It is network-enabled, utilizes a tri-mode seeker with SAL, MMW, and Imaging Infra-Red (IIR), and will IOC on the F-35B in FY21.

JAGM

JAGM fuzed for Height of Burst

Guns:

New Initiative

The GAU-21 Common Defensive Weapon System (CDWS) improves reliability, lethality, and rate of fire. GAU-21 CDWS prototype procurement begins in FY15 for MV-22 and FY16 for CH-53K.

Future requirement

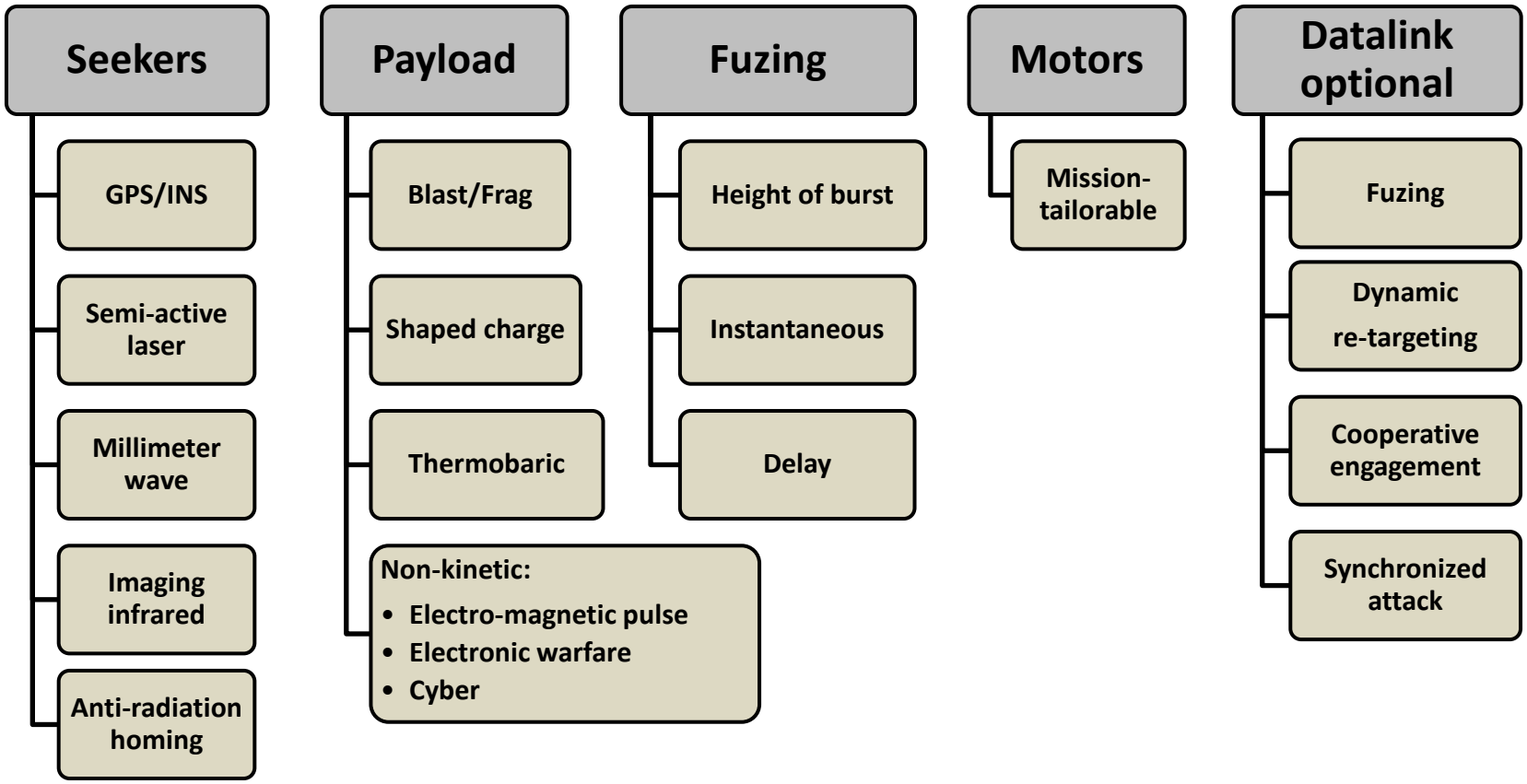
HQMC, in conjunction with NAVAIR, is researching improved 20mm and 25mm ammunition for air-to-ground delivery. Potential capabilities include improved point detonation, increased armor penetration, and incendiary effects.

Future Weapon Requirements:

Investment in weapons requirements for the future must leverage modular classes of weapons in order to support operations ranging from crisis response to major combat operations. Weapons modularity will permit the flexibility required to support the combatant commander's distributed forces with tactical flexibility.

2.14 MARINE AVIATION WEAPONS AND MUNITIONS PLAN

Weapon Modularity



1) Increased kills per sortie
2) Economies of scale
3) Maximize ship's fill space
4) Low cost
5) Counter measure resistant
6) Open architecture / Reprogrammable
7) Common launchers / racks / LAUs

FUTURE WEAPONS EMPLOYMENT

The future Marine Expeditionary Force will require an assortment of light-weight precision weapons with scalable lethality. As the MAGTF becomes digitally interoperable, Marine aviation will become more lethal through net-enabled weapons that take advantage of our ability to out-pace our adversaries.

Improved lethality and stand-off with net-enabled weapons

The low-visibility F-35B with a payload of eight SDB II bombs carried internally will provide the MAGTF with a stand-off, all-weather capability against enemy C4I nodes, surface to air threats, and vehicles.

F-35

MV-22

F/W and R/W teaming

Digital interoperability within the MAGTF will create a dilemma for our adversaries. Fixed- and rotary- wing platforms, UAS, cyber, land, and space will work in parallel to detect and destroy targets that previously enjoyed sanctuary.

F-35

UH-1Y

AH-1Z

TACP

FARP / Distributed STOVL Operations (DSO)

The SDB II and other net-enabled weapons will be transportable by MV-22s. The reduced weight of future weapons will provide improved battlefield lethality by supporting DSO when requested.

SPMAGTF-CR Operations

Enhanced offensive weapon systems on the MV-22 will provide increased capabilities for the SPMAGTF-CR and employment options to the combatant commander.

Enhanced Cooperation on Carrier Operations

JSF and MV-22B interoperability with HMS *Queen Elizabeth* and LHD-class ships will provide robust and flexible maritime power projection for allied forces.

Improved JTAC networking

Net-enabled communications will provide increased situational awareness to the ground combat element. Radio frequency (RF) round counters integrated with digital CAS applications will provide real-time updates to JTACs.

2.15 AIRCRAFT SURVIVABILITY EQUIPMENT PLAN

The Marine Corps aviation vision for ASE is to equip all USMC aircraft with integrated aircraft survivability equipment (IASE) systems . IASE uses modular, open system architectures that are optimized to ensure survivability across the platform's full range of operations, providing threat engagement information and situational awareness across the digital battlespace.

Current baseline mission sensor capabilities equip Marine Corps fixed-wing, tiltrotor and rotary-wing aircraft with a variety of situational awareness (SA) and countermeasure capabilities in the radio frequency (RF) and electro-optic (EO)/infrared (IR) spectrums. Many of these capabilities are aircraft platform-specific solutions that support each platform's required operational threat environments and contribute into platform tactics, techniques and procedure (TTPs) for susceptibility reduction.

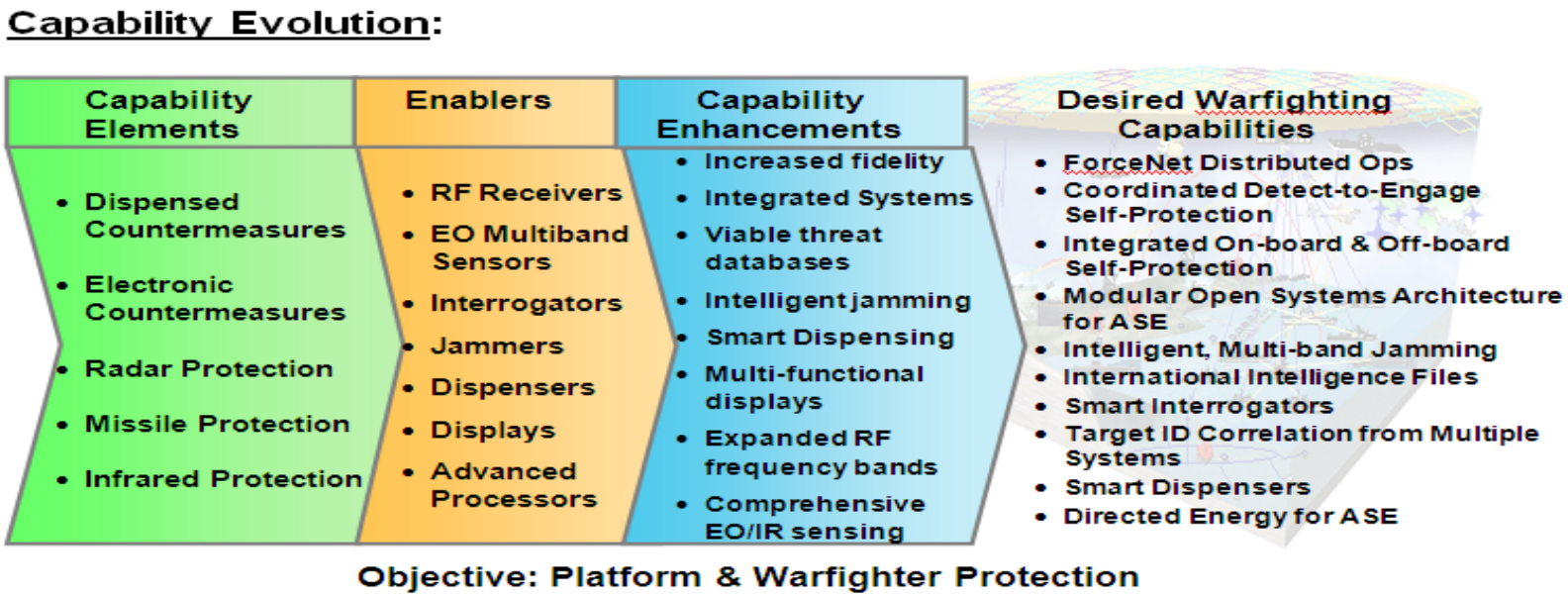
HQMC aviation collaborates with numerous DoD and service-specific entities, including MAWTS, NAVAIR, PMA272, Joint Electronics Advanced Technology (JEAT), service aviation training commands (NSAWC), Joint Aircraft Survivability Program Office (JASPO), all service laboratories (DARPA, NRL, ONR, AFRL and ARL), and other services' science and technology development organizations to achieve desired goals

ASE Concept and Capabilities

Achieve susceptibility reduction through radio frequency (RF) confusion, prevent self-identification, create deceptive targets, detect radar signals, threat signatures, threat lasers, identify hostile radar detectors and detect ballistic events (such as guided missiles, unguided rockets and unguided ballistic fires, i.e. hostile fire).

Address aircraft survivability equipment (ASE) for electronic support (ES), electronic attack (EA) and advanced electro-optic/infrared (EO/IR) sensing that enable platforms to successfully conduct operations in a battlefield.

Employ training tactics and procedures (TTPs) and countermeasures against threats using directed RF and IR jamming, chaff dispensing, flares, decoys or other obscurants that prevent hostile weapons system effectiveness.



MARINE AVIATION ASSAULT SUPPORT ASE PLAN

The AAR-47 Missile Warning System (MWS) is an electronic warfare system designed to protect aircraft against IR guided missile threats, laser-guided / laser-aided threats and unguided munitions. Upon detection of the threat, the system will provide as audio and visual sector warning to the pilot. For IR missile threats, the system automatically initiates countermeasures by sending a command signal to the Countermeasure Dispensing Set. The AAR-47 is currently deployed on MV-22B, AH-1W/Z, UH-1Y, and CH-53E aircraft

The AAQ-24 Department of Navy (DoN) Large Aircraft Infra-Red Countermeasure (DAIRCM) system is an advanced Missile Warning System (MWS), Laser Warning, and Hostile Fire Indicator "front end" and directed energy, Guardian Pointer Tracker (GPT) IRCM "back end", to be fielded on the CH-53E/K, KC-130J, and MV-22 aircraft. The Advanced Threat Warner (ATW) upgrade will provide aircrew with improved situational awareness using advanced two color IR MWS sensors to detect IR guided missiles (e.g. MANPADS), hostile fire (AAA, small arms/RPGs), and Band A/B lasers and hand-off threat information to IRCM (GPT, flares.) The current size and weight of the GPT and Central Processor excludes AAQ-24 as a suitable IRCM solution for smaller aircraft (H-60/H-1).

The ALE-47 Countermeasure Dispensing Set (CMDS) receives threat data from the aircraft's survivability sensors (MWS or RWR), and then selects the appropriate response to the threat in terms of expendables to be employed (Chaff and/or Flares), dispersal sequence and pattern, and when to dispense the selected expendables

The Distributed Aperture IRCM (DAIRCM) is a light weight MWS and integrated IRCM being developed by NRL under an FY04 ONR FNC with additional risk reduction funding from PMA-272. This system has been OSD approved in response to JUUONS SO-0010 and is a viable path forward as a Program of Record for the H-1 community offering significant savings in size, weight and power (SWaP) as well as cost avoidance.

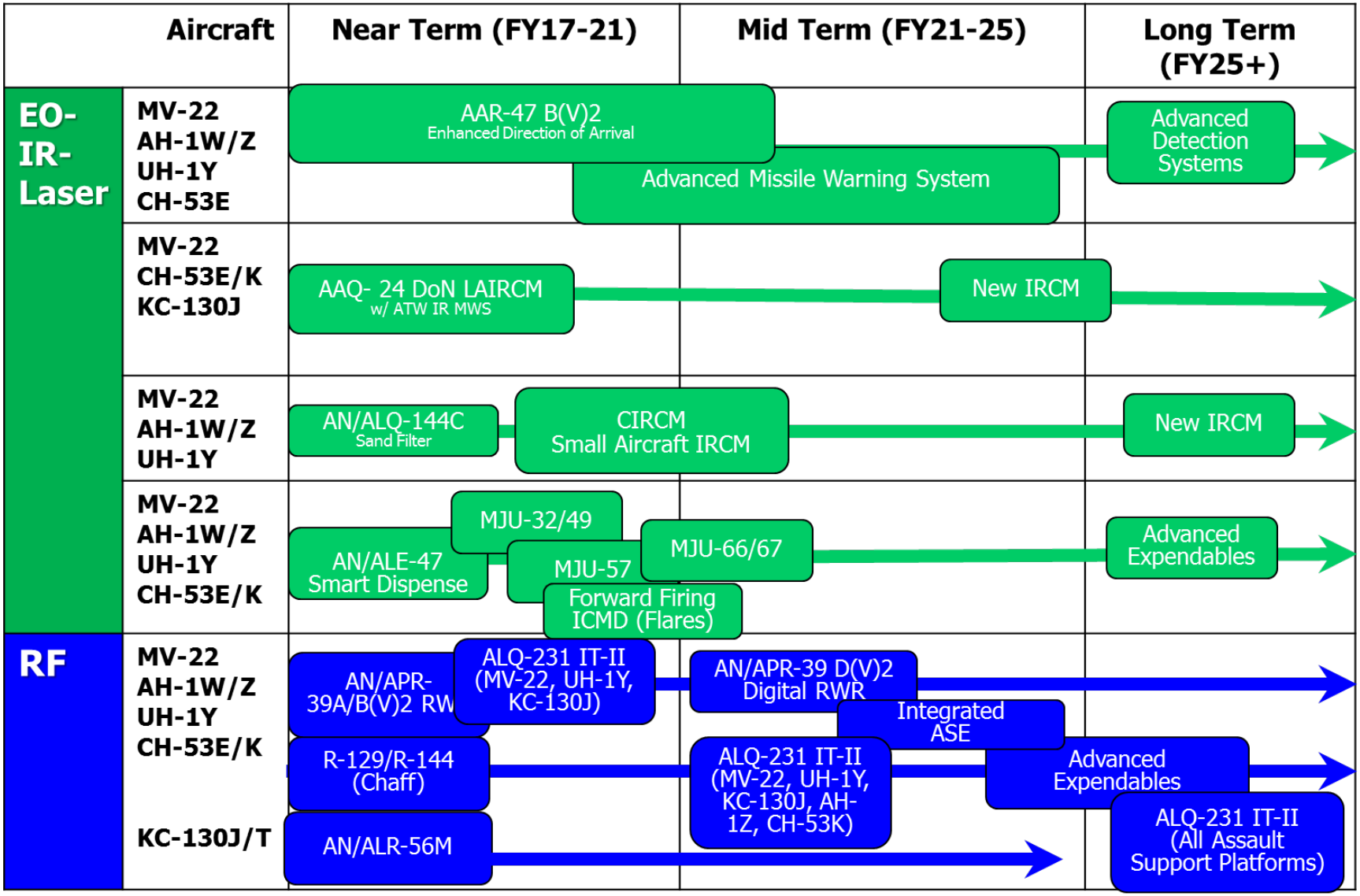
The APR-39 Radar Warning Receiver (RWR) series provides aircraft with a Radar Signal Detecting Set (RSDS) designed for use on USMC, USN, and USA assault support aircraft in order to provide onboard situational awareness and warning of radar threats. The system also provides control and display of the AAR-47 Missile Warning System and Chaff dispense commands to the ALE-47 Countermeasure Dispensing System (CMDS). The APR-39D(V)2 will correct major deficiencies and obsolescence in the current version. The APR-39 System acts as EW Bus Controller and is one of the pillars to fusing threat data and information for Digital Interoperability applicability.

Technology Transition Agreements (TTA's)

Helicopter Active RPG Protection (HARP): Will seek to develop an expendable countermeasure that would offer a hard kill system to defeat unguided munitions such as RPGs. This system will require the development of not only the expendable but also the guidance system required to drive the expendable countermeasure to intercept the threat

Multi-Spectral Electro-Optical/Infrared Seeker Defeat (MSSD): Will seek to develop techniques, components, and technologies to improve the ability to defeat advanced multi-spectral EO/IR MANPADS by (1) better understanding the advanced MANPAD threat posed to rotor-craft and the current countermeasure capabilities that are employed and (2) developing advanced flares/obscurants and laser sources to better defeat advanced MANPADs

MARINE ASSAULT SUPPORT ASE ROADMAP



The AN/ALR-67 countermeasures warning and control system is the standard threat warning system for tactical aircraft and was specifically designed for the F/A-18 and AV-8B aircraft. The system detects, identifies and displays radars and radar-guided weapon systems in the C to J frequency range (about 0.5 to 20 GHz). The system also coordinates its operation with onboard fire control radars, datalinks, jammers, missile detection systems and anti-radiation missiles. The AN/ALR-67(V)3 is an upgrade to the ALR-67(V)2 system referred to as the Advanced Special Received (ASR) set. The receiver electronics unit has been upgraded to a fully channelized digital architecture with dual 32-bit processors, yet with an overall reduction in system size and weight. The Azimuth Display Indicator (ADI) is a 3 in (76.2 mm) diameter CRT or LCD cockpit display, carried over from the AN/ALR-67(V)2, used to show intercepted threats.

The ALQ-214 Integrated Defense Electronic Countermeasure (IDECM) will provide internal self-protection for the F/A-18 C/D by establishing a common on-board jammer solution to counter modern SAM and Air-to-Air RF Threats. Block V IOC is slated for FY17. The Software Improvement Program (SWIP) is scheduled for IOC in FY18, and will provide for additional DRFM techniques to degrade a threat's ability to engage while also improving interoperability, timeline challenges, and the ability to engage multiple threats simultaneously. The ALQ-165 Air Self-Protection Jammer (ASPJ) will be replaced by the ALQ-214(V)3 providing a baseline ASE suite of ALR-67(V)3, ALQ-214(V)3, and ALE-47.

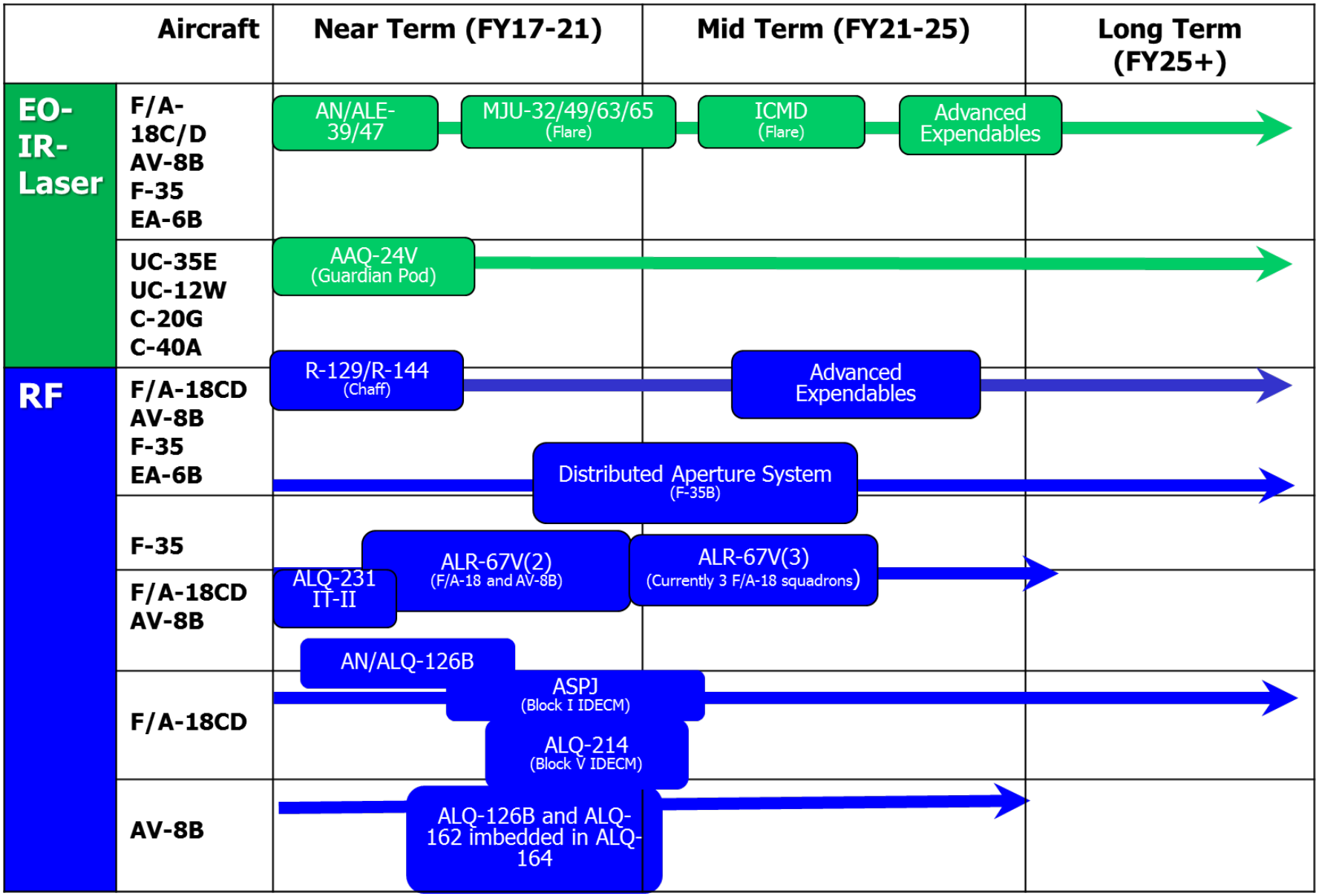
The ALE-47 Countermeasure Dispensing Set (CMDS) receives threat data from the aircraft's survivability sensors (MWS or RWR), and then selects the appropriate response to the threat in terms of expendables to be employed (Chaff and/or Flares), dispersal sequence and pattern, and when to dispense the selected expendables.

Intrepid Tiger II (IT-II) is a Precision Electronic Warfare (EW) pod providing organic distributed and net-centric Airborne Electronic Attack (AEA) capability. Early Operational Capability (EOC) of IT-II pod in Operation Enduring Freedom (OEF) was conducted in 2012. The Approved Acquisition Objective (AAO) for USMC is 136 total pods. IT-II(V)1 deployed on AV-8B and F/A-18A++/C/D aircraft in 2012, KC-130J capability is currently in development. IT-II(V)3 is currently deployed on UH-1Y (EOC FY16), with AH-1Z capability in the future. Additional future IT-II platforms include the MV-22B and CH-53K. Radar AEA variant of IT-II is currently in development (Block X).

Future Naval Capability (FNC)

FNC programs will address expanded frequency threats through GAP analysis and provide solution sets comprised, but not limited to ALQ-214, and advanced IR/RF expendables in addition to smart dispense technology.

MARINE FIXED-WING ASE ROADMAP



INTEGRATED AIRCRAFT SURVIVABILITY EQUIPMENT

Integrated Aircraft Survivability Equipment (iASE) will provide the capability to cooperatively use information derived from on-board and off-board systems or networks to enhance aircraft protection, combat survivability, and mission effectiveness by providing situational awareness of flight and mission environments to warfighters and the supporting network systems, thus enabling the most survivable and effective single or multi-system response available.

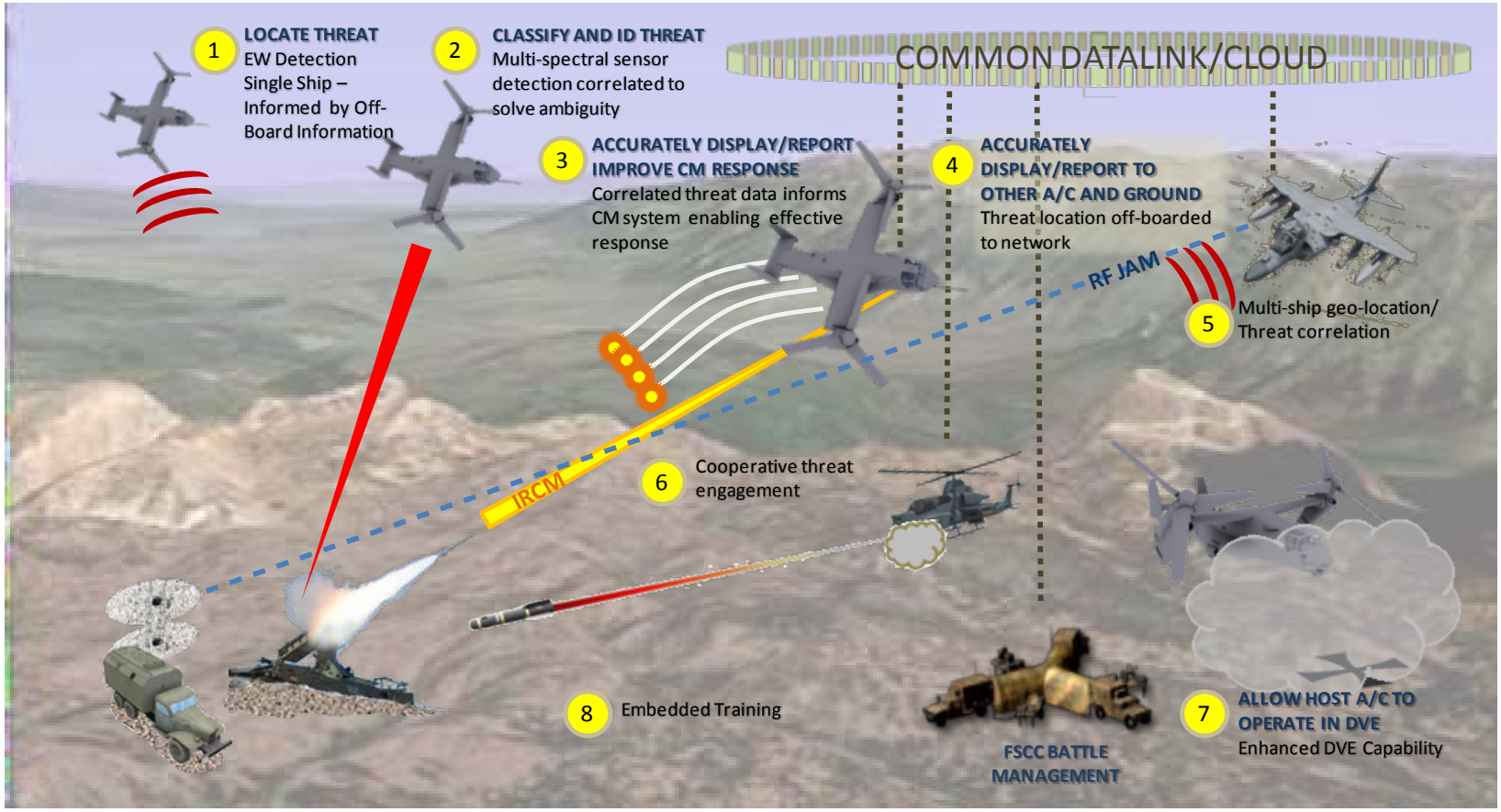
DESIRED CAPABILITY

1) **LOCATE THREATS:** ACCURATELY DISPLAY/REPORT THREATS TO HOST AIRCRAFT

2) **CLASSIFY/ID THREATS:** SHARE THREATS WITH GRD FORCES, AIRCRAFT, COMMANDERS

3) **AVOID ENGAGEMENT:** PREVENT TRACK OR LOCK-ON

4) **EMBEDDED TRAINING:** LOCATE OBSTACLES OR OTHER AIRCRAFT



2.16 MARINE OPERATIONAL SUPPORT AIRLIFT

OPERATIONAL SUPPORT AIRLIFT PLAN: PROGRAMMATICS, SUSTAINMENT AND FUTURE

OVERVIEW:

The USMC operational support airlift (OSA) fleet supports the time-sensitive air transport of high priority passengers and cargo to, within, and between theaters of war. Current fleet consists of 12 UC-12F/M/W, 12 UC-35C/D, 2 C-9B and 1 C-20G. These aircraft are distributed throughout USMC bases and stations and are actively supporting forward deployed Marine Air Ground Task Forces.

COMMUNITY IMPROVEMENTS:

USMC is invested in making the OSA fleet readily deployable throughout the world. Aviation Survivability Equipment has been integrated onto UC-12W, UC-35D and C-20G aircraft to allow operations in low-threat environments. 3rd flare dispenser for the UC-12W has been incorporated. This allows forward-firing kinematic flares, enhancing aircraft survivability. Testing and integration of night vision compatible flight station and external lighting for the UC-12W, along with an integrated satellite phone capability, enhancing forward deployed capability and dynamic tasking through beyond-line-of-sight communications is funded for 4 of 8 aircraft. Funding needs to be identified for the remaining 4 aircraft.

TRANSITION PLAN:

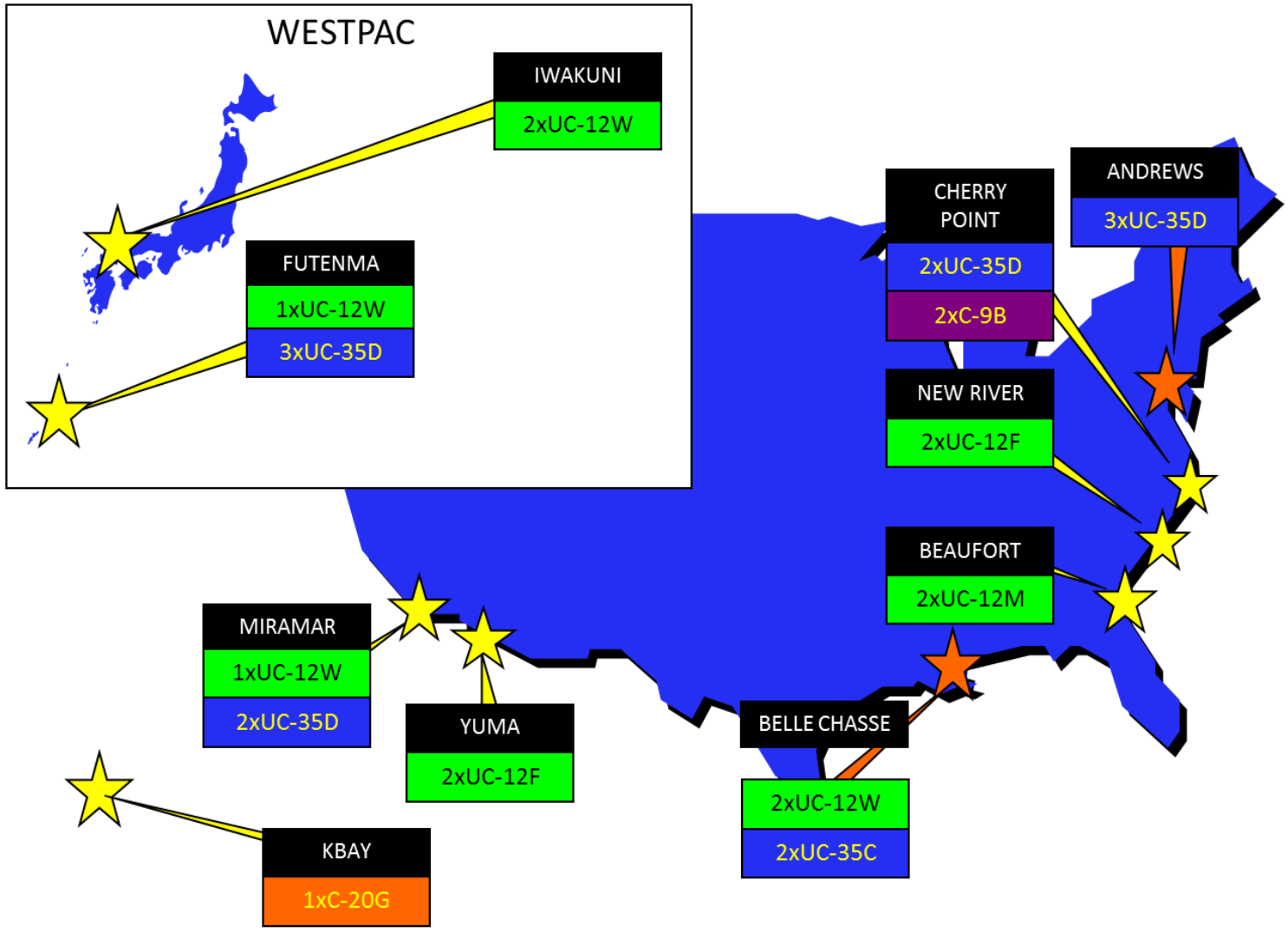
The UC-12W transition has four legacy UC-12F/M aircraft required for recapitalization. This transition, along with continued use of low-density, high-demand UC-35C/D aircraft will posture the Marine Corps to support the forward deployed MAGTFs with air mobility. The Marine Corps will divest of the obsolete and expensive-to-operate C-9B aircraft no later than FY25.

1) UC-35C/D & C-20G do not have an established service life limit, and USMC will continue to operate until sustainment costs become prohibitive

FUTURE:

The shift in national strategy and emerging operating concepts such as the expanded use of Special Purpose Marine Air Ground Task Forces, disaggregated Marine Expeditionary Units and distributed operations continues to increase demand for air mobility. To satisfy this need, the Deputy Commandant for Aviation (DCA) will expand the use of Operational Support Airlift assets outside of the continental United States. DCA intent is to provide advocacy, oversight and standards for aviation-specific issues for OSA operations, aircraft and aircrew through the MAW CGs and in close coordination with the Deputy Commandant for Installations and Logistics.

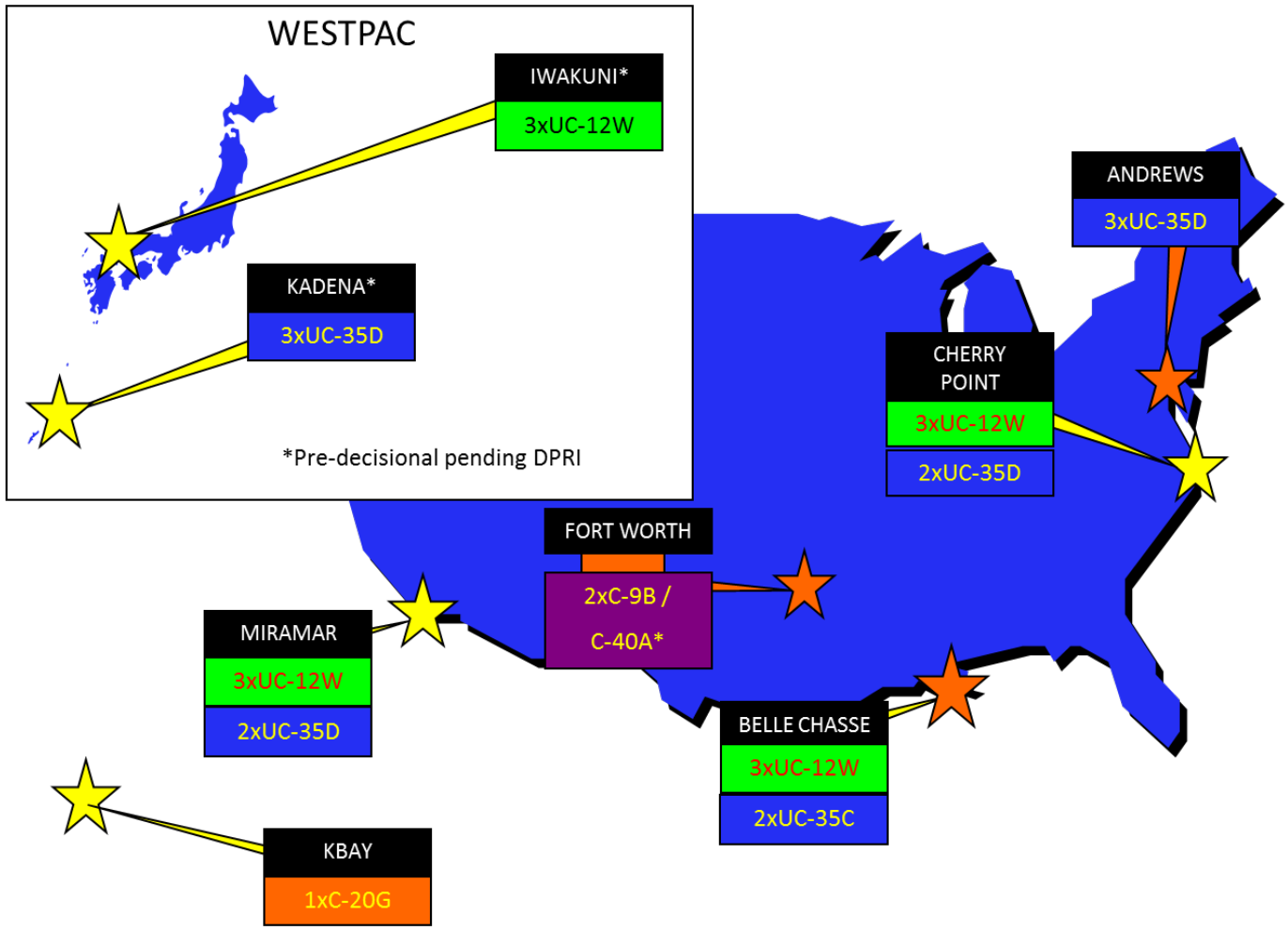
CURRENT USMC OSA LAYDOWN



PROPOSED FUTURE USMC OSA LAYDOWN

- ✓ MROC-DM 57-2010 OSA Master Plan
- ✓ MROC-DM 19-2016 VMR-1 (Flag) and 2 C-9B's move to Fort Worth and Transition to 4th MAW

OSA Consolidation and Proposed USMC OSA Laydown will be addressed through a separate MROC-DM



*2xC-9B to be replaced with 2xC-40A (MROC-DM 19-2016 approves move to Fort Worth)

MARINE OPERATIONAL SUPPORT AIRLIFT (OSA) PLAN

	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27
POAI PLAN											
UC-12F/M	6	5	5	5	5	5	5	3	0	0	0
UC-12W	6	7	7	7	7	7	7	9	12	12	12
UC-35C/D	12	12	12	12	12	12	12	12	12	12	12
C-20G	1	1	1	1	1	1	1	1	1	1	1
C-9B	2	2	2	2	2	2	2	0	0	0	0
C-40A	0	0	0	0	0	0	2	2	2	2	2
TOTAL POAI	**27**	**27**	**27**	**27**	**27**	**27**	**29**	**27**	**27**	**27**	**27**
BAI PLAN											
UC-12W	1	1	0	0	0	0	0	0	0	0	0
TOTAL BAI	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
TOTAL	**28**	**28**	**27**	**27**	**27**	**27**	**29**	**27**	**27**	**27**	**27**

GENERAL NOTE:
UC-12W delivered in FY16 will be BAI until extended range and 3rd countermeasure dispenser modifications are complete for all of the 6 Block I aircraft.

MARINE OPERATIONAL SUPPORT AIRLIFT (OSA) PLAN

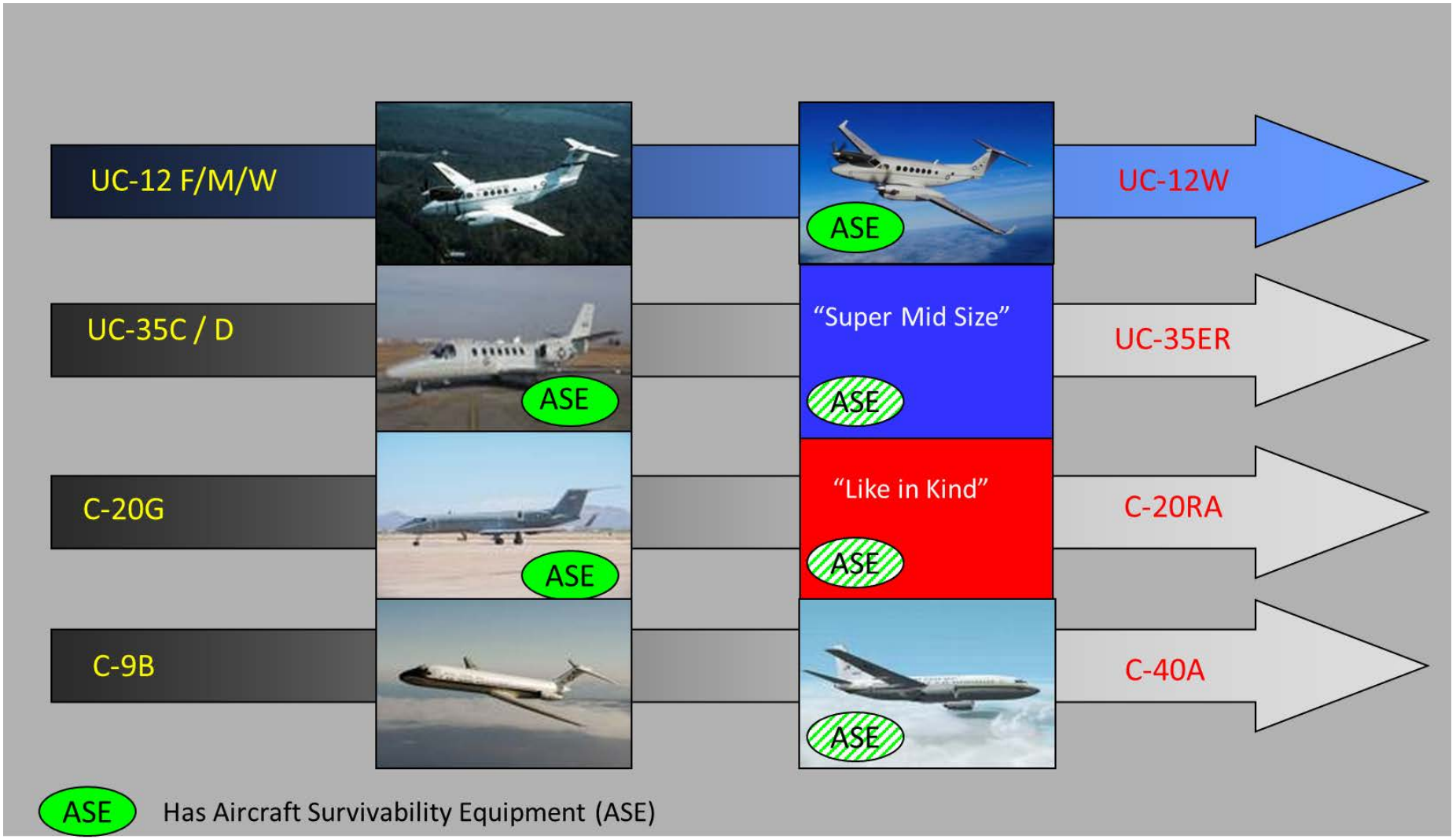
CURRENT FORCE:
12 UC-35C/D
12 UC-12F/M/W
1 C-20G
2 C-9B

FORCE GOAL:
12 UC-35 Extended Range Replacement Aircraft
12 UC-12W
1 C-20 Replacement Aircraft
2 C-40A

UNIT/LOCATION	PAI	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	PAI	UNIT/LOCATION
		1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4		
MCAS CHERRY PT														**MCAS CHERRY PT**
VMR-1	2 x C-9B		T											
	2 x UC-35D												2 x UC-35D	VMR-1
	4 x UC-12F		T					D						
								T					3 x UC-12W	
MCAS NEW RIVER														
H&HS NEW RIVER	2 x UC-12F		T											
MCAS BEAUFORT														
H&HS BEAUFORT	2 x UC-12M		T											
MCAS MIRAMAR														**MCAS MIRAMAR**
H&HS MIRAMAR	2 x UC-35D												2 x UC-35D	H&HS MIRAMAR
	2 x UC-12M		T						D					
	2 x UC-12W								T					
									T				3 x UC-12W	
MCAS YUMA														
H&HS YUMA	2 x UC-12F		T											
MCAF K-BAY														**MCAF K-BAY**
H&HS K-BAY	1 x C-20G												1 x C-20G	H&HS K-BAY
MCAS FUTENMA														**MCAS FUTENMA**
H&HS FUTENMA	3 x UC-35D												3 x UC-35D	H&HS FUTENMA
	1 x UC-12W						T							
MCAS IWAKUNI														**MCAS IWAKUNI**
H&HS IWAKUNI	2 x UC-12W						T							H&HS IWAKUNI
							T						3 x UC-12W	
JRB FORT WORTH														**JRB FORT WORTH**
	2 x C-9B		T					D						
								T					2xC-40A	
NAF ANDREWS														**NAF ANDREWS**
VMR-5	3 x UC-35D												3 x UC-35D	VMR-5
NAS JRB NO														**NAS JRB NO**
VMR-4	2 x UC-35C												2 x UC-35C	VMR-4
	2 x UC-12W								T					
									T				3 x UC-12W	

D = Divestiture
T = Transition

MARINE OSA TRANSITION



SECTION THREE TOTAL FORCE, TRAINING, TEST, ACADEMICS, MANPOWER

3.1 Marine Reserve Aviation Plan

RESERVE INTEGRATION AND THE TOTAL FORCE

AUGMENT, REINFORCE AND SUSTAIN THE ACTIVE COMPONENT

The 4th Marine Aircraft Wing's (4th MAW) mission is to augment, reinforce, and sustain the active component as an operational aircraft wing under a total force construct. In order to maintain the total force, reserve aviation must be postured to meet combatant commander (CCDR) requirements on an immediate, sustained and enduring basis. As the draw-down, sequestration and resulting fiscal austerity continues, reserve aviation units must be fully prepared for the current fight, creating options and decision space for the Commandant and national leaders. 4th MAW will remain postured as an operational aircraft wing, prepared to "fight today's fight with today's forces" as an integrated member of America's expeditionary force in readiness.

4th MAW Priorities

In addition to its role as a force provider for aviation operations around the globe, 4th MAW units remain engaged in providing support along predefined lines of operation to include:

1. THE CURRENT FIGHT: 4th MAW continues to integrate and deploy aviation forces in support of the current fight to meet our national security objectives. 4th MAW will aggressively man, train, and equip units for expeditious deployment and sustained combat operations as directed by the Commandant of the Marine Corps. Current operations include sustained VMR UC-35D and UC-12W deployments in support of SPMAGTF-CR-CENTCOM and SPMAGTF-CR-AFRICOM; 4th MAW's Aviation Command and Control Team (AC2T) individual augments in support of the CENTCOM Combined Air Operations Center (CAOC), VMGR operations across the globe, HMH in support of SPMAGTF-SOUTHCOM, and VMM in support of SPMAGTF-CR-AFRICOM.

2. UNIT DEPLOYMENT PROGRAM: 4th MAW will support the Unit Deployment Program by providing OPTEMPO relief for the active component as required.

3. THEATER SECURITY COOPERATION: 4th MAW remains postured to provide forces to meet CCDR demand for forces in support of our allies and partner nations around the globe.

4. PRE-DEPLOYMENT TRAINING: 4th MAW will continue to support training for units preparing for deployment. Examples include recurring support for the Integrated Training Exercises (ITX) aboard MCAGCC Twentynine Palms and MARSOC's Exercise Raven.

5. OPLANS/CONPLANS: 4th MAW remains postured to support OPLAN/CONPLAN exercises and contingency operations. Examples include participation in Exercises Ulchi Freedom Guardian, Key Resolve, RIMPAC, Valient Shield, and Cold Response.

6. STAFF AUGMENTATION: 4th MAW remains postured to provide highly-qualified individual staff officers to augment and reinforce JTF, MARFOR, MEF, MEB, and MEU command elements in support of the current fight.

7. SHOCK ABSORBER: 4th MAW conducts daily distributed operations and serves as the "shock absorber" for the active MAWs by providing regular frag support for all three MEFs, MARSOC, and TECOM.

"We will employ a total force approach to meet the Marine Corps' force generation requirements. We will pursue policies and operational practices to better develop and access the skill, knowledge, and expertise of Marines in the Reserve component."

-Marine Corps Vision and Strategy 2025

AVPLAN RESERVE INTEGRATED STRATEGY (AVRIS)

ALIGNING AND SYNCHRONIZING THE TOTAL FORCE

The success of the Marine Corps' total force construct is based on enduring and habitual relationships, standardized TTPs and common platforms. By ensuring the reserve and active components share common aircraft, equipment and TTPs; the Marine Corps truly fosters an interoperable total force approach. Maintaining commonality is fundamental to recruiting, sustaining and employing this essential capability.

Programmed transitions include:

1) F/A-18 and AV-8B : The Marine Corps is reviewing options for reserve component F/A-18 and AV-8B units aboard MCAS Miramar and MCAS Cherry Point. These units will be a buffer for operational requirements through the F-35 transition.

F-35B:

The proposed transition of VMFA-112 and VMFA-134 to the JSF remains a critical part of the TACAIR roadmap and 4th MAW's ability to augment, reinforce, and sustain the active component. Additionally, 4th MAW is pursuing a stand-up of a VMFAT-501 SAU in support of F-35 FRS flight operations and student production in FY17.

KC-130J:

The accelerated transition to the KC-130J remains a reserve aviation priority for HQMC. VMGR-234 received their sixth aircraft during the 4th Quarter of FY2016. VMGR-452 is projected to receive it's first KJ in FY19 and achieve IOC in FY20. The KC-130T continues to deploy and support the active component with minimal loss of core METS.

UH-1Y/AH-1Z:

Reserve transition to the AH-1Z remains programmed for FY2020. HMLA-773(-) consolidation from three sites to two sites was completed the 4th quarter of FY2016. In addition, HMLA-775 (-) will reactivate aboard MCAS Camp Pendleton during the 1st Quarter of FY2017, adding strategic depth to reserve aviation and preserving HMLA operational capacity in support of the total force.

MV-22B:

VMM-764 achieved FOC in April 2016, a milestone for the squadron as they prepare to deploy in support of SPMAGTF(CR/AF). In addition, VMM-774 received it's initial complement of MV-22B and received their Safe for Flight certification in March 2016. VMM-774 is working towards a projected FOC in 4QFY18 aboard NS Norfolk, where it remains best positioned to sustain reserve recruiting requirements and support East Coast forces.

RQ-21A:

VMU-4 (-) will transition to the RQ-21A in FY2021 to provide operational depth for this high demand / low density asset. In the long-term, VMU-5 (-) is planned to activate in FY2023 to provide additional flexibility and depth to the VMU community.

F-5F/N:

With VMFT-401 scheduled to fly the F-5F/N into the foreseeable future, several upgrades are planned to maintain the currency and relevancy of this platform. Establishment of an East Coast based VMFT-401 Detachment at MCAS Beaufort is under analysis IOT support to the JSF training requirements at VMFAT-501.

OSA:

4th MAW continues to play a pivotal role in the OSA community. With the flexibility and experience base existent within 4th MAW, VMR-1 will re-locate to NAS JRB Ft Worth and re-flag as a 4th MAW unit in FY17. The aging C-9 fleet will reach its service life in the 2025 timeframe and will eventually be replaced with C-40s. Realigning the remaining CONUS-based OSA assets under 4th MAW remains under analysis based on availability of additional structure.

G/ATOR:

To maintain interoperable command and control systems with the active component and update outdated capabilities, 4th MAW will transition to the TPS-80 G/ATOR beginning in FY2019.

CH-53K:

At the start of the CH-53K transition in FY2019, HMH-772 (-) will return to its full T/E of CH-53E aircraft, followed by the reactivation of HMH-769 (-) aboard MCAS Miramar in FY2023. Both squadrons will eventually transition to the CH-53K beginning in FY2029.

Aviation Training Systems (ATS):

4th MAW continues to aggressively pursue procurement of flight training devices as part of ongoing and programmed transitions to next generation aircraft. Funding for the majority of these systems has been provided through annual National Guard and Reserve Equipment Appropriations.

AVRIS OVERVIEW

Complete (FY 2013-2016)	Near/Mid-Term (FY 2017-2020)	Long Term (FY 2021-2031)
RIS INITIATIVES		
• HMM-774 REDESIGNATES VMM-774 • VMM-764 (MV-22B) FOC • VMGR-234 (KC-130J) IOC • HMLA-773 (-) RELOCATE (JBMDL) • VMU-4 IOC	• LEGACY SUSTAINMENT • HMLA-775 (-) REACTIVATE • VMGR-234 (KC-130J) TRANSITION • HMLA (AH-1Z) TRANSITION • VMR-1 MOVE & RE-ALIGNMENT • VMGR-452 (KC-130J) TRANSITION • VMU-4 (RQ-7B V2) TRANSITION • VMFAT-501 SAU • OSA REORGANIZATION • CAC2S TRANSITION • METFMF(R) ACCEPT • VMFT-401 DET ESTABLISHED • TPS-80 (G/ATOR) TRANSITION	• LEGACY SUSTAINMENT • ATS FOC • HMH-769 (-) REACTIVATE • VMU-4 (RQ-21A) TRANSITION • VMU-5 ACTIVATE • CH-53K TRANSITION • F-5 UPGRADE/TRANSITION • F-35B TRANSITION • VMFA-134 REACTIVATE (CADRED) • VMFA (RESERVE) – MIRAMAR • VMA (RESERVE) – CHERRY POINT

Reserve Aviation Strategic Goals

- Uninterrupted levels of support in all six functions of Marine aviation
- Manageable transition to next generation aircraft/equipment/personnel
- Mitigation of legacy transitional shortfalls
- Augmentation and reinforcement of AC across 4th MAW lines of operation

MARINE COMPOSITE TRAINING SQUADRON CONCEPT

MARINE COMPOSITE TRAINING SQUADRON CONCEPT

USMC fixed wing adversary and fleet Tactical Air Control Party (TACP) and Forward Air Controller (Airborne) (FAC(A)) training requirements will persist, and likely grow. Headquarters Marine Corps Aviation is examining alternatives and solutions for these high demand/low density adversary and CAS training platforms.

The Marine Corps composite training squadron concept could address those needs. This squadron, likely in 4th MAW, would provide low cost, regionally distributed adversary and light attack-capable fixed-wing airframes to support fleet aviation and TACP/FAC(A) production, while improving readiness across the MAGTF.

Compositing two different aircraft regionally will support crucial local training requirements:

1) The F-5 (or similar aircraft) will support fixed-wing adversary support for fixed- and rotary-wing squadrons, as well as for LAAD and command and control training.

2) The turboprop aircraft and/or unmanned platform will augment close air support training for TACP and FAC(A)

SQUADRON COMPOSITION AND SUSTAINMENT

The USMC F-5 current fleet has a service life plan that extends the current platforms to 2025 (see F-5 Plan). Research is ongoing to examine low-cost turbo propeller aircraft alternatives to employ alongside the F-5. Marine aviation is examining options to purchase and/or lease contractor-owned and -maintained airframes that could be operated by USMC aviators from the composite training squadron and local flying units.

CAPACITY AND ACCESIBILITY

Current USMC inventory is 12 F-5s assigned to VMFT-401 at MCAS Yuma that execute detachments to away sites for training support.

Marine aviation is researching the requisite manning and logistics to expand adversary and TACP/FAC(A) capacity and capability while improving accessibility by possibly placing permanent resources at MCAS Beaufort, MCAS Cherry Point, and MCAS Miramar.

CAPABILITY

The current configuration and future upgrades to the F-5 do not meet all MAGTF requirements for F-35 and F/A-18, but these aircraft can effectively service many fixed wing, rotary wing DACM, GBAD, and C2 training needs (see F-5 Plan). Additionally, an ordnance-employing light attack turbo prop airframe with variable communication and sensor suites would help support all air and ground terminal attack control training requirements.

FUTURE

Procurement of additional F-5s with significant service life remaining along with leasing or procuring a light ordnance capable turbo prop could allow the USMC to meet, with a combination of organic assets and contracted solutions, most of the requirements for adversary training and appropriately augment close air support for TACP and FAC(A) training.

** The turboprop aircraft shown here represents a possible option and does not indicate the solution.*

MARINE COMPOSITE TRAINING SQUADRON CONCEPT

VMT

MCAS MIRAMAR, CA
~6 x F-5**
~6 x Turboprop**
(~12 airframes)

VMT

MCAS CHERRY PT, NC
~6 x F-5**
~6 x Turboprop**
(~12 airframes)

**NOTES:

1. Squadron locations and type and number of aircraft will be tailored based on regional adversary and TACP/FAC(A) support training requirements.

2. Future analysis may affect numbers and types of airframes in the composite training units.

VMT

MCAS YUMA, AZ
~6 x F-5**
~6 x Turboprop**
(~12 airframes)

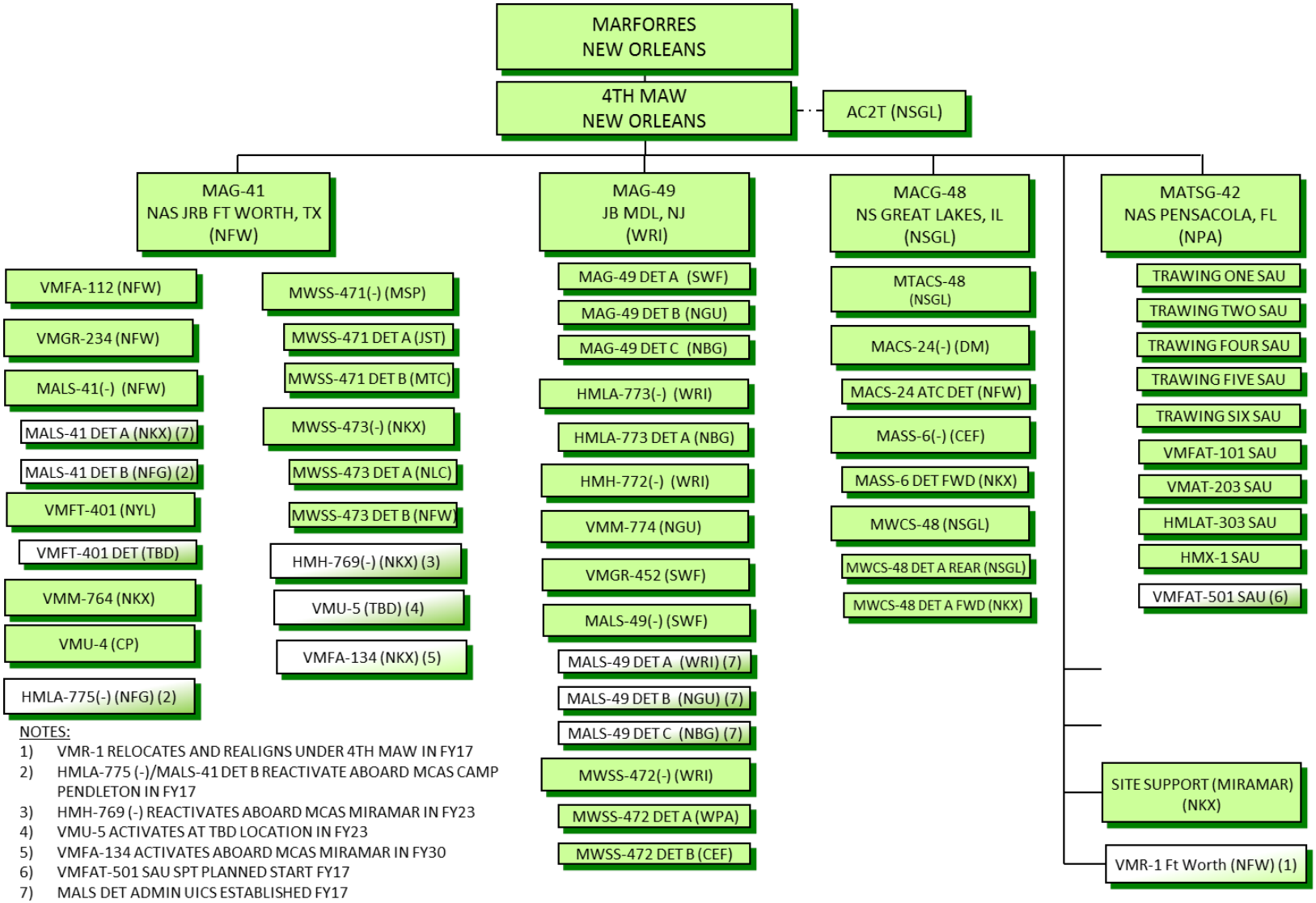
VMT

MCAS BEAUFORT, SC
~6 x F-5**
~6 x Turboprop**
(~12 airframes)

* The turboprop aircraft shown here represents a possible option and does not indicate the solution.

--- Command relationships, manning, and basing are subject to change following further analysis ---

4TH MAW ORGANIZATIONAL CHART

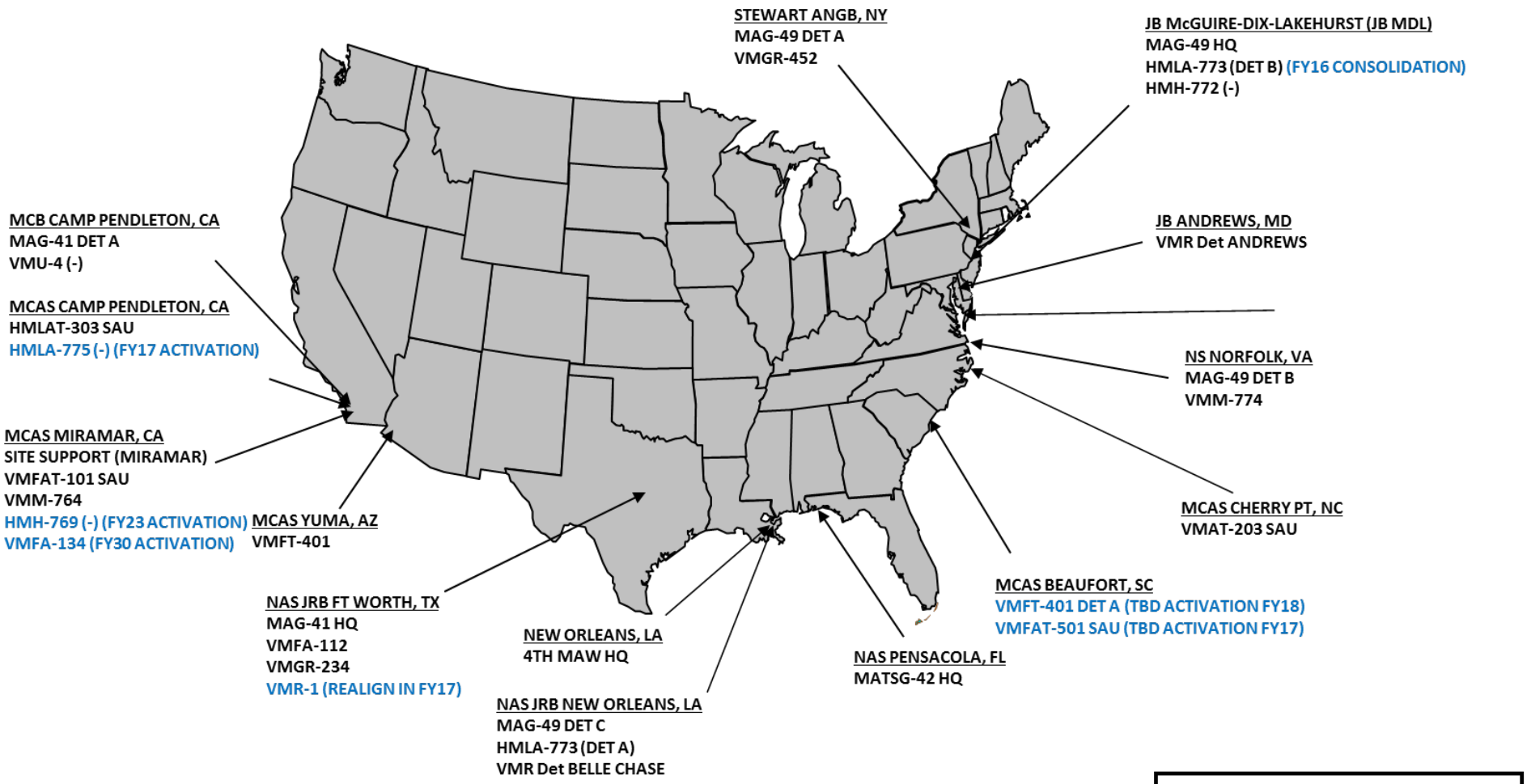


NOTES:

1) VMR-1 RELOCATES AND REALIGNS UNDER 4TH MAW IN FY17
2) HMLA-775 (-)/MALS-41 DET B REACTIVATE ABOARD MCAS CAMP PENDLETON IN FY17
3) HMH-769 (-) REACTIVATES ABOARD MCAS MIRAMAR IN FY23
4) VMU-5 ACTIVATES AT TBD LOCATION IN FY23
5) VMFA-134 ACTIVATES ABOARD MCAS MIRAMAR IN FY30
6) VMFAT-501 SAU SPT PLANNED START FY17
7) MALS DET ADMIN UICS ESTABLISHED FY17

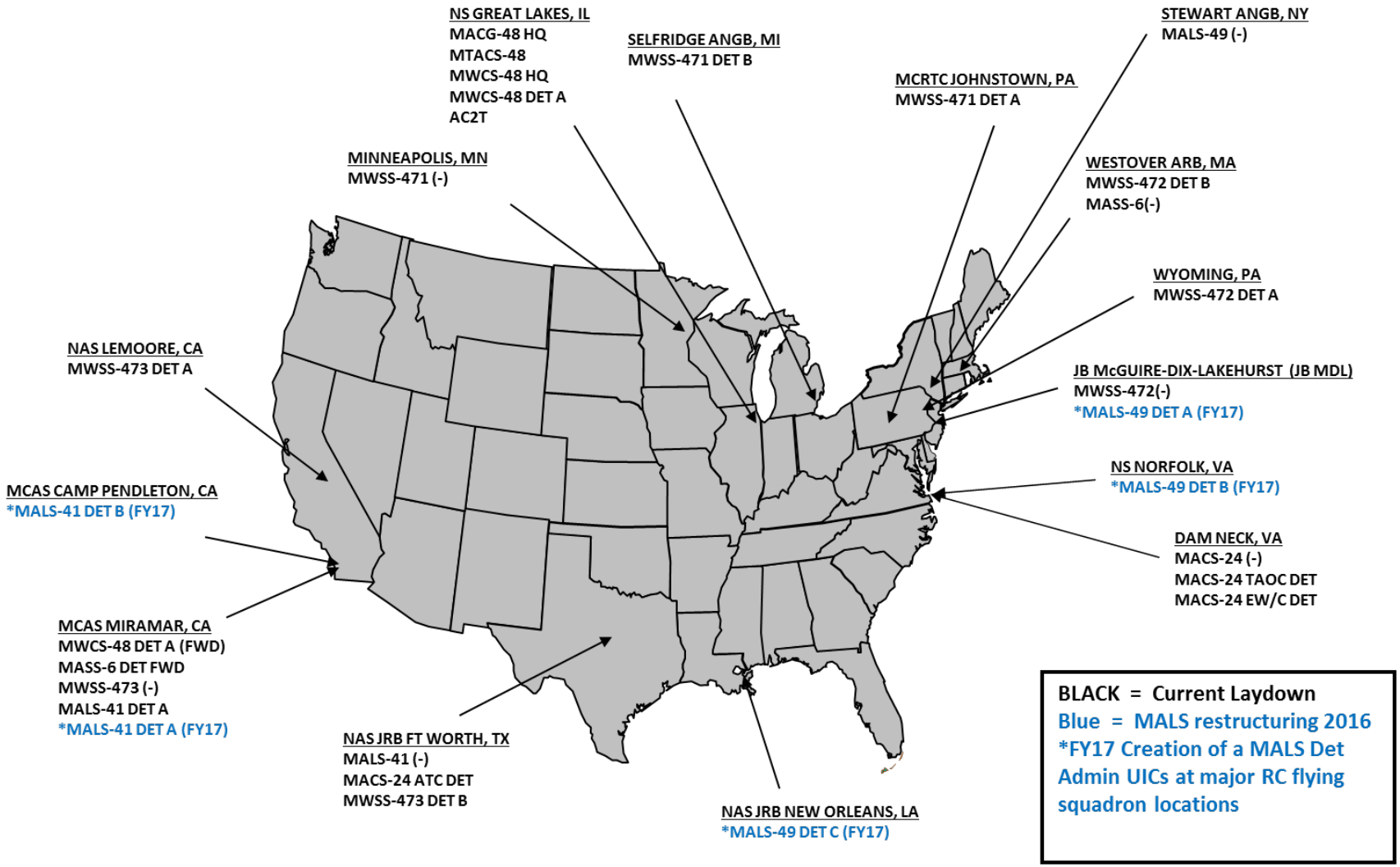
ADW – Joint Base Andrews, MD
BKF – Buckley AFB, CO
CEF – Westover ARB, MA
CP – MCB Camp Pendleton, CA
DM – Dam Neck/Oceana, VA
JST – Johnstown, PA
MTC – Selfridge ANGB, MI
MSP – Minneapolis, MN
NBG – NAS JRB New Orleans, LA
NFG – MCAS Camp Pendleton, CA
NFW – NAS JRB Fort Worth, TX
NGU – NS Norfolk, VA
NKX – MCAS Miramar, CA
NLC – NAS Lemoore, CA
NPA – NAS Pensacola, FL
NSGL – NS Great Lakes, IL
NYL – MCAS Yuma, AZ
SWF – Stewart ANGB, NY
WPA – Wyoming, PA
WRI – Joint Base McGuire-Dix-Lakehurst, NJ

4TH MAW FLYING SQUADRON AND GROUP LAYDOWN



BLACK = Current Laydown
Blue = Restructuring 2016+

4TH MAW AGS, MACCS, AND MALS LAYDOWN



F-5 PLAN : PROGRAMMATICS, SUSTAINMENT AND FUTURE

F-5E/F, N:

The F-5 fleet consistently meets readiness goals while supporting as many MAGTF adversary commitments as possible based on limited structure. USMC adversary requirements have grown significantly over the past thirteen years of combat operations. Today, the adversary capacity gap is growing, with VMFAT-501 (F-35B FRS) requiring more than 1,500 per year and MAWTS-1 requiring more than 420 annually from VMFT-401. Some of the additional requirements that have increased adversary demands are:

FY10 MAWTS-1 reconstitutes Marine Division Tactics Course for the F/A-18 fleet

FY13 AV-8B training and readiness manual increases focus on additional air defense capabilities

FY15 Continued transition of legacy TACAIR to F-35

TBD VMFAT-502 (2nd F-35 FRS) stand-up at MCAS Beaufort

F-5 SERVICE LIFE MANAGEMENT

The F-5 fleet is funded for life limited components of upper cockpit longerons, wings, horizontal stabilator pairs, and vertical stabilators that will enable the F-5 to achieve its 8000 hour life. This extends the Department of the Navy's 44 F-5 airframes to 2025 and at least 12 aircraft to approximately 2028 in support of fleet training.

CAPABILITY

The current configuration of the F-5 meets all MAGTF requirements except for F-35 and F/A-18.

Upgrades to provide improved beyond visual range situational awareness, as well as passive weapon systems are being studied. Advanced electronic attack capabilities will continue to be fielded.

ACCESSIBILITY

Further desired expansion of the F-5 program, to potentially include a permanent footprint at MCAS Beaufort in FY18, and conceptual plans for adversary elements at MCASs Miramar, Yuma, and Cherry Point are being explored. Efficiently co-locating adversary support with the operational forces generates the most readiness for our operational forces at the least cost. Composite training squadrons beneath 4th MAW will also leverage on extensive TACAIR experience and contribute to enhanced Reserve integration across aviation.

F-5 PROGRAM CAPACITY, CAPABILITY AND ACCESIBILITY

Current USMC inventory is 12 F-5s assigned to VMFT-401 at MCAS Yuma. Based on the low cost per flight hour and ease of maintenance of the F-5, plans to expand the adversary capacity and capability while improving accessibility are being sought.

FUTURE

Procurement of numerous F-5s with significant service life remaining would allow the USMC to meet, with organic assets, most requirements for adversary training. The first phase of expanded adversary capacity will be to establish a detachment on the East Coast in support of VMFAT-501 at MCAS Beaufort, S.C. for F-35 pilot production requirements.

3.2 MARINE HELICOPTER SQUADRON ONE

3.2 MARINE HELICOPTER SQUADRON ONE

Marine Helicopter Squadron One (HMX-1) was established 1 December 1947 as an experimental unit tasked with testing and evaluating military helicopters when rotary wing flight was still in its infancy. Founded to test tactics, techniques, procedures, and equipment, HMX-1 has since then become synonymous with helicopter transport of the President of the United States. HMX-1's missions include the worldwide transportation for the President of the United States, transportation within the National Capital Region of the Vice President of the United States, members of the President's cabinet, and visiting heads of state. Additionally HMX-1 provides support for the Commanding General, Marine Corps Combat Development Command and continues to conduct operational test and evaluation for rotary wing presidential lift aircraft.

Marine aviation has been a force in transition for the past ten plus years and, like the rest of the fleet, HMX-1 has been part of this evolving force. Historically HMX-1 has been a four T/M/S squadron flying the VH-3D, VH-60N, CH-53E, and CH-46E aircraft. However, beginning in FY11 HMX-1 began the preparatory work to both aid the Fleet Marine Force in their transition efforts and also posture themselves for their own success. The first step was divesting of their heavy lift aircraft and transitioning to an all CH-46E support element. Executed in less than nine months this move provided much needed CH-53E assets to the fleet while posturing the squadron for their own MV-22B transition. In FY13 HMX-1 began the one year transition from CH-46E to the MV-22B. This was completed during the 4th Qtr FY14 providing HMX-1 with 12 MV-22B aircraft for presidential support.

The final component of the HMX-1 transformation is the Presidential Helicopter Replacement Program (VXX). The VXX will replace both the VH-3D and VH-60N aircraft. The VXX program entered the JCIDS process in FY09 with the JROC approved Initial Capabilities Document (ICD). Since that time the program has completed the Analysis of Alternatives (AoA) phase and has a JROC approved Capability Development Document (CDD). Source selection efforts began during 3rd Qtr FY13 and the program achieved MS B during 2nd Qtr FY14. Shortly thereafter, the Sikorsky S-92 was selected and designated the VH-92A. The introduction of the VH-92A into HMX-1 operational missions will begin in 2020 with steady deliveries through 2023, coupled with commensurate retirement of In-Service assets.

In addition to these aircraft transitions HMX-1 will be updating their training systems to reflect the Marine aviation Training vision. As part of this update the squadron replaced its aging VH-60N Aircraft Procedures Trainer (APT) with a VH-60N Containerized Flight Training Device (CFTD) and in support of the MV-22B transition HMX-1 added two MV-22B CFTDs to their training system. The addition of these CFTDs has incorporated an expanded and more detailed visual database, upgraded graphics presentation, and more representative flight models to better replicate the characteristics of the actual aircraft they represent. To further reduce flight time on the VH aircraft the squadron received two training aircraft during FY16, one UH-3D and one UH-60N.

MARINE HELICOPTER SQUADRON ONE: PROGRAMMATICS, SUSTAINMENT AND FUTURE

VH-3D/VH-60N

The VH-3D/VH-60N have consistently and reliably supported the office of the President of the United States for decades. Deployed worldwide at a moment's notice, these aircraft provide a vital service ensuring the safe and timely travel of each president, his family, and Cabinet officials.

SUSTAINMENT

VH-3D/VH-60N SERVICE LIFE EXTENSION PROGRAM (SLEP):

The VH-3D/VH-60N will undergo a Service Life Extension Program (SLEP) beginning in FY15 which will extend the service life by 4,000 flight hours (each airframe). This SLEP is part of the necessary sustainment plan to maintain these aircraft until their planned replacement beginning in FY20.

In addition to the SLEP both aircraft will also receive planned upgrades and sustainment modifications in order to ensure mission effectiveness during this transition period. Some of these programs include weight reduction efforts, communications upgrades, and upgrading the VH-60N to the 401C engine to improve high altitude performance.

FUTURE

PRESIDENTIAL HELICOPTER REPLACEMENT PROGRAM (VXX):

The VXX will replace both the VH-3D and VH-60N aircraft. The VXX program entered the JCIDS process in FY09 with the JROC approved Initial Capabilities Document (ICD). Since that time the program has completed the Analysis of Alternatives (AoA) phase and has a JROC approved Capability Development Document (CDD). Source selection efforts began during 3rd Qtr FY13 and the program achieved MS B during 2nd Qtr FY14. Shortly thereafter, the Sikorsky S-92 was selected and designated the VH-92A. The introduction of the VH-92A into HMX-1 operational missions will begin in 2020 with steady deliveries through 2023, coupled with commensurate retirement of In-Service assets

UPGRADE ROADMAP

VH-3D

1) Weight reduction program
2) Abbreviated Cockpit Upgrade Program
3) 1st install FY16
4) Wide Band Line of Sight
5) Service Life Extension Program (FY15)
6) Training asset development (UH-3D)
7) Delivered 1st Qtr FY16

VH-60N

1) 401C engine upgrade
2) In-progress upgrade
3) Planned completion 1st Qtr FY16
4) Service Life Extension Program (FY15)
5) Training asset development (UH-60N)
6) Delivered 1st Qtr FY16

FUTURE INITIATIVES

1) Presidential Helicopter Replacement Program (VH-92A)
2) Planned IOC 4th Qtr FY20
3) Planned FOC 4th Qtr FY22

MARINE HELICOPTER SQUADRON ONE (HMX-1) PLAN

MARINE HELICOPTER SQUADRON ONE (HMX-1) PLAN

CURRENT FORCE: VH-3D X 11
VH-60N X 8
MV-22B X 12
UH-3D X 1
UH-60N X 1

FORCE GOAL: VH-92A x 21
MV-22B X 14

		FY16				FY17				FY18				FY19				FY20				FY21				FY22				FY23				FY24				FY25				FY26			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
UNIT/LOCATION	TAI																																											
HMX-1 QUANTICO	11 x VH-3D																	H								X																			
	8 x VH-60N																					H							X															
	21 x VH-92A													H																X															
	1 x UH-60N																										D																		
	1 x UH-3D																							D																					
	14 x MV-22B																																												

H = VH AIRCRAFT TRANSITION BEGINS
X = VH AIRCRAFT TRANSITION COMPLETE
D = UH-60N DIVESTING
D = UH-3D DIVESTING

	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26
AIRCRAFT TYPE/TAI											
VH-3D	11	11	11	11	8	8	5	0	0	0	0
VH-60N	8	8	8	8	8	6	6	0	0	0	0
VH-92A	0	0	0	3	4	8	15	21	21	21	21
UH-3D	1	1	1	1	1	1	0	0	0	0	0
UH-60N	1	1	1	1	1	1	1	0	0	0	0
MV-22B	14	14	14	14	14	14	14	14	14	14	14
TOTAL HMX-1 TAI	**35**	**35**	**35**	**38**	**36**	**38**	**41**	**35**	**35**	**35**	**35**

GENERAL NOTES:

1) HMX-1 is located at MCAF Quantico, VA.

2) The 13th and 14th MV-22B aircraft are part of the overall USMC MV-22B community BAI and are depicted here for operational planning considerations.

TAI – Total Aircraft Inventory

1) Aircraft assigned to operating forces for mission, training, test, or maintenance functions

2) Inclusive of mission, back-up, attrition, training, and depot aircraft

Basing plans are subject to change and further environmental analysis

3.3 MARINE OPERATIONAL TEST AND EVALUATION SQUADRON ONE

3.3 MARINE OPERATIONAL TEST AND EVALUATION SQUADRON ONE

Marine Operational Test and Evaluation Squadron 1 (VMX-1) has continued to develop and grow the conduct of operational test and lead the way for the future Marine Corps. The squadron has undergone an overhaul of its mission statement which has evolved to include a role in science and technology, unmanned platforms, and aviation command and control systems. The spectrum of the VMX-1 mission will continue to expand and enhance the Marine Corps ability to ensure that Marine aviation is equipped with the needs of today's warfighter, as well as that of the future. VMX-1 continues to support the Commander, Operational Test and Evaluation Force, Marine Corps Operational Test and Evaluation Activity and Air Test and Evaluation Squadron 21.

UAS

We will build on the lessons learned from using unmanned cargo delivery aircraft in Afghanistan by assigning the UAS we used in OEF for cargo to VMX-22 in Yuma. We will continue to expand the capability of unmanned aerial logistics support to the MAGTF in a wider variety of employment scenarios than used in Afghanistan and we will also investigate adding BLOS, sensor and weapons capability to the K-MAX to allow it to fill a utility role.

In 2015, VMX-22 assumed responsibility for operational testing and experimentation of unmanned systems, beginning with the MQ-21 Blackjack. In support of the Initial Operational Test and Evaluation (IOT&E) of the MQ-21, VMX-22 will operate a single system of five air vehicles in MCAS Yuma, AZ. Multiple advanced payloads are currently in development for the MQ-21 to meet MAGTF specific requirements for signals intelligence, electronic warfare, cyber warfare, communications and data relay, and kinetic fires. VMX-22 will be ideally postured to test future payloads as they are introduced. The co-location with MAWTS-1 (and VMU-1 in 2016) will ensure rapid development of TTP's associated with new weapons systems of the MQ-21 and follow-on unmanned aerial systems

MV-22

Upon relocation from MCAS New River to MCAS Yuma, three of four VMX-1 MV-22B Ospreys were equipped with the upgraded Department of the Navy Large Aircraft Infrared Counter Measure (DoN LAIRCM) Advanced Threat Warning (ATW) system. Testing was conducted from late-2015 through 2016 in order to assess the performance of this new RADAR and missile defense system. Concurrent Operational Test included follow-on live-fire testing of the GAU-21 Ramp Mounted Weapon System (RMWS) and belly-mounted Defensive Weapon System (DWS). ATW testing continued into 2017 as part of both UUNS and JUONS requirements, incorporating an updated RADAR warning system, with the MV-22B chosen as the lead platform for the APR-39D(v)2 testing. 2016 concluded with VMX-1 lead support of the Navy's Fleet Battle Experiment (FBE), which examined the logistical footprint future Navy CMV-22s would require as they replace the aging COD C-2 Greyhound aircraft.

Improvements to the MV-22Bs navigation FLIR included an in-depth assessment of multiple EO/IR targeting sensor upgrades. Future capability growth will include the ability to off-board ATW threat data via a growing suite of Digital Interoperability capabilities, as well as refinement of organic defensive weapons capabilities. V-22 Aerial Refueling System (VARS) and Distributed STOVL operations will continue to be developed and refined throughout 2017 and into the future.

3.3 MARINE OPERATIONAL TEST AND EVALUATION SQUADRON ONE

Marine Air Command and Control Systems

The VMX-1 C3 Department is charged with ensuring future aviation command and control (C2) systems are operationally suitable and interoperable, and that those systems meet warfighter requirements across the spectrum of military operations. To accomplish this, the C3 Department contributes to operational test and evaluation (OT&E) of aviation C2 systems through support to Marine Corps Operational Test and Evaluation Activity (MCOTEA), and conducts concept and TTP development through integration with MAWTS-1 C3 Department and in coordination with the supporting establishment and operating forces. The C3 Department's primary focus in 2016 was providing support to MCOTEA's Common Aviation Command and Control System (CAC2S) Phase 2 integrated and operational test events. C3 also provided OT&E planning support to MCOTEA for G/ATOR Block 1, and Command and Control Air Operations Suite – Command and Control Information Services (C2AOS-C2IS) developmental test (DT) assistance. In addition to test support, C3 supported concept and TTP development on Counter-Small UAS projects, Integrated Fire Control (IFC) events and exercises, as well as development and refinement of the Tactical Air Control Element (TACE) concept, a potential future replacement for the Marine Air Control Group MEU Detachment. The Department's activity in FY17 will retain primary emphasis on OT&E and DT assistance, as well as TACE concept refinement and demonstration. FY17 Department Focus Areas outside of test support are USMC/naval Integration ashore and afloat, Counter-UAS, MAGTF Digital Interoperability, and MACCS role in IFC.

CH-53

CH-53: VMX-1's CH-53E/K Detachment is stationed at MCAS New River with two CH-53E aircraft and supports various operational and developmental test efforts. Additionally, the CH-53 Division supports the validation and certification of external and internal cargo. VMX-1 will support the development of the CH-53K by participation in integrated testing at Sikorsky's West Palm Beach, FL facility and will assist in the training and standup of our first CH-53K fleet squadron in MCAS New River. Once the CH-53K fleet introduction is complete, the VMX-1 CH-53E/K Detachment will join the VMX-1 main body in Yuma with two CH-53E and two CH-53K aircraft.

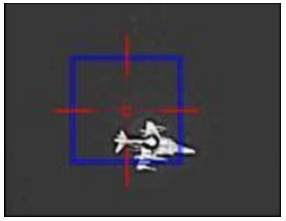
H-1

Two AH-1Z, two UH-1Y, and one AH-1W reside at VMX-1 as operational testing aircraft. In 2016, VMX-1 conducted a Quick Reaction Assessment of the Intrepid Tiger II (V)3 pod in support of the Rapid Deployment Capability on the UH-1Y. The Light/Attack division also worked with NASA and NRL to collect acoustic propagation data for the H-1 Upgrades aircraft. Future tests include software upgrades, an improved APKWS warhead with penetration capability, and the Joint Service Aircrew Mask.

F-35B

VMX-1 Det Edwards continues testing on four F-35B Lightning II aircraft. The Det participated in Operation Steel Knight which assisted in TTP development for VMFA-121 and the future of F-35 employment. As part of the Joint Strike Fighter Operational Test Team (JOTT) at Edwards AFB, the detachment continues to train and receive aircraft modifications required for IOT&E of the F-35B that is scheduled to begin in 2017. The detachment will grow to six aircraft through the IOT&E of the F-35B.

Following the completion of IOT&E, the F-35Bs will transition from Edwards AFB to MCAS Yuma to join the VMX-1 aviation combat element. The detachment also supports initial tactics development and new software and weapon systems capabilities are introduced, and concept of employment for amphibious and expeditionary operations



3.3 MARINE OPERATIONAL TEST AND EVALUATION SQUADRON ONE

CH-53K IT

IASE / DoN LAIRCM

F-35B LHD DT-3

IT-2 / JAGM / FMV

Digital Interoperability

CVN Fleet Battle Experiment

3.4 MARINE AVIATION WEAPONS AND TACTICS SQUADRON ONE

3.4 MARINE AVIATION WEAPONS AND TACTICS SQUADRON ONE

MAWTS-1

The origin of MAWTS-1 may be traced to the aftermath of World War II when Marine pilots were first assigned to Navy Composite Squadrons (VCs). These squadrons, operating from shore bases and carriers, were assigned the special weapons delivery mission. Special Weapons Training Units (SWTUs) were formed to provide necessary training to the attack squadrons. In response to their growing mission, the size of the SWTUs was increased, and they were redesignated as Marine Air Weapons Training Units, MAWTULant at Cherry Point, North Carolina, and MAWTUPac at El Toro, California.

In 1975, a study group was formed at Headquarters Marine Corps to determine requirements for the enhancement and standardization of aviation training. A series of recommendations, labeled as numbered projects, were made to the head of Marine aviation and to CMC in early 1976. Project 19 recommended establishment of the Weapons and Tactics Training Program (WTTP) for all of Marine aviation.

The cornerstone of the WTTP was the development of a graduate-level Weapons and Tactics Instructor (WTI) Course and the placement of WTI graduates in training billets in every tactical unit in Marine Corps aviation. Consolidated WTI Courses were subsequently conducted at Marine Corps Air Station, Yuma, Arizona, by a combined MAWTU staff in May 1977 and February 1978. Due to the overwhelming success of the consolidated WTI Courses, the Commandant of the Marine Corps commissioned Marine Aviation Weapons and Tactics Squadron One at Marine Corps Air Station, Yuma, Arizona, on 1 June 1978.

MAWTS-1's mission is to provide standardized graduate-level advanced tactical training for Marine aviation and assists in the development and employment of aviation weapons and tactics. Advanced tactical training is accomplished through two Weapons and Tactics Instructor (WTI) Courses and two Marine Division Leader Tactics Courses each year, as well as home station fleet support throughout the year.

MAWTS-1 provides assistance to Headquarters Marine Corps, industry, and the Systems Commands in the development and employment of aviation weapons and tactics through the Aviation Development, Tactics and Evaluation (ADT&E) department. ADT&E's enduring mission to develop weapon systems requirements, create concepts of operation, manage Marine aviation doctrine, and conduct tactical demonstrations (TACDEMOs) of advanced emerging concepts keeps Marine aviation engaged at the forefront of combat tactics.

Among these is the convergence of cyber and electronic warfare. MAWTS-1 is currently pursuing new and innovative techniques in the application of both kinetic and non-kinetic combined arms in support of MAGTF objectives. The WTI course integrates the Cyber Electronic Warfare Coordination Cell (CEWCC) to plan and execute non-kinetic fires supporting major evolutions throughout the WTI course.

Centers of Excellence

MAWTS-1 is partnering with the Marine Corps Tactics and Operations Group (MCTOG) and the Marine Corps Logistics Operations Group (MCLOG) to create a MAGTF Weapons School environment, responsible for the development of individual advanced tactical training, as well as exercise design supporting the MAGTF Training Program. This construct creates both an individual and collective training environment supported by a MEB-level operational scenario, allowing our Marines to train in an O PLAN-informed environment and perform with acumen across the spectrum of conflict.

Additionally, the combined arms integration of the WTI course and Talon exercise (TALONEX) continues to provide exceptional infantry battalion live fire training as part of the MAGTF Training Program.

3.4 MARINE AVIATION WEAPONS AND TACTICS SQUADRON ONE

Weapons and Tactics Instructor (WTI) Course

MAWTS-1's semi-annual training venue, the Weapons and Tactics Instructor Course, is the Marine Corps' only service- level exercise that provides students and supporting units the full spectrum of combat operations - - from small unit inserts to noncombatant evacuation operations (NEOs) to infantry battalion heliborne lifts into the heart of a sophisticated enemy's battlespace to the highest-threat strike and air-to-air combat profiles. Exposing Marine, joint and partner nation prospective WTIs to the unique array of capabilities our MAGTF possesses is the hallmark of this training program.

Aside from a rigorous academic curriculum, students participate in numerous graduate level exercises that integrate all six functions of Marine aviation. These evolutions, such as anti-air warfare, air base ground defense, assault support tactics, offensive air support, and ground based air defense culminate in a series of final exercises that integrate joint, conventional and special operations forces.

WTI continues to serve as the best live and simulated training venue for the Marine Air Control Group and the largest training exercise for which employs a Marine Air Command and Control System (MACCS). The MACG deploys with more than 900 personnel and over 90 million dollars' worth of equipment.

WTI continues to serve as the best live and simulated training venue for the Marine Air Control Group and the largest training exercise for which employs a Marine Air Command and Control System (MACCS). The MACG deploys with more than 900 personnel and over 90 million dollars' worth of equipment.

3.4 MARINE AVIATION WEAPONS AND TACTICS SQUADRON ONE

CONCEPT EXPERIMENTATION

As the Marine Corps pursues new concepts, MAWTS-1 continues to define and standardize the training the ACE requires to support future MAGTF operations. The strategic environment compels the Marine Corps to operate in an increasingly distributed fashion. In order to respond rapidly to dispersed global threats, we are moving toward a model wherein infantry units deploy as battalions and employ as companies. We are beginning to think of units as small as the company landing team (CLT) as separate maneuver elements. Marine aviation is central to dispersed and effective maneuver elements and enables such rapid response now. With aviation weapons systems like the KC-130J, F-35B, MV-22, and MQ-21, the MAGTF will be equipped to quickly respond to crisis across the range of military operations.

MAWTS-1 facilitates experimentation and collaboration across multiple venues with different agencies. The movement of VMX-1 to MCAS Yuma has presented a tremendous opportunity for synergistic planning and execution of TACDEMOS for Marine Aviation innovation and experimentation advancement. MAWTS-1 continues to advance Digital Interoperability initiatives, advance counter-UAS TTPs, and assists VMX-1 with UAS efforts such as the MQ-8C Firescout and K-Max. The coordination of VMX-1 and MAWTS-1 will ultimately improve operational test, link OT with MAWTS-1 IP aviation subject matter expertise, and improve TTP development and innovation efforts across the Marine Corps.

As part of honing our collective skills when embarking for long range crisis response, MAWTS-1 continues to partner with The Basic School during each WTI course to execute long range missions in support of the Infantry Officers Course through the Talon Reach exercises. These events are also supported by MCTOG and MCLOG. These missions capitalize on the unique capabilities of Marine aviation's range and speed to deliver more effective, lethal, and survivable long-range operations as well as advance innovation and out-of-the box thinking.

During the WTI course the MV-22, CH-53E and KC-130J communities further explore our range of capabilities within this arena while conducting a humanitarian assistance and embassy reinforcement missions between Yuma and Las Cruces, New Mexico – nearly 500 miles. The ADT&E department takes advantage of the evolutions to demonstrate multiple airborne and ground networks connected with commercial level encryption (Black Core Network).

Black Core establishes and interconnects Link 16, TTNT, Net-T, CDL, and ANW2 networks through use of Mesh Network Manager (MNM) gateways installed on the MV-22 and CH-53. This connectivity provides troop commanders enhanced situational awareness via Wi-Fi networked tablets, expanded C3, limited gateway functionality and mesh network range extension to the CEWCC and TACC. Additionally, this venue provides a practical application to conduct radio frequency identification (RFID) operations in order to track Marines and logistical support, and then disseminate the data across the tactical networks.

3.4 MARINE AVIATION WEAPONS AND TACTICS SQUADRON ONE

C3

MAWTS-1 continues to spearhead innovating concepts to increase our lethality via the command, control, and communications (C3) department. With the employment of the Advanced Simulation Combat Operations Trainer (ASCOT), MAWTS-1 increases the scope and depth of knowledge of our command and control Marines in the live / virtual / constructive (LVC) environment.

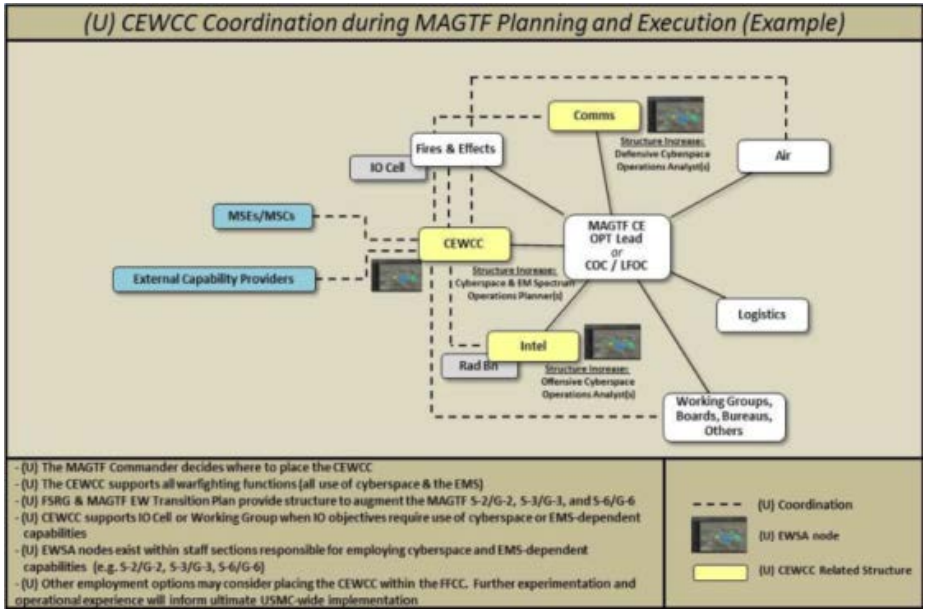
Additionally, during previous WTI courses, a composite detachment of DASC and TAOC Marines combined to perform a proof-of-concept for future MACCS agency employment. In 2017, we will continue to experiment with aviation command and control nodes capable of supporting both air support and air defense from a common set of equipment. MAWTS-1 C3 and VMX-22 are partnering to collect data and lessons learned in support of HQMC Aviation's future MACCS roadmap.

The G/ATOR is an expeditionary radar able to detect and track low-observable/low-radar cross-section targets such as guided rockets, artillery, mortars, and missiles; this system also provides a new level of protection to ground forces. MAWTS-1's C3 Department is deeply involved in implementing CAC2S as a ground-based gateway, fusing real-, near-real, and non-real-time data derived from the F–35, RQ–21, G/ATOR, and other inputs into an integrated tactical picture providing the ground combat element new levels of situational awareness and advanced decision support tools.

The new systems of the Marine air command and control system allow the MAGTF commander to "see" and exploit opportunities with speed and precision.

Cyber Electronic Warfare

The WTI Course now features a fully-staffed Cyberspace / Electronic Warfare Coordination Center (CEWCC) during the execution phase, with key support from the MACGs, Marine Corps Information Operations Center (MCIOC), Marine Corps Forces Cyberspace Command (MARFORCYBER), Marine Corps Forces Special Operations Command (MARSOC), and Radio Battalion. Integrating curricula from C3, GCD, AOD, UAS and Prowler Divisions, as well as some new Spectrum-unique academics, the WTI course now validates the efficacy and relevance of the curriculum for our target communities: 7588 Prowler ECMOs, 7315/7314 UAS EW specialists, 06xx and 26xx Cyberspace and EW (offensive and defensive) experts, 8834 / 0550 Information Operations experts, and 8866 MAGTF Space Officers. PWTIs are now being exposed to the planning, coordination and C2 of various aspects of cyberspace, electronic warfare, information operations, spectrum management and MAGTF space operations. CEWCC vignettes are deeply integrated in every aspect of WTI execution, and execution on the Joint Information Operations / Cyberspace Range (JIOR) enables combined live kinetic and non-kinetic operations over a realistic network-in-depth, in support of live operating forces and across the full spectrum of the OPLAN-aligned WTI scenario.



3.4 MARINE AVIATION WEAPONS AND TACTICS SQUADRON ONE

Trusted Handheld Tablets

MAWTS-1 continues to issue Trusted Handheld (TH2) tablets to the students during the academic phase of WTI courses. The tablets augment the student's ability to study the courseware, take examinations, and operate as a publications repository. Marine Air Ground Tablets (MAGTAB) are issued for the flight phase to enable planning and execution of flight evolutions leveraging digital applications in place of many traditional paper products. The MAGTABs are information assurance (IA) compliant and were provided by APW-74's Digital Interoperability initiative. They are authorized to operate on a secure wireless network. The tablet demonstrations pave the way for future expansion of tablet computing across the Marine Corps and helps advance the Electronic Kneeboard initiative for PMA-281.

Defense of the Expeditionary Airfield

WTI continues to incorporate air base ground defense operations through the defense of the expeditionary airfield (DEAF) 1 & 2 evolutions. The focus of training is on integration of live aircraft into the ground defense plan while conducting simulated CAS using unqualified controllers. Another key objective is to demonstrate the ability of defense forces to separate friendly forces from enemy once the enemy is inside the perimeter. MCLOG has been involved providing guest instructors who demonstrate the intricacies of how to run a combat operations center. A portion of the AGS department academic instruction is completed at MCLOG's classrooms in Twentynine Palms, CA by the staff members of MCLOG. This instruction continues to strengthen the collaborative efforts between these institutions.

Distributed Operations

The Assault Support and Aviation Ground Support departments continue to refine the procedures for the conduct of distributed operations missions with STOVAL aircraft at Laguna Army Airfield. MV-22B aircraft conduct ADGR and weapons reload for the AV-8B , increasing the number of sorties sent to the objective area executing offensive air support. This falls in line with the F-35B's desired capability to fight in anti-access/area denial (A2/AD) environments. With the F-35B, our MEUs and MEBs will have a fifth-generation low observable strike and sensor platform providing a unique and critical role in joint forcible entry operations

Distributed operations are also well-rehearsed during separate evolutions involving reactive forward arming and refueling points (FARPs) supporting AH-1 and UH-1 aircraft sorties. These rapidly deployable FARPS relocate on call based on the enemy situation and mission requirements providing fuel and ordnance to Marine attack and utility helicopters.

3.4 MARINE AVIATION WEAPONS AND TACTICS SQUADRON ONE

Air Officer WTI

Air Officer WTI started as a five week embedded course based on OIF 1 after-actions to train forward air controllers (FACs) to be better Air Officers for fleet units. It has since grown to a full seven-week, MOS- producing course intended for MEU and regimental air officers. The primary focus is integrating aviation capabilities within the ground combat element. Additionally the course trains each graduate to be a JTAC evaluator and program manager, empowered to develop a cadre of professional terminal controllers and aviation integrators.

During the WTI exercise each prospective instructor has the opportunity to control close air support in day and night conditions in urban and rural environments, integrated with indirect fires and maneuver. In addition to the live controls, the course includes a robust simulation phase integrating multiple controllers using the distributed virtual training environment (DVTE) and supporting arms virtual trainer (SAVT) into complex CAS scenarios. At the conclusion of WTI, each graduate is certified as a WTI and receives the 8077 MOS.

3.4 MARINE AVIATION WEAPONS AND TACTICS SQUADRON ONE

Tactical Risk Management

Since 2005, MAWTS-1 has been striving to reshape the thinking of tactical leaders in Marine aviation. They have made risk management an inherent part of the way we train, operate, and fight. A program called Tactical Risk Management (TRM) was started in 2004 as a result of a spike in aviation mishaps. An analysis of the causal factors for these mishaps indicated that the spike was not due to enemy action, despite the significant combat operations that the Marine Corps was involved in at the time. Mistakes or errors in judgement were the main causes of Marine aviation mishaps - indicating the need to examine and develop tactics to counter these "blue threats."

MAWTS-1 restructured the curriculum during their semi-annual Weapons and Tactics Instructor (WTI) course to include instructing students how to balance the blue threat and the red threat during mission planning and execution. Ultimately, WTI graduates return to their squadrons and foster a culture of excellence in risk management and tactical execution across the fleet.

Tactical Risk Management is a two-day lecture series conducted during every WTI course. The course builds on the fundamentals of ORM by presenting the students with various safety topics through the lens of mission effectiveness. TRM teaches the students that a tactically sound plan is an inherently safe plan. The principles taught during TRM are risk management, ethics, leadership, human performance, aerodynamics, managing red and blue threats, and professionalism in their trade. WTI students understand their role in managing risk is necessary to enhance mission effectiveness by preventing injury to personnel and damage to critical assets.

TRM principles are reinforced throughout the execution phase. MAWTS-1 requires students come up with a mitigation strategy and brief the red and blue threat (risk to mission/risk to force) during every confirmation brief. During mission planning the WTI students are asked if their plan is tactically sound and executable with the assets that have been allocated to the mission. If not, then they fine tune their plan until the red and blue threats are mitigated appropriately. Risk management is inherent to the mission planning conducted during WTI.

The curriculum is constantly transforming as the blue threats change on the battlefield. The next set of changes to the TRM curriculum will be based on an analysis of the DoD Human Factors Analysis and Classification System (HFACS) codes most frequently identified in aviation mishaps. Some of the most prevalent blue threats include complacency, communicating critical information, making adequate real-time risk assessments, and following published procedures. The course will bring in new relevant guest speakers presenting both a civilian and military perspective for managing high risk activities. WTI 2-16 incorporated a sports psychologist to help WTI students learn how to operate at their peak potential, and brought in an expert from Delta Airlines to give a different perspective on crew coordination and operational risk management. During WTI 1-17 physiologists and nutrition experts will teach specially tailored classes on mental and physical preparedness.

MAWTS-1 will also include several mentorship sessions with their students where they will talk about identifying hazards and preventing mishaps in a small group setting. Guest speakers that have experienced Marine Corps mishaps will speak to the students about lessons learned from their experience. The students will also review the most recent mishaps and the causal factors that were identified through investigation.

Marine Corps aircraft are national assets; their preservation is essential to continued success on the battlefields of tomorrow. Reshaping the thinking of future tactical leaders will transform the culture of aviation to include an appreciation for the development and execution of blue threat tactics - ultimately enhancing tactical excellence fleet wide while preserving assets.

3.4 MARINE AVIATION WEAPONS AND TACTICS SQUADRON ONE

F-35 Integration

During WTI 1-14, the initial F-35B sorties were flown in support of the course. In every course since, the staff has continued to integrate additional F-35 participation, incorporating antiair warfare, deep air support, close air support, electronic warfare, and assault support escort missions. With the July 2015 IOC declaration of VMFA-121, MAWTS-1 was positioned to take the next step towards a complete F-35 student syllabus. The WTI 2-16 Course graduated the first three F-35B students with support from MAG-13, specifically VMFA-121, and VMX-1. The first WTI class with F-35B students was a tremendous success and will pave the way for future courses as they evolve to incorporate the capabilities of the Marine Corps' newest TACAIR platform.

Summary

While there are many "new and different" aspects of the WTI course, the central core persists as world class and unique. MAWTS-1 remains the weapons school of the Marine Corps, dedicated to meeting the needs of the operating forces. We continue to focus on relevance and responsiveness, with a bias towards innovation and tactical excellence. Ultimately, the goal is to continue to produce graduates who are well prepared to fight and win our nation's battles.

3.5 NAVAL AVIATION ENTERPRISE

Naval Aviation Enterprise & Current Readiness Mission

Advance and sustain naval aviation warfighting capabilities and readiness at best possible cost...today and in the future.

The mission of the naval aviation enterprise is unchanged: to keep naval aviation a warfighting force. It brings to bear the right capabilities, capacity, and wholeness for fighting and winning. Advancing and sustaining these core functions at an affordable cost is smart, prudent, and responsible.

Naval aviation with an enterprise approach ensures a team effort dedicated to working together and committed to open information sharing and process improvement across naval aviation stakeholder organizations. This way of doing business must be ingrained throughout naval aviation. It significantly and measurably improves our ability to deliver warfighting readiness more efficiently. It leads to a better understanding of our operational costs and readiness degraders from the deckplate to the flag and general officer level. It facilitates better informed resource decisions for the overall good of the entire naval aviation enterprise.

Within the NAE, it is our mission to intelligently optimize those resources to meet today's and tomorrow's threats.

Marine aviation commanders and leaders – in concert with the naval aviation enterprise – will plan, execute, and manage the current readiness (CR) process in order to maximize equipment and personnel readiness. The focus must be on optimizing material resource allocations and expenditures while minimizing logistics downtime and delays. Leaders will conduct CR operations to align Marine aviation with enabling organizations. The purpose of this alignment is to predictably and effectively achieve required levels of readiness to produce core competent aviation units (squadrons / detachments) for warfighting missions

Goals

The goal of Marine aviation is to attain and maintain combat readiness to support expeditionary maneuver warfare while at the same time preserving and conserving Marines and equipment. Embedded within this combat readiness goal is the ability to plan for crises and/or contingency operations, and the capacity to deploy rapidly, effectively, and efficiently on short notice. The specific goals are as follows:

1) Increase aircraft readiness
   - Increase aircraft availability
   - Increase in-reporting (IR) rates / Decrease out-of-reporting (OOR) rates
   - Increase depot throughput
2) Reduce workload on Marines
3) Understand and manage costs and schedule
4) Extend service life for legacy aircraft / achieve programmed service life for new platforms
5) Improve health of organizational and intermediate level maintenance departments
6) Increase sortie generation and combat power
7) Increase reliability of aircraft, components, and logistics process

The Goal - A Core Competent Unit

The most direct measurable output of the CR process is the production of readiness: T-2.0. The design of CR, therefore, is to support mission essential task (MET)-based output standards that are consistent with a core competent unit (squadron or detachment).

Key Performance Indicators (KPIs)

To create consistent and integrated performance-based measurements, type/model/series (TMS) teams have determined which processes should be measured, what metrics would be used for the analysis, and which of those metrics are to be considered key performance indicators (KPIs).

-Pilot Training: T-Rating shows the TMS pilot training readiness based on unit inputs to the Defense Readiness Reporting System – Marine Corps (DRRS-MC). TMSs are funded to a T-Rating of 2.0

-Trained Maintenance Manpower: Maintainer core competency (MCC), the maintenance department's technical ability to maintain aircraft, is central to producing Ready for Tasking (RFT) aircraft. MCC includes, at a minimum, qualifications and licensing , collateral duty inspector (CDI), collateral duty quality assurance representative (CDQAR), aircraft sign off, and so forth to conduct the assigned number of maintenance shifts.

-Ready for Tasking (RFT): A main goal of the CR cross-functional team (CFT) is being able to provide the appropriate amount of RFT resources to support a squadron's current mission.

-Aircraft Life Management: Proper management of aircraft utilization ensures airframes attain the expected service life, including managing airframe usage within an acceptable range of life-limiting parameters (flight hours, fatigue, etc.).

-Flight Hour Cost-Per-Hour: The goal of the NAE is to produce the required readiness and RFT aircraft while efficiently managing cost. In order to meet this goal, TMS teams must be aware and critical of the rate at which, and how, fiscal resources are expended.

The Future of the NAE

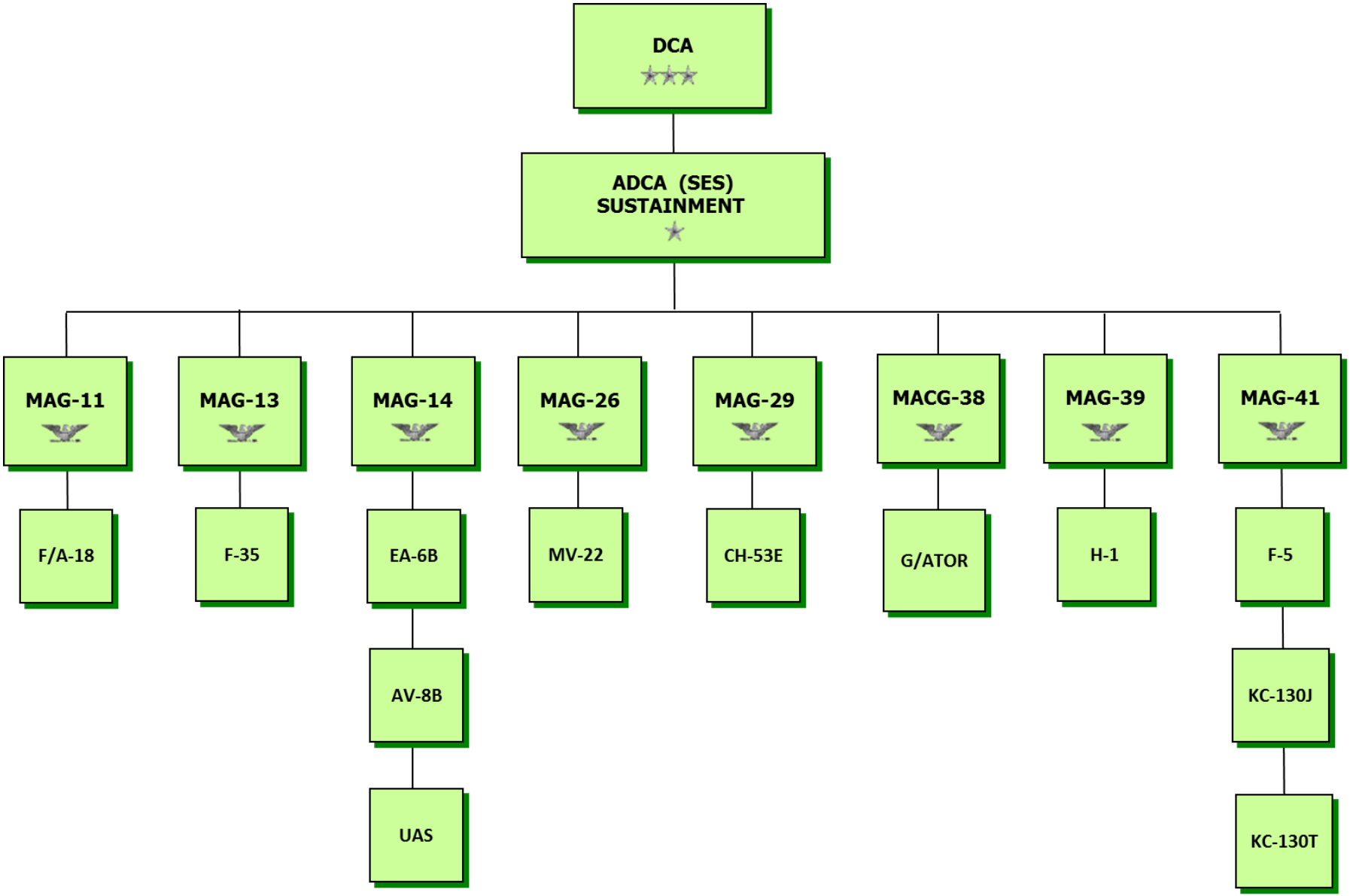
In order to reach these goals , the following stakeholder actions will be critical to the success of naval aviation:

1) Improve readiness of each TMS to service targets
2) Reduce Cost Per Flight Hour (CPFH) by the percentage assigned for each TMS while meeting readiness requirements
3) Develop methodology for managing fully burdened operating and support (O&S) costs
4) Apply O&S cost reduction initiative across all TMS platforms
5) Implement the Integrated Logistics Support Management System (ILSMS) tool across all TMS Program Offices
6) Expand Commander, Fleet Readiness Center (COMFRC) Aviation Rapid Action Team (ARAT) process to all TMS Teams
7) Streamline depot business operations
8) Program executive office (PEO)/program manager (PM) address future O&S costs in new acquisitions
9) Modify TMS briefs

- Shorten the briefs to focus on exactly what flag/general officers need to know/can impact/desire as needed
- Provide mid-cycle reviews every four months after the Air Board
- Provide focus on both key readiness degraders and cost initiatives/progress

10) Increase PM engagement in submission of affordability initiatives Future Readiness (FR) CFT

MARINE AVIATION TYPE/ MODEL/ SERIES LEADS

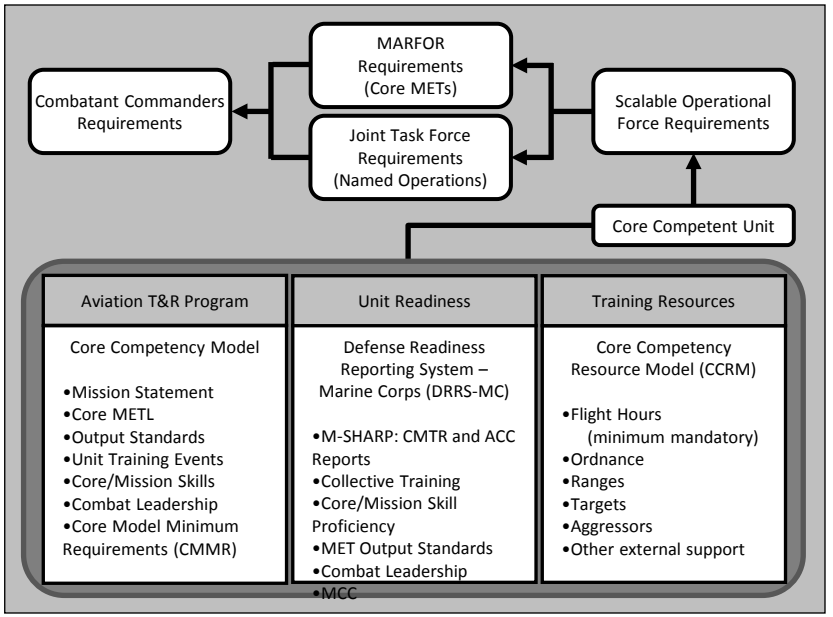


3.6 MARINE AVIATION TRAINING AND READINESS PROGRAM

Marine aviation must be prepared to respond to operational tasking around the world. Its effectiveness is directly related to unit sortie generation capability, the ability to command and control aviation assets, and our ability to train mission skill-proficient crews and combat leaders in a standardized manner to meet Mission Essential Task List output standards.

Aviation Training and Readiness Program

The Marine aviation training and readiness (T&R) program aligns with Department of Defense (DoD) and joint requirements by prescribing training standards required to develop core competent units that can fulfill operational requirements of combatant commanders. The T&R program implements a comprehensive, capabilities-based training system providing mission skill-proficient crews and combat flight leaders to MAGTF and combatant commanders. The T&R program has been updated to identify training resource requirements and assist in HQMC planning and budgeting. The Marine aviation T&R program structure, unit readiness reporting methods, and training resources requirements' contribution to force readiness is depicted below.



T&R Program Manual

NAVMC 3500.14D, Aviation Training and Readiness (T&R) Program Manual, outlines the standards, regulations and policies regarding the training of Marine Corps aircrew; command and control; airfield emergency and operations services; and meteorological and oceanographic personnel.

The foundation of every Marine aviation community T&R is the Commandant of the Marine Corps-approved Core Competency Model. The Core Competency Model establishes the basic structure around which each T&R program is created and links the following:

1) Mission statement
2) Mission Essential Task List (METL)
3) Core Model Minimum Requirement (CMMR)
4) Unit Core Capability (MET Output Standards)
5) Core/Mission Skill Proficiency (CSP/MSP), Crew CMMR, and combat leadership (CL) requirements

3.6 MARINE AVIATION TRAINING AND READINESS PROGRAM

Mission Essential Task List

Each aviation community has a unique Mission Essential Task List (METL) which captures the capabilities for which a unit was designed. The METL is composed of Mission Essential Tasks (METs) derived and validated from the Marine Corps Task List. Each unit-specific MET is defined as either Core (primary capability) or Core Plus (on demand or theater specific capability) and forms the basis for community T&R development.

Mission Skills

T&R Program Manual establishes a framework whereby training is composed of essential events that act as enablers for advanced skills and events known as "mission skills." Mission skills are linked to METs. Aircrew who are trained to standard in MET-specific mission skills enable a unit to execute that MET.

MET to Core/Mission/Core Plus Skill Matrix

The MET to Core/Mission/Core Plus Skill Matrix ensures that skills are linked to METs, thus laying a firm foundation for both training program structure and accurate readiness reporting. This matrix is produced in each T&R manual and represents the training required to satisfy MET training and readiness requirements. It is in the mission skills-to-MET correlation where a commander can best gauge the readiness of his unit to accomplish a specific MET.

Sortie-Based Training Program

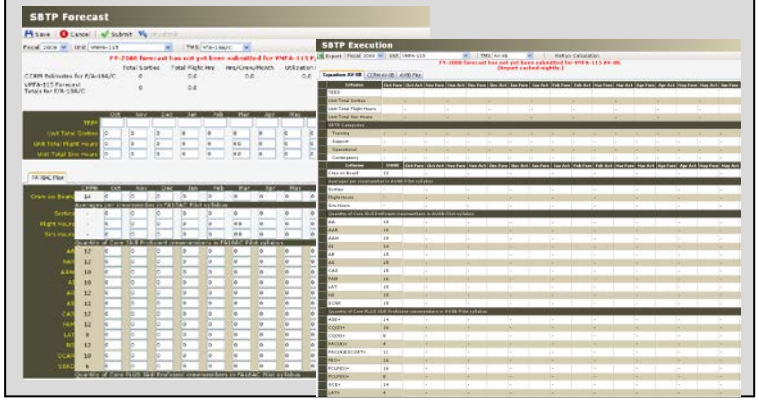
The Marine Aviation Sortie-Based Training Program (SBTP) enables squadron commanders to develop their unit's TEEP and train mission skill-proficient aircrew and combat leaders to their T/M/S T&R Core Model Minimum Requirement (CMMR) to maintain a T-2 level of readiness. A T-2 level of readiness allows a unit to fully execute its Mission Essential Task output standards in support of a Marine Air-Ground Task Force or joint force commander.

An annual SBTP forecast is developed at the squadron level, then reviewed and approved through the MAG/MAW/MCI/MARFOR/DCA chain of command. Unit SBTP forecasts shall be submitted by each respective MARFOR NLT 1 September to HQMC Aviation Plans and Policies each year for the following fiscal year (FY) or as specified by the SBTP Message.

HQMC Aviation Plans and Policy (APP) consolidates the MARFOR-approved inputs into a single Marine aviation SBTP by T/M/S.

Monthly Unit SBTP Execution Submission: the monthly unit SBTP execution report provides Marine aviation organizations at all levels the required data to track unit SBTPs and FHP execution.

M-SHARP SBTP Forecast/Execution Reports



MET to Core/Mission/Core Plus Skill Matrix

METL	CORE SKILLS 2000 PHASE							MISSION SKILLS 3000 PHASE				
	NS (E)	LGN	TN	LAT	SBC FORM	DIV FORM	IR TR	ALE	CPL	AAR	BGR	AD
MCT 1.3.3.3.2 Conduct Aviation Ops From Expeditionary Shore-Based Sites	X						X	X				
MCT 1.3.4.1 Conduct Combat Assault Transport	X	X	X	X	X	X	X		X			
MCT 1.3.4.2 Conduct Air-to-Air Refueling	X		X		X	X	X			X		
MCT 1.3.4.2.1 Provide Aviation Delivered Ground Refueling	X										X	
MCT 4.3.4 Conduct Air Delivery	X		X		X	X	X					X

3.6 MARINE AVIATION TRAINING AND READINESS PROGRAM

Marine Corps Sierra-Hotel Aviation Readiness Program (MSHARP)

M-SHARP provides Marine Aviation with user-friendly scheduling, event tracking and objective operational risk management capabilities. M-SHARP is the USMC authoritative data source for a multitude of Marine Aviation training and readiness management, flight hour execution, and resource utilization data points, and utilizes data warehousing to archive historical data for enhanced trend analysis across a variety of aviation specific and related areas of interest.

Marine aviation has made great advances in M-SHARP schedule automation, providing commanders with scheduling risk management tools to identify and advise on delinquent or unqualified aircrew without the requisite skills, proficiency, or supervision.

The next step on Marine Aviation's automated training management roadmap enhances usability and efficiency through modernization of user interfaces and system architecture, as well as continued implementation of information assurance security and controls. TECOM (Aviation Standards Branch) is responsible for the programmatic management of M-SHARP.

Squadrons' utilization and data accuracy levels are reported monthly and are critical to the validation and verification process. System Accuracy Status Level 1 data ensures squadrons' utilization of M-SHARP is proper and the data is valid.

Defense Readiness Reporting System – Marine Corps (DRRS-MC)

DRRS-MC captures the present state of a unit's personnel, equipment, resources and METL ability (training). It is a resourcing, force sourcing, and readiness tool that feeds DRRS-Strategic. Marine aviation can assess DRRS-MC METL ability though the development of highly objective T&R standards and the use of MSHARP. M-SHARP provides various tools to assess a near real-time picture of a unit's aircrew readiness and provides the commander a ready-reference to better inform the DRRS-MC assessment.

FLYING HOUR PROGRAM (FHP) AND CORE COMPETENCY RESOURCE MODEL (CCRM)

Marine Corps flying hour program management is detailed in MCO 3125.1B.

The term "flying hour program" refers to the allocation and obligation of funds from the Operation and Maintenance, Navy (OMN) and Operation and Maintenance, Navy Reserve (OMNR) accounts appropriated to the Marine Corps for the operation and maintenance of Marine Corps aircraft.

Marine Corps flight operations management is composed of two elements: the Sortie Based Training Program (SBTP) and the FHP. The SBTP is the commander's execution tool while the FHP, which provides policy, guidance, and responsibilities for the execution of the Marine Corps flight hours, is the HQMC's budgeting tool. It is important to stress that the SBTP is the foundation for all that we do, while the FHP is a measuring tool used by OPNAV to allocate resources. All commanders shall use all available resources to ensure their commands are trained per the current editions of the appropriate type/model/series T&R manuals. Key sections of the FHP order include:

1) Marine Corps Flying Hour Programs
2) Marine Corps Unit CCRM Guidelines
3) Marine Corps Sortie Based Training Program
4) Marine Corps FHP Reporting

Marine Corps Flying Hour Programs

Schedule A: Tactical Aircraft (TACAIR) FHP

Deployable active component (AC) fixed-wing, rotary-wing and tiltrotor squadrons. Activated reserve component (RC) squadrons will also be funded from the gaining MARFOR TACAIR FHP.

Schedule B: Fleet Air Training (FAT) FHP

All Marine Corps fleet replacement squadrons (FRS).

Schedule C: Fleet Air Support (FAS) FHP

Deployable and non-deployable AC operational support aircraft (OSA), SAR, HMX-1, VMX-1, and VMFT-401 aircraft.

Schedule D: Reserve FHP

Deployable and non-deployable RC FW/RW/TR squadrons and OSA aircraft

Core Competency Resource Model (CCRM)

CG, Training and Education Command (TECOM) Aviation Standards Branch (ASB) is the custodian of the CCRM for each T/M/S. The CCRM directly links the FHP, T&R syllabi, and the readiness reporting system (DRRS-MC) in order to generate annual flying hour and sortie requirements (including training, support, or operational sorties) for T-2.0 readiness level. The Deputy Commandant for Aviation uses CCRM data as the primary guide/validation tool when providing annual TACAIR FHP inputs to the USN OP-20 budgeting document.

Marine Corps SBTP Guidance

In recent years the Marine Corps FHP experienced a negative trend in SBTP baseline flight hour execution. The divergence between the annual CCRM modeled training requirement and the execution of SBTP flight hours is typically due to aircraft availability, increased mission and T&R requirements. This has resulted in an unfavorable optic in a pressurized budget environment potentially placing funding for the T-2.0 flight hour requirement.

In order to promote accurate and executable SBTPs that successfully achieve readiness goals that mirror the CCRM requirements, HQMC Aviation Plans, Policy, & Budget branch released the 'FY16 Marine Corps Aviation SBTP' guidance message (261129ZMay15). This message defines the CCRM and SBTP, describes the utility of the Operational Forecasting tool to assist in the development of a unit's SBTP, and outlines those data points and variables that shall be factored into an accurate and executable SBTP.

MARINE CORPS FLYING HOUR PROGRAM

Presidential Budget (PB) FY17
Fleet Aircraft FHP Requirement by T/M/S

T/M/S	Hours
AV-8B	17,565
MV-22B	38,816
F-35B	9,226
CH-53E	24,633
KC-130J	18,963
AH-1W	10,560
AH-1Z	13,996
UH-1Y	18,124
F/A-18A/C/D	35,200
EA-6B	4,341
TOTAL	**191,424**

*Schedule A
Source: PB-17 Requirement v3888







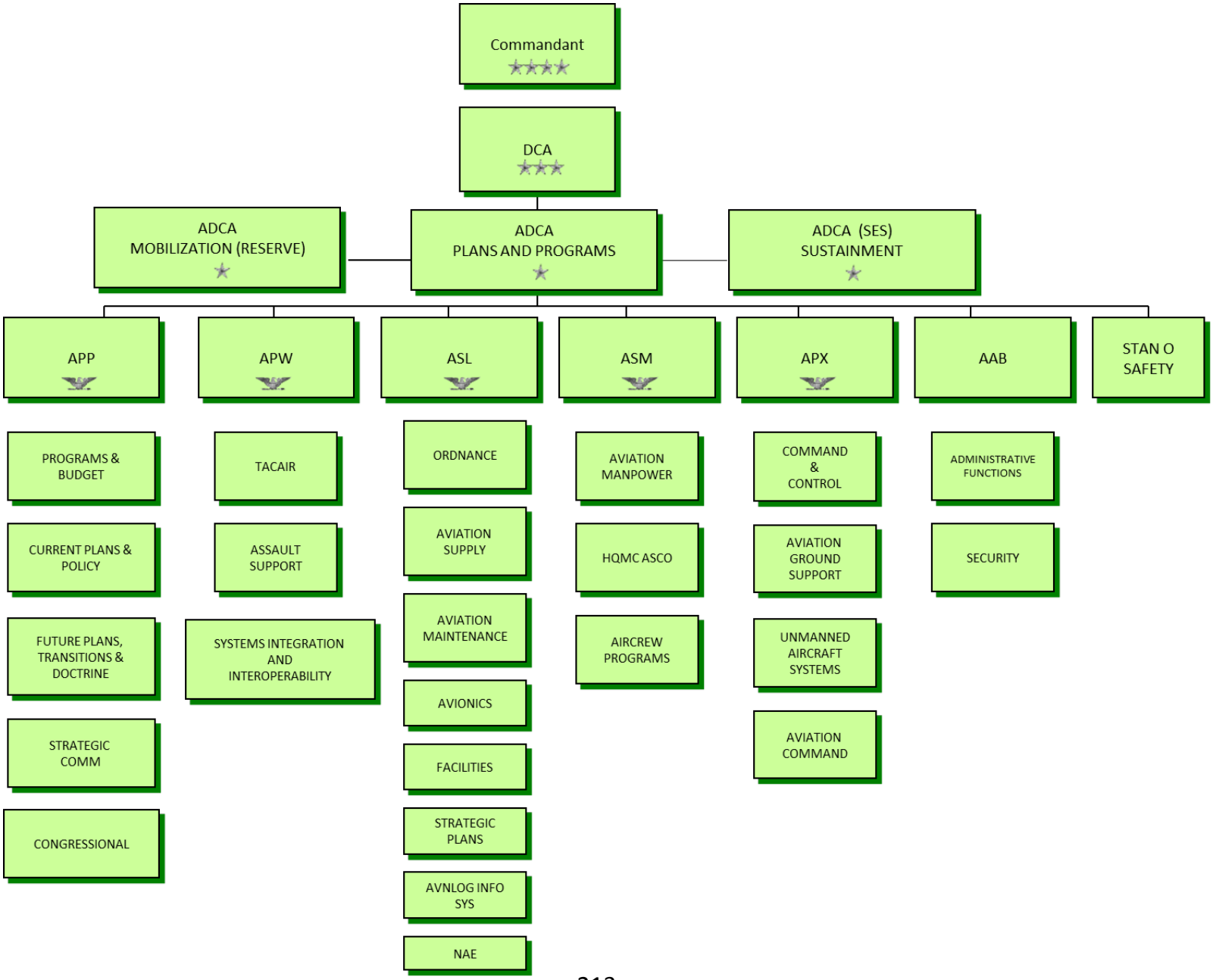
Schedule	FY 17	FY 18	FY 19	FY 20	FY 21	FY22
Fleet aircraft (TACAIR) Hours	**173,439**	**176,340**	**177,750**	**175,245**	**172,684**	**TBD**
Fleet Replacement Squadron (FRS) Aircraft Hours	**29,933**	**27,242**	**27,170**	**27,668**	**27,459**	**TBD**
Fleet Air Support Aircraft Hours	**28,207**	**25,924**	**27,608**	**28,431**	**22,808**	**TBD**
Reserve aircraft Hours	**26,301**	**26,349**	**27,046**	**28,111**	**26,868**	**TBD**
USMC FHP TOTAL BUDGETED HOURS	**257,880**	**255,855**	**259,574**	**259,455**	**249,819**	**TBD**

Source: PB-17 Control v3871 for FY17-21; POM-18 budgeted hours are pending

MARINE CORPS AVIATION INVENTORY

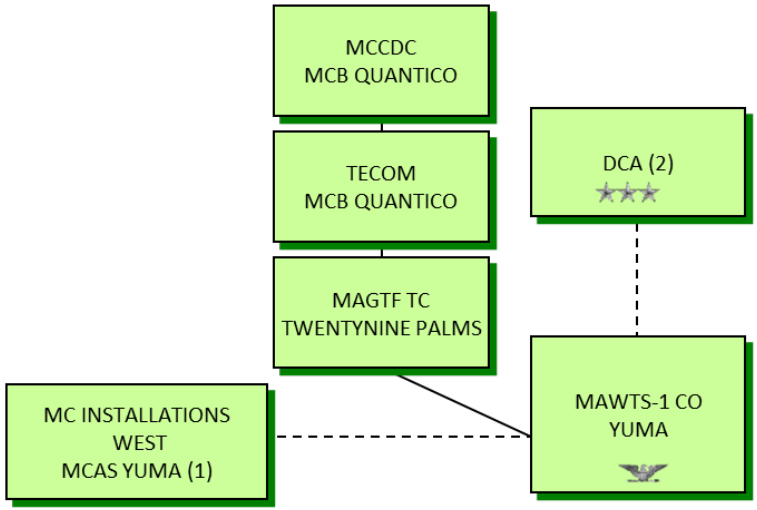
T/M/S	CURRENT INVENTORY	AVERAGE AGE
AH-1W	109	25.25
AH-1Z	47	3.86
AV-8B	112	20.02
C-20G	1	21.87
C-9B	2	33.62
CH-53E	146	27.92
EA-6B	18	28.98
F-35B	43	2.56
F-5F	1	37.83
F-5N	11	35.22
FA-18A	52	29.82
FA-18B	7	31.48
FA-18C	122	23.99
FA-18D	92	22.60
HH-1N	4	43.77
KC-130J	48	9.18
KC-130T	14	26.15
MV-22B	250	5.23
RQ-21A	6	2.16
RQ-7B	47	6.25
T-34C	3	38.00
TAV-8B	16	26.78
UC-12F	4	29.47
UC-12M	3	28.36
UC-12W	6	5.55
UC-35C	2	16.50
UC-35D	10	11.90
UH-1Y	128	3.80
UH-3D	1	48.25
UH-60N	1	33.58
VH-3D	11	40.68
VH-60N	8	27.90

3.7 MARINE CORPS AVIATION ORGANIZATIONAL CHARTS

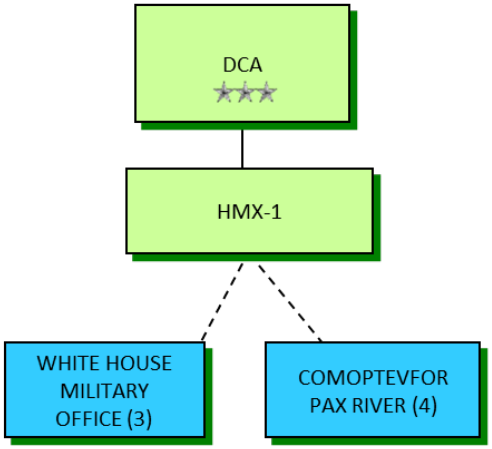


AVIATION-UNIQUE ORGANIZATIONAL CHARTS

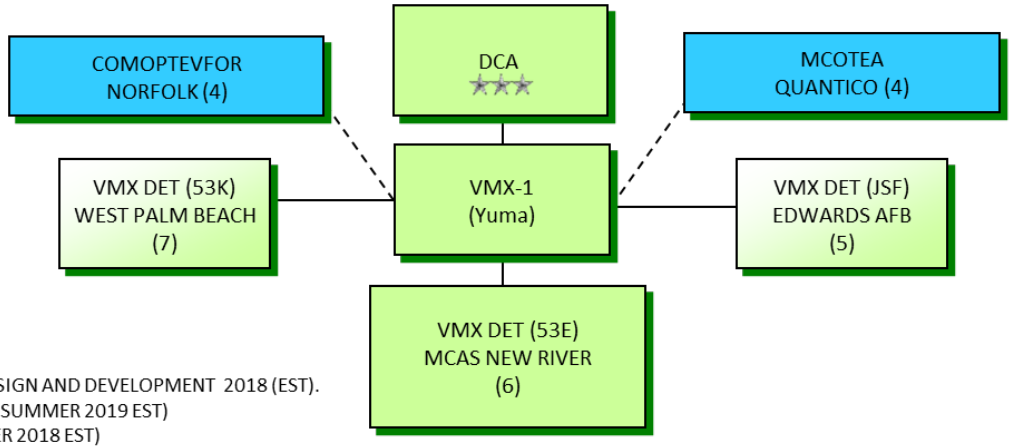
MARINE AVIATION WEAPONS AND TACTICS SQUADRON ONE



MARINE HELICOPTER SQUADRON ONE



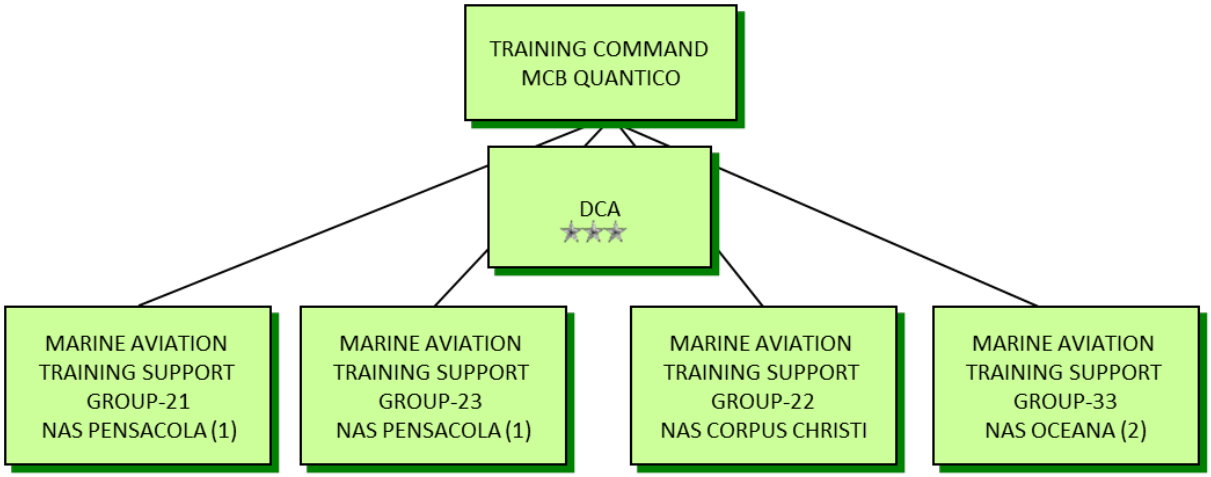
MARINE OPERATIONAL TEST AND EVALUATION SQUADRON ONE



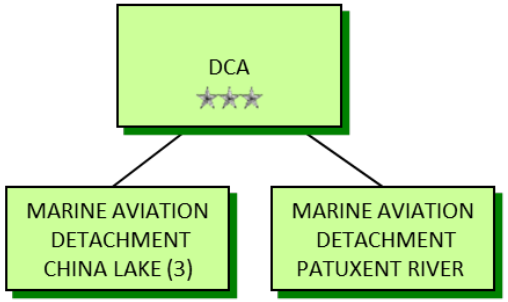
NOTES:
1) FISCAL/COMPTROLLER SUPPORT.
2) DCA: ADVOCACY RELATIONSHIP FOR AVIATION ISSUES
3) TASKING FOR PRESIDENTIAL MISSIONS.
4) OPCON FOR OPERATIONAL TEST MISSIONS.
5) VMX DET (JSF) RE-LOCATES TO MCAS YUMA AT COMPLETION JSF SYSTEM DESIGN AND DEVELOPMENT 2018 (EST).
6) VMX DET (53E) RE-LOCATES TO MCAS YUMA AT COMPLETION OF 53K IOT&E (SUMMER 2019 EST)
7) VMX DET (53K) CONSOLIDATES WITH 53E DET AFTER SDTA DELIVERY (SUMMER 2018 EST)

AVIATION-UNIQUE ORGANIZATIONAL CHARTS

MARINE AVIATION TRAINING SUPPORT GROUPS (MATSGs)

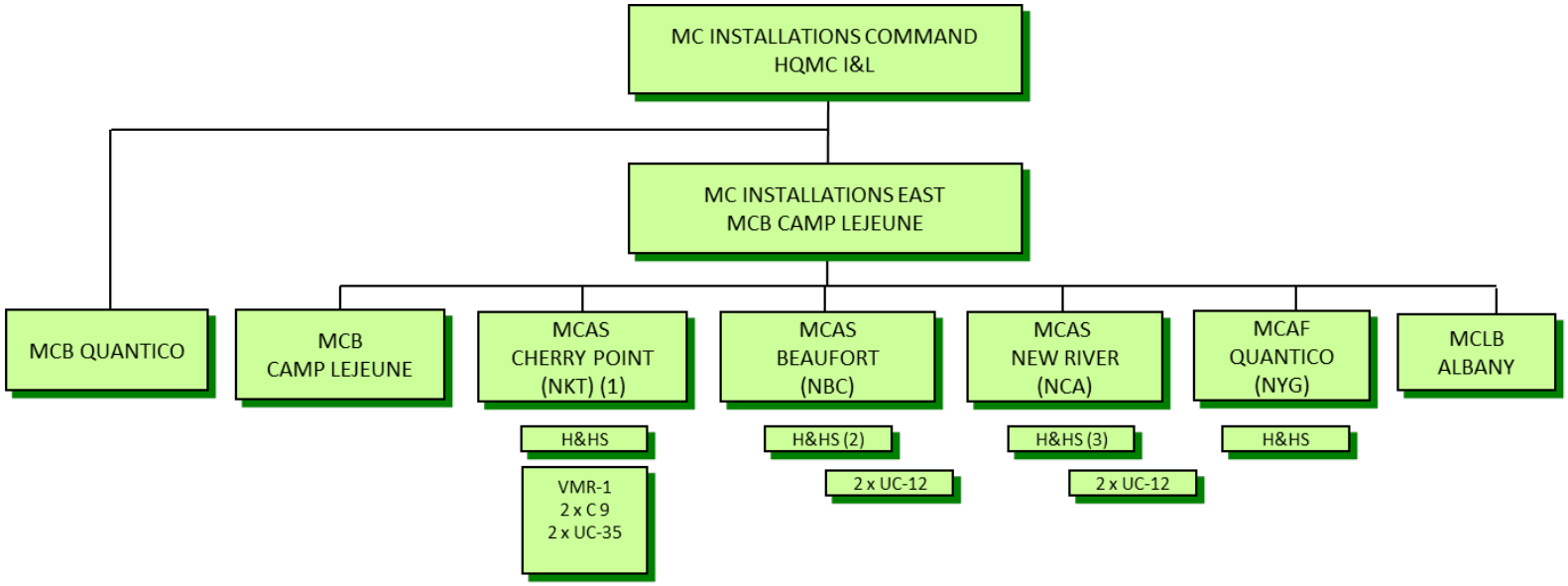


MARINE AVIATION DETACHMENTS (MADs)



NOTES:
1) MATSG-21 AND MATSG-23 COLOCATED
2) MATSG-33 CLOSES IN FY 16.
3) MAD CHINA LAKE IS CURRENTLY O-6 COMMAND; IN FY 2017, MAD CHINA LAKE BECOMES O-5 COMMAND REPORTING TO MAD PATUXENT RIVER.

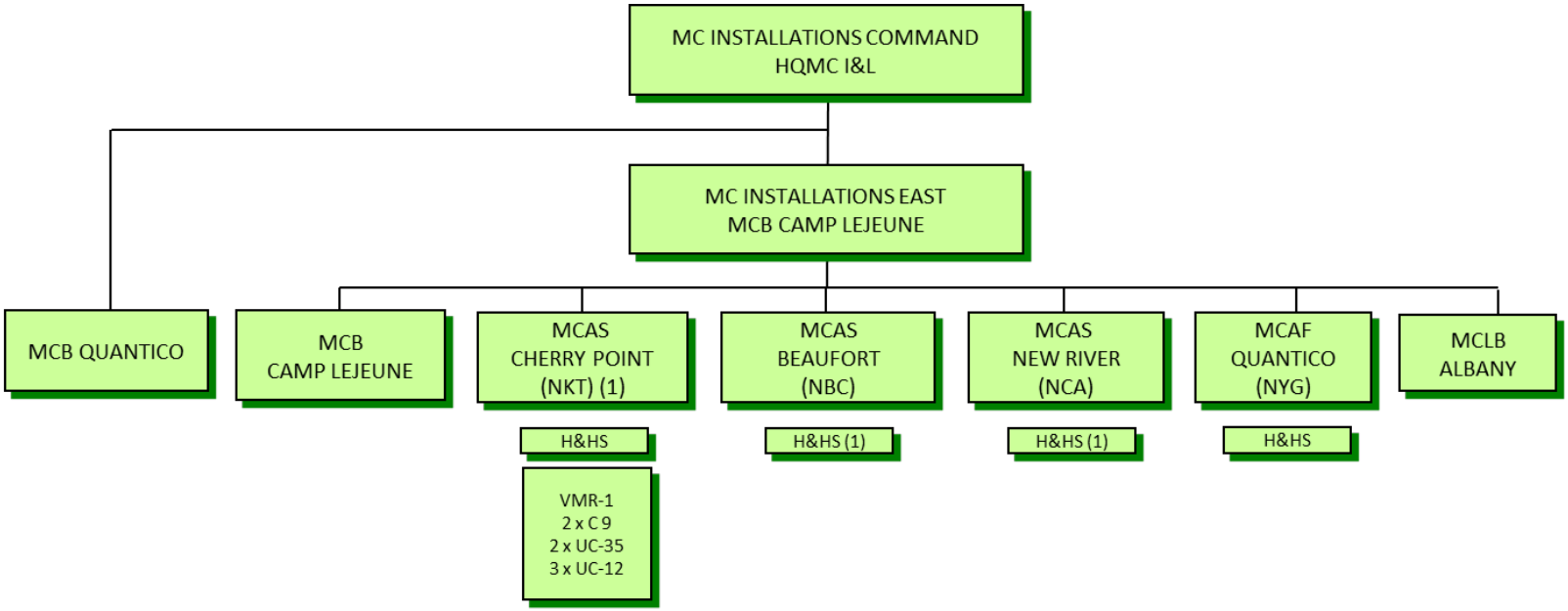
CURRENT MARINE CORPS INSTALLATIONS EAST ORGANIZATIONAL CHART



NOTES:
1) VMR-1 IS AN ACTIVE DUTY SQUADRON ASSIGNED TO MCI EAST STATIONED AT MCAS CHERRY POINT.
2) H&HS MCAS BEAUFORT 2 X UC-12M.
3) H&HS MCAS NEW RIVER 2 X UC-12F.

* Air station commanding officers have advocacy relationship with wing commander and staff for prioritization and planning for aviation issues.

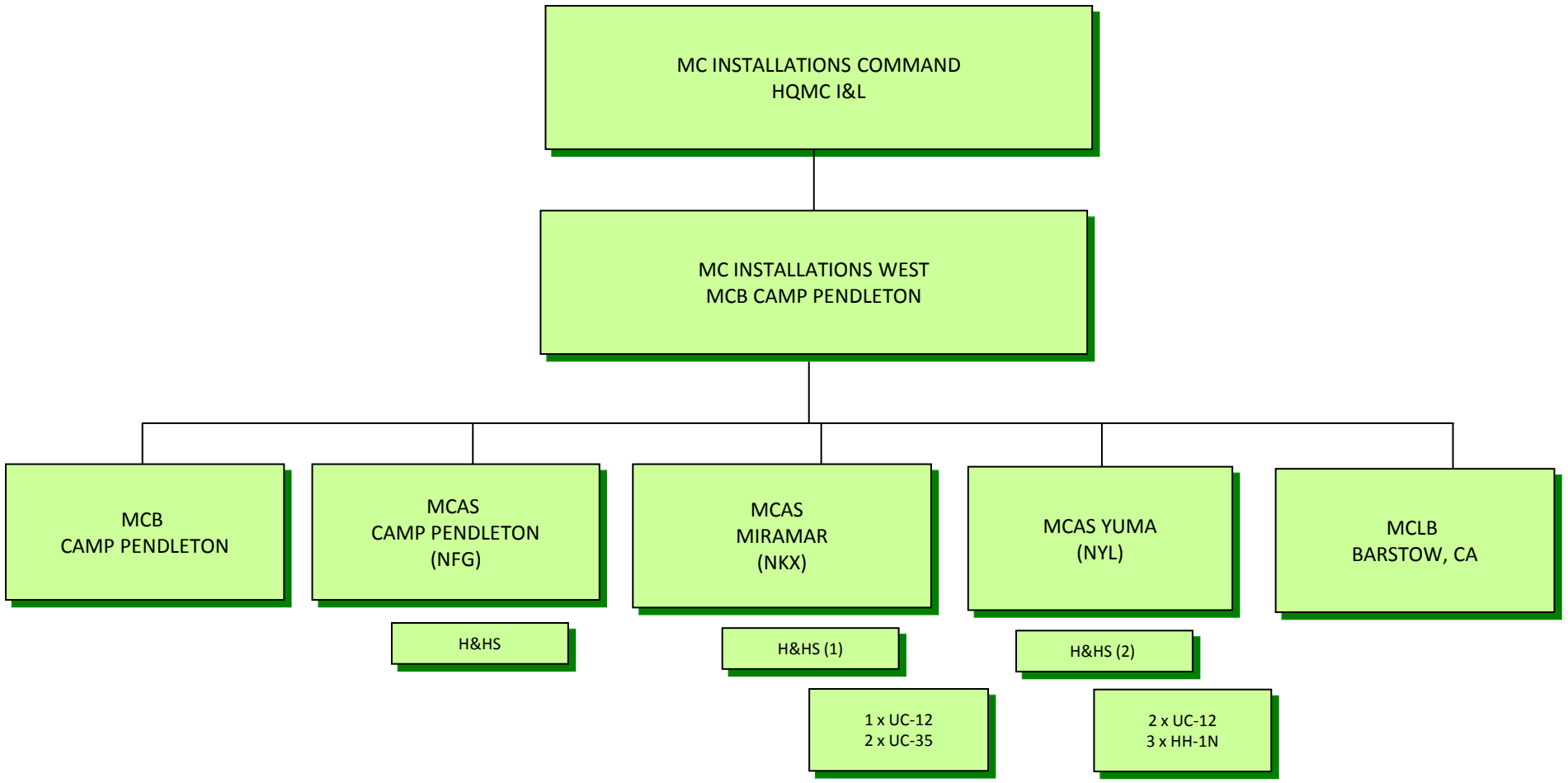
FUTURE MARINE CORPS INSTALLATIONS EAST ORGANIZATIONAL CHART



NOTE:
1) DCA INITIATIVE: CONSOLIDATE OSA ASSETS FROM BEAUFORT AND NEW RIVER UNDER VMR-1 IN CHERRY POINT (4 UC-12)

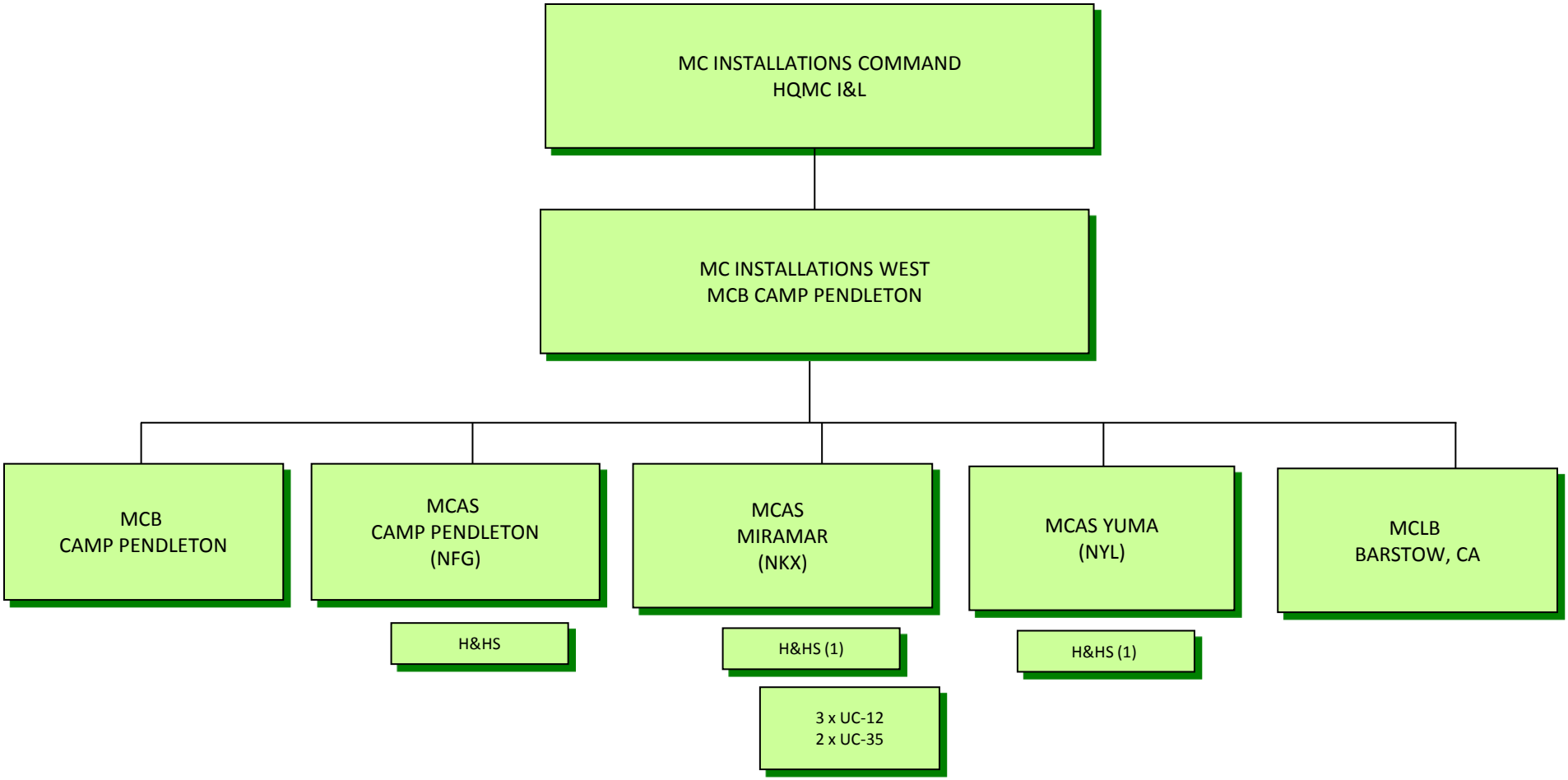
* Air station commanding officers have advocacy relationship with wing commander and staff for prioritization and planning for aviation issues.

CURRENT MARINE CORPS INSTALLATIONS WEST ORGANIZATIONAL CHART



*** Air station commanding officers have advocacy relationship with wing commander and staff for prioritization and planning for aviation issues.**

FUTURE MARINE CORPS INSTALLATIONS WEST ORGANIZATIONAL CHART

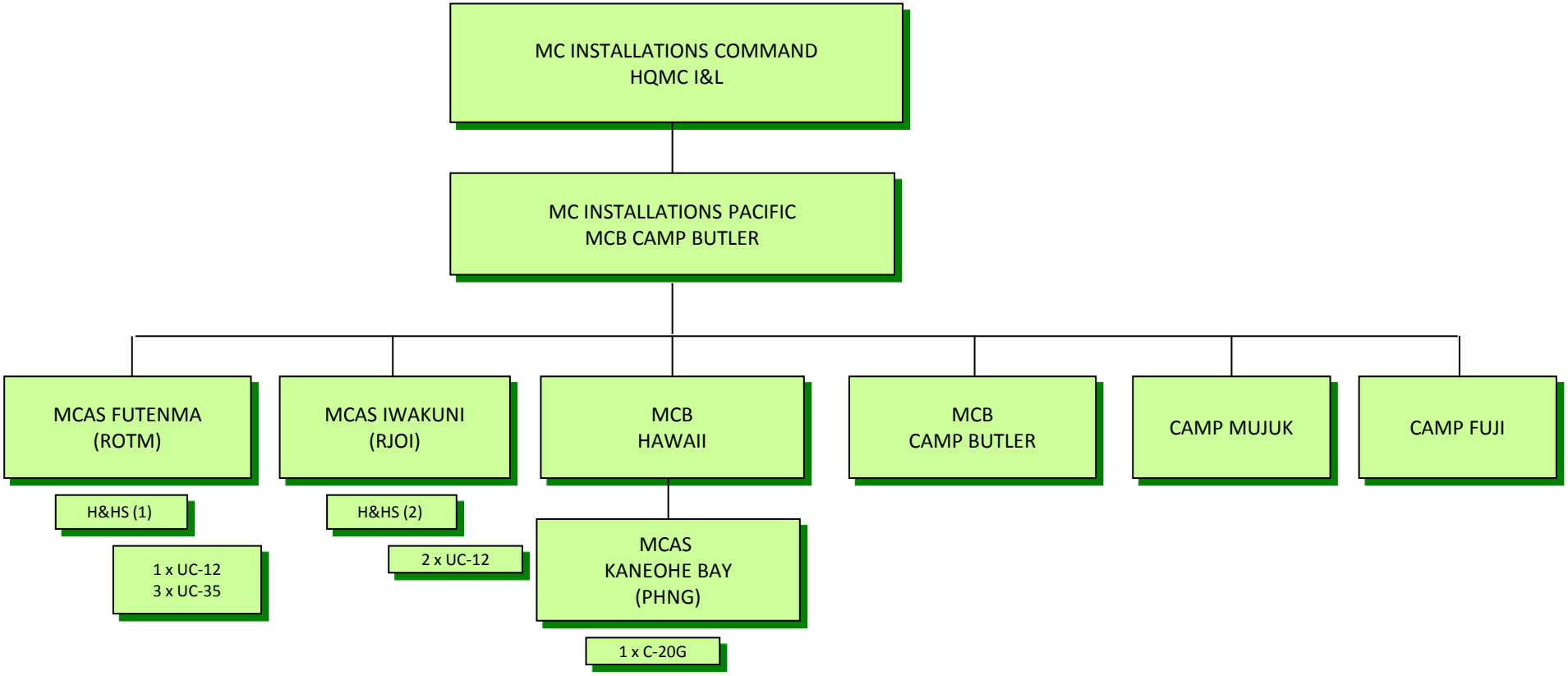


NOTE:

1) UPON DIVESTURE OF SAR, MCAS YUMA OSA ASSETS WILL CONSOLIDATE AT MCAS MIRAMAR.

*** Air station commanding officers have advocacy relationship with wing commander and staff for prioritization and planning for aviation issues.**

CURRENT MARINE CORPS INSTALLATIONS PACIFIC ORGANIZATIONAL CHART



NOTES:

1) H&HS MCAS FUTENMA OPERATES 1 X UC-12W EQUIPPED WITH EXTENDED RANGE TANKS.

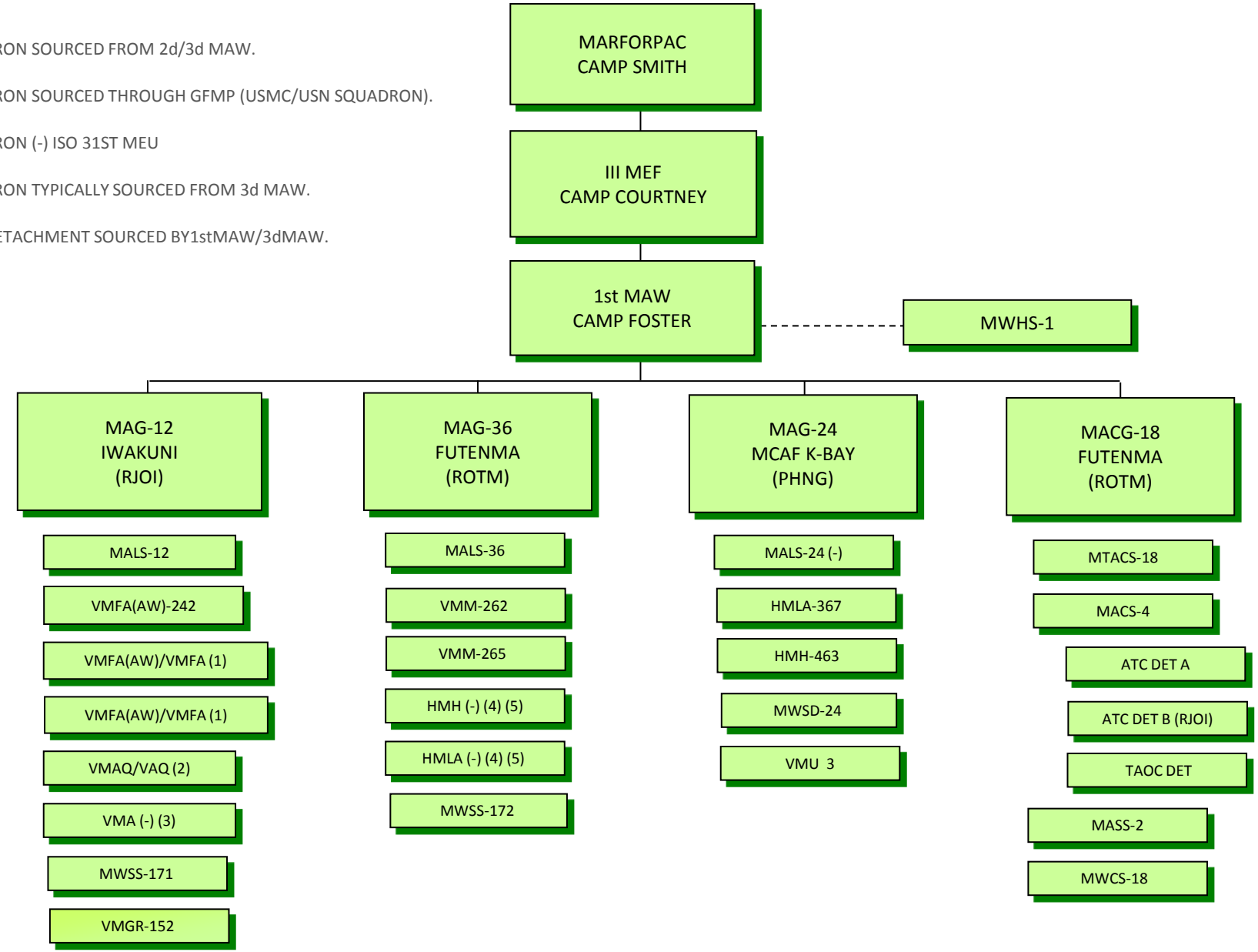
2) H&HS MCAS IWAKUNI OPERATES 1 X UC-12W NOT EQUIPPED WITH EXTENDED RANGE TANKS AND 1 X UC-12W EQUIPPED WITH EXTENDED RANGE TANKS.

*** Air station commanding officers have advocacy relationship with wing commander and staff for prioritization and planning for aviation issues.**

MARFORPAC/1st MAW ORGANIZATIONAL CHART

NOTES:

1) UDP SQUADRON SOURCED FROM 2d/3d MAW.
2) UDP SQUADRON SOURCED THROUGH GFMP (USMC/USN SQUADRON).
3) UDP SQUADRON (-) ISO 31ST MEU
4) UDP SQUADRON TYPICALLY SOURCED FROM 3d MAW.
5) 31ST MEU DETACHMENT SOURCED BY1stMAW/3dMAW.



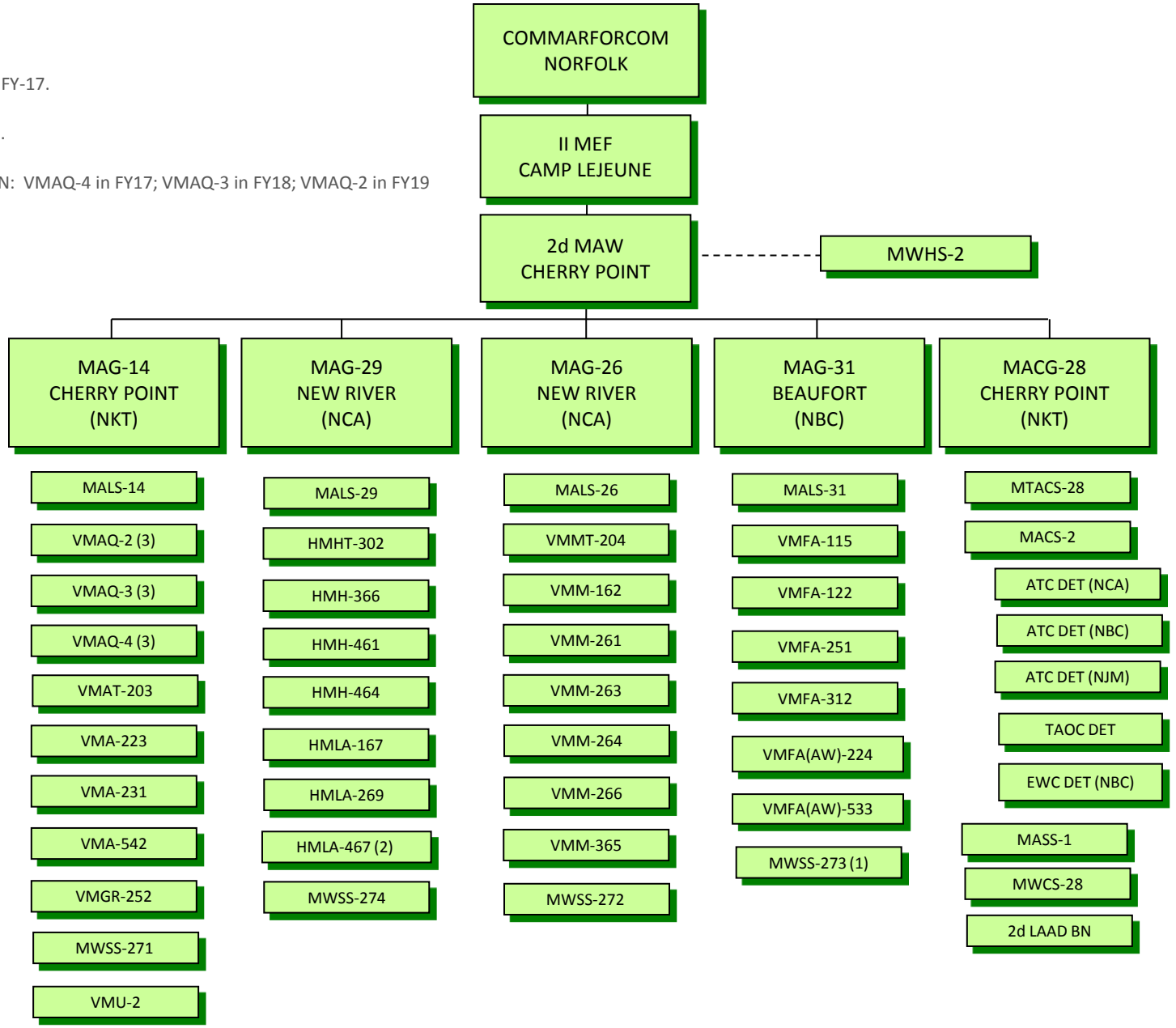
MARFORCOM/2d MAW ORGANIZATIONAL CHART

NOTES:

1) MWSS-273 BECOMES MWSD-31 IN FY-17.

2) HMLA-467 DISESTABLISHES IN FY16.

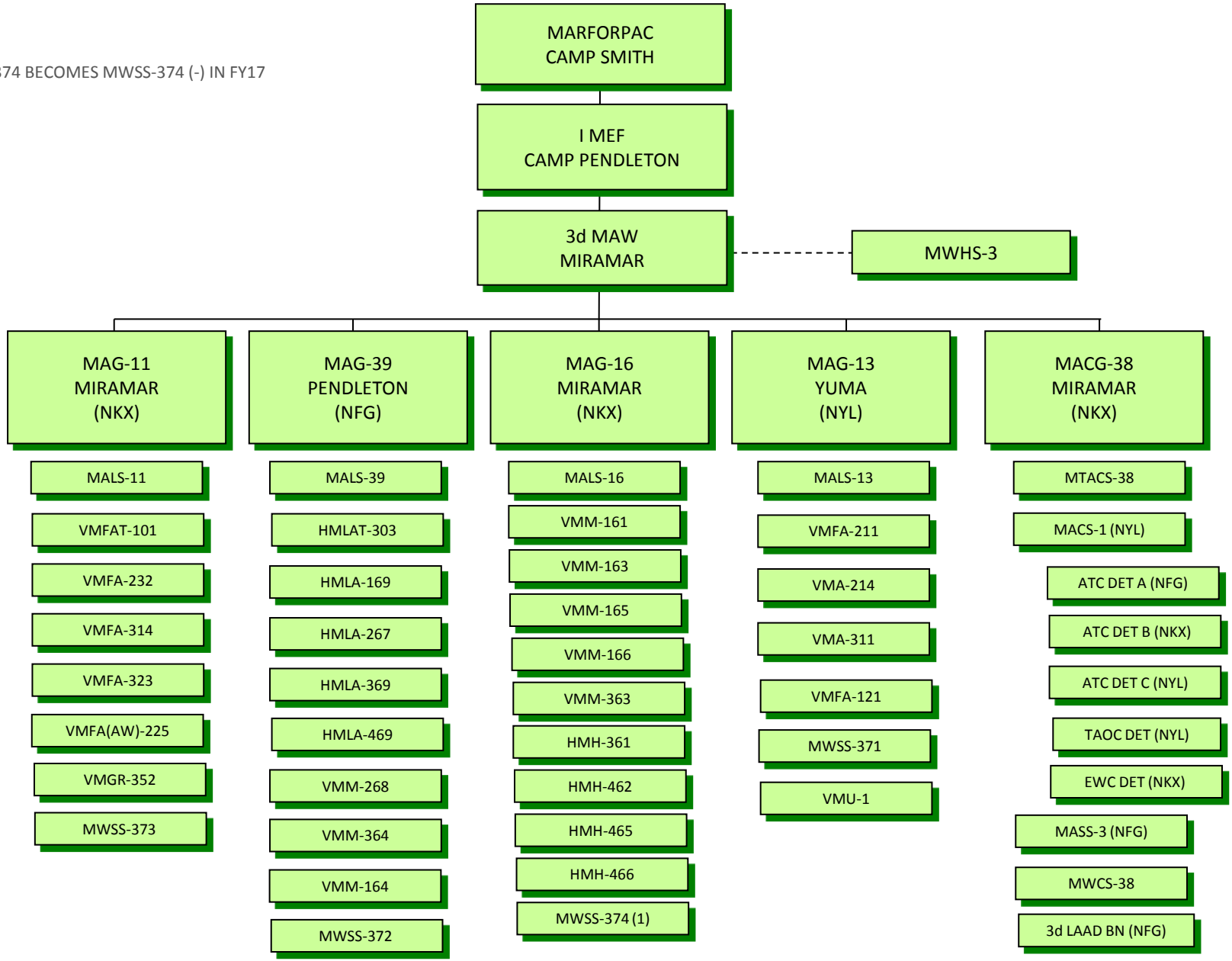
3) VMAQ SQUADRON SUNDOWN PLAN: VMAQ-4 in FY17; VMAQ-3 in FY18; VMAQ-2 in FY19



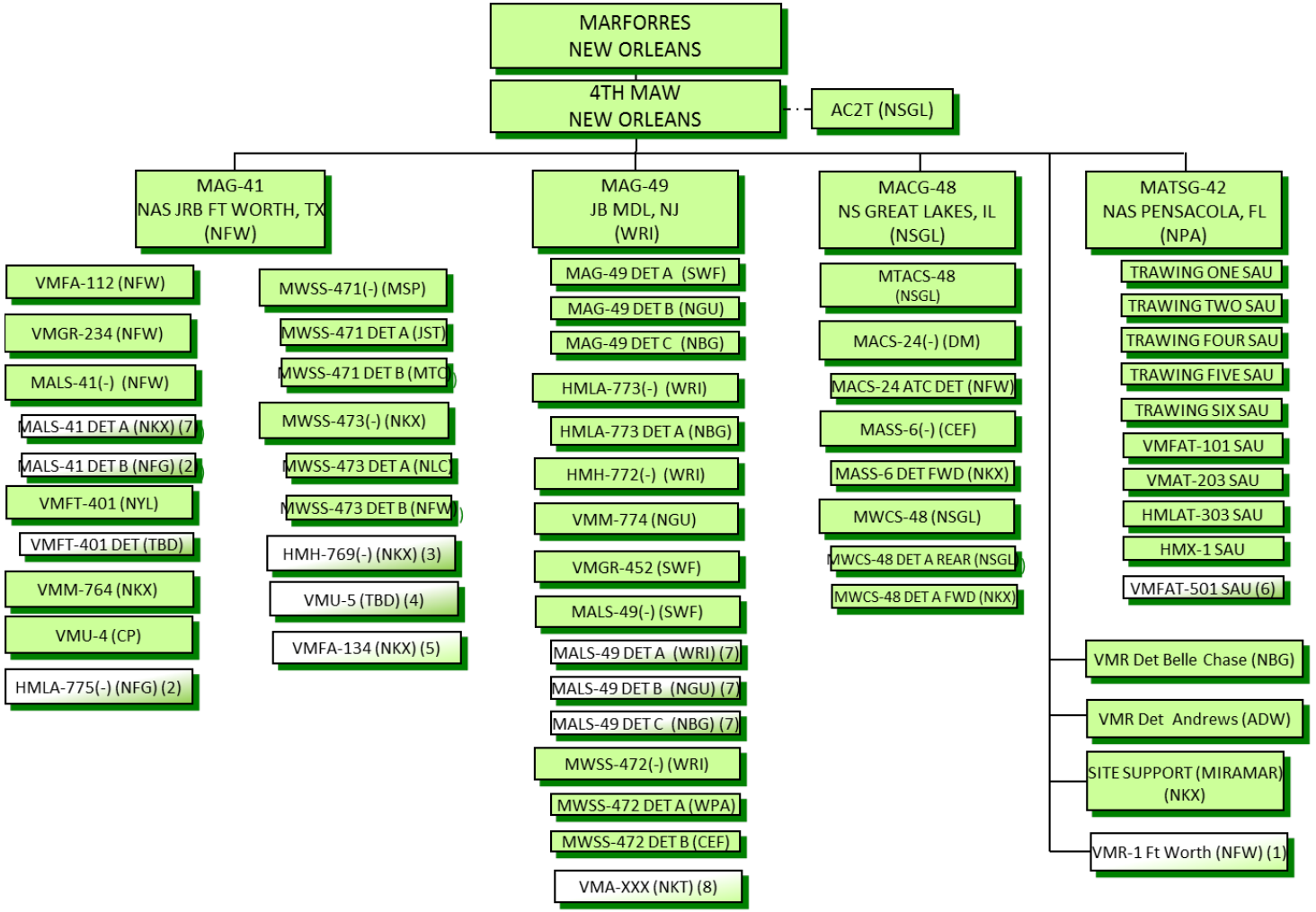
MARFORPAC/3d MAW ORGANIZATIONAL CHART

NOTES:

1) MWSS-374 BECOMES MWSS-374 (-) IN FY17



4TH MAW ORGANIZATIONAL CHART



NOTES:

1) VMR-1 RELOCATES AND REALIGNS UNDER 4TH MAW IN FY17
2) HMLA-775 (-)/MALS-41 DET B REACTIVATE ABOARD MCAS CAMP PENDLETON IN FY17
3) HMH-769 (-) REACTIVATES ABOARD MCAS MIRAMAR IN FY23
4) VMU-5 ACTIVATES AT TBD LOCATION IN FY23
5) VMFA-134 (F/A-18) ACTIVATES ABOARD MCAS MIRAMAR IN FY TBD
6) VMFAT-501 SAU SPT PLANNED START FY17
7) MALS DET ADMIN UICS ESTABLISHED FY17
8) VMA-XXX (AV-8B) ACTIVATES ABOARD MCAS CHERRY POINT IN FY TBD

ADW – Joint Base Andrews, MD
BKF – Buckley AFB, CO
CEF – Westover ARB, MA
CP – MCB Camp Pendleton, CA
DM – Dam Neck/Oceana, VA
JST – Johnstown, PA
MTC – Selfridge ANGB, MI
MSP – Minneapolis, MN
NBG – NAS JRB New Orleans, LA
NFG – MCAS Camp Pendleton, CA
NFW – NAS JRB Fort Worth, TX
NGU – NS Norfolk, VA
NKX – MCAS Miramar, CA
NLC – NAS Lemoore, CA
NPA – NAS Pensacola, FL
NSGL – NS Great Lakes, IL
NYL – MCAS Yuma, AZ
SWF – Stewart ANGB, NY
WPA – Wyoming, PA
WRI – Joint Base McGuire-Dix-Lakehurst, NJ

3.8 MARINE AVIATION MANPOWER

3.8 MARINE AVIATION MANPOWER

Marine Aviation Manpower Plans

The focus of aviation manpower is to improve current and future readiness through active management of structure and associated aviation policy. Aviation Marines continue to stay highly engaged at home and abroad. Operational tempo, legacy aircraft reset, and fleet upgrades continue to present challenges to managing manpower.

In particular, Company Grade manpower shortfalls due to draw-down force shaping measures and delays in pilot production further taxed aviation readiness recovery. HQMC Aviation is working with M&RA and Training Command on top-down solutions. Additionally, bottom-up approaches are being utilized with surveys and Operational Advisory Groups that provide feedback and input from the fleet on where HQMC Aviation devotes its advocacy efforts toward.

End Strength

The Marine Corps' end-strength has solidified at 182,000 active duty Marines. Meanwhile, aviation's current operational needs, continued transitions, and future force requirements were factored into the Force Optimization Review Group's (FORG) strategy that supports our current end-strength level. With no anticipated growth in end-strength, aviation structure will need to be managed with the understanding that any increase in structure is at the expense of another community. Any structure changes must result in a net zero change to USMC manpower.

Aviation Structure

In FY15, 40,687 active duty Marines had primary military occupational specialties (PMOS) that were aviation and aviation support-related. Over 22,000 pieces of the Marine Corps structure are used within our fleet aviation units. Management of this structure is aimed at optimization in order to support the attainment of readiness that ensures success for our operational units while also meeting the needs for transitioning platforms and training institutions.

MOS Initiative

The Deputy Commandant for Aviation has instituted an initiative that will assign additional MOSs (AMOS) to aviation designations and qualifications that contribute to the enhancement of combat readiness. As our enlisted and Marine officers attain flight leadership, instructor and maintenance inspector ratings, MOSs will be assigned to them to ensure their assignments to the correct units, and in order to have a metric of the health of aviation.

Historically, aviation readiness has been inextricably linked to qualifications and designation of our personnel. The MOS Initiative intends to improve our readiness through the creation of metrics that prevent inefficient manning and staffing while also creating opportunities for directed retention incentives of our Marines who have attained advanced qualifications.

Force of the Future

Optimizing structure is only a portion of the equation. We demand much from our Marines and we will continue to do so as our Marines begin to operate and maintain our transitioning platforms with more complex technologies. As we look at how to better train, man and equip our units to succeed operationally, we are seeking ways to improve the training institutions that provide aviation Marines with the proper training to work on our evolving equipment while also reducing timeline inadequacies that reduce our Marines impact on operational units.

With the ever increasing resource demand to train and equipment our Marines, it is absolutely imperative that we continue to recruit, train, educate and RETAIN our most qualified Marines.

MANPOWER CHANGES WITH A TRANSITIONING FORCE

HQMC Aviation Manpower and Support (ASM), Total Force Structure Division (TFSD) and Manpower and Reserve Affairs (M&RA) continue to manage finite resources to meet the expanding requirements associated with our transition plans and the operational requirements of our force.

The Deputy Commandant for Aviation advocated for first- tour aviators to spend a dedicate period of years in their fleet squadrons before those aviators become eligible for PCS orders. The goal is to maximize the return on investment while also allowing for their professional growth and maturity in their primary MOS.

The TACAIR community has felt the greatest shortfalls in manpower. Solutions are in place to mitigate these current gaps. Through improved maintenance and resources in our training commands, the target for improved "normal" pilot production is FY18.

F-35 Transition

Manpower requirements have been programmed to support all squadron transitions from legacy TACAIR T/M/S's (F/A-18A/C/D, EA-6B and AV-8B) to F-35 and the activation of FRS squadrons through the end of the transition. The first F-35B FRS (VMFAT-501, which is transitioning to become an O-6 command) is located at MCAS Beaufort, while F-35B/C maintenance training is located at the Joint Integrated Training Center (JITC), Eglin AFB. F-35C FRS training is conducted at VFA-101 at Eglin AFB. VMX-22 has assumed the mission of F-35B OT&E.

Transition manpower plans are designed to support manpower requirements for the introduction of F-35 squadrons while maintaining legacy TMS capability. Aviation will continue to convene F-35 transition selection boards to harvest

fleet experience to meet squadron staffing requirements. The FY16 Transition/Conversion board selected nine aviators from all TACAIR T/M/S's. This year we will select our first two pure F-35 aviators from flight school.

F/A-18A/C/D FRS Training

VMFAT-101 serves as the Marine Corps' sole F/A-18 aircrew producer for CAT I aviators with the divesture of VFA-106's legacy production in FY18.

VFA-106 will maintain a small cadre of Marine instructor pilots to support CAT Other refresher training for aviators returning to the fleet. VMFAT-101 student production will decrease beginning in FY22.

EA-6B Sundown and EW Way Ahead

Sundown of the EA-6B commenced in FY16 with VMAQT-1. Each subsequent year a Prowler squadron will stand down until completion in FY19. The management and redistribution of the VMAQ structure and its personnel will be closely monitored to ensure operational readiness is maintained while also responsibly managing the career paths of those that stay in the community through its final sundown. This will be accomplished through the continued use of the Transition/Conversion board process and re-designation process of MMOA-3 to fill gaps in manpower.

MAGTF EW is the Marine Corps' comprehensive plan to address post-EA-6B Prowler EW requirements. MAGTF EW will be an integration of manned and unmanned EW capabilities. These capabilities fill operational requirements and also provide the retention of the EW corporate knowledge that is currently held within the VMAQ community.

KC-130J Conversion

With the active component fully transitioned to the J model KC-130, the reserve component will continue transitioning to the KC-130J through its procurement life cycle. Additionally, as KC-130 pilots continue their training as Fire Control Officers (FCO) in the Harvest HAWK variant of the armed KC-130J, their capability will expand while minimizing the manpower impact on the squadrons and on Marine aviation.

MANPOWER INITIATIVES WITH A TRANSITIONING FORCE

MV-22 Transition

Active-duty Marine Aircraft Wings' HMM-to-VMM transitions are complete and the transitional focus is now on the reserve squadrons. The move of two 3d MAW VMM squadrons to Hawaii is continuing. This move will provide a greater distribution of the MV-22 manpower structure across the globe, to better position and capitalize on Osprey capabilities while also improving deployment-to-dwell ratios.

The detachment capabilities of the MV-22 community continues to expand and further highlights efforts to allow commanders to match the appropriate force against our operational requirements in order to optimize our manpower resources. As the community progresses to fill its ranks and to meet the growth of an additional squadron on both east and west coast, deployment to dwell ratio is expected to increase which will allow our personnel and equipment more time to rest, refit, train and inevitably increase operational readiness.

The annual transition/conversion board process for fixed and rotary-wing pilots from outside the MV-22 community for transition to the MV-22 platform is under review as the MOS-producing capability of the FRS becomes saturated. B-billets for officers and enlisted will continue to be staffed by MMOA and MMEA as community health improves. As the VMM community continues to mature, manpower requirements will continue to be evaluated and improved as required.

UH-1Y/AH-1Z Conversion

The conversion to the UH-1Y is complete in both active and reserve components of Marine aviation. The AH-1Z conversion is still underway with the sequence remaining 3d MAW, 1st MAW, 2d MAW, and then 4th MAW. As of the summer of 2015, 3d MAW has 42 UH-1Y aircraft and 34 AH-1Z aircraft. 2d MAW has 26 UH-1Y aircraft, and will begin converting to the AH-1Z in the third quarter of FY18. HMLA-469 is next to convert to the AH-1Z aircraft in FY16, followed by HMLA-367.

The change in Primary Mission Aircraft Authorization (PMAA) mix of HMLA squadrons to 15 AH-1Z and 12 UH-1Y has created an opportunity for growth in UH-1Y pilot production. Transition/conversion boards will continue to provide opportunities to fill available UH-1Y positions.

HMLA-467 is scheduled for deactivation at the end of FY16 while HMLA-775 will be reactivated as the second reserve HMLA in FY17. The AH-1W production ends at HMLAT-303 in Q1 of FY19. The AH-1W pilot population will continue to be closely monitored to ensure appropriate career progression opportunities are available and communicated as its sundown nears.

CH-53K Transition

The CH-53K transition is scheduled for 2d MAW, 1st MAW, 3d MAW and then 4th MAW. Due to a shallow procurement ramp, the first squadron transition will take four years. Once HMH-366 has completed its transition, squadron transitions will take 18 months with two squadrons transitioning at a time.

The CH-53K is scheduled to achieve IOC in FY19. In order to ensure a successful IOC, a large contingent of pilots and maintainers who participated in the initial operational test of the CH-53K at VMX-22 will transition to HMH-366, the first operational CH-53K squadron.

In order to capitalize on lessons learned from previous transitions and minimize reliance on contract maintenance, a maintenance training support detachment was established in West Palm Beach, Florida. Upon completion of the maintenance detachment assignment, these Sikorsky engineer-trained Marines will be assigned throughout the CH-53K fleet to pass on their expertise.

MANPOWER INITIATIVES WITH A TRANSITIONING FORCE

UAS Transition

The Marine Unmanned Aerial Vehicle Squadron (VMU) tables of organization are structured and manned to support the RQ-7 Shadow, MQ-21 Blackjack, and now the Training and Logistics Support Activity (TALSA) for the Small Unmanned Aircraft Systems (SUAS). Previously staffed by contractor support personnel, the TALSA will now be manned and led by VMU-trained Marines in order to continue the training, maintenance and development of SUAS throughout the Marine Corps.

A Fleet Replacement Detachment and eventually squadron for the Blackjack is standing up at MCAS Cherry Point. The VMU FRD/S is intended to provide an MOS - producing school for the Blackjack as the Marine Corps proliferates its inventory with these new systems.

In FY16, VMU-1 completes its relocation from MCAGCC Twenty-nine Palms, CA to MCAS Yuma, AZ. This move will provide more support to VMU-1 through its physical location adjacent to its parent MAG, MAWTS-1, VMX-22 and the Yuma Training Range Complex.

Marine Aviation Training Support Groups

Marine aviation will reduce time to train and increase the capabilities of our Marines entering into fleet aviation. We are concerned about staffing shortfalls in our Marine Aviation Training Support Groups (MATSG). We know Marine aviation MOS production's linkage to fleet readiness; efforts are underway to improve instructor staffing.

Additionally, efforts are underway to implement tiltrotor training modifications that reduce time to train by up to ten weeks while also reducing resource requirements. Also underway is a review of the introductory flight syllabus (IFS). The goal is to ensure IFS maximizes its value to our future student naval aviators and student naval flight officers.

The last initiative under review is to reduce overall time to train for rotary wing aviators while also increasing the rotary wing hours to the syllabus. This effort falls in line with the overall goal of getting our Marines into fleet aviation faster, while ensuring that the standards are upheld or improved. The Deputy Commandant for Aviation will continue to work closely with our Navy brethren to ensure our Marines' time and training is optimized.

PERSONNEL EXCHANGE PROGRAM

Personnel Exchange Program (PEP)

The Marine Corps shares aviation exchange billets with our sister services, allies, and partners. In addition to these billets, the Marine Corps continues to expand exchange programs to share tactical experience and operational employment concepts for a new generation of aircraft, unmanned aircraft systems, and C2 technology. Applicants for PEP billets are thoroughly screened to ensure they are the most competitive and qualified individuals to represent their service and country. Tables 4-2 depicts current USMC aviation exchanges. More information can be found on the HQMC Aviation website.
http://www.aviation.marines.mil/Branches/ManpowerandSupport/PersonnelExchange.aspx

Current Aviation Exchanges

Country/Service	USMC Billets with Foreign Nation or Inter-Service	Foreign Nation or Inter-service Billet with USMC
Australia	ARH Tiger (Aus Army)	AH-1 (MAG-39)
	F/A-18 (RAAF)	F/A-18 (MAG-31)
	F/A-18 Maintenance Officer (RAAF)	F-35 Maintenance Officer (VMFAT-501)
	Air Traffic Control (RAAF)	Air Traffic Control (MACG-38)
Canada	CC-130 (CAF)	KC-130J (VMGR-252)
	F/A-18 (CAF)	F/A-18 (MAG-31)
Finland	F/A-18 (FINAF)	F/A-18 (VMFAT-101)
Spain	AV-8B (SPN)	AV-8B (MAG-13)
United Kingdom	C-130 (RAF) - A400 IN 2019	KC-130J (VMGR-352)
	Mk3/4 (RN)	MV-22 (MAG-26)
	Mk7 (RM)	AH-1 (MAG-39)
	Air Defense Control (RAF)	Air Defense Control (MAWTS-1)
	Typhoon F2 (RAF)	F/A-18 (VMFAT-101)
	JSF Staff Exchange (RAF Air Cmd)	JSF Staff Exchange (HQMC AVN)
	Chinook (RAF)	CH-53 (HMHT-302)
	UAS (RN)	UAS (VMU-2)
United States Air Force	MC-130 (Cannon AFB)	KC-130J (VMGR-252)
	EC-130 EWO (Davis-Monthan AFB)	EA-6B ECMO (MAG-14)
	F-35 (Nellis AFB)	F-35 (VMX-1, Fill in 2017)
	F-35 (16 WPS, Nellis AFB)	F-35 (MAWTS-1)
	JTAC (AGOS/JFCC) (Nellis AFB)	JTAC (EWTGPAC)
	HH-60G (Davis-Monthan AFB)	UH-1Y (MAG-39)
	Air Traffic Control (Eglin AFB)	Air Traffic Control (MACG-38)
	Air Defense Control (Hill AFB)	Air Defense Control (MACG-38)
	F-16 (Shaw AFB)	F-5 (VMFT-401)
	F-16 (Luke AFB)	F/A-18 (MAG-31)
	CV-22 (Eglin AFB)	MV-22 (MAWTS-1)
	CV-22 (Cannon AFB)	MV-22 (Fill in 2019)
United States Army	AH-6 (160TH)	AH-1 (MAWTS-1)
United States Navy	F/A-18 (NSAWC, NAS Fallon)	F/A-18 (MAWTS-1)

TABLE 4-2

SECTION FOUR MARINE AVIATION ALMANAC

F-35 B/C Lightning II

Program Description

The F-35 brings strategic agility, operational flexibility and tactical supremacy to the MAGTF and represents the centerpiece of Marine aviation transformation. The F-35B unites 5th generation stealth, precision weapons and multi-spectral sensors with the expeditionary responsiveness of a Short Take-off and Vertical Landing (STOVL) fighter-attack platform. The F-35C provides additional flexibility and persistence operating from conventional aircraft carriers.

The F-35 in 2016:

52 aircraft delivered into Marine Corps service

Three USMC F-35 squadrons in place

VMFA-121 Permanent Change of Station to Japan underway

First F-35B shipboard deployments on track for 2018

Program Update

F-35B has flown more than 15,900 sorties and over 22,500 flight hours

F-35B completed successful ship test trials in 2011, 2013, 2015, 2016

VMFAT-501

Combined US/UK training squadron

First 2 CAT I students in training February 2016

VMFA-121

First IOC squadron in F-35 Program

PCS to Japan in January 2017

VMFA-211

VMA-211 transitioned 30 June, MCAS Yuma

VMX-1

F-35 Operational Test Det Edwards

Working Issues

Transition Task Force (TTF) and Cross Functional Teams (CFT)

CFT 1: Test and Training

CFT 2: Organization and Manpower

CFT 3A: Maintenance/Logistics

CFT 3B: Installations/Facilities/Environmental

CFT 4: Requirements

CFT 5: Autonomic Logistics Information System (ALIS) integration

Performance / Systems

Combat radius:

F-35B = 450 nm; F-35C = 600 nm

Internal fuel:

F-35B = 14,000 pounds; F-35C = 20,000 pounds

Ordnance load-out:

F-35B = 15,000 pounds; F-35C = 18,000 pounds

Internal carriage:

F-35B 2 x 1,000 pound class + 2 x AIM-120 AMRAAM

F-35C 2 x 2,000 pound class + 2 x AIM-120 AMRAAM

Max gross weight:

F-35B = 61,500 pounds; F-35C = 70,400

Cruise speed w/ attack payload:

.94M / Top speed: 1.6M

Offensive systems:

APG-81 radar, Electro Optical Targeting System (EOTS)

Defensive systems:

advanced Electronic Warfare / Electronic Protection (EP/EW), electro-optical Distributed Aperture System (DAS)

Network systems:

Link 16, VMF, Multi-function Advanced Data Link (MADL)

Low observable, 360° integrated fused sensor information

Current software load is 2B / 3i:

initial combat capability

Aircraft will be full combat capable in August 2017.

F/A-18A-D Hornet

Program Description

VMFA Mission: Support the MAGTF commander by destroying surface targets and enemy aircraft, and escorting friendly aircraft, day or night under all weather conditions during expeditionary, joint, or combined operations.

F/A-18

Active: 11 Squadrons

FRS: 1 Squadron

Reserve: 1 Squadron

Enduring Missions Both Coasts

TAI: 2 squadrons

UDP: 2 rotational squadrons + 1 assigned squadron

SPMAGTF-CR-CC: 1 rotational squadron commitment shared with AV-8B

Contingency Operations

VMFA(AW)-533 - SPMAGTF-CR-CC

Program Update

F/A-18A+/C/D Inventory Issues

SLAP Phase II, SLEP Phase A and B complete

Phase C (ECP Kit installs began in FY2014)

ECP-583 / 1153 (A++, C+)

A++ complete

C+: 30 aircraft FY16 to FY19 (AFC-638 23 a/c from AMARG)

APG-73 RUG II Expand 4/5 (F/A-18D)

All-weather enhanced target resolution capability

Litening Targeting Pod

Generation IV, A/A MSI integration

Electronic Warfare

ALR-67v3 (96 DoN) 86 USMC)

ALQ-214 (96 DoN) (56 USMC)

Intrepid Tiger II V 1 Block X

Weapons

APKWS

Net Enabled Weapons study

AIM-9X Block II

AIM-120D

Working Issues

F/A-18 Inventory managed to support JSF transition

Structural Life Management Program Goals (minimum)

SLEP Phase B complete

6,000 hrs □10,000 hrs

2000 Traps □2700 (1500 B/D)

8,300 landings □14,500 (20,000 B/D)

.78 FLE □1.0 FLE (via 350 CBR+)

Mission System Goals to meet AVPLAN Requirements

HOL Mission Computer and upgraded displays

G4 LITENING

Digital CAS Interoperability – Gen 5 radio with 29C

EW Suite - ALR-67(v3) and ALQ-214

JHMCS - Complete

LINK 16 - Complete

AIM-120D and AIM-9X Block II

Performance / Systems

Combat radius:

500+ nm (900+ km)

Seating capacity/crew options:

Model F/A-18A++/C: one-seat (pilot-only)

Model F/A-18D: two-seats (pilot/WSO)

Dimensions:

length 56 ft (17.1 m), wing span 40 ft (12.3 m), height 15.3 ft (4.7 m)

Propulsion:

two F404-GE-402 engines, each with 18,000 pounds of thrust

Top speed:

Mach 1.8 (Cruise 0.78M – 0.85M)

Aircraft gross weight:

24,000-25,000 pounds (13,700 pounds external weapons and fuel payload)

Armament: Air – Air

AIM-9, AIM-120, AIM-7, 20mm Gun

Armament: Air – Ground

20mm Gun, Rockets, GP bombs, Laser Guided, GPS weapons, Dual Mode

Sensors:

APG-65/73 RADAR,

Litening FLIR, Advanced Tactical Air Reconnaissance System (ATARS on F/A-18D only)

Electronic Warfare:

ALE-39 / 47, ALQ-126B / 165 / 214, ALR-67v(2) / v(3)

AV-8B Harrier

Program Description

VMA Mission: Support the MAGTF commander by destroying surface targets and escorting friendly aircraft, day or night under all weather conditions during expeditionary, joint, or combined operations.

AV-8B:

1) Active: 5 Squadrons/80 Aircraft
2) FRS: 1 Squadron/30 Aircraft
3) Test: 4 Aircraft
4) Total: 128 Aircraft

Enduring Missions

1) MEU: 12 Aircraft deployed / 12 in work ups
2) UDP: 8 Aircraft deployed ISO 31st MEU
3) SPMAGTF-CENT: 10 aircraft (biennial rotation with F/A-18)

Program Update

Tactical Data Link Efforts

Link 16 PPLI capability to be fielded with H6.2

Link 16 Fighter-to fighter capability with H7.0

Advanced Tactical data link to be fielded in Litening with H7.0

Digital Video Recorder – funded drop-in replacement

Digital Improved Triple Ejector Rack (DITER)

Airborne VMF Terminal (AVT) procurement and installs

CNS/ATM Efforts

RNP/RNAV capability in H6.2

IFF Mode 5/S capability in H7.0

Stores Modernization Efforts

APKWS II employment envelope expansion

AIM-9X in 7.0

Intrepid Tiger II V 1 Block X development

Working Issues

Airframe/Engine Sustainment

1) Close Ready Basic Aircraft (RBA) gap
2) Readiness Management Program/Engineering support

Reduce Ready for Tasking (RFT) gap

1) Capitalize on the success of RBA gap reduction initiatives

Sustain Engine Readiness Goal

1) Material availability/sustained production

Post-production support to address obsolescence mitigation

Warfighter relevance upgrades to meet operational requirement

Funded Tactical Relevance upgrades

H6.2 OFP Upgrade Initial Operating Capability in FY18

1) Initial Link 16 capability
2) RNP/RNAV (GPS approach)
3) Mission Planning update

H7.0 OFP Upgrade Initial operating Capability in FY20

1) Full Link 16 capability
2) Weapons modernization

Performance / Systems

Combat Radius: ~300nm (500nm w/tanks)

Weapons Stations: 7

Empty Weight: 14,912 pounds

Max Gross Weight: 32,000 pounds

Propulsion: Rolls Royce F402-RR-408 turbo fan providing 23,400 pounds of thrust

Top Speed: 585 KCAS/1.0 IMN

Armament: 500/1000-pound GPS/Laser/General Purpose Bombs, CBU-99/100, CBU-78, MK-77, 2.75/5.0 inch rockets, APKWS, AGM-65E, AIM-120B, AIM-9M, GAU-12

Sensors: APG-65 RADAR, AN/AAQ-28 LITENING Pod Gen 4, NavFLIR, Dual-mode tracker

Electronic Warfare: ALE-47 ECM, ALR-67 RWR, ALQ-164 DECM Pod

Network Systems: Automatic Target Handoff System/VMF, LITENING C-band video downlink, Intrepid Tiger II

EA-6B Prowler and MAGTF EW

Program Descriptions

MAGTF EW Mission: Support the MAGTF commander by conducting airborne electronic warfare, day or night, under all weather conditions during expeditionary, joint, or combined operations. Increase combat survivability of ground forces, assault support and strike aircraft & weapons by denying, degrading, disrupting the enemy's ability to target and engage our forces.

EA-6B

1) 3 operational squadrons of 6 aircraft
2) Program of record into 2019

MAGTF EW

Intrepid Tiger II (ALQ-231)

1) AV-8B, F/A-18, H-1 series aircraft
2) EW pods for counter-comms and IW RF target sets
3) Technology and capacity to field radar EA variant of Intrepid Tiger II
4) MV-22B, KC-130J, CH-53K in development

EW Payloads

1) 28 EW Payload for MQ-21

Program Update

EA-6B

1) Fully funded ICAP III Block 7 upgrades

ALQ-231 Intrepid Tiger II

1) Continued development of H-1 variant
2) Continued development of radar EA variant

EW Payloads

1) Proposed EW Payload for MUX in development

F-35B

1) Continued expansion of JSF EW capabilities and target sets

Performance / Systems

EA-6B

1) Combat Radius – 30 min. out; 1 hr. 45 min. TOS - 30 min RTB; 20 min. reserve
2) Weapons Stations - 5
3) Top Speed – Subsonic
4) Empty Weight – 34,000 pounds
5) Max Gross Weight & Use Payload – 61,500 pounds
6) Cruise Speed w/ Attack Payload – 0.86 IMN with Stores
7) Offensive Systems –ICAP III ALQ-218 Receiver and ALQ-99 pods; USQ-113 Communications Jammer; AGM-88 HARM; LITENING Pod; ALE-43 Bulk Chaff Pod
8) Defensive Systems – ALE-47
9) Network Systems - Multi-functional Info Distribution System (MIDS) with Link 16; Integrated Broadcast System (IBS)

KC-130J Hercules

Program Description

Mission: Support the MAGTF commander by providing air-to-air refueling, aviation delivered ground refueling, and assault support airlift, day or night in all weather conditions during expeditionary, joint, or combined operations.

Program Update

USMC Program of Record (POR): 79 KC-130J aircraft (TOAI)

1) 3 active squadrons of 15 KC-130Js (PMAI)
2) 2 reserve squadrons of 12 KC-130Js (PMAI)
3) 9 pipeline assets (BAI), (1) asset T&E (PDAI)

52 KC-130J aircraft delivered as of the date of this publication.

1) 1 additional aircraft scheduled for delivery in FY17
2) 4 additional aircraft funded
3) 24 aircraft short of POR

Survivability Upgrade Roadmap:

1) AAQ-24B(V)25 DoN LAIRCM/ATW
2) Intrepid Tiger II : final fit, UNS in work

Interoperability Upgrade Roadmap:

1) Dual Vortex (Harvest HAWK)
2) Block 7.0/8.1 with Link 16
3) SRP
4) EO/IR Sensor

Working Issues

1) 4th MAW KC-130J Transition: Accelerated KJ procurement to transition reserve component VMGR squadrons from the KC-130T to the KC-130J aircraft

2) Procurement and integration delays of the C-130J block upgrade 7.0/8.1 will impact compliance with CNS/ATM mandates.

3) MILCON transition to an all Marine aircrew training solution requires Fuselage Trainers (FuT), Cockpit Procedure Trainers (CPT), and Observer Trainers (ObsT).

4) PFPS Mission Planning transition to JMPS.

Performance / Systems

Range (20,000-pound Payload) . . . . . 3,250 nm
Empty Weight . . . . . 91,000 pounds
Fuel Capacity . . . . . .58,500 pounds
Maximum Normal Takeoff Weight (2.0g). . . . . 164,000 pounds
Maximum Cruise Speed . . . . . 320 kts
Cruise Ceiling . . . . . .25,000 ft
Fuel Offload @ 1200nm / 20,000 ft . . . . . 30,000 pounds
Passenger Capacity (Ground Troops) 92
Paratroop Capacity 64
Air Ambulance Litter Capacity 74

Defensive Electronic Countermeasures:

Radar Warning Receiver (RWR) AN/ALR-56M
Advanced Missile Warning System and Laser Detecting Set .. AN/AAR-47(V)2
Advanced Countermeasure Dispenser System (CMDS) AN/ALE-47
Advanced IR Countermeasure System . . . . . AN/ALQ-157 version 2
SATCOM BLOS.....Hatchmount KuSS antenna

KC-130J Harvest HAWK

Program Description

Mission: Support the MAGTF commander by conducting intelligence, surveillance, reconnaissance, target acquisition, indirect and direct fires adjustment, battlefield damage assessment and destroying surface targets day or night, under all weather conditions, during expeditionary, joint, or combined operations.

Description: The USMC has fielded a bolt-on/bolt-off ISR/weapon mission kit for use on existing KC-130J aircraft. This mission kit is designed to rapidly re-configure a KC-130J aircraft with the appropriate modifications (A-kit) into a platform capable of performing persistent Multi-sensor Imagery Reconnaissance (MIR) and Close Air Support (CAS).

The Harvest HAWK mission kit enables the aircraft to deliver precision fires using Hellfire, as well as Griffin and Viper Strike, Stand Off Precision Guided Munitions (SOPGM). The Harvest HAWK mission kit is designed as a complementary capability that takes advantage of the aircraft's extended range and endurance.

Program Update

Status: The capability first deployed in support of OEF in October, 2010 and has experienced overwhelming success in theater. Feedback from supported units is outstanding.

Ten aircraft have been modified with A-kits to accept the Harvest HAWK mission D-kit and six mission D-kits have been delivered to the Fleet. MROC Decision Memorandum 19-2012 stated the baseline Harvest HAWK requirement is for continuous support to OEF with one mission kit, satisfied through six full (A+D) kits; three kits at 2nd MAW and three kits at 3rd MAW, and that global sourcing of Harvest HAWK assets will be required to support Westpac contingencies.

Harvest HAWK capability is postured to support each CONUS-based MEF as directed.

Working Issues

Future upgrades (FY17 and beyond):

1) Relocate wing-mounted sensor to aircraft chin
2) Regain additional 18k pound fuel capacity.
3) Upgrade Mission Operators Pallet
4) Hellfire P+ compatibility.
5) Full Motion Video (FMV)/Common Tactical Data Link.
6) Digitally Aided CAS.
7) JAGM

Performance / Systems

Combat Radius . . . . . 300 nm

On-station time at radius. . . . . 8+hrs

Maximum Speed . . . . . 250 kts

Operational Ceiling . . . . . .25,000 ft

Systems:

Sensor . . . . . AN/AAQ-30 Target Sight System (TSS) FLIR/Camera, 3rd Gen Mid Wave FLIR with Color Camera optimizes D/R/I ranges, Laser Range Finder and Designator

Fire Control . . . . . Lockheed Martin Littoral Combat Ship Fire Control Station (FCS), SOCOM Battle Management System (BMS)

Weapons: (2 Air to Ground Weapons Stations)

(4) wing-mounted AGM-114 Hellfire

(2) shot pressurized SOPGM launcher integrated into right hand paratroop door

Interoperability:

AN/ARC-210 HAVEQUICK/ SINCGARS Radio,

UHF frequency hopping system, SATCOM, Rover IV Down Link

KC-130T Hercules

Program Description

Mission: Support the MAGTF commander by providing air-to-air refueling, aviation delivered ground refueling, and assault support airlift, day or night in all weather conditions during expeditionary, joint, or combined operations.

Program Update

KC-130J Transition: 4th MAW KC-130Ts will be sold via FMS or retired as KC-130Js are delivered. VMGR-234 (Fort Worth, TX) has transitioned to the KC-130J as of August 2015, followed by VMGR-452 (Newburgh, NY).

Projected IOC (5 KC-130Js):

1) VMGR-452 – FY20

Projected FOC: (12 KC-130Js):

1) VMGR-234 – FY24
2) VMGR-452 – FY26

NOTE: KC-130Ts will continue to operate in 4th MAW until the reserve KC-130J transition timeline can be defined

Working Issues

KC-130T Parts Obsolescence/Readiness Extension: Due to KC-130J procurement delays, the USMC is investing in upgrades as a bridge to KC-130J transition.

Electronic Propeller Control System

Engine Indicator Display System

Weather RADAR

GPS

TACAN

Tactical Systems Operator End of Mission: POA&M to manage sundown of existing inventory of Warrant Officer and Enlisted Tactical Systems Operators.

Performance / Systems

Range (20,000-pound Payload)	3,000 nm
Empty Weight	87,000 pounds
Fuel Capacity	58,500 pounds
Maximum Normal Takeoff Weight (2.0g)	155,000 pounds
Maximum Cruise Speed	300 kts
Cruise Ceiling	25,000 ft
Fuel Offload @ 1200nm / 20,000 ft	30,000 pounds
Passenger Capacity (Ground Troops)	92
Paratroop Capacity	64
Air Ambulance Litter Capacity	74

Defensive Electronic Countermeasures:

Radar Warning Receiver (RWR)	AN/APR-39A(V)2
Advanced Missile Warning System and Laser Detecting Set	AN/AAR-47(V)2
Advanced Countermeasure Dispenser System (CMDS)	AN/ALE-47
Advanced IR Countermeasure System	AN/ALQ-157A(V)1

MV-22B Osprey

Program Description

The V-22 is the world's first production tiltrotor aircraft. Unlike any aircraft before it, the V-22 successfully blends the vertical flight capabilities of helicopters with the speed, range, altitude and endurance of fixed-wing transports.

The incredible effectiveness and survivability of this versatile aircraft have been demonstrated time and again, from land-based operations in Iraq, Afghanistan and Special Purpose MAGTFs to sea-based operations in Haiti and Libya.

The future of expeditionary operations and crisis response will leverage the speed and flexibility of the V-22. Marine Air-Ground Task Force commanders will have an expanded area of influence due to the enhanced capabilities of the cornerstone of the aviation combat element, the MV-22.

Program Update

Survivability Upgrade Roadmap:

UUNS DON LAIRCM – 2016 (SPMAGTF)

JUONS DON LAIRCM – 2017 (MEU)

Intrepid Tiger II V 1 Block X FY19-21

Interoperability Upgrade Roadmap:

Iridium SATCOM in FY16 to provide Beyond Line Of Sight (BLOS) C2 capabilities.

C-4 UUNS – 2018 (SPMAGTF) Iridium, Link-16, ANW2, TTNT, CDL, and Ku

Software Reprogrammable Payload (SRP) with a gateway functionality will be available in FY20 and will incorporate voice, data, still photos, and video

Airborne gateway functionality for multiple waveforms, initially including Link 16, ANW2, TTNT, and BE-CDL

Radio frequency identification (RFID) of cargo and personnel to be fielded with SRP

Lethality Upgrade Roadmap:

V-22 Aerial Refueling System (VARS)

Traffic Collision and Avoidance System (TCAS)

TFLIR; Advanced Targeting Sensor (ATS) with EO/IR optics, Laser Target Designator and Ranging (LTD-R), IR Marker, and Video Data Link (VDL)

Enhanced Weapon System; Medium range immediate suppression

Reliability Upgrade Roadmap:

Open Architecture / Modular Avionics

Nacelle Wiring / Blade Nickle Cap/ Electrical System)

Swashplate Actuator(SPA) / Infrared Suppressor (IRS)

Working Issues

1) Detachment capability for all VMMs (Manpower, Equipment, Training)
2) Facilities, readiness and sustainability for the growing fleet
3) Aircraft Survivability Equipment upgrades
4) Software Reprogrammable Payload (SRP) with Link 16
5) Adding mission kits to support expanded mission sets (Aerial Refueling, enhanced defensive weapons)
6) Extended range (Aft Sponson, Additional receivers KC-10/KC-46)

Performance / Systems

Combat Radius: 325nm

Empty Weight : 35,000 pounds

Max Gross Weight: 52,600 pounds VTOL / 57,000 pounds STO

Payload: Internal / External - 24 passengers / 12 litters / 12,500 pounds

Top Speed: 280 KCAS

Cruise Speed: 266 KCAS

Defensive Systems: AAR-47 B(V)2, APR-39 C(V)2, ALE-47, M240D 7.62 / GAU-16 Ramp Gun, GAU-17 IDWS

UH-1Y Venom

Program Description

The H-1 program replaces the UH-1N and AH-1W aircraft with the AH-1Z "Viper" and the UH-1Y "Venom". The H-1 Upgrades Program is a single acquisition program which leverages 85% commonality of major components, enhancing deployability and maintainability.

The Venom is the next generation of utility aircraft. Speed, range, and payload have been increased significantly, while decreasing supportability demands, training timelines, and total ownership cost. The advanced cockpit is common to both aircraft, reduces operator workload, improves SA, and provides growth potential for future weapons and joint digital interoperability enhancements.

The cockpit systems assimilate onboard planning, communications, digital fire control, all weather navigation, day/night targeting, and weapons systems in mirror-imaged crew stations.

Procurement objective is 160 UH-1Ys, with FY16 planned as the last year of USMC UH-1Y procurement.

Program Update

1) Interoperability Upgrade Roadmap: Blue Force Tracking, Software Reprogrammable Payload (SRP) with LINK 16, FMV – 2016
2) Relevancy Enhancements: Structural / power upgrades – 2021
3) Reliability Upgrade Roadmap:– 2021
4) Lethality Upgrade Roadmap: APKWS, Advanced Missile Warning System, DRL Digital Rocket Pod, Brite Star w/Laser Spot Tracker
5) Intrepid Tiger II V 3
6) Future Upgrades:
7) Integrated Aircraft Survivability Equipment (ASE)
8) Degraded Visual Environment solutions
9) Advanced Threat, Missile, and Laser Warning System

Working Issues

160 UH-1Ys (Lots 1-13) on contract

1) 136 aircraft delivered to date
2) All active and reserve component HMLAs have complete conversion and have their full authorization of 12 UH-1Ys.
3) Full Motion Video (FMV)
4) Fleet Installations to commence 3rd Qtr. 2016
5) Advanced Precision Kill Weapon System (APKWS)
6) The UH-1Y employs the Advanced Precision Kill Weapon System (APKWS)

Performance / Systems

Combat Radius*: 119 nm

Weapons Stations: Two

Empty Weight: 11,700 pounds

Max Gross Weight: 18,500 pounds

Use Payload (HOGE): 5,930 pounds

Cruise Speed: 139 kts

Offensive Systems:

2.75-inch rockets,fixed forward or crew served 7.62mm/GAU-17A gun and or crew served M240D/GAU-16/GAU-21 machine guns

Defensive Systems:

AAR-47, ALE-47, and APR-39

* (Mission radius with eight combat loaded troops, 5 minute mid-mission HOGE, 10 minutes on station, and 20 minute fuel reserve)

AH-1W Super Cobra

Program Description

The AH-1W "Super Cobra" is a combat proven force multiplier for the MAGTF. The Super Cobra provides close air support, strike coordination and reconnaissance, armed reconnaissance, escort, forward air controller airborne, and air interdiction.

The Marine Corps has flown the AH-1W since 1986, with the last AH-1W delivery occurring in 1998. The AH-1W will be replaced by the AH-1Z as part of the H-1 Upgrades Program combined with the UH-1Y.

Although the AH-1Z achieved Initial Operational Capability in 2011, the AH-1W will remain in service until 2021.

Program Update

1) AH-1Ws are outfitted with the Night Targeting System Upgrade (NTSU), a 3rd Generation Targeting FLIR with Laser Designator / Rangefinder and color TV camera, which has made significant contributions to the quality of offensive air support provided during Operation Enduring Freedom.

2) 90 AH-1Ws have been outfitted with the Tactical Video Data Link (TVDL) system, enabling aircrews to send and receive sensor Full Motion Video (FMV) in C, L, and S Bands in support of reconnaissance and close air support missions.

3) The AH-1W employs the Advanced Precision Kill Weapon System (APKWS) laser guided rocket system which achieved Initial Operational Capability (IOC) in Mar 2012.

4) The 20mm Linkless Feed System recently deployed to contingency operations has increased gun reliability.

5) Systems forward fit to AH-1Z

Working Issues

The AH-1W will remain relevant through the end of its service life through the incorporation of the systems below:

Helmet Display and Tracker System (HDTS)

1) Full Rate production approved Jul 2012
2) Fleet installs continue through 2015

Night Targeting System Upgrade

1) GFE Reliability kits

Advanced Precision Kill Weapon System (APKWS) laser guided rocket system

Performance / Systems

1) Combat Radius*: 58 nm
2) Weapons Stations: Four
3) Empty Weight: 10,750 pounds
4) Max Gross Weight: 14,750 pounds
5) Useful Payload (HOGE): 3,986 pounds
6) Cruise Speed : 131 kts
7) Offensive Systems: 20mm cannon, 2.75 rockets (to include APKWS), TOW, HELLFIRE with multiple warhead configurations and AIM-9 Sidewinder
8) Defensive Systems: AAR-47, ALE-47 Dual Dispenser Pods, ALQ-144, and APR-39
9) * (Combat radius includes 30 minutes time on station and a 20 min fuel reserve)

AH-1Z Viper

Program Description

The H-1 program replaces the UH-1N and AH-1W aircraft with the AH-1Z "Viper" and the UH-1Y "Venom". The H-1 Upgrades Program is a single Acquisition Program which leverages 85% commonality of major components, thereby enhancing deployability and maintainability.

The Viper is the next generation of attack aircraft. Speed, range, and payload have been increased significantly, while decreasing supportability demands, training timelines, and total ownership cost. The advanced cockpit is common to both aircraft, reduces operator workload, improves SA, and provides growth potential for future weapons and joint digital interoperability enhancements.

The cockpit systems assimilate onboard planning, communications, digital fire control, all weather navigation, day/night targeting, and weapons systems in mirror-imaged crew stations.

The procurement objective is 189 AH-1Zs; 152 are build new aircraft (ZBN).

Program Update

Interoperability Upgrade Roadmap: Blue Force Tracking, Software Reprogrammable Adaptive Networking Wideband Waveform (ANW2) with LINK 16

1) DI FMV – 2016
2) Relevancy Enhancements: Power Upgrade – 2021
3) Reliability Upgrade Roadmap:– 2021
4) Lethality Upgrade Roadmap: APKWS, JAGM Advanced Missile Warning System, Digital Rocket Pod, TSS w/Laser Spot Tracker
5) Future Upgrades:
6) Integrated Aircraft Survivability Equipment (ASE)
7) Degraded Visual Environment solutions
8) Advanced Threat, Missile, and Laser Warning System
9) Enhanced EW capability

Working Issues

120 AH-1Zs (Lots 1-13) are currently on contract.

1) 54 AH-1Zs have been delivered to date.
2) Advanced Precision Kill Weapon System (APKWS)
3) APKWS Initial Operational Capability (IOC) scheduled 1st Qtr. 2016
4) Laser guided rocket system:
5) Full Motion Video (FMV)
6) Fleet installations to commence 3rd Qtr. 2016
7) The AH-1Z achieved Full Rate Production (FRP) on 28 Nov 2010 and Initial Operational Capability on 24 Feb 2011.
8) First deployment of the AH-1Z occurred in the Fall of 2011 as part of the 11th MEU. It was also the first "all upgrades" detachment in which the AH-1Z and UH-1Y deployed alongside one another, showcasing the advantages of 85% commonality.
9) Three of the eight active component HMLAs have completed their Z conversion, and are currently building inventory towards their full authorization of 15 aircraft
10) Reserve component HMLAs will begin their Z conversion in FY19.

Performance / Systems

1) Combat Radius*: 139 nm
2) Weapons Stations: Six
3) Empty Weight: 11,700 pounds
4) Max Gross Weight : 18,500 pounds
5) Useful Payload (HOGE): 5,764 pounds
6) Cruise Speed: 139 kts
7) Offensive Systems: 20mm cannon, 2.75 rockets, HELLFIRE with multiple warhead configurations and AIM-9 Sidewinder
8) Defensive Systems: AAR-47 B(V)2, ALE-47, and APR-39
9) * (Combat radius includes (8) HELLFIRE, (14) 2.75" rockets, (650) 20mm, 120 chaff and flare, 30 minutes time on station and 20 minute fuel reserve)

CH-53E Super Stallion

Program Description

The CH-53E is a heavy lift helicopter designed to transport heavy equipment and supplies during the ship-to-shore movement of an amphibious assault and during subsequent operations ashore.

The aircraft is capable of transporting 32,000 pounds externally at a cruise speed of 100 KIAS to a range of 50 NM, hover for 5 minutes, and return. The CH-53E was derived from an engineering change proposal to the twin-engine CH-53D. Improvements include the addition of a third engine to give the aircraft the ability to lift the majority of the Fleet Marine Force's equipment, a dual point cargo hook system, improved main rotor blades, and composite tail rotor blades. A dual digital automatic flight control system and engine anti-ice system give the aircraft an all-weather capability.

The helicopter seats 32 passengers in its normal configuration and has provisions to carry 55 passengers with centerline seats installed. With the dual point hook systems, it can carry external loads at increased airspeeds due to the stability achieved with the dual point system.

We will be flying the CH-53E until replaced by the CH-53K. CH-53E readiness recovery continues to be a focus of the community until the CH-53K transition is complete in 2029.

Program Update

Interoperability Upgrade Roadmap:

Software Reprogrammable Payload (SRP) with LINK 16

Reliability Upgrade Roadmap:

Integrated Mechanical Diagnostics System, 419 Engine Upgrade (increases payload by 5000 to 8000 pounds), Prognostic/Diagnostic Based Maintenance Engine Nacelles, Kapton Wiring Replacement

Avionics Upgrade Roadmap:

Critical Systems Upgrade: Mode V IFF, Master Zeroize Switch, GPS Inertial Navigation System (INS), Brown Out Symbology Set (BOSS), Embedded SATCOM, Smart Multifunction Color Display (SMFCD), Day Heads-up Display (HUD), Degraded Visual Environment (DVE) Phases 2 and 3

Future Upgrades:

Integrated Aircraft Survivability Equipment (ASE), Degraded Visual Environment solutions Advanced Threat Warner Missile Warner/Laser Warning

Working Issues

CH-53E Readiness Recovery Effort is a continuous process addressing recommendations from the Super Stallion Independent Readiness Review (SSIRR) conducted in order to assist the CH-53E community to achieve and maintain T-2.0 until Full Operational Capability (FOC) of the CH-53K in 2029. The recovery plan is expected to be a three year process extending through FY19.

Critical Survivability Upgrade (CSU): DIRCM threat message to CDNU, Smart Dispensing, Forward Firing Buckets, SMFCD, Day/Night HUD symbology for DVE, EGI data on 1553 Data bus, AAR-47 Hostile Fire Indication.

Hot Day Performance Upgrade: Upgrading GE T64-416A to GE T64-419

Fleet Common Operational Environment (FCOE) continues to make progress and has done recent work with the TRDCs, vibration analysis, and engines. This is a place where data comes in from multiple entities, gets processed and analyzed. The FCOE enables fleet relevant outcomes by arriving at faster/safe solutions and assists with correct technical and business decisions, based on root cause analysis, driving operational success while reducing total ownership cost. The release of a new dashboard will provide single point of data displaying the current health of the fleet using data collected from: DLA-supply status, NAVSUP-supply status, fleet retail sites, AMSRR / hi-pri report, depot data, open work orders, and open requisitions. The dashboard will reflect current status of fleet, with data viewing (down to the BuNo) of fleet to the wing/group and squadron.

Performance / Systems

1) Max range 540 nm; max endurance: 4 hours (unrefueled) / indefinite (HAAR)
2) Empty Weight: 37,500 pounds
3) Max Weight on Wheels: 69,750 pounds
4) Max Gross Weight with External load: 73,500 pounds
5) Internal Load: 32 troops or 24 litter patients or 7 40”x48” Warehouse pallets
6) External Load: Hook rated to 36,000 pounds
7) Flight Controls: Mechanical
8) External Hook system: Single-point or Dual-point hook system
9) Max Speed: 150 kts
10) Armament: 2 XM-218 or 2 GAU-21 .50 caliber machine guns, 1 Ramp-mount GAU-21 .50 caliber machine gun
11) ASE: DIRCM, AAR-47(v)2, ALE-47, Dual Dispensing Pods, APR-39
12) Network Systems: FBCB2 Blue Force Tracker

CH-53K King Stallion

Program Description

The CH-53K new build helicopter is the only marinized helicopter that can lift 100% of the Marine Corps equipment designed for vertical lift from amphibious shipping to inland objectives under high altitude and hot atmospheric conditions. The aircraft will be capable of externally transporting 27,000 pounds to a range of 110 NM in support of the baseline MEB and is the only heavy lift helicopter currently being developed within DoD.

CH-53K system and capability improvements include : the T408-GE-400 7500 SHP engine, 88,000 pounds max gross weight airborne, low maintenance drive train and rotorhead, 4th generation composite rotor blades, CAAS cockpit, triple hook capability, integrated cargo pallet locking system, and the first DoD heavy-lift rotorcraft aircraft compatible with the Air Mobility Command (AMC) 463L pallet. The CH-53K is designed to reduce logistics shipboard footprint, reduce operating costs per aircraft, reduce direct maintenance man hours per flight hours, and significantly reduce threat vulnerable area compared to the CH-53E.

Program Update

1) Acquisition Procurement Baseline (APB) approved Apr 2013, Program of Record (POR) 200 aircraft
2) Entered DT Dec 2013
3) Ground Test Vehicle (GTV) Bare Head Light Off and bladed turn in 2014.
4) Engineering Demonstration Model (EDM) 1 flew for the first time 27 Oct 2015 and EDM 3 flew for the first time 22 Jan 2016.
5) First external was conducted on 19 Apr 2016 with a 12,000lb load.
6) 20,000lb load and 27,000lb load externals conducted on 27 May 16 and 17 June 16.
7) System Demonstration Test Articles (SDTAs) 1-4 in assembly, and SDTA 5 and 6 on contract
8) Milestone C (LRIP authorization) scheduled for FY 2017
9) Initial Operational Capability (IOC) scheduled for 2019
10) Full Operational Capability (FOC) scheduled for 2029

Working Issues

Sikorsky and PMA-261 in concert with Fleet Subject Matter Experts (SMEs) and HQMC Aviation currently staffing courseware development to support Training & Readiness Manuals

Lessons learned from CH-53E Fleet Common Operating Environment (FCOE) to support CH-53K Integrated Vehicle Health Monitoring System, leveraging predictive Condition Based Maintenance

CH-53 Transition Task Force meets biannually to provide a proactive mechanism for operational forces, both Active and Reserve, to act in concert with the Program Office and acquisition agencies in the formulation and implementation of each pillar of the DOTMLPF (Doctrine, Organization, Training, Material, Leadership, Personnel and Facilities)

On the horizon: Capability Production Document (CPD) is currently in joint staffing for Milestone “C”, scheduled for FY17

Performance / Systems

1) Max range 454 nm; Endurance: 4 hours (unrefueled) / indefinite (HAAR)
2) Empty Weight: 43,750 pounds
3) Max Weight on Wheels: 74,000 pounds
4) Max Gross Weight with External load: 88,000 pounds
5) Internal Load: 30 troops or 24 litter patients, or 12 x 40”x48” Warehouse Pallets, 2 x 463L Pallets (Full) or 5 x 463L Pallets (Half)
6) External Load: Hook rated to 36,000 pounds
7) Flight Controls: Fly-by-Wire
8) External Hook system: Triple hook system (ability to independently lift and release three separate external loads)
9) Max Speed: 170 kts
10) Armament: 3 GAU-21 .50 caliber machine guns
11) ASE: Directional IR Countermeasures (DIRCM), APR-39(C)V2, ALE-47
12) Network Systems: Link 16, VMF, SATCOM

Presidential Aircraft

Program Descriptions

HMX-1 Mission: Provide helicopter transportation for the President of the United States, Vice President of the United States, members of the president's cabinet, and foreign dignitaries, as directed by the Director, White House Military Office (WHMO).

VH-3D - 11 aircraft

VH-60N - 8 aircraft

MV-22B - 14 aircraft

TH-3D – 1 aircraft

TH-60N – 1 aircraft

Program Update

Presidential Helicopter Replacement Program (VH-92A)

JROC approved ICD Aug 2009

AoA kick-off Feb 2010

AoA completed Feb 2012

JROC approved CDD Nov 2012

Source Selection Activities began 3rd Qtr FY13

MS B 2nd Qtr FY14

EMD contract award 3rd Qtr FY14

2 test articles

IOC planned for 4th QTR FY20

FOC planned for 4th QTR22

21 production aircraft

Working Issues

VH-3D

Weight reduction program

Abbreviated Cockpit Upgrade Program

Wide Band Line of Sight

Service Life Extension Program planned FY15

Additional 4000 hours useful life

Training asset delivery 1st QTR FY16 (TH-3D)

VH-60N

401C Engine Upgrade

Service Life Extension Program planned FY15

Additional 4000 hours useful life

Training asset delivery 1st QTR FY16 (TH-60N)

Performance / Systems

Max Ranges

VH-3D - 90 nm

VH-60N - 200 nm

Max Gross Weight:

VH-3D – 21,500 pounds

VH-60N – 22,000 pounds

Cruise Speed:

VH-3D – 120 kts

VH-60N – 150 kts

Passenger Load:

VH-3D – 10 (plus pilot, co-pilot, and crew chief)

VH-60N – 10 (plus pilot, co-pilot, crew chief, and Communication Systems Operator (CSO))

MAGTF UAS Expeditionary Capability (MUX) ICD

Program Description

- The MAGTF UAS Expeditionary Capability (MUX) ICD will inform a material solution that will provide sea-based, high altitude, persistent capability with ranges complimentary to MV-22 and F-35 missions.
- Envisioned as USMC/USN POR and teaming with N99
- Scalable MAGTF support; deploy as detachments or squadrons.
- Based on leverage and technical maturation of DARPA Tern/ONR program.

Program Update

1) Technology demonstration flight in 2018.
2) EOC in 2024
3) IOC in 2026

Working Issues

Aviation and OPNAV will conduct Pre MS A Acquisition Start up activities to include:

Teaming with vendors to develop specifications, formal Technology Readiness Assessment (TRA), and develop the Life Cycle Cost estimates.

Identify technology maturation efforts needed to augment DARPA/ONR concept demonstrator to assess viability of aircraft for USMC missions.

System Specifications

Multi-mission, long range, BLOS to fulfill missions in the battlespace awareness, EMSO, C4 bridge, target acquisition, and strike roles.

Ship-board capable

High-altitude - 30k'

24hr orbit at 600nm for 10 days with 2 aircraft

MAGTF UAS Expeditionary Capability (MUX) ICD (Utility)

Program Description

CMC directed development of an "Immediate Cargo UAS" capability to "get trucks off the road." Cargo UAS was in response to 2009 UUNS and JUONS: USMC was designated lead service.

A GOCO Cargo UAS contract awarded to two vendors: Boeing A160 Hummingbird and Kaman/Lockheed Martin K-MAX.

The K-MAX system was selected went forward to OEF as part of the Military Users Assessment (MUA).

Program Update

At the conclusion of OEF the K-MAX system returned to CONUS and underwent repair and reset at the OEM. The system is based with VMX-1 in MCAS Yuma.

Several incremental upgrades to include external fuel tanks, high definition EO/IR sensor ball and through-the-rotor beyond line of sight datalink will allow the KMAX to expand the Group 4 CONOPS envelope and continue to refine MUX experimentation and risk reduction.

The MUX ICD will help inform a material solution that provides the MAGTF commander with an autonomous tactical distribution and transportation capability.

Working Issues

K-MAX deployed for a six month Military Utility Assessment (MUA) to OEF in 1Q FY12; due to its success , that deployment continued for three years.

With a range of 84 miles and a payload capacity of 4500 pounds, it flew over 2000 sorties and delivered over 4.4 million pounds of cargo from December 2011 to May 2014.

It demonstrated a consistent 95% readiness rate and 1.5 maintenance man-hours per flight hour.

System Specifications

Combat radius – 84 nm (with cargo)

Top speed – 80 kts

Delivery accuracy – 10m grid, homing beacon, drop on coordinates.

Payload Capability – 4500 pounds at 12,000' MSL.

Spiral Upgrades include:

HD EO/IR sensor

External fuel tanks – increase endurance to > 7hrs

BLOS datalink – increase radius to > 300mi

RQ-21 Blackjack

Program Description

Primarily an aerial reconnaissance system supporting target acquisition, command & control and battlespace awareness support to the MEB or MEU commander and their subordinate units.

In 2005, the Marine Requirements Oversight Council validated an urgent need for aerial reconnaissance support to the MEB/MEU level MAGTF. Source selection completed in 4th Qtr FY10 and Insitu Integrator was selected.

Each VMU squadron will possess nine systems with each system comprised of five air vehicles and two ground control stations. Capable of operating ashore and from ships in support of MEU/ARG.

Program Update

VMU-2 currently has five systems and is deploying in support of East Coast MEUs and MARSOC.

VMU-1 received its first system in 2016 and will deploy in support of West Coast MEUs in 2017.

After VMU-1 and VMU-2 are FOC at 9 systems, VMU-3 and VMU-4 will receive RQ-21 systems.

Working Issues

System is currently being fielded throughout all CONUS Active Duty VMUs; completion projected in FY-22.

Core Skill Introduction Training (1000 level) will transition from contractor instructors (Insitu) to USMC in 2017.

In 2020, the Fleet Replacement Squadron will be stood up at MCAS Cherry Point.

System Specifications

RQ-21 is a rail-launched, Sky Hook Recovery System (SRS) aircraft.

5 aircraft, one launcher, one SRS, 2 Integrated Trailer-ECU-Generator (ITEG) associated support equipment and 4 HMMVS constitute (1) RQ-21A system

Combat radius – 50 nm (control envelope)

Extended operational range (employing a “hub and spoke”) is 50-100 nm

Payload – EO/IR/IR Marker/Laser range finder; with future payload capabilities of EW, Laser designator, SAR, GMTI. 25lb useful load (fuel and payload)

Automated Identification System (AIS)

RQ-7Bv2 Shadow

Program Description

1) Primarily an aerial reconnaissance system supporting target acquisition and designation, command & control and ISR support to the MEF commander and his subordinate units.

2) Marine Corps procurement began in 2007 through an existing Army UAS program, the Chairman of the Joint Requirements Oversight Council (JROC) signed the Mission Need Statement (MNS) for this capability in 1990. In 2007, Marine Requirements Oversight Council (MROC) adopted JROC documents and authorized procurement to replace RQ-2 Pioneer UAS.

3) VMU – 1 and VMU -3 squadron possesses three RQ-7B systems with each system comprised four air vehicles and two ground control stations. VMUs are organized to provide up to three detachments of 50 Marines each providing up to 12 hours of daily support or deploy as an intact squadron to provide continuous 24 hour daily support.

Program Update

1) V2 Shadow - Tactical Common Datalink (TCDL)
- NSA Type 1 encrypted primary datalink
- STANAG message compliance

2) As the RQ-21A is introduced, the RQ-7B will be phased out. This transition began in July 2016 with VMU-2 ceasing RQ-7B operations.

3) VMU-1 will transition in FY17 to an all RQ-21A Squadron.

4) VMU-3 and VMU-4 will operate the RQ-7B until 2020.

5) VMU-3 will actively deploy the RQ-7Bv2 Shadow in the Pacific

Working Issues

1) TCDL (Tactical Common Data Link) initiative provides mandated Type 1 encrypted data link for C2 and FMV downlinks.

2) TCDL has been fully fielded to VMU-1 and VMU-3; further fielding and training continues through FY-18 for VMU-4.

System Specifications

1) Combat radius – 67nm

2) Max Gross weight – 467 pounds

3) Payload – POP 300D, EO/IR/IR marker/laser designator

4) Rail launched / Runway and arresting gear recovered.

RQ-11B, RQ-12A, RQ-20A (SURSS)

Program Description

The Small Unit Remote Scouting System includes the RQ-12A Wasp, RQ-11B Raven, and RQ-20A Puma as the foundational tier of the USMC UAS Family of Systems.

Organic to select regiments and battalions from the GCE, LCE, and ACE, these hand-launched systems are typically employed at the company level and below to provide day/night RSTA for small units across the range of military operations. Wasp (2.2 pounds) and Raven (4.2 pounds) are man-portable while Puma (13 pounds) is typically employed from vehicles or static positions due to its size.

Each system includes a laptop-based ground control station and a number of Wasp, Raven, and/or Puma unmanned aircraft.

Program Update

1) RQ-11 Raven fully fielded to AAO requirement

2) RQ-12 Wasp procured to AAO requirement , fielding in progress

3) Developing additional payloads for EW, Laser Designator and Communications relay

4) Developing common ground station

RQ-11B Raven

Working Issues

1) Program office is continually working to fund and complete procurement to AAO.

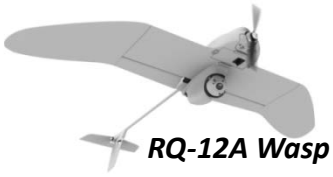
2) Efforts to increase RDT&E funding to develop new payloads and improve capabilities are essential in satisfying the demand signal for SURSS.

RQ-20A Puma

System Specifications

RQ-11B	Battery Powered	RQ-20A
Battery Powered	2.5-5 km range	Battery Powered
5-10 km range	45 kts Vmax	10-20 km range
44 kts Vmax	50+min endurance	40 kts Vmax
60-90 min endurance	500 ft AGL	120min endurance
150 – 1000 ft AGL	10,000 ft MSL	500 ft AGL
10,000 ft MSL	Gimbaled EO/IR , laser pointer	10,500 ft MSL
Gimbaled EO/IR, laser pointer		Gimbaled EO/IR, laser pointer, EW payload

RQ-12A



RQ-12A Wasp IV

VTOL/Nano VTOL

Program Description

1) Both products are COTS, selected based on market research of available potential solutions
2) Very small, lightweight, organic ISR asset capable of operation in confined areas where vertical launch and recovery is necessary. Capable of operations in a wide range of environmental conditions.
3) User: MARSOC

Program Update

1) Received final MROC approval (DM 03-2015) for MARSOC U-UNS
2) Fielded to MARSOC units Jan 2014
3) Incremental approach phased with MARSOC orbits (deployments)
4) Future procurements based on results of field user evaluations

***SkyRanger* (VTOL)**

Working Issues

1) No funding identified for further procurement and sustainment
2) Awaiting clarification of requirements for MAGTF units

***Mk-2 Gen 3 Instant Eye* (Nano)**

System Specifications

SkyRanger

1) Battery Powered
2) 5 km range
3) 35 kts Vmax
4) 50 min endurance
5) 15,000 ft MSL
6) 1,500 ft AGL
7) Gimbaled EO/IR

InstantEye

1) Battery Powered
2) 2 km range
3) 30 kts Vmax
4) 30 min endurance
5) 12,000 ft MSL
6) 1,500 ft AGL
7) 1 axis Gimbaled EO/IR

OSA

CURRENT

1) Operational Support Airlift (OSA) supports the MAGTF
2) commander by providing time sensitive air transport of high
3) priority passengers and cargo between and within theaters of
4) war, day and night, under all weather conditions, during
5) expeditionary, joint or combined operations

6) The Marine Corps currently operates 27 OSA aircraft*:
- 1 x C-20G
- 2 x C-9B
- 12 x UC-12F/M/W
- 12 x UC-35C/D

7) * (2) aircraft remain forward deployed ISO SPMAGTF requirements

FUTURE

1) MROC endorsed OSA Master Plan recapitalizes OSA:
- 1 x C-20RA
- 2 x C-40A
- 12 x UC-12W
- 12 UC-35RA

2) Consolidation of CONUS OSA aircraft and personnel:
- Enduring SPMAGTF requirements cannot be sustained under
- current construct
- Plan consolidates active component CONUS based OSA assets aboard MCAS Cherry Point and MCAS Miramar
- Reduction of 3 sites

3) Creates a sustainable, deployable construct
4) Active/Reserve component construct under analysis

FY17 UPDATES

1) UC-12W Transition:
- Aircraft #7 delivers in fall of 2016.

1) UC-12W Upgrades:
- 3rd ASE Dispenser
  - ❖ All aircraft funded (2 complete)
- Extended Range (ER) Tanks
  - ❖ Increases range from 1500 – 2400 NM
  - ❖ (4) aircraft currently equipped
  - ❖ Remaining aircraft are funded for completion by 4QFY16
- NVIS Compatibility (Interior and Exterior)
  - ❖ (2) aircraft funded for completion 2QFY16
- Satellite Phone
  - ❖ All aircraft are funded
  - ❖ (2) installs complete

FY17 UPDATES

1) UC-35D ASE
- (8) of (10) aircraft currently equipped
- Remaining 2 aircraft are funded for completion by 4QFY16

2) C-9B Divestiture
- To be complete no later than 2025

3) OSA assets cannot operate from Futenma Replacement Facility

4) WESTPAC relocation alternatives currently under review

C-9B

Program Description

Mission: Provide time sensitive air transport of high priority passengers and cargo between and within a theater of war.

Description:

1) Boeing / McDonnell Douglass C-9B
2) Capable of transporting 90 passengers
3) 20,000 lbs of cargo
4) Operational range of 1,740 nautical miles
5) Average Age: 33

Program Update

USMC intent is to divest of the (2) C-9B's and replace them with (2) C-40A's

1) Mandate: Based on the current 510 month airframe life our A/C reach life limits:
2) 161529 March 2025
3) 161530 April 2025
4) DOTMLPF conducted on 12Apr2016 to pursue moving VMR-1 (Flag) and (2) C-9B's to NAS JRB Fort Worth and place them under 4th MAW

Working Issues

1) Sustaining C9B until divestiture
2) FAA SFAR 88 Fuel Tank compliance is complete
3) UNS-1FW funded, projected completion in 1st QTR 16
4) TCAS 7.1 funded, projected completion in 1st QTR 16
5) CNS-ATM

- MANDATE: Automatic Dependent Surveillance- Broadcast out to DO 260B standard by 2020.
- Requires APN-5 funding in FY-17/18

Performance / Systems

1) Range: 1,740 NM with 20,000 lbs
   2,500 NM with 5,000 lbs
1) Crew: 5 to 8
2) Length: 119 ft 3 in
3) Wingspan: 93 ft 5 in
4) Height: 27 ft 6 in
5) Max takeoff weight: 110,000 lb
6) Empty weight: 59,700 lb
7) Powerplant: 2× P&W JT8D-9 turbofan
8) Max Speed: M.84/340 KIAS
9) Cruise Speed: M.78/485 KTAS

UC-35C/D Citation

Program Description

Mission: Provide time sensitive air transport of high priority passengers and cargo (limited cargo capability) between and within a theater of war.

Description:

1) UC-35C/D twin engine turbofan
2) Capable of transporting 7 passengers or 1,500 lbs of cargo
3) Operational range of 700 nautical miles
4) Cost: $9M (new cost)
5) Acquired: FY98-06

Program Update

USMC intent is to replace current (12) UC-35C/D aircraft with (12) "Super Mid-Size" class transport with improved range and payload capabilities.

Working Issues

1) Acquisition of "Super Mid-Size" class aircraft

2) Fleet submission of Universal Needs Statement for improved range and payload

3) Install ASE "A-Kits" in remaining UC-35D assets
- (8) aircraft complete

4) CNS-ATM compliance
- MANDATE: Block III Avionics modification includes Future Air Navigation Systems 1/A and Automatic Dependent Surveillance –Broadcast out to DO 260B standard. Prototype certification completed 1st QTR 16
- Remaining aircraft will be completed in FY16
- Requires APN-5 funding in FY16

Performance / Systems

1) Range: 1,300 NM Max Range
   700 NM with 7 Passengers
1) Crew: 2
2) Length: 48 ft 11 in
3) Wingspan: 52 ft 2 in
4) Height: 15 ft 0 in
5) Max takeoff weight: 16,300 lb for C/ 16,830 for D
6) Empty weight: 9,395 lb for C / 10,642 for D
7) Powerplant: 2× P&WC JT15-D turbofans
8) Cruise Speed: M.755/420 KTAS

UC-12F/M Huron

Program Description

Mission: Provide time sensitive air transport of high priority passengers and cargo between and within a theater of war.

Description:

1) Beechcraft UC12F/M (King Air 200)
2) Twin engine turbo-prop
3) Capable of transporting 7 passengers
4) 1,500 lbs of cargo
5) Operational range of 700 nautical miles
6) Cost: $6M
7) Average Age: 24 Yrs

Program Update

HQMC intent is to replace all UC-12F/M with UC-12W Huron aircraft.

Working Issues

1) Funding of 4 X USMC UC-12W aircraft to replace legacy UC-12F/M

2) Sustaining UC-12F/M readiness until UC-12W acquisition complete

3) CNS-ATM compliance

- Mandate Automatic Dependent Surveillance- Broadcast Out to DO 260B standard by 2020.

- Funding Requires APN-5 funding in FY-17/18

4) No install of Aircraft Survivability Equipment for legacy UC-12F/M planned

- - Negative impact to payload

Performance / Systems

1) Range: 1,200 NM Max Range
   700 NM with 7 Passengers
1) Crew: 2
2) Length: 43 feet 10 inches
3) Wingspan: 54 ft 6 in
4) Height: 15ft 0 in
5) Max takeoff weight: 12,500 lb
6) Empty weight: 7,755lb
7) Powerplant: 2× P&WC PT6A-41/42 turbo-prop
8) Max Speed: 294 KIAS

UC-12W Huron

Program Description

Mission: Provide time sensitive air transport of high priority passengers and cargo between and within a theater of war.

Description:

1) Capable of transporting 8 passengers
2) 2,500 lbs of cargo
3) Operational range of 1,500 nautical miles
4) ASE installed
5) CNS/ATM compliant
6) RVSM compliant
7) Cargo door
8) Cost: $15.1M

Program Update

Marine aviation intent is to replace all UC-12F/M with UC-12W Huron aircraft.

Working Issues

1) Funding of 4 x UC-12W aircraft to replace legacy UC-12F/M

2) Retrofit Extended Range Tanks for remaining (2) Block I aircraft

3) Prototype of 3rd dispenser forward firing - kinematic flares has been certified
- Complete remaining (5) Block I aircraft
- Aircraft 7 will be delivered with 3rd dispenser installed

4) Investigating potential requirements for GPS Anti-Jam technology

5) CNS-ATM compliance
- Mandate Automatic Dependent Surveillance- Broadcast out to DO 260B standard by 2020.

- Funding Requires APN-5 funding in FY-17/18

Performance / Systems

1) Range: 2,100 NM Max Range
   1,500 NM with 8 Passengers
1) Crew: 2
2) Length: 46 feet 8 inches
3) Wingspan: 57 ft 11 in
4) Height: 14ft 4 in
5) Max takeoff weight: 16,500 lb
6) Empty weight: 10,200lb
7) Powerplant: 2× P&WC PT6A-60A turbo-prop
8) Max Speed: 300 KIAS

CAC2S

Program Description

CAC2S Increment I provides the command and control system to process, display, and distribute air and ground data from sensors, other C2 nodes, and aircraft for the ACE commander to effectively command, control, direct and coordinate air operations in support of the MAGTF and joint force.

1) CAC2S is an ACAT IAC MAIS program providing aviation command centers, air defense and air support operation centers
2) Key Performance Parameters: Net Ready and Data Fusion
3) Common hardware, software, equipment, and facilities
4) Modular and scalable
5) Interoperable with MACCS organic sensors and weapons systems; fosters joint interoperability

Program Update

1) Phase 1
- All (20) Phase 1 systems have been fielded to the MASS, MACS, MTACS and Air Control Training Squadron (ACTS).

2) Phase 2
- Contract awarded to General Dynamics for 3 year development effort: IOC FY17 / FOC FY20
- AAO (50) Aviation Command and Control Systems (AC2S)
- (75) Communication Subsystems (CS)

3) Phase 2: MS-C completed Q2FY15
4) Phase 2: IOT&E Q3FY16

Working Issues

CAC2S Increment I is separated into two phases. Phase 1, currently fielded, focused on core aviation C2 capabilities. Phase 2, under development, will achieve the full CPD requirements of the TACC, TAOC and DASC.

1) Phase 1:
- Combines non and near real-time data to provide a combined air/ground Common Tactical Picture, communications, and operations facility.

2) Phase 2:
- Fuses real-time, near, and non real-time data
- Provides data fusion and sensor integration to TACC/TAOC/DASC
- Provides common HW/SW to TACC/TAOC/ DASC

Performance / Systems

1) Increment I replaces equipment within:
- TACC (176 seats)
- TAOC (17 seats)
- DASC (17seats)

2) Operational Impact
- Provide connectivity between ACE and GCE networks
- Integrated air and ground picture providing critical battlespace awareness to the MAGTF
- Sensor network provides real time composite air picture
- Increases echeloning options between MACCS units
- Agencies not tethered to sensors

Marine Air Traffic Control

AN/TPN-31A (V) 7 Program Description

The AN/TPN-31A(V)7 is a fully autonomous Airport Surveillance Radar and Precision Approach Radar air traffic control system. When combined with the AN/TSQ-263 Tactical Terminal Control System, it allows the Marine Air Traffic Control Detachment to provide the full range of radar services.

1) 2004 Army ORD adopted: ASPARCS over cost and delayed.
2) 2007 System identified as complementary to legacy MATCALS.
3) Bridging system until G/ATOR and CAC2S.
4) Replaced legacy MATCALS with fielding of extended range of version 7
5) Rapidly deployable, HMMWV based system transportable with organic USMC assets.

Program Update

In Operations Support/Sustainment Phase of Acquisition Life Cycle

1) Total systems: 15
- IOC – FY07
- FOC – FY13

2) ECP
- Range Extension - In fielding. Increases primary radar range from 25NM and 10,000 feet to 60 NM and 60,000 feet.
- ATNAVICS Tactical Data Link – Receive only to begin fielding in FY16. Planned two-way system in development.
- Mode 5 – Developed jointly with Army lead. Installation to commence in FY16.

AN/TRN-47(V)2 Program Description

1) The AN/TRN-47(V)2 Airfield Mobile TACAN (AMTAC) is a highly mobile, rapidly deployable navigational aid, capable of providing navigational assistance in a GPS denied environment. Provides range and bearing information for navigational assistance and forms the basis of non-precision approaches in supported airfields.

2) Replaces AN/TRN-44, ISO-container based TACAN
3) Entire system on one trailer
4) Power supplied by fielded generators
5) Increased deployability with no loss in capability

Program Update

Currently in testing as an ECP to the AN/TRN-47 portable TACAN

1) ECP Part 1 to be complete in FY16
2) ECP Part 2 to commence in 3rd Quarter FY16
3) Initial fielding planned for FY17

CTN

Program Description

The Composite Tracking Network (CTN) system will distribute composite tracking data to Command and Control (C2) and weapon systems participating in a Cooperative Engagement Capability (CEC) network. The system will significantly contribute to real-time situational awareness and high fidelity track data.

1) ACAT III designation in Nov 01
2) MDA: Program Executive Office, Land Systems-1 Feb 12
3) USMC led with US Navy and US Army cooperation
4) AAO: 10 systems

Program Update

1) MS C Decision (Oct 08)
2) FOC: FY 16
3) Fielded to MACS-1,2,4, 24, MCTSSA and MCCES
4) AAO revised from 25 to 10 (Jan 24th, 2014)
5) CAB-E Array replacing the CSSA antenna

Working Issues

1) Money put back into the CTN POM to support CAB-E array antenna development, procurement and fielding in 2017 through 2019 will ensure continued connectivity with Navy CEC.

2) The NIFC-CA Flag Steering Committee (FSC) was briefed on CTN/TPS-80 operational concepts. The NIFC-CA FSC is exploring how to best include CTN & TPS-80 into NIFC-CA concepts.

3) TPS-80, CTN & CAC2S need ECPs to ensure the correct message sets are communicated throughout all three systems IOT use TPS-80 as a target provider for Navy & Marine Corps IFC kill chains. These ECPs are expected to be low cost and low risk. Industry & PEO LS currently establishing time/cost estimates for these ECPs.

Performance / Systems

1) System supports WTI & CAC2S/GATOR testing – Can establish CTN/CEC network between E-2C, TPS-59 and TPS-80
2) Fielding : 10 systems – Currently FOC
3) CTN will have two-way data transmission once CAC2S phase II is fielded

LAAD

Program Description

LAAD is the Marine Corps' only persistent air defense capability defending the MAGTF against low altitude UAS, cruise missiles and rotary/fixed-wing (RW/FW) aircraft. Marine aviation requires a replacement weapon system for the current Program of Record, the Stinger missile, to mitigate the capability gap versus low observable/low radar cross-section threats (UASs/cruise missiles). To fill this gap, Marine aviation intends to integrate kinetic (missile/gun system) and non-kinetic (directed energy) weapons to provide continuous, low altitude air defense of High Value Asset (HVA) Aircraft, Combat Operation Centers (MEF COC, ACE TACC, Division COC's) and maneuvering units.

Program Update

The Marine Corps is investing in the modernization of current weapon systems and LAAD equipment by:

1) Fielding the remaining AMANPADS Inc 1 to provide a common tactical picture (CTP) that enables timely cueing for LAAD Firing Teams and enhances aircraft identification and target acquisition to engage hostile air threats against the MAGTF. AMANPADS Inc I is a C2 bridge for CAC2S and the Composite Tracking Network.

2) Completing a joint Service Life Extension Program (SLEP) for Stinger Block I Missiles. The SLEP extends the shelf life to 2028 and serves as a bridge until another kinetic MDD capability is determined.

3) Transitioning the on-going High Energy Laser (HEL) weapon system Office of Naval Research (ONR) Science and Technology (S&T) initiative to a Program of Record with a planned Initial Operational Capability (IOC) of the future GBAD Weapons System in FY28.

4) Developing, sourcing, and fielding a Mode 5 IFF capability by 2020 to conform to DoD directed fielding requirements.

Working Issues

1) Aviation is pursuing incremental approach since there's no one size fits all solution.

2) The Ground Based Aerial Defense – Transformation (GBAD-T) program only includes funding to maintain the Stinger missile system.

3) S&T, R&D, and PMC investment is needed to continue developing long-term kinetic/non-kinetic GBAD solution to defeat the full spectrum of UAS, FW/RW, and Cruise Missile threats.

4) Current ONR 30kW HEL initiative is entering its final year of funding (ends 01 Oct 17) and requires a Technology Transition Agreement signed by ONR, PEO LS and FPID. Lack of TTA puts this effort and field demonstrations in jeopardy.

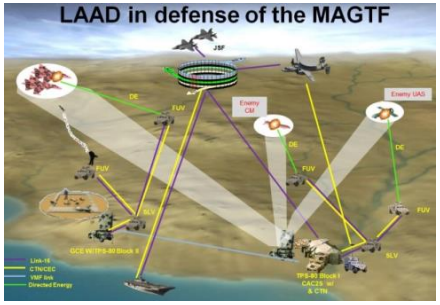
5) AOA will be completed in August and will help determine technical maturity of potential solutions in the 2020 timeframe.

Performance / Systems

1) GBAD HEL performance includes a HEL cueing source, C2 system, and a GBAD HEL Weapon System.

2) GBAD HEL weapon consists of a solid state ruggedized, expeditionary HEL mounted on a light tactical vehicle with a power source capable of supporting HEL target engagement rates during a joint engagement sequence (JES).

3) The GBAD HEL concept demonstrator will be developed and provided to the transition sponsor to advise the formal acquisition of the GBAD Program of Record.



AN/TPS-59A(V)3

Program Description

The AN/TPS-59A(V)3 radar is the Marine Corps' only transportable, solid-state, L-band, long range, 3-dimensional, air surveillance, and TBM-capable radar.

The AN/TPS-59A(V)3 is the principal air surveillance radar of the MAGTF, used to support aviation command and control required for sustained operations ashore and as part of a joint theater air and missile defense architecture.

1) Fielded in 1985: Upgraded in 1998 (Theater Ballistic Missile capability).
2) Upgraded to A(V)3 designation in 2011 to address obsolescence within the Control/Signal Processor Shelter.
3) Post production sustainment efforts keep radar viable against threats.
4) Contributes to CEC/CTN networks by providing early warning track data.
5) Supports ground sensor TBM data requirement to IAMD network via C2 node (Link 16).
6) IAMD defense in depth, persistent surveillance-threat detection.

Program Update

In operations support / sustainment phase of acquisition life cycle

1) Post Production Modification II (MK XIIA, IFF Mode 5, and Array Power Cabinet Technical Refresh)
2) On-going ECPs to address obsolescence :
3) Antenna transmitter group ECPs
4) Radar console/servers tech refresh
5) Information Assurance & SW Integration
6) ECCM updates (HW & SW)
7) Shelter Tech refresh (limited)
8) TBM SW improvements
9) RES development

Working Issues

1) HQMC DCA guidance to sustain radar to 2035. Addressed by Program Office through incremental Engineering Change Proposals and Tech Refresh Initiatives to address Diminishing Manufacturing Sources (DMS) and Obsolescence.
2) Key Sustainment Metrics:
3) Implement IFF Mode 5 technical solution per DoD mandates
4) Mitigate obsolescence/DMSMS and issues in array power supply, receiver and exciter cabinets & control shelter op/console/servers
5) Increase reliability availability and maintainability (RAM)
6) Maintain same frequency and signal strength
7) Improve mobility and survivability
8) Reduce power requirements and weight

Performance / Systems

MACS-4	**1 MAW**	**2**
MACS-2	**2 MAW**	**2**
MACS-1	**3 MAW**	**2**
MACS-24	**4 MAW**	**2**
MCTSSA	**Camp Pendleton, CA**	**1**
MCCES	**Twentynine Palms, CA**	**1**
Depot	**Tobyhanna, PA**	**1**
Total		11

METMF(R) NEXGEN

Program Update

The Meteorological Mobile Facility (Replacement) Next Generation [MetMF(R) NEXGEN] is a mobile, fully integrated, FORCENet compliant USMC tactical meteorological support system. The system delivers relevant, timely METOC products and mission impact assessments via Common Operating Picture to the MAGTF and joint force.

1) CPD Approved Acquisition Objective (AAO): 15 modified to 14 per (CMC/APX-1, OPNAV N2/N6E) Joint Letter of 17 May 2013

- 11 of 14 systems delivered to the ATC Dets including MARFORRES.
- Funding shortfall for (3) systems remains = ~$12M-$14M
- A new competitive contract must be awarded upon funding

2) MACG-48, MACS-24, Det A (MARFORRES) NEXGEN Delivered Q3FY16.

3) NEXGEN supported deployments/exercises

- Weapons & Tactics Instructor (WTI) Course, Large Scale Exercises (LSE), Contingency Operations (Afghanistan), SPMAGTF-CR-CC.
- Continues to provide METOC support to aviation operations around the world.
- Currently deployed ISO SPMAGTF-CR-CC

Top 2 Identified Issues

1) Funding Issues

- ~$7.5M OM/N required to sustain the NEXGEN program - FYDP
- ~$4M.4 OP/N for tech refresh …maintain system baseline
- ~$12-$14M OP/N …procure (3) NEXGENS organic to the INTEL BNs

2) Viper Generator issue

- OEM Generator may be unsupportable based upon possible vendor bankruptcy & unavailability of replacement parts.
- The ISEA (SSC-PAC) requires ~$.5M funding to conduct AoA

3) Software/Hardware issues

- HQMC mandated Windows 10 migration NLT 31 Jan 2017. Effort previously unplanned/unfunded - quoted at ~$227K by Prime contractor.
- System remains susceptible to
- dirty power, FY17 plan in place
- to provide power
- transformer/leveler.

Location	Contract Delivery Date	Smiths Delivery Date	Govt Acceptance Date	SOVT / Training	MILCON Complete?
MCAS Futenma, Okinawa - MACG-18 Det A	11/20/2012	11/20/2012	11/30/2012	8/1/2013	No
MCAS Miramar, CA - MACG-38 Det B	11/30/2012	11/30/2012	12/21/2012	12/1/2012	No
SSC PAC – ISEA	12/31/2012	12/12/2012	1/24/2013	N/A	Yes
MCAF Boque Field, NC - MACG-28 Det C	4/30/2013	4/26/2013	6/14/2013	6/1/2013	No
NAS Pensacola, FL	6/13/2013	5/21/2013	5/30/2013	5/21/2013	Yes
MCAS New River, NC - MACG-28 Det B	5/31/2013	5/29/2013	6/14/2013	6/1/2013	No
MCAS Yuma, AZ - MACG-38 Det C	6/28/2013	7/1/2013	7/20/2013	7/1/2013	No
MCAS Iwakuni, Japan - MACG-18 Det B	7/23/2013	7/15/2013	7/25/2013	8/1/2013	Yes
MCAS Camp Pendleton, CA - MACG-38 Det A	7/07/2014	7/07/2014	8/1/2014	10/1/2014	N/A
MCAS Beaufort, SC - MACG-28 Det A	7/31/2014	7/31/2014	9/22/2014	2/16/2015	N/A
NAS JRB Fort Worth Tx, MACG-48 Det A	9/25/2015	1/15/2016	2/11/2016	2/26/2016	Partially
1st Intelligence BN, Camp Pendleton CA					
2nd Intelligence BN, Camp Lejeune, NC					
3rd Intelligence BN, Camp Hanson, Okinawa					

Unfunded Requirement

P-19A Replacement (P-19R)

Program Description

This initiative replaces the A/S32P-19A Aircraft Crash and Structure Fire Fighting Truck, TAMCN D1064, known as the P-19A. The P-19A, introduced into service in 1984, with a service life of 12 years, has undergone depot level rebuild two times.

1) The P-19A is the Marine Corps' only major aircraft fire fighting vehicle, utilized at Marine Corps Air Stations and Forward Operating Bases for immediate response to aircraft emergencies (primary) and structural fires (secondary).

2) At 30 years of service, the P-19A faces parts obsolescence, frame fatiguing, and possesses 1984-era mechanical and fire fighting technology.

3) The P-19R is compliant with current National Fire Protection Association (NFPA) standards for aircraft rescue and fire fighting vehicles, resulting in a vehicle optimized for crew/operator safety and fire fighting effectiveness.

4) The P-19R drivetrain and power-pack maintains up to is 75% commonality with current USMC tactical vehicles (MTVR and LVSR), resulting in greater logistical and maintenance supportability. COTS fire fighting components (Pierce Mfg.) will increase parts availability and sustainability.

Program Update

1) Training Curriculum Overview March 2015.
2) Milestone "C" achieved on 31 March 2015.
3) Field User Evaluation planned for November 2015.

Chart reflects current funding profile as of 4 Feb 2014

APPN	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY13-19
RDTEN	$6.5	$.9	$1.6	$0	$0	$0	$0	$9.0
PMC	$0	$16.9	$11.0	$30.1	$33.1	$16.0	$16.3	$123.4
OMMC	$0	$.6	$1.1	$1.2	$1,5	$1,5	$1.6	$7.5
OTHER	$0	$0	$0	$.949	$.966	$.984	$1.0	$3,9
TOTAL	**$6.5**	**$18.4**	**$13.7**	**$32.2**	**$35.5**	**$18.5**	**$18.9**	**$143.8**

Working Issues

1) P-19A Replacement initial operational capability (IOC) is planned for Fiscal Year (FY) 2017. IOC is achieved when one MAW has received a complete issue of P-19A Replacements, the assigned mechanics and crews have received initial training at the Operator/Crew, Field and Sustainment levels and sufficient repair parts are in place to support operations.

2) P-19A Replacement full operational capability (FOC) is desired by FY 2020 to meet the Approved Acquisition Objective (AAO) of 164.

3) MARCORSYSCOM and I&L proceeding with the SLEP of MWSS and MCAS P-19As to extend service life .

Performance / Systems

1) 4-man crew
2) 1,000 gallon water tank, 130 gallon foam concentrate tank
3) Approximately 75% parts commonality between P-19R, LVSR, and MTVR
4) Proven MTVR Transmission and chassis powered by LVSR engine
5) EPA approved chemical firefighting agent (minimum of 500 pounds)
6) National Fire Protection Association Standard 414 compliant
7) JP-8 capable with range of 150 miles @ 55 mph
8) 0 to 50 mph in 25 seconds or less
9) Alternate Power Unit (APU) to reduce engine idle time
10) Capability to draft water from a static supply source (structural panel-equipped)

EAF Sustainment Lighting System (SLS)

Program Description

Current EAF hard-wire lighting system utilizes 1960-era technology, is maintenance intensive, and consistently encounters logistical challenges due to parts obsolescence.

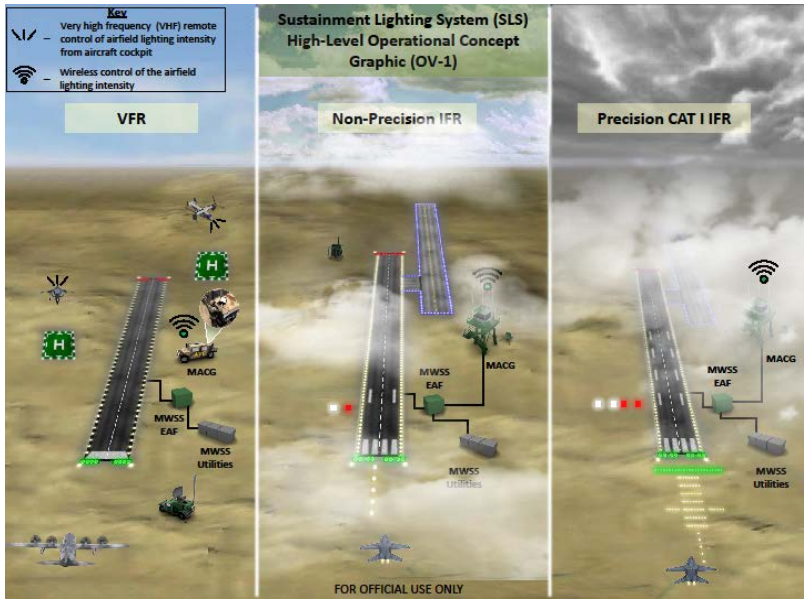
1) The EAF SLS will make use of all available modern energy efficiency technology (Improved batteries, solar capability, etc.).

2) SLS will be lighter, easily adaptable to various airfield configurations, and heat-resistant IOT support MV-22 and F-35B operations.

3) EAF SLS will fill existing capability gap by providing the visual cues required for CAT I, precision IFR approaches. Effectively "marrying" MACG and EAF capabilities to provide a safer operational environment for our aviators.

Program Update

TY$M	FY13	FY14	FY15	FY16	FY17	FY18	FY14-18
OPN		--	--	--	--	0.0	0.0
POM 14 Req		--	--	--	--	23.1	23.1
Delta		--	--	--	--	**-23.1**	**-23.1**
TY$M	**FY13**	**FY14**	**FY15**	**FY16**	**FY17**	**FY18**	**FY14-18**
RDTEN	3.1	7.6	20.3	15.0	11.0	0.0	59.2
POM 14 Req		5.2	9.3	18.2	19.5	10.1	67.6
Delta		**2.4**	**11.2**	**-3.2**	**-8.5**	**-10.1**	**-8.2**
TY$M	**FY13**	**FY14**	**FY15**	**FY16**	**FY17**	**FY18**	**FY14-18**
Total Delta		**2.4**	**11.2**	**-3.2**	**-8.5**	**-33.2**	**-31.3**



Working Issues

1) Milestone "B" achieved on 5 December 2014
2) Milestone "C" slated for 15 February 2019
3) Initial operational capability (IOC) is expected on 11 December 2019
4) Full operational capability (FOC) is expected on 13 August 2020

Light-weight Matting (MV-22 Cap)

Initiative Description

This initiative will develop and field, to the MWSS Expeditionary Airfield Platoon, a light-weight matting solution that will withstand the heat signature produced by the MV-22 aircraft.

Initiative Update

There are possible COTS solutions available that are currently undergoing testing at Engineer Research and Development Center (ERDC) as part of an Expeditionary Airfield (EAF) Congressional plus-up. A gap was identified in the EAF 2014 Capabilities Based Assessment (CBA) for MV-22 capable light-weight matting, subsequently, an EAF Initial Capabilities Document (ICD) has been staffed and a light-weight matting Capabilities Description Document (CDD) is slated to kick-off in late June 2016.

Initiative Requirements

1) The system shall support the operations of both aircraft and ground support vehicles
2) The matting shall withstand the heat/flux duration of MV-22 air and ground operations with degradation of structural integrity
3) The system should require minimum ground preparation, minimum CBR of four
4) EAF Marines should be able to install the matting at a rate of 600 square feet per man-hour using a four man crew
5) The matting system must contain a non-skid surface and mate with AM-2 medium duty matting system
6) Matts shall be recoverable and suitable for reuse after being subject to a conditional inspection, cleaned, and repackaged
7) The matt shall be able to withstand exposure to all POLs without degradation to performance or structure

Airfield Damage Repair

Program Description

Marine Wing Support Squadron (MWSS) engineers supporting Marine Corps Task (MCT) 6.3.3 Restore Mission Essential Operations/Communications have a critical requirement to upgrade their current ADR capability to support semi-permanent (concrete) repair of 12-24 small (< 10') craters within 6 hours using organic means. These repairs will provide a Minimum Operating Strip (MOS) of 50' x 5000' on an airfield that has experienced an attack, which will allow for the launch and recovery of United States Marine Corps (USMC) KC-130 and fighter aircraft.

The required capability for one ADR Kit is to provide the tools and materials to repair six 10-foot diameter craters, in a concrete surface, and/or fifteen 10-foot diameter craters, in an asphalt surface, in less than 92 minutes plus (+) a two hour curing period. One ADR Kit must also contain the materials to repair 45 spalls in a concrete surface.

Program Update

1) Statement of Need Change request has been submitted to CD&I
2) ADR kit allocations have been identified
3) Volumetric mixer is being tested by ERDC.

Working Issues

1) The total program cost is anticipated to be approximately $34,000,000. Current funding for this program consist of: $11.5M [FY17 -Family of Construction Equipment (FCE)], $5M (FY18 - FCE), and $5M (FY19 - FCE), totaling $21.5M. Based upon the established AAO, this program will not be fully funded. Because of this, it has been designated to fund the following units (by priority): Marine Corps Engineer School, Marine Wing Support Squadrons, Engineer Support Battalions

Performance Systems

1) Self-Contained Volumetric cementitious material mixing capability capable of hydrating, mixing and placing cementitious flowable fill and rapid setting crater capping materials.
2) Material to enable small crater repair including a cementitious flowable fill.
3) A rapid setting crater capping material.
4) Lightweight and scaleable FOD cover.
5) FOD cover anchoring system tools.
6) Rubber tracked skid-steered/loader capable of powering the existing ADR Kit attachments, equipped with steel road wheels and a high flow hydraulic system capable of powering a wheel saw attachment able to cut reinforced concrete to a depth of 22 inches.
7) Drum type Concrete mixing attachment for skid steer that will allow the mixing, transport and dumping of concrete where required.
8) Moil Points and rubber tracks for excavator.

Aviation Training Systems

Current state of the USMC Aviation Training System

1) Marine aviation will have significant growth in fielded simulators from 94 currently to 175 by the end of FY 19.

2) Currently 64 are enabled for local or wide area networked Distributed Mission Training (DMT) over the Aviation Distributed Virtual Training Environment (ADVTE).

3) The Marine Corps Automated Learning System (MCALMS) is the program of record that delivers courseware via an approved .mil architecture. T&R simulation requirements account for 15-37% in the core and mission skill phase on average for USMC aviation platforms; several incorporate over 50-90% simulation in the basic skill, mission and core skill, and flight leadership development syllabi.

Future AVPLAN FY18-28

1) All new and upgraded trainers have USMC TEn and core database architecture enabling cross Type/Model/Series, community, and network circuit connectivity via ADVTE.

2) Of the 175 devices projected in the ATS by FY19, over 120 are programmed to be connected to ADVTE (H-1, V-22, H-53E/K, F/A-18, F-35, UAS, KC-130, and AV-8B).

- ADTVE next generation and the TEn Technical Refreshers (TR) will target:
- Integration of 1st and 4th MAW into the ADVTE architecture.
- Creation of a USMC Common Synthetic Training Area (CSTA).
- Upgrades and updates to the TEn hard/software interface.

3) MAVWC procured and operational at MCAS Yuma enabling robust, MAGTF level virtual training.

4) MCALMS upgrades will allow for local and central database access and more tailored courseware delivery.

1) Delivering higher fidelity simulation:

- New acquisition and technical refreshes of existing devices using future modeling and simulation industry technology.
- Development of a USMC CSTA of sufficient fidelity to enable "fair fight" correlated simulated training environments; Goal to promote interoperability within ATS, the USMC GCE and joint DMT Circuits.
- Improved threat and weapons databases and interfaces.

1) Restructuring of existing simulator policies and orders to capitalize on the current and future USMC simulator and ATS assets (classrooms, Brief/Debrief spaces, mission planning spaces, training devices etc.) which will cement the uniformed and civilian manpower requirements that critically support the ATS mission.

2) Improving MCALMS, enabling local and central updating and tailored instruction delivery.

ATS Process incorporates:

1) Flight Leadership Standardization and Evaluation – rigorous platform evaluation under the governing T&R and MAWTS-1 Program Guides.

2) Concurrency Management – evaluating and adjusting curricula, systems, and courseware for changes in platform/OFP and tactics.

3) Training Information Management Systems – MSHARP and ASM spiral development to track training, and MCALMS to deliver courseware

4) Risk Mitigation – promoted by flight leadership discipline and adherence to established procedures and requirements.

5) Training Management Process – forum to identify and present training issues across DOTMLPF to efficiently and holistically develop funding strategies and solutions within formal requirements process.

4.2 MARINE CORPS AIR STATION FACILITIES AND MILITARY CONSTRUCTION PLAN

Aviation military construction (MILCON) projects are essential to achieving the Commandant's vision for Marine Corps aviation. MILCON projects enable IOC fielding for introducing new weapon systems, such as the CH-53K, RQ-21A, and F-35B to the operational forces and training commands. MILCON designs will focus on flexibility of use to allow new weapon systems, squadron relocations, and re-designations to serve MAGTF requirements as they evolve over time. Marine Corps aviation's new weapon systems have a much greater range and more robust capabilities than legacy platforms. As a result, the use of air station facilities, ranges, and air space may differ to accommodate these enhanced capabilities.

The MILCON, DPRI, and host nation projects listed in the following tables represent projects required for the realization of the current AVPLAN, air safety or required to address some deficiencies. The project tables represent a snapshot in time, are subject to change and include pure AVPLAN and regular air station projects.

Marine Corps air stations and air facilities must remain viable in the future. Where possible, existing physical assets will be used as a bridge to the full funding and construction of MILCON programs. The introduction of F-35B and other weapon systems will require additional MILCON resources to ensure programmatic and operational risk to both Marine Corps aviation and the Marine Corps as a whole are mitigated. Consequently, Marine aviation has planned MILCON projects which validate the commitment to establish a JSF capability within the MEFs as per the TACAIR Transition Plan. Some risk can be accepted in order to move forward with the modernization of the force, but the resources must eventually be found to recapitalize air stations.

4.2 MARINE CORPS AIR STATION FACILITIES AND MILITARY CONSTRUCTION PLAN

MCI EAST								
QUANTICO AIR FACILITY			**CHERRY POINT, CONT.**			**LEJEUNE**		
FY14	P-1406	ATC TX/RX RELOCATION	FY22	P-234	F-35 MAINTENANCE TRAINING FACILITY	FY19	P-456	REPAIR RUNWAY 5/23 CAMP DAVIS SOUTH
FY16	P-647	ATFP GATE	FY22	P-205	VERTICAL LANDING PAD IMPROVEMENTS	**BEAUFORT**		
CHERRY POINT			FY22	P-207	GROUND SUPPORT EQUIPMENT SHOP	FY13	P-459	RECYCLE/HAZWASTE FACILITY
FY13	P-163	MASS-1 COMPLEX	FY22	P-209	ENGINE MAINTENANCE FACILITY	FY14	P-465	AIRCRAFT HANGAR - VMFA
FY16	P-193	WATER SYSTEMS UPGRADES & IMPROVEM	FY22	P-226	MALS 14 MAINT HANGAR / MAG14 HQs	FY14	P-473	TOWNSEND BOMBING RANGE ACQ - PH 1
FY16	P-194	UAS FACILITIES EXPANSION	FY22	P-562	POST OFFICE	FY14	AM00037	LAUREL BAY ELEM/MIDDLE SCHOOL
FY16	P-229	KC-130 FUSELAGE TRAINER	FY22	P-142	FIRE STATIONS	FY15	DLA 1606	JET FUEL STORAGE & PIPELINE REPLACE
FY16	P-222	AIRFIELD SECURITY UPGRADES	FY24	P-200	F-35 HANGAR (2 MODULES)	FY16	P-474	TOWNSEND BOMBING RANGE ACQ - PH 2
FY17	P-224	CENTRAL HEATING PLANT CONV	FY27	P-201	F-35 HANGAR (1 MODULE) RESERVE	FY17	P-464	AIRCRAFT HANGAR - VMFAT
FY17	P-233	LHD TOWER - BOGUE	**NEW RIVER**			FY19	P-457	CRYOGENICS FACILITY
FY19	P-235	FLIGHTLINE UTILITIES UPGRADE, PH I	FY14	P-726	REGIONAL COMM STATION	FY19	P-476	REGIONAL COMMUNICATIONS CENTER
FY19	P-199	F-35 HANGAR (2 MODULES)	FY14	P-676	CH-53K MAINTENANCE TRAINING	FY19	P-484	F-35 MAINTENANCE TRAINING FACILITY
FY19	P-658	INDOOR FITNESS FACILITY	FY14	P-674	CORROSION CONTROL HANGAR	FY19	P-458	LAUREL BAY FIRE STATION
FY19	P-134	PHYSICAL SECURITY - SLOCUM ROAD	FY16	P-729	OPERATIONAL TRAINER FACILITY	FY19	P-487	CLIMATE CONTROLLED WAREHOUSE
FY19	P-080	ATLANTIC FIELD SECURITY	FY16	P-686	ATC FACILITY ADDITION	FY20	P-471	MAG-31 HEADQUARTERS
FY19	P-129	MACS-2 OPERATIONS & MAINTENANCE	FY19	P-690	STATION ARMORY	FY20	P-482	MACS-2 VEHICLE STORAGE & MAINT FAC
FY19	P-196	RIFLE RANGE OPERATIONS BUILDING	FY19	P-675	REGIONAL STORMWATER BMP	FY20	P-485	F-35 OPERATIONAL SUPPORT FACILITY
FY20	P-130	MWSS MOTOR TRANSPORT & COMM SHOP	FY19	P-728	C-12 A/C MAINT HANGAR	FY21	P-475	AIRCRAFT HANGAR - VMFAT
FY20	P-173	MWCS DETACHMENT FACILITIY	FY19	P-389	GROUP HEAD QUARTERS MAG-29	FY21	P-488	WAREHOUSE
FY20	P-143	PHYSICAL SECURITY GRADES - MAINGATE	FY19	P-709	ORDNANCE STORAGE	FY21	P-481	MRAP STORAGE AND MAINT FACILITY
FY20	P-223	POTABLE WATER WELLS	FY19	P-706	SQUADRON WAREHOUSE	FY21	P-483	RUNWAY OVERRUNS
FY20	P-227	CONSTRUCT TARGET BERMS AT BT-11	FY19	P-724	LIBRARY AND EDUCATION CENTER	FY22	P-477	JET FUEL SYSTEM CAPACITY EXPANSION
FY20	P-232	CALA BERM	FY19	P-713	THEATER	FY22	P-480	UPGRADE COMM INFRASTRUCTURE
FY20	P-204	TRAINING AND SIMULATOR FACILITY	FY19	P-366	CH-53K BRIDGE CRANE UPGRADES	FY22	P-462	F-35B ASSAULT STRIP
FY20	P-167	ORDNANCE MAGAZINES	FY19	P-378	CH-53K REPLACE AS3905	FY22	P-479	EXPEDITIONARY CONSTR COMPLEX
FY20	P-210	MCALF BOGUE AIRFIELD IMPROVEMENTS	FY19	P-635	OSPREY SUPPORT CENTER	FY22	P-478	STATION MAINTENANCE COMPLEX
FY20	P-228	ATC TOWER &AIRFIELD OPS	FY19	P-721	MALS ADDITION	FY23	P-489	WAREHOUSE
FY21	P-149	GUIDED MISSILE INTEGRATION FACILITY	FY20	P-712	DOUGLASS GATE SECURITY UPGRADE	FY23	P-486	ORDNANCE CONTROL BUNKERS
FY21	P-197	F-35 HANGAR (2 MODULES)	FY21	P-386	REPLACE AS4108			
FY21	P-162	SECURITY OFFICE	FY22	P-660	REPLACE AS515			
FY21	P-202	SUPPORT EQUIPMENT STORAGE	FY23	P666	REPLACE AS518			
FY21	P-203	AVIATION ARNAMENT SHOP	FY24	P672	REPLACE AS4106			
FY21	P-239	FLIGHTLINE UTILITIES UPGRADE, PH II						

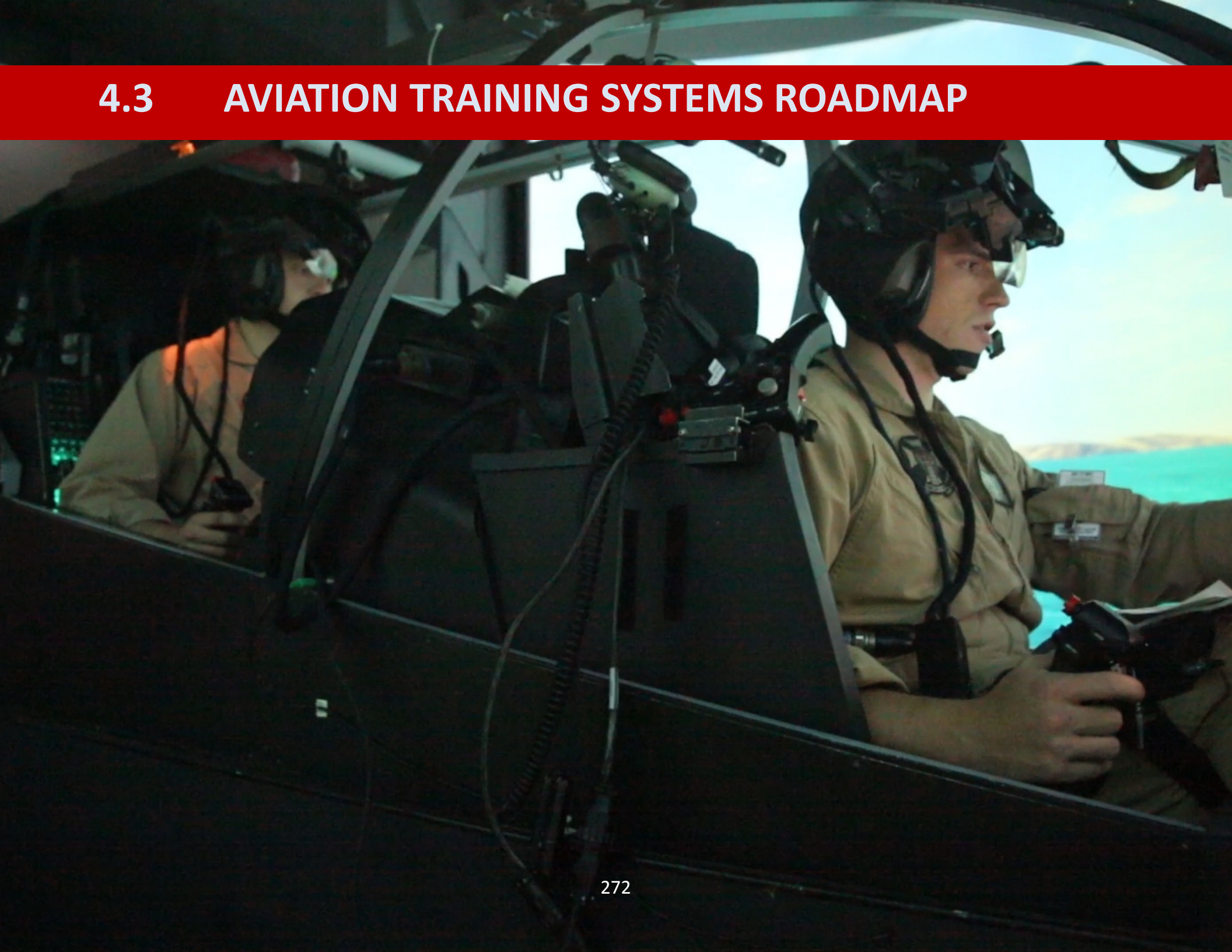
4.2 MARINE CORPS AIR STATION FACILITIES AND MILITARY CONSTRUCTION PLAN

MCI WEST								
YUMA			YUMA, CONT.			MIRAMAR, CONT.		
FY13	P-378	SECURITY OPERATIONS FACILITY	FY21	P-570	AIRCRAFT MAINT HANGAR (F-35)	FY17	P-249	F-35 COMM BLDG & INFRA UPGRADE
FY15	P-617	MALS-13 FACILITIES UPGRADES (F-35)	FY22	P-600	MAINT BUILT IN TEST PADS (F-35)	FY17	P-203	F-35 AIRCRAFT PARKING APRON
FY16	P-602	MAWTS-1 CALA MAINT COMPLEX PH I	FY22	P-572	COMPOSITE REPAIR FACILITY (F-35)	FY18	P-198	F-35 AIRCRAFT MAINT HANGAR A
FY17	P-612	VMX-22 MAINT HANGAR (MV-22/CH-53K)	FY22	P-587	TAXIWAY UPGRADES	FY19	P-238	F-35 AIRFIELD SECURITY
FY18	P-539	ENLISTED DINING FACILITY	FY22	P-598	CONSOLIDATED CHILLER FACILITY	FY19	P-256	MALS HANGAR COMPLEX
FY19	P-538	BEQ (F-35)	FY22	P-616	LOX/N2 FACILITY	FY19	P-250	CHILD DEVELOPMENT CENTER
FY19	P-596	HANGAR 95 REN & ADD (VMX -- F-35)	FY22	P-605	UAS HANGAR (GROUP 4/5)	FY19	P-166	LEGAL SERVICES CENTER
FY19	P-620	AME STORAGE ADDITION, HANGAR 80	FY22	P-553	POST OFFICE	FY19	P-197	INDOOR FITNESS FACILITY
FY19	P-621	AME STORAGE ADDITION, HANGAR 78	FY23	P-585	RUNWAY UPGRADES (F-35)	FY19	P-210	F-35 SIMULATOR FACILITY
FY19	P-623	MOUT COLLECTIVE TRAINING FACILITY	FY24	P-576	ALF PH II (F-35)	FY19	P-222	F-35 VERTICAL LANDING PADS
FY19	P-364	FITNESS/WATER SURVIVAL TRAINING FAC	FY25	P-532	SECURE ACCESS CONTROL FACILITY	FY19	P-205	PLESS AVE ROAD EXTENSION
FY19	P-619	F-35 MAINTENANCE TRAINING FACILITY	FY27	P-580	FLIGHT LINE PARKING STRUCTURE (F-35)	FY19	P-225	AIRFIELD TAXIWAY
FY19	P-504	CONSOLIDATED STATION ARMORY	MCAS PENDLETON & MCB PENDLETON (AIR SUPPORT)			FY20	P-244	MATCU OPERATIONS BUILDING
FY19	P-501	FIRE STATION	FY16	P-1607MR	CONSTRUCT SIMULATOR ROOMS IN B-2319	FY21	P-193	BACHELORS ENLISTED QUARTERS
FY19	P-421	STUDENT QUARTERS BOQ	FY16	P-132	ORDNANCE BUILD UP FACILITY	FY21	P-204	VEHICULAR BRIDGE
FY19	P-606	UAS AVIATION LOGISTICS SUPPORT COMP	FY19	P-120	DOUBLE HANGAR EXPANSION	FY22	P-254	CENTRAL ENGINE REPAIR FAC (CERF)
FY19	P-604	GROUP 3 UAS OPERATIONS FAC	FY19	P-137	AVN CORROSION CONTROL FAC	FY23	P-258	HANGAR 3 MOD AND ADDITION
FY19	P-568	CLC-16 COMPOUND	FY19	P-134	MULTI-PLATFORM AVIATION SIM FAC	FY23	P-190	TACTICAL COMM OPS & TRAINING FAC
FY19	P-579	AVIATION MAINTENANCE STORAGE FAC	FY21	P-140	ARM AND DEARM TAXIWAY	FY23	P-191	TACTICAL AIR CONTROL EQUIP FAC
FY19	P-536	MAG/MALS/STATION OPS FACILITY (F-35)	FY21	P-135	AVIATION PRESERVATION WAREHOUSE	FY23	P-194	ARMORY ADDITION
FY19	P-551	AIRCRAFT MAINT HANGAR (F-35)	FY21	P-139	AIRCRAFT RESCUE & FIRE FIGHTING STA	FY24	P-216	RUNWAY 24R PHASE 1
FY20	P-538	BEQ (F-35)	FY22	P-138	MARINE AVIATION VMU-4 FACILITIES	FY25	P-201	F-35 AIRCRAFT MAINT HANGAR B
FY20	P-640	AIRFIELD DUST ABATEMENT	FY22	P-141	AIRCRAFT MAINTENANCE HANGAR 4&5	FY25	P-234	RUNWAY 24R PHASE 2
FY20	P-531	TAC AIR COMMAND CENTER	FY20	PEN121	CONVERT SIM LHA DECK TO CONCRETE	FY27	P-202	F-35 AIRCRAFT MAINT HANGAR C
FY20	P-446	CONSOLIDATED ORDNANCE DISPOSAL	FY20	PEN1056	LHD PAD MODERNIZATION	MFR MILCON -- VARIOUS LOCATIONS		
FY20	P-589	VL PAD	FY20	PEN1057	VTOL PAD MODERNIZATION	FY18	P-077	MFR SIMULATOR FACILITY -- NAS FW
FY20	P-419	LIFELONG LEARNING CENTER	FY20	PEN1058	HOLF RUNWAY LIGHTING IMPROVEMENTS	FY18	P-650	APRON, TAXIWAY & SUPPORT -- JBDIX
FY20	P-450	RELIGIOUS EDUCATION CENTER ADD	MIRAMAR					
FY20	P-493	RUNWAY 3R/21L EXTENSION	FY13	P-181	HANGAR 5 MODIFICATION			
FY20	P-503	TRANSIENT QUARTERS	FY14	P-308	POL PIPELINE			
FY20	P-542	MWSS-371 RELOCATION	FY14	P-906	ENERGY SECURITY AND MICROGRID			
FY20	P-591	WATER TREATMENT FACILITY	FY16	P-242	DEHUMIDIFICATION AVN ARMAMENT			
FY21	P-614	AIRFIELD LIGHTING AND POWER	FY16	P-200	ENLISTED AIRCREW TRAINING SYSTEMS			

4.2 MARINE CORPS AIR STATION FACILITIES AND MILITARY CONSTRUCTION PLAN

MCI PAC								
KANEOHE BAY			**OKINAWA IE SHIMA**			**OKINAWA MARINE WING LIAISON KADENA**		
FY13	P-905	AIRCRAFT STAGING AREA (MV-22)	FY15	P-801	LHD PRACTICE SITE IMPROVEMENTS	FY15	P-803	AIRCRAFT MAINT HANGAR ALTS & SAPF
FY14	P-863	HMLA HANGAR RENOVATION	**OKINAWA CONSOLIDATION PROGRAM (DPRI)**			FY16	P-809	MODERNIZE APRON FOR F-35
FY14	P-884	MISSION SUPPORT FACILITY (ATS)	TBD	TBD	1st MARINE AIR WING HQ FACILITY	FY17	P-807	AIRCRAFT MAINTENANCE COMPLEX
FY14	P-907	MV-22 PRKG APRON/INFRA (2ND SQD)	TBD	TBD	MTACS-18 AIR SURVEILLANCE RADAR FAC	FY19	P-810	MWLK BARRACKS
FY14	P-908	MV-22 HANGAR (2ND VMM SQND)	TBD	TBD	MACG-18 AND MWCS-18 HQ FACILITY	**IWAKUNI (DPRI)**		
FY15	P-861	VMU INFRASTRUCTURE UPGRADES	TBD	TBD	MWCS-18 WAREHOUSE	2013	MC159T	MAG12/CVW-5 HQ BUILDING
FY15	P-924	MV22 EIS TRAFFIC MITIGATION	TBD	TBD	MWCS-18 AUTO SHOP	2014	MC948	FIRE DRILL PIT (JFIP)
FY16	P-902	AIRFIELD LIGHTING AND ELEC UPGRADES	TBD	TBD	BEQ (E6-E9) COURTNEY	2014	MC403	MWSS 171 FUEL STORAGE SHED (JFIP)
FY16	P-910	BACHELOR ENLISTED QUARTERS PH I	TBD	TBD	BEQ (E1-E5) COURTNEY	2014	MC407	CSSD-36 MAINT COMPOUND (JFIP)
FY17	P-949	FUEL PIT AND TAXIWAY IMPROVE MV-22	TBD	TBD	BEQ COURTNEY	2014	MC165T	CVW-5 HANGAR
FY18	P-887	LHD PAD CONV & MV22 LZ IMPROVE	TBD	TBD	ENLISTED DINING HALL CAMP COURTNEY	2014	MC166T	CVW-5 AIRCRAFT HANGAR
FY19	P-929	VMU OPERATIONS SUPPORT SHED (WAAF)	TBD	TBD	MACS-4 HEADQUARTERS FACILITY	2015	MC173T	VMGR-152 APRON, WASHRACK & RINSE
FY19	P-936	VAN PAD MODERNIZATION	TBD	TBD	MACS-4 ELECTRONICS MAINT FACILITY	2015	MC167T	CVW-5 MAINT HANGAR
FY19	P-877	MCBH KBAY ENTRY CONTROL AT/FP	TBD	TBD	MACS-4 WAREHOUSE	2015	MC175T	CONSOLIDATED MAINTENANCE HANGAR
FY19	P-891	HANGAR 102 MODERNIZATION	TBD	TBD	BEQ (E1-E5) HANSEN	2015	MC158T	OPERATIONAL TRAINERS COMPLEX
FY19	P-931	PUULOA RANGE COMM/ELEC & GATE MOD	TBD	TBD	BEQ (E6-E9) HANSEN	2015	MC255T	FLIGHT LINE INFRASTRUCTURE
FY19	P-946	MALS CORROSION CONTROL HANGAR	TBD	TBD	BEQ HANSEN	2015	MC360T	RANGE COMMUNICATION FACILITY
FY19	P-774	PTA EQUIPMENT STORAGE	**OKINAWA FUTENMA REPLACEMENT FACILITY (DPRI)**			2015	MC975T	ORDNACE OPERATIONS FIELD OFFICE
FY19	P-875	WATER RECLAMATION FAC	FY21	MC1566-T	MAINTENANCE HANGAR (HMH)	2016	MC164T	STATION/VISTING AC APRON & SUPPORT
FY19	P-879	ORDNANACE STORAGE MAGAZINE	FY21	MC1563-T	MAINTENANCE HANGAR (VMM1)	2016	MC948T	AIRFIELD FIRE TRAINING FACILITY PH2
FY19	P-911	BACHELOR ENLISTED QUARTERS PH II	FY24	MC1530-T	RUNWAY	2016	MC194T	JP5 FUEL STORAGE
FY19	P-913	MAG-24 ARMORY EXPANSION	FY24	MC1531-T	TAXIWAY	2016	MC908T	HAZADOUS CARGO LOADING AREA
FY20	P-916	MV-22/HMLA WAREHOUSE	FY24	MC1551-T	AIRFIELD PARKING APRON	2016	MC0135	STATION AIRCRAFT MAINT HANAGER
FY20	P-926	MALS ORDNANCE STORAGE	FY25	MC1562-T	CORROSION CONTROL HANGAR	2016	MC263T	CVW-5 MAINTENANCE TEST AREA
FY20	P-948	MALS-24 MAINTENANCE FACILITY	FY25	MC1564-T	MAINTENANCE HANGAR (VMM2)	2016	MC936T	STATION AIR CARGO TERMINAL
FY21	P-882	RUNWAY CLEAR ZONE AIRFIELD IMPRV	FY25	MC1565-T	MAINTENANCE HANGAR (HMLA)	2017	MC320T	FLIGHT LINE PERIMETER FENCING
FY21	P-928	PTA AMMUNITION STORAGE	FY25	MC1567-T	MAINTENANCE HANGAR (FRC WP/MALS)	**GUAM - ANDERSON AB (DPRI)**		
FY21	P-876	AIRFIELD SECURITY FENCING & UPGRADE	FY25	MC1568-T	MAINTENANCE HANGAR (OSA)	2014	J-200	AAFB NR UTILITIES PH II
FY21	P-836	MAG-24 HQ AND PARKING BUILDING	**IWAKUNI**			2014	P-109	AIRCRAFT HANGAR #1
FY21	P-912	BACHELOR ENLISTED QUARTERS PH III	FY14	P-945	TYPE III HYDRANT FUELING STYEM (DESC)	2015	P-230	GSE SHOPS
FY25	P-883	RUNWAY UNDERPASS	FY17	P-994	ALT TRUCK FUEL RECEIPT SYSTEM (DESC)	2015	P-240	MWSS FACILITIES
FY25	P-915	MCCS SELF STORAGE	FY18	P-1006	KC130J ENLISTED AIR CREW TRAINER	2019	P-601	AIRCRAFT HANGAR #2
OKINAWA MCAS FUTENMA			FY19	P-XXX	F-35 MAINT TRAINER	2019	P-250	MALS FACILITIES
FY15	P-213	HANGAR & RINSE FAC MODERNIZATION	FY19	P-1005	VTOL PAD – SOUTH	2019	P-260	CORR CONTROL HANGAR
FY19	P-202	GATE 1 UPGRADE	FY19	P-1000	ACFT MAINT HANGAR IMPROVEMENTS, S.	2019	P-270	ACE GYM & DINING
FY19	P-205	AIRCRAFT RUNWAY OVERRUN	FY19	P-993	PROVIDE T-5 CAPABLE PIER (DESC)	2019	P-295	ORDNANCE OPS
FY19	P-214	JP-5 FUEL TRUCK OFF-LOAD SYSTEM (DLA)	FY18	P-992	BULK FUEL STRG TANKS-PACOM (DESC)	2019	P-280	AIR OPS BLDG
			FY20	P-1001	ACFT MAINT HANGAR IMPROVEMENTS, N.	2022	P-290	EARTH MAG

4.3 AVIATION TRAINING SYSTEMS ROADMAP



MARINE AVIATION DISTRIBUTED VIRTUAL TRAINING ENVIRONMENT (ADVTE)

Networked Training

Networked training began with the execution of the MCASMP and is a growing part of T&R execution across several plaforms which directly contibutes to Aircrew Combat Readiness and Flight Leadership Development. MATSS incorporate Network Exercise Command Center (NECC) hubs, which are linked to other MATSS, MEF battle simulation centers, and to the Joint National Training Capability (JNTC) through nationwide network infrastructure. These NECCs are currently used to develop, plan, rehearse, execute , and review scenario-based network training event s for local and distributed aviation and limited integrated ground training. Future upgrades and modifications will target wider intra- and inter-service joint exercise distributed training.

Live/Virtual/Constructive (LVC) Goals

High-fidelity networked simulators incorporated with instrumented and embedded training systems support individual and collective T&R and LVC training yielding:

- Increased Core Skill, Mission Skill, Core Plus Skill and Mission Proficiency.
- Systems training capability for multi-ship, multi-type, multi-community in support of small scale distributed mission training to Large Scale Exercises (LSE).
- Improved flight safety through expanded CRM opportunities.

ADVTE & NECC ROADMAP

Common Integrated Products Team Lead: Kent Campbell PH: 407 380-4237 e-mail: kent.compbell@navy.mil

Location					FY15				FY16				FY17				FY18				FY19				FY20				FY21				FY22				FY23				FY24				FY25			
T/M/S	Type Sim	COG Name	ADVTE	Last Tech Ref Date	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
ADVTE CONNECTIVITY (WIDE AREA NETWORK)																																															
Cherry Pt/New River	LAN/WAN		2013	N/A																																												
Miramar/Pendleton	LAN/WAN		2013	N/A																																												
Yuma/Beaufort	LAN/WAN		2013	N/A																																												
BSC, MCAS Camp Pend	WAN		2017	N/A																																												
Fort Worth	LAN/WAN		2Q2020	N/A					NOTE 1, 2												NOTE 3																												
MDL	LAN/WAN		2Q2020	N/A					NOTE 1, 2												NOTE 3																												
Norfolk LAN/WAN	LAN/WAN		1Q2021	N/A					NOTE 1, 2												NOTE 3																												
Bell Chase	LAN/WAN		4Q2020	N/A					NOTE 1, 2												NOTE 3																												
Kaneohe Bay	LAN/WAN		1Q2020	N/A																	NOTE 3																												
Okinawa	LAN/WAN		2Q2020	N/A																	NOTE 3																												
Iwakuni	LAN/WAN		2Q2020	N/A																	NOTE 3																												
MCAS NEW RIVER																																															
NECC[1]	2H157-4		2013	N/A																																												
MCAS CHERRY POINT																																															
NECC[2]	2H157-1		2013	N/A																																												
MCAS MIRAMAR																																															
NECC[2]	2H157-2		2013	N/A																																												
MCAS CAMP PENDLETON																																															
NECC[1]	2H157-3		2013	N/A																																												
MCAS BEAUFORT																																															
NECC[3]	2H157-6		2013	N/A																																												
MCAS YUMA																																															
NECC[3]	2H157-5		2013	N/A																																												
1st MAW																																															
NECC (Iwa)	TBD		2Q2020	N/A																	NOTE 3																												
NECC (Fut)	TBD		3Q2020	N/A																	NOTE 3																												
NECC (KBay)	TBD		1Q2020	N/A																	NOTE 3																												
4th MAW																																															
NECC (FtW)	TBD		2Q2020	N/A					NOTE 1, 2												NOTE 3																												
NECC (BelleC)	TBD		4Q2020	N/A					NOTE 1, 2												NOTE 3																												
NECC (MDL)	TBD		3Q2020	N/A					NOTE 1, 2												NOTE 3																												
NECC (Norf)	TBD		1Q2021	N/A					NOTE 1, 2												NOTE 3																												

Roadmap Legend

- **Trainer Operational**
- **New Build**
- **Trainer Down for Mod/Upgrade**
- **Planned Device Disposal**
- **Trainer Relocation**

NOTE 1: Devices require NGREA funding and Office of Marine Forces Reserve Approval
NOTE 2: Procurement of this system is Predecisional/Unfunded. Schedule is notional
NOTE 3: Notional Fielding or "Go-Live" Date

MARINE COMMON AIRCREW TRAINER (MCAT) ROADMAP

APMTS: Kent Campbell PH: 407-380-4237 e-mail: kent.campbell@navy.mil

T/M/S	Type Sim	COG Name	ADVTE	Last Tech Ref Date	FY15				FY16				FY17				FY18				FY19				FY20				FY21				FY22				FY23				FY24				FY25			
					1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
NEW RIVER																																															
CH-53/CH-46	MCAT-P1*	2H160A	Feb-17	N/A																																											
CH-53/MV-22/UH-1Y	MCAT (CFTD)	2H166A-1	1Q19	N/A													Nov																															
MIRAMAR																																															
CH-53/MV-22/UH-1Y	MCAT-P2*	2H160B	Apr-14	N/A																																											
CH-53/MV-22/UH-1Y	MCAT (CFTD)	2H166A-3	2Q20	N/A																					Feb																						
PENDLETON																																															
CH-53/MV-22/UH-1Y	MCAT (FTD)	2H166B-1	2Q19	N/A																	Feb																										
KANEOHE BAY																																															
CH-53/MV-22/UH-1Y	MCAT (CFTD)	2H166A-2	3Q19	N/A																	Jun																										
FUTENMA (FRF)																																															
CH-53/MV-22/UH-1Y	MCAT (FTD)	2H166B-2	1Q20	N/A																	Oct																										
McGuire (4th MAW)																																															
CH-53/MV-22/UH-1Y	MCAT (CFTD)	2H166A-5	TBD	N/A	NOTE 1&2																																									
Norlfolk (4th MAW)																																															
CH-53/MV-22/UH-1Y	MCAT (CFTD)	2H166A-6	TBD	N/A	NOTE 1&3																																									

Roadmap Legend

- Trainer Operational
- New Build
- Trainer Down for Mod/Upgrade
- Planned Device Disposal
- Trainer Relocation

*: MCAT-P1/2 are demonstrator/prototype/proof of concept training devices

NOTE 1: Devices require NGREA funding and Office of Marine Forces Reserve Approval

NOTE 2: Approximately 3Q20

NOTE 3: Approximately 4Q20

UAS RQ-7 INTEGRATED/UNIVERSAL MISSION SIMULATOR ROADMAP

Assistant Program Manager, Training Systems: Don Sheehan PH: 301-757-0421 e-mail: donald.sheehan@navy.mil

T/M/S	Type Sim	COG Name	Db	TEn	Last Tech Ref Date	IA Cert	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25
							1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
KANEOHE BAY																	
RQ-7B	IMS (#3)	2F217			N/A	02-14											
RQ-7B v2	UMS (#3)	2F240		TBD	N/A	TBD											
RQ-7B v2	UMS (#4)	2F240		TBD	N/A	TBD											
29 PALMS																	
RQ-7B	IMS (#1)	2F217			N/A	02-14											
RQ-7B v2	UMS (#1)	2F240		TBD	N/A	TBD			Transfer/move to MCAS Yuma								
RQ-7B v2	UMS (#2)	2F240		TBD	N/A	TBD			Transfer/move to MCAS Yuma								
CHERRY POINT																	
RQ-7B	IMS (#2)	2F217			N/A	02-14											
RQ-7B v2	UMS (#5)	2F240		TBD	N/A	TBD			TBD								
PENDLETON																	
RQ-7B	IMS (#5)	2F217			N/A	02-14											
RQ-7B v2	UMS (#6)	2F240		TBD	N/A	TBD			TBD								
YUMA																	
RQ-7B v2	UMS (#1)	2F240		TBD	N/A	TBD											
RQ-7B v2	UMS (#2)	2F240		TBD	N/A	TBD											

New Build
Trainer Down for Mod/Upgrade
Planned Device Disposal
Trainer Relocation

VH AIRCREW TRAINING SYSTEMS ROADMAP

Training Integrated Products Team Lead: Robert Peterson PH: 301-757- 8956 e-mail: rob.peterson@navy.mil

T/M/S	Type Sim	COG Name	Db	TEn	Last Tech Ref Date	IA Cert	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25
							1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
QUANTICO																	
VH-3D	APT	2F180	ESUSA V1.2	v4.0	12-Aug	12-Sep						Note 1					
VH-60N	CFTD	2F233	ESUSA V1.2	v5.0	NA	TBD								Note 1			
VH-92A	FTD	TBD	TBD	TBD	NA	TBD											

Roadmap Legend

Trainer Operational
New Build
Trainer Down for Mod/Upgrade
Planned Device Disposal
Trainer Relocation

Note 1: Trainer Disposals are pre-decisional

MV-22 AIRCREW TRAINING SYSTEMS ROADMAP

Integrated Products Team Lead: Mary Beth Rodriguez PH: (301) 757-8158 e-mail: mary.b.rodriguez1@navy.mil

T/M/S	Type Sim	COG Name	Db	TEn	Last Tech Ref Date	IA Cert	FY15				FY16				FY17				FY18				FY19				FY20				FY21				FY22				FY23				FY24				FY25			
							1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
NEW RIVER																																																
MV-22	FFS-1	2F182	NPSI, Note 1	v6.0	2016	2016																																											
MV-22	FFS-2	2F182	NPSI, Note 1	v6.0	2016	2016																																											
MV-22	FFS-3	2F182	NPSI, Note 1	v6.0	2016	2016																																											
MV-22	FTD-1	2F183	NPSI, Note 1	v6.0	2016	2016																																											
MV-22	CFTD-1	2F200	NPSI, Note 1	v6.0	2015	2016																																											
MV-22	CFTD-6	2F200	NPSI, Note 1	v6.0	2015	2016																																											
MV-22	ICLE	2F212	N/A	N/A	2015	-																																										
MV-22	CMS PTT-1	2C81	N/A	N/A	2015	-																																										
MIRAMAR																																																
MV-22	CFTD-2	2F200	NPSI, Note 1	v6.0	2015	2016																																											
MV-22	CFTD-3	2F200	NPSI, Note 1	v6.0	2015	2016																																											
MV-22	CFTD-4	2F200	NPSI, Note 1	v6.0	2015	2016																																											
MV-22	CFTD-5	2F200	NPSI, Note 1	v6.0	2015	2016																																											
MV-22	CMS PTT-2	2C81	N/A	N/A	2015	-																																										
FUTENMA																																																
MV-22	CFTD-7	2F200	NPSI, Note 2	v6.0	New	2016																																											
MV-22	CFTD-8	2F200	NPSI, Note 2	v6.0	New	2016																																											
QUANTICO/HMX-1																																																
MV-22	CFTD-9	2F200	NPSI, Note 3	v6.0	New	2016																																											
MV-22	CFTD-10	2F200	NPSI, Note 3	v6.0	New	2016																																											
CAMP PENDLETON																																																
MV-22	CFTD-11	2F200	NPSI, Note 3	v6.0	New	2016	Jan																																										
MV-22	CFTD-12	2F200	NPSI, Note 3	v6.0	New	2016		Apr																																									
KANEOHE BAY																																																
MV-22	CFTD-13	2F200	NPSI, Note 3	v6.0								Apr																																					
MV-22	CFTD-14	2F200	NPSI, Note 3	v6.0								Jun																																					
4TH MAW (NORFOLK)																																																
MV-22	CFTD-15	2F200	NPSI, Note 3,4												Oct																																	
MV-22	CFTD-16	2F200	NPSI, Note 3,4												Dec																																	

Roadmap Legend

- Trainer Operational
- New Build
- Trainer Down for Mod/Upgrade
- Planned Device Disposal
- Trainer Relocation

***Notes* (These databases include:)**

- Note 1: East Coast, West Coast, Bridgeport Summer/Winter, Iraq, Afghanistan
- Note 2: Note 1 plus WestPac
- Note 3: Note 2 plus Wash DC, Hawaii
- Note 4: NGREA funded

CH-53E AIRCREW TRAINING SYSTEMS ROADMAP

Assistant Program Manager, Training Systems: Mark Elliott PH: 301-342-6688 e-mail: Mark.Elliott@navy.mil

T/M/S	Type Sim	COG Name	Db	TEn	Last Tech Ref Date	IA Cert	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25
							1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
NEW RIVER																	
CH-53E	WST	2F174-1	Aechelon	v5.0	2008	Mar 12											
CH-53E	APT	2F190-1	Aechelon	v5.0	2010	Nov 11											
CH-53E	EAET/AET	2H164-1	Aechelon	v5.0	NA	TBD											
FUTENMA																	
CH-53E	APT	2F171	Aechelon	TBD	2009	TBD											
CH-53E	CFTD	2F246	TBD	TBD	New Build	TBD											
MIRAMAR																	
CH-53E	WST	2F174-2	Aechelon	v5.0	2009	Oct 11											
CH-53E	APT	2F190-2	Aechelon	v5.0	2011	Nov 11											
CH-53E	EAET/AET	2H164-2	Aechelon	v5.0	NA	TBD											
KANEOHE BAY																	
CH-53E	CFTD	2F220	Aechelon	v5.0	2012	TBD											
CH-53E	EAET	2H164-3	Aechelon	v5.0	NA	TBD											
JB MCGUIRE-DIX-LAKEHURST																	
CH-53E	FTD	2F239	Aechelon	v5.0	NA	TBD											

CH-53K AIRCREW TRAINING SYSTEMS ROADMAP

Assistant Program Manager, Training Systems: Mark Elliott PH: 301 342-6688 e-mail: Mark.Elliott@navy.mil

T/M/S	TYPE SIM	COG Name	Db	TEn	Last Tech Ref Date	IA Cert	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25
							1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
NEW RIVER																	
CH-53K	CFTD #1	2F243	Aechelon	v5.x													
CH-53K	CFTD #2																
CH-53K	AMSPTT																
CH-53K	CLT #1																
CH-53K	CFTD #3																
CH-53K	FTD #4																
CH-53K	FTD #5																
KANEOHE BAY																	
CH-53K	CFTD #6																
CH-53K	CLT #2																
MIRAMAR																	
CH-53K	CFTD #7																
CH-53K	CFTD #8																
CH-53K	CFTD #9																
CH-53K	CFTD #10																
CH-53K	CLT #3																
JB MCGUIRE-DIX-LAKEHURST																	
CH-53K	CFTD #11																

Roadmap Legend

- **Trainer Operational**
- **New Build**
- **Trainer Down for Mod/Upgrade**
- **Planned Device Disposal**
- **Trainer Relocation**

H-1 AIRCREW TRAINING SYSTEMS ROADMAP

Training Integrated Products Team Lead: Mark Eagles PH: 301-995-3716 e-mail: mark.eagles@navy.mil

T/M/S	Type Sim	COG Name	Db	TEn	Last Tech Ref Date	IA Cert	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25
							1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
KANEOHE BAY																	
AH-1W	APT	2F170 S/N 3	NPSI Note-2	v4.0	Jan 2012	In Work											
UH-1Y	FTD	2F196B S/N 3	NPSI Note-2	v4.0	New (Lot 3)	2014											
AH-1Z	FTD	2F227 S/N 1	NPSI Note-2	v4.0	New (Lot 4)	2017											
CAMP PENDLETON																	
AH-1W	APT	2F170 S/N 1	Ft. Rucker Note-3	v4.0	Feb 2012	In Work	→	Note 5									
AH-1W	WST	2F136A S/N 2	PSI/NPSI Note-1	v4.0	Oct 2005	Aug 2011											
AH-1Z	FTD	2F197 S/N 1	NPSI Note-2	v4.0	New	Nov 2011											
AH-1Z	FFS	2F215 S/N 1	NPSI Note-2	v4.0	New	Nov 2011											
UH-1Y	FFS	2F206 S/N 1	NPSI Note-2	v4.0	New	2014											
UH-1Y	FTD	2F196B S/N 2	NPSI Note-2	v4.0	Lot 3	2014											
UH-1Y	CPT	2C84 S/N 1	N/A	N/A	New	Sep 2011											
AH-1Z	CPT	2C83 S/N 1	N/A	N/A	New	Sep 2011											
UH-1Y	CPT	11H184	N/A	N/A	New	Sep 2011											
AH-1Z	CPT	11H185	N/A	N/A	New	Sep 2011											
NEW RIVER																	
AH-1W	WST	2F136A S/N 1	PSI/NPSI Note-1	v4.0	Oct 2005	May 2010											
UH-1Y	FTD	2F196 S/N 1	NPSI Note-2	v4.0	New	Mar 2012											
AH-1Z	FTD	2F197B S/N 2	NPSI Note-2	v4.0	Lot 3	2016											
UH-1Y	FTD	2F226 S/N 1	NPSI Note-2	v4.0	Lot 4	2017											
AH-1Z	FTD	2F227 S/N 2	NPSI Note-2	v4.0	Lot 5	2019											
ROBINS AFB																	
AH-1W	APT	2F170 S/N 2	NPSI Note-2, 6	v4.0	Aug 2012	Dec 2012		→	Note 6								
BELLE CHASSE																	
AH-1W	APT	2F170 S/N 2	NPSI Note-2, 6	v4.0	Aug 2012	Dec 2012		Note 6 →									
UH-1Y	FTD	2F226 S/N 2	NPSI Note-2	v4.0	Lot 4	2017											
AH-1Z	FTD	2F227 S/N 4	NPSI Note-2	v4.0	Lot 5												
MCGUIRE																	
AH-1W	APT	2F170 S/N 1	NPSI Note-2, 5	v4.0	Feb 2012	In Work	Note 5 →										
UH-1Y	FTD	2F196B S/N 4	NPSI Note-2	v4.0	Lot 4	2017											
AH-1Z	FTD	2F227 S/N 3	NPSI Note-2	v4.0	Lot 5	2019											

Roadmap Legend

- Trainer Operational
- New Build
- Trainer Down for Mod/Upgrade
- Planned Device Disposal
- → Trainer Relocation
- Proposed/Unfunded

Note 1: VITAL-9 Image Generator (IG) with areas: EC, WC, NY, Bridgeport,Okinawa, Mediterranean. Panama, & Norway

Note 2: VITAL-X IG with gamng areas : NPSI (EC, WC, Bridgeport, Iraq, Afghanistan)

Note 3: Aechelon IG with gaming areas: NPSI (EC, WC, WestPac, Iraq, Afghanistan, Southeast Asia, and Horn of Africa

Note 4: Aechelon IG with gaming areas: NPSI (EC, WC, WestPac, Iraq, Afghanistan)

Note 5: Trnr Move to JRB MDL

Note 6: Device move to New Orleans - unfunded move for MARFORRES, O&M/NR

KC-130 AIRCREW TRAINING SYSTEMS ROADMAP

Assistant Program Manager, Training Systems: MGySgt E.J. Hammerquist PH: 301-757-8742 e-mail: eric.hammerquist@navy.mil

T/M/S	Type Sim	COG Name	Db	TEn	Last Tech Ref Date	IA Cert	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25
							1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
CHERRY POINT																	
KC-130J	WST	2F199-1	NPSI Note-1	v6.0	MAY 14				Note 5		Note 6						
KC-130J	HH PTT+	2A85-1	Afghanistan	N/A													
KC-130J	CPT	2C87	Note-7	N/A													
KC-130J	FuT	2A88	Note-2,4,7	N/A													
KC-130J	OBST	TBD	Note-2,7	N/A													
MIRAMAR																	
KC-130J	WST	2F199-2	NPSI Note-1	v6.0	DEC 15		Note 6			Note 5		Note 6					
KC-130J	HH PTT+	2A85-2	Afghanistan	N/A													
KC-130J	CPT	2C87	Note-7,8	N/A													
KC-130J	FuT	2A88	Note-2,4,7	N/A													
KC-130J	OBST	TBD	Note-2, 7, 8	N/A													
FUTENMA/IWAKUNI																	
KC-130J	WST	2F199-3	NPSI Note-1,3	v6.0	DEC 17		Note 3	→	Note 5,6					Note 6			
KC-130J	CPT	2C87	N/A	N/A													
KC-130J	FuT	2A88	Note-2,4,7	N/A													
KC-130J	OBST	TBD	Note-2,7	N/A													
FT WORTH (KC-130T/KC-130J)																	
C-130T	OFT (USN)	2F107-1	NPSI Note-1	v2.4	DEC 14					Note 6							
C-130T	CPT (USN)	2F107A	NPSI Note-1	N/A													
KC-130T	APT	2F176	NPSI Note-1	v2.1	SEP 12					Note 6							
KC-130J	WST	2F199-4	NPSI Note-1	v6.0					Note 9						Note 6		
KC-130J	CPT	2C87	Note-7,8	N/A													
KC-130J	FuT	2A88	Note-2,4,7	N/A													
KC-130J	OBST	TBD	Note-7,8	TBD													
STEWART ANGB (KC-130T/KC-130J)																	
KC-130J	WST	2F199-5	NPSI, Note 1,4	TBD													
KC-130J	CPT	2C87	Note-7,8	N/A													
KC-130J	FuT	2A88	Note-2,4,7	N/A													
KC-130J	OBST	TBD	Note-2,7	TBD													
MDL (KC-130T)																	
C-130T	OFT (USN)	2F152	NPSI Note-1,10	N/A					→	Note 10						Note 6	

Roadmap Legend

- Trainer Operational
- New Build
- Trainer Down for Mod/Upgrade
- Planned Device Disposal
- Trainer Relocation

***Notes* (These databases include:)**

1 - East & West Coasts, Bridgeport, Afghanistan and Iraq
2 -This Trainer can perform in Standalone or connected to WST for full CRM Training
3 - Move from Okinawa to Iwakuni
4 - New Building needed for this Trainer
5 - LAIRCM Upgrade in WST
6 - Technology Refresh
7 - This Trainer will go into FuT building
8 - This Trainer will be in temp loction until FuT building is complete
9 - Ready For Training Oct 2017
10 - Move from MDL to Ft Worth, perform Tech Refresh and upgrade with AOU Suite

EA-6B AIRCREW TRAINING SYSTEMS ROADMAP

Assistant Program Manager, Training Systems: MGySgt E.J. Hammerquist PH: 301-757-8742 e-mail: eric.hammerquist@navy.mil

T/M/S	Type Sim	COG Name	Db	TEn	Last Tech Ref Date	IA Cert	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25
							1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
CHERRY POINT																	
EA-6B	TTT	15E43 (I3)		FY13	FY11	FY13		BLK7									
EA-6B	OF/NT	2F143 (I2)		4.0	FY08	TBD											
EA-6B	OF/NT	2F185 (I3)		FY13	FY10	FY13		BLK7									
EA-6B	WST	2F188 (I3)		FY13	FY12	FY14		MR17									
IWAKUNI																	
EA-6B	WST	2F178 (I2)		N/A	FY10	N/A											

Roadmap Legend

- Trainer Operational
- New Build
- Trainer Down for Mod/Upgrade
- Planned Device Disposal
- Trainer Relocation

AV-8B AIRCREW TRAINING SYSTEMS ROADMAP

Assistant Program Manager, Training Systems: Brian Trago PH: 407-380-4719 e-mail: brian.trago@navy.mil

T/M/S	Type Sim	COG Name	Db	TEn	Last Tech Ref Date	IA Cert	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25
							1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
CHERRY POINT																	
AV-8B	WST	2F150F-1	NPSI Note-1	Rev 5.0.1C	Jun-10	Mar-12											
AV-8B	WST	2F150F-2	NPSI Note-1	Rev 5.0.1C	Aug-12	Mar-12										Notional	
AV-8B	WST	2F150F-4	NPSI Note-1	Rev 5.0.1C	Mar-11	Mar-12											
AV-8B	MTT	15A23	Device unique	No	Jun-05	No											
AV-8B	DMRT (6)	TBD	TBD	TBD	N/A	FY18											
YUMA																	
AV-8B	WST	2F150F-3	NPSI Note-1	Rev 5.0.1C	Dec-10	Feb-12								Notional			
AV-8B	WST	2F150F-5	NPSI Note-1	Rev 5.0.1C	Dec 09	Feb-12								Notional			
AV-8B	MTT	15A23	Device unique	No	Jun-05	No											
AV-8B	DMRT (2)	TBD	TBD	TBD	N/A	FY18											

Roadmap Legend

- Trainer Operational
- New Build
- Trainer Down for Mod/Upgrade
- Planned Device Disposal
- Trainer Relocation

Visual Database Notes:

Note 1: Q3D IG, NPSI-compliant Vis DB, gaming areas - NPSI (EC-CONUS, WC-CONUS)

USMC F/A-18 C-D AIRCREW TRAINING SYSTEMS ROADMAP

Assistant Program Manager, Training Systems: Tim McDonald PH: 301-757-7333 e-mail: timothy.mcdonald@navy.mil

T/M/S	Type Sim	COG Name	Db	TEn	Last Tech Ref Date	IA Cert	FY15				FY16				FY17				FY18				FY19				FY20				FY21				FY22				FY23				FY24				FY25			
							1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
IWAKUNI																																																
F/A-18C	TOFT #16	2F193A		NASMP v1.4														Note 1																															
F/A-18D	TOFT #37	2F193B		NASMP v1.4														Note 1																															
F/A-18C	TOFT #25	2F193A		NASMP v1.4				NAS Lemoore										Note 1																															
MIRAMAR																																																
F/A-18D	TOFT #30	2F193B		NASMP v1.4																																											
F/A-18D	TOFT #31	2F193B		NASMP v1.4																																											
F/A-18C	TOFT #32	2F193A		NASMP v1.4																																											
F/A-18C	TOFT #33	2F193A		NASMP v1.4																																											
F/A-18C	TOFT #35	2F193A		NASMP v1.4																																											
F/A-18C	TOFT #38	2F193A		NASMP v1.4																																											
BEAUFORT																																																
F/A-18C	TOFT #28	2F193A		NASMP v1.4												Note 2																															
F/A-18D	TOFT #34	2F193B		NASMP v1.4																																											
F/A-18D	TOFT #36	2F193B		NASMP v1.4																																											
F/A-18C	TOFT #40	2F193A		NASMP v1.4																																											
FT WORTH																																															
F/A-18C	TOFT #43	2F193A		NASMP v1.4																																											
F/A-18C	TOFT #XX	XXXXX		NASMP v1.4				Note 3																																							

Roadmap Legend

- Trainer Operational
- New Build
- Upgrades
- Planned Device Disposal
- Move/Relocation

Note 1: New Facility Schedule in flux, driving timing of move. Effort is funded and will occur ICW Technology Refresh

Note 2: SAN DISK Hardware upgrades will be installed at Beufort, Miramar and Iwakuni in late FY16-early FY17

Note 3: Trainer move and MILCON funds need to be identified

F-35 AIRCREW TRAINING SYSTEMS ROADMAP

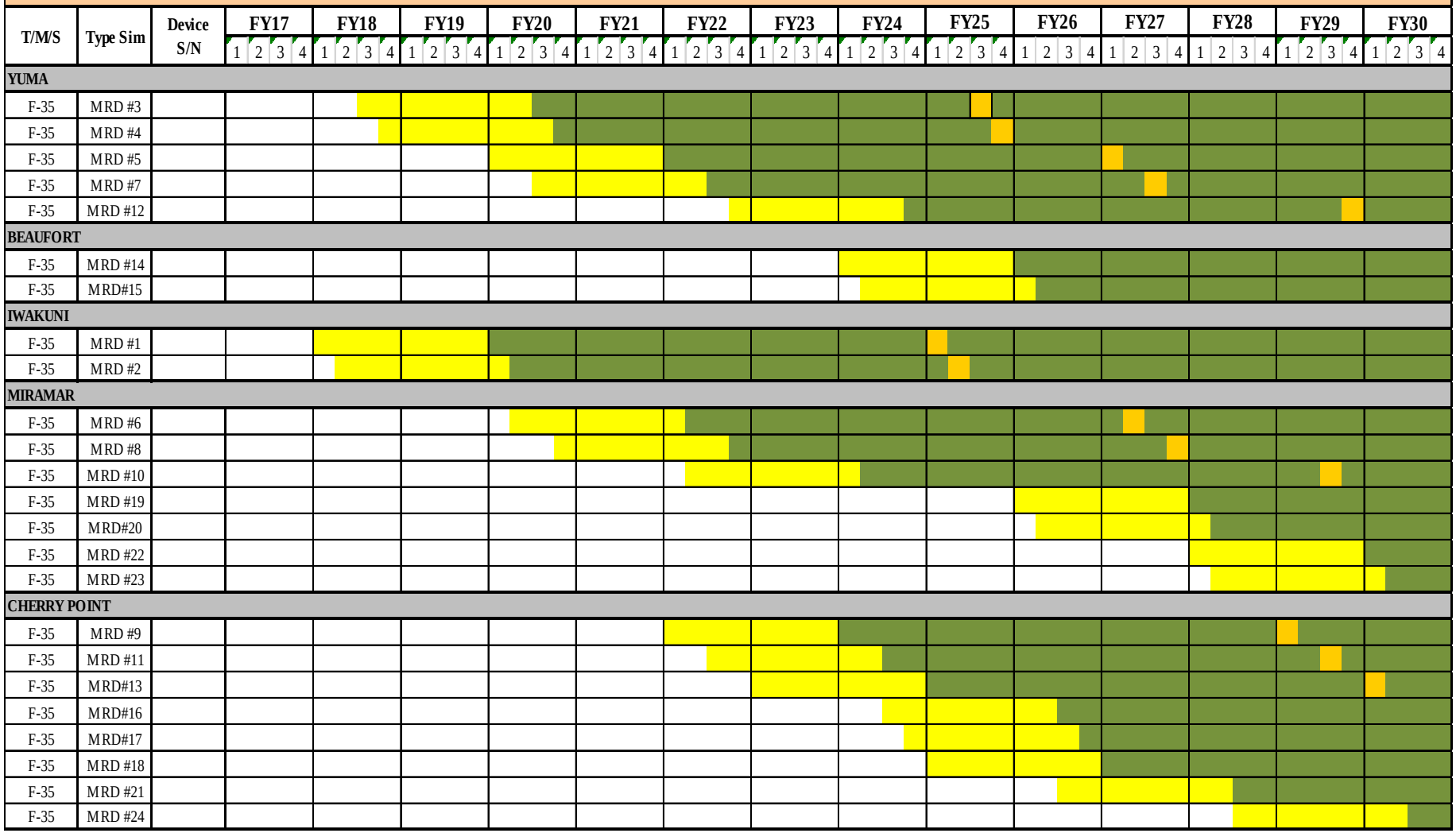
HQMC Aviation F-35 Training Lead: WgCdr Nicolas Hindley PH: (571) 256-4362 email: nicolas.hindley.uk@usmc.mil

T/M/S	Type Sim	Device S/N	FY15				FY16				FY17				FY18				FY19				FY20				FY21				FY22				FY23				FY24				FY25			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
YUMA																																													
F-35	FMS#1																																												
F-35	FMS#2																																												
F-35	FMS#3																																												
F-35	FMS#4																																												
F-35	FMS#5																																												
F-35	FMS#6																																												
BEAUFORT																																												
F-35	FMS#1																																												
F-35	FMS#2																																												
F-35	FMS#3																																												
F-35	FMS#4																																												
F-35	FMS#5																																												
F-35	FMS#6																																												
F-35	FMS#7																																												
F-35	FMS#8																																												
IWAKUNI																																												
F-35	FMS#1																																												
F-35	FMS#2																																												
F-35	FMS#3																																												
F-35	FMS#4																																												
MIRAMAR																																												
F-35	FMS#1																																												
F-35	FMS#2																																												
F-35	FMS#3																																												
F-35	FMS#4																																												
F-35	FMS#5																																												
F-35	FMS#6																																												
CHERRY POINT																																												
F-35	FMS#1																																												
F-35	FMS#2																																												
F-35	FMS#3																																												
F-35	FMS#4																																												
F-35	FMS#5																																												
F-35	FMS#6																																												
EDWARDS																																												
F-35	DMRT																																												

Roadmap Legend

- Trainer Operational
- New Build
- Trainer Down for Mod/Upgrade
- Planned Device Disposal
- Trainer Relocation

F-35 AIRCREW MISSION REHEARSAL DEVICE (MRD) TRAINING SYSTEMS ROADMAP



Roadmap Legend

- Trainer Operational
- New Build
- Trainer Down for Mod/Upgrade
- Planned Device Disposal
- Trainer Relocation

Marine Aviation Virtual Warfighting Center (MAVWC)

T/M/S	Type Sim	Device S/N	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
			1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
TACAIR																
F-35	FMS #1															
F-35	FMS #2															
F-35	FMS #3															
F-35	FMS #4															
F-35	FMS #5															
F-35	FMS #6															
F-35	FMS #7															
F-35	FMS #8															
F/A-18C	TOFT															
F/A-18C	TOFT															
F/A-18D Note 1	TOFT															
F/A-18D Note 1	TOFT															
AV-8B Note 2	WST													Notional		
AV-8B Note 2	WST													Notional		
ASSAULT SUPPORT																
KC-130J	WST															
MV-22	FTD #1															
MV-22	FTD #2															
MV-22	FTD #3															
MV-22	FTD #4															
MV-22	FTD #5															
MV-22	FTD #6															
CH-53E	FTD #1												Notional			
CH-53E	FTD #2												Notional			
CH-53K	FTD #1															
CH-53K	FTD #2															
CH-53K Note 3	FTD #3															
CH-53K Note 3	FTD #4															
UH-1Y	FTD #1															
UH-1Y	FTD #2															
UH-1Y	FTD #3															
UH-1Y	FTD #4															
AH-1Z	FTD #1															
AH-1Z	FTD #2															
AH-1Z	FTD #3															
AH-1Z	FTD #4															

Roadmap Legend

- **Trainer Operational**
- **New Build**
- **Trainer Down for Mod/Upgrade**
- **Planned Device Disposal**
- **Trainer Relocation**

Notes

1 = F/A-18D TOFT Front and Rear Cockpit Device

2 = Utilize existing devices/Storage and relocation

3 = "K" devices to replace "E" devices

Marine Aviation Virtual Warfighting Center (MAVWC)

T/M/S	Type Sim	Device S/N	FY17				FY18				FY19				FY20				FY21				FY22				FY23				FY24				FY25				FY26				FY27				FY28				FY29				FY30			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
EXPEDITIONARY ENABLERS																																																										
SAVT #1	Dome																																																									
SAVT #2	Dome																																																								
SAVT #3	Dome																																																								
SAVT #4	Dome																																																								
DASC (11/1/1)	Multi-Station																																																							
TACC (21/1/1)	Multi-Station																																																							
TAOC (17/1/1)	Multi-Station																																																							
ATC (7/2/1)	Multi-Station																																																							
LAAD/SHORAD	Dome																																																							
JFACC (15/1/1)	Multi-Station																																																							
MQ-21 A2	UMS																																																							
MQ-21 A2	UMS																																																							
UAS Gen-5 A1	UMS																																																						
UAS Gen-5 A2	UMS																																																						
OTHER																																																								
H/H FCO A1	Fire Control																																																							
KC-130J AD/AR	ObsT																																																							
RED AIR #1 Note 5	Desktop																																																						
RED AIR #2 Note 5	Desktop																																																						
RED AIR #3 Note 5	Desktop																																																						
RED AIR #4 Note 5	Desktop																																																						
RED AIR #5 Note 5	Desktop																																																						
RED AIR #6 Note 5	Desktop																																																						
RED AIR #7 Note 5	Desktop																																																						
RED AIR #8 Note 5	Desktop																																																						
NECC-1 Note 6	Controller																																																							
NECC-2 Note 6	Controller																																																							
NECC-3 Note 6	Controller																																																							
NECC-4 Note 6	Controller																																																							
NECC SAS Note 7	Controller																																																							
Red Cell (10/1/1) Note 8	Multi-Station																																																							
White Cell (10/1/1) Note 8	Multi-Station																																																							

Roadmap Legend

Trainer Operational

New Build

Trainer Down for Mod/Upgrade

Planned Device Disposal

Trainer Relocation

Notes

4 = Expeditionary Enabler device show (15/1/1) which is the Number of Agency Seats/Supervisor/Instructor Operating Station

5 = Reconfigurable entity model to represent threat aircraft

6 = Multiple NECCs required for numerous federations of device with other simulators/sites

7 = System Admin Station (SAS). Used to control NECCs.

8 = Exercise and threat control stations to dynamically challenge simulators/simulations

Marine Aviation Plan 2017 link