EAGLE ONE

November 24, 2002 **MARINE AVIATION WEAPONS AND TACTICS SQUADRON ONE** Issue 5

WEAPONS AND TACTICS INSTRUCTOR COURSE 1-03 LESSONS LEARNED

The intent of the Eagle One Newsletter is to communicate lessons learned from the Weapons and Tactics Instructor course. This newsletter is also published on the MAWTS-1 home page at SIPRNET web site ***http://www.mawts1.usmc.smil.mil***.

SEMPER FI

R. C. FOX

COLONEL, US MARINE CORPS
COMMANDING

TABLE OF CONTENTS

Direct Air Support Center Airborne System DASC(AS) 3
JRE Enhances Situational Awareness 3
M3M .50 Caliber Crew Served Machine Gun Qualitative Assessment 4
Multipurpose Ammunition for the .50 Caliber Machine Gun 5
JSTARS and Attack Helicopter Integration 6
TBFDS/FARP NVD Spot Marking 7
Rapid Bore Sight Procedures M-197 Turret System 8
Implementation of TAWS 3.1.1 and AREPS 2.1 9
AV-8B Forward Operating Bases (FOB) Hot Load 10
AV-8B LITENING II Video Transmission 11
Tactical Exploitation Group (TEG) 11

ADT&E ISSUES
Aviation Multipurpose Training System (AMTS) 13
Aircraft Survivability Equipment (ASE) 13
AH-1W Air Naval Tactics, Techniques, and Procedures Manual (ANTTP) 14
Joint Mission Planning Systems (JMPS) 14
Joint Datalink Information Combat Execution (JDICE) 14
Limited Warfighting Experiment of the Direct Air Support Center Airborne System DASC(AS) 15
On the Horizon 15
Digital Close Air Support 15
Precision Targeting for CAS 15
IZLID 1000 IR Pointer Qualitative Assessment 16
Krill Lamp Qualitative Assessment 17

This page intentionally left blank

DIRECT AIR SUPPORT CENTER AIRBORNE SYSTEM DASC(AS) INTO THE MACCS
CAPT LEWIS, DASC DIVISION, C3 DEPARTMENT

The DASC(AS) system had undergone initial safety of flight test in Cherry Point before the WTI course and was tested in an operational role for the first time during WTI 1-03. Personnel from MASS-3 and MASS-1 supported the crews with DASC and communication Marines. The shelter has panels to hook up externally to other CDS capable systems such as the ground DASC AN/TSQ 207. The shelter required a 16-foot pallet, which is wider than the Two 8-foot pallets used with the current AN/UYQ-3A system. This required special consideration for transportation on tractor-trailers. The shelter did not have any accommodations for a forklift and a crane had to be used for movement. The production models will be able to be moved by forklift. The number of radios remains the same with three UHF, two HF, and a VHF. The HF radios with the prototype DASC(AS) were VRC-102 and replaced the GRC-193 used in the AN/UYQ 3A. It is uncertain if the VRC-102 will be put in the production version yet. The Communications Distribution System (CDS) used in the ground DASC is also used in the DASC(AS) so the operators are already familiar with how to access radios. Using the CDS increased the usable space inside the shelter as can be seen in the picture.

There is an external port for a User Control Device (UCD) so the technician is able to be on a headset outside of the shelter and they could also affiliate the radios with their laptop. With the addition of a workstation outside the shelter some provisions will be made to accommodate the technician and their gear. The remote control box for the GRC-171 is not compatible with the CDS and the ability of the operators to change frequencies on the UHF radios is lost until a fix is found. For changing a GRC-171 frequency a Marine has to go to the face and change it; whereas, in the AN/UYQ3A the operator could change it from the remote. This caused problems for the technician having to come in and out of the shelter to support the crew. An autonomous position for the technician is being identified as a need to better support the crew. A PSC-5 radio was used for SATCOM and UHF. The hatch mount antenna was used in the C-130. The addition of another radio aided in frequency management. With the addition of another radio the option to dedicate a radio to data becomes more viable. Data to the DASC (AS) needs to be planned for during pre-deployment so a radio could be added to help support the requirement.

MAWTS-1 recommends that the test director publish his report with 35 action items that are being sent to the manufacturer.

JRE ENHANCES SITUATIONAL AWARENESS
CAPT HANSON, TAOC DIVISION, C3 DEPARTMENT

WTI 1-03 afforded the opportunity to interface three Joint Range Extensions (JRE) within the MACCS. JREs are currently being used extensively in contingency operations. The JRE is comprised of Government Furnished Equipment (GFE) and software, Commercial-Off-The-Shelf (COTS) equipment and software, and JRE software applications programs. A pair of JRE systems, one at each end of a JRE data link, serves as a communications bridge between Joint Tactical Information Distribution System (JTIDS) and non-JTIDS Long-haul communications systems. The JRE thus extends the range of Link-16 (TADIL-J) networks beyond the normal Line-Of-Sight (LOS) limitations of the JTIDS and Multi-functional Information Distribution Systems (MIDS) radio terminals. Essentially, the JRE is a router that translates J-series messages into Long-haul protocols (i.e. TCP/IP, SATCOM, or serial line) and sends that information to a receiving JRE where the data is translated back into the J-message format and transmitted via a Class 2M, 2H, or MIDS radio terminal. The messages can also be displayed directly from the JRE for the user by connecting a tactical display system such as a Link Monitoring System-16 (LMS-16) or an Air Defense Systems Integrator (ADSI).

(Continued on page 4)

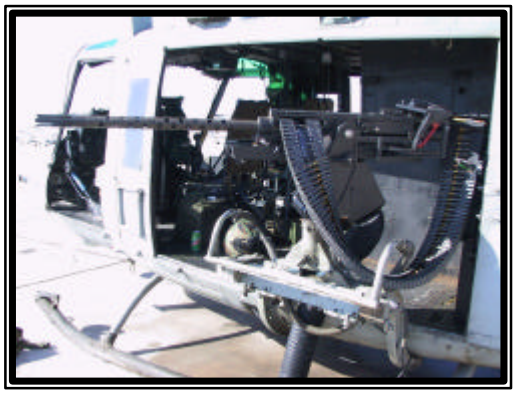
(Continued from page 3)

Employment of three JRE systems during WTI 1-03 was a tremendous asset in helping achieve a recognized air picture (RAP) for the MACCS. One JRE was placed at the Sector Air Defense Facility (SADF), co-located with the TAOC, where input of Link-16 J-series messages were received via a Class 2 terminal and routed via TCP/IP (SIPRNET) and SATCOM to another JRE located at the TACC. TCP/IP and SATCOM were used simultaneously to build redundant data paths from the TAOC to the TACC. The JRE at the TACC would time tag each track and automatically filter any redundant tracks received. The TACC displayed the J-series messages using an LMS-16. This capability provided the TACC with a near-real-time data link picture enhancing overall situational awareness (SA). The third JRE was placed at the CALA fixed-wing flight line to give pilots big picture SA prior to launching, or placed at the DASC to enhance SA in the world of procedural control. A serial line, or TCP/IP was used to connect this JRE to the JRE at the TACC. Although the J-series messages were received at these locations, there were no tactical display systems on-hand and subsequently, little SA to be obtained. From the pilot's perspective at the CALA, a little SA was better than none at all, but as far as the DASC is concerned, for the data link to be any use at all, a tactical display system is a requirement. With J-STARS integrated within the Link-16 architecture, JREs can be employed to provide Moving Target Indicator (MTI) originated ground track data to the DASC. MAWTS-1 recommends that JRE employment provides the capability to ensure Link-16 messages are received and/or forwarded to agencies beyond-line-of-sight, or those not capable of receiving Link-16 by any other means. The WTI training forum demonstrated how to use the Link-16 architecture to accommodate both air and surface tracks, thereby enabling the JRE to enhance SA for all players. SA with regards to deep air operations and time-sensitive-targeting within the DASC is greatly enhanced by displaying Link-16 air/surface tracks using an ADSI.

M3M .50 CALIBER CREW SERVED MACHINE GUN QUALITATIVE ASSESSMENT
MAJ BAGGETT, UH-1N DIVISION, ASSAULT SUPPORT DEPARTMENT
GYSGT HAMMER, CH-53 CREWCHIEF DIVISION, ASSAULT SUPPORT DEPARTMENT

The following is an unclassified executive summary of observations form the M3M .50 caliber crew served machine gun qualitative assessment conducted by MAWTS-1 during WTI 1-03. The final results of this demonstration will be released in an unclassified format.

During WTI 1-03, MAWTS-1 continued assessment of M3M .50 caliber machine gun performance aboard the CH-46E and on the UH-1N Defensive Armament Subsystem (DAS).



The WTI 1-03 Qualitative Assessment (QA) was a continuation of previous QAs, summaries of which may be found in the 1-02 and 2-02 Eagle One newsletters. The focus of this QA was on M3M effectiveness and suitability when employed in an improved port side configuration and a new starboard side configuration on the CH-46E, and system performance in a new UH-1N DAS mount configuration.

CH-46E assessment systems were configured for employment from both the port and starboard side weapon stations and included 600-round ammunition canisters on base plates that mounted to the left of the weapon stations and provided ammunition to the guns via-flexible feed chutes. In response to previous MAWTS-1 recommendations, the port side weapon configuration was modified with an improved link ejection chute, a link collection bag instead of a hard canister, and vertical elevation limits that were increased to +5° above horizontal. The new starboard side mount was similar to the port side, however weighed approximately 80 pounds less (256 pounds for the entire system). Deficiencies noted in the starboard side mount include excessively restrictive field of fire (47° less than those of the XM-218), inefficient ammunition feed that restricted ammunition movement into the weapon, and unsatisfactory casing ejection trajectory at airspeeds greater than 80 knots.

(Continued on page 5)

(Continued from page 4)

UH-1N assessment systems were configured for employment from the port side DAS mount, and included a 600 round ammunition canister that was mounted to the aft wall of the cabin, providing ammunition to the weapon via a flexible feed chute. The interface with the DAS was a modified Medium Pintle Head (MPH) of reduced weight and size. This was the first time that MAWTS-1 assessed the M3M mounted on the DAS. Questionnaire responses indicated that the positioning of the system on the DAS, which placed the weapon higher than the GAU-16 and resulted in a greater length of weapon protruding aft of the mounting point, was ergonomically unsuitable. Interference was encountered between the weapon and cabin roof when operating the system at maximum depression at the 90° position, and clearance between the weapon back plate and the ammunition canister was inadequate to allow the operator to maintain positive control when attempting to traverse the weapon to engage targets at maximum elevation within 45° of the nose of the aircraft. This minimal space near the aft cabin wall also significantly restricted aircrew ability to manipulate the cocking lever. Aircrew experienced multiple weapon stoppages caused by rounds misfeeding as a result of links stretching as the feed chute extended to accommodate firing near the forward azimuth limit.

FNH is continuing to modify mount designs for all platforms. The primary goals of these design efforts will be to develop acceptable CH-53 window and ramp systems, reduce overall system weight, and refine CH-46E and UH-1N system characteristics.

Conclusions:

1. The M3M can be effectively employed aboard the CH-46E with minimal changes. The primary suitability concerns are the increased weight of the system in comparison to the XM-218, and relative complexity of the weapon itself.

2. The M3M system as currently designed cannot be effectively employed aboard the UH-1N due to weapon placement in relation to the cabin opening and ammunition canister. The primary suitability concerns are the increased weight of the system in comparison to the GAU-16, and relative complexity of the weapon itself.

3. The suitability of the M3M must be examined in a more comprehensive manner to determine whether the system could be maintained and logistically supported in the current USMC maintenance concept. The increased complexity of the M3M system in comparison to current weapons may present significant challenges to assault support aircrew, maintainers, and the established supply system.

MULTIPURPOSE AMMUNITION FOR THE .50 CALIBER MACHINE GUN
MAJ BAGGETT, UH-1N DIVISION, ASSAULT SUPPORT DEPARTMENT

The MAWTS-1 UH-1N Division employed the MK 211 Multi-Purpose (MP) armor piercing explosive incendiary .50 caliber round during WTI 1-03 to assess its suitability for use by Fleet units. The round was observed to have increased effectiveness when compared to standard .50 caliber ammunition, with no deficiencies or characteristics noted that would preclude Fleet employment.

Headquarters Marine Corps (HQMC APW-72) provided the ammunition to MAWTS-1 in support of continuing efforts to improve the effectiveness of the .50 caliber machine guns employed aboard Marine helicopters. The MK 211 round requires no special handling and is distinguishable from other types of .50 caliber ammunition only by its purple painted tip.

(Continued on page 6)

(Continued from page 5)

Although not currently available to USMC helicopter units, it is available in the Navy supply system under the NALC AA06. AA06 is 100 round linked .50 caliber ammunition in the following five round combination: one MK 211 MP round, one M2 armor piercing (AP) round, one MK 211 MP round, one M2 AP round, one M20 AP incendiary tracer (APIT) round.

This ammunition was fired through the UH-1N GAU-16 machine gun and the M3M. Facilities were not available to quantitatively measure the effects of the MK 211. However, WTI aircrew observed increased explosive effects with the MP round (in comparison to standard API ammunition) in the form of larger burst signatures when bullets impacted both soil and tank armor. FLIR video corroborated these observations, showing discernibly larger fragmentation patterns for the MK 211 as compared to API rounds.

Although MAWTS-1 could not determine the casualty radius of the MK 211, this ammunition has the potential to significantly increase the effectiveness of current and future helicopter crew served .50 Caliber weapons. Because of the explosive, fragmentary, and incendiary properties of the MK 211, gunners do not have to get “steel on steel” to have damaging effects on a target – impacts in close proximity to soft targets will produce destructive as well as suppressive effects. Increased effectiveness will also result when targets are struck directly, with bullet fragments puncturing soft materials while blast and incendiary effects cause additional damage. Imagine the difference in effects between a single armor piercing round penetrating an armored personnel carrier (and embedding someplace inside it) and a single MK 211 round penetrating the vehicle and exploding inside.

The MK 211 has Weapon System Explosives Safety Review Board (WSESRB) approval and is cleared for use with all .50 caliber machine guns. AA06 linked ammunition is available in the Navy supply system as NSN 1305-01-400-1398. The one negative aspect of this version of the ammunition is that the chemical composition of the primer used in the M2 AP rounds may cause barrels to corrode at an increased rate if they are not cleaned immediately after employment. Improved AA06 ammunition that utilizes M263 AP rounds in place of M2 AP will eliminate this problem and will be available in the near future as NSN 1305-01-473-4774.

APW-72 will be coordinating the procurement of AA06 for USMC helicopter units, with the focus of effort being to get the ammunition into ship Mission Load Allowances (MLAs) and forward positioned in order to support contingency employment. Small quantities will be available via the Non-Combat Expenditure Allowance (NCEA) to provide exposure to the round, but do not anticipate large quantities due to cost and the fact that it offers no training advantage over other less expensive rounds.

MAWTS-1 recommends that units request AA06 multipurpose ammunition if going into combat. If only limited quantities are available, consideration should be given to mixing MK 211 rounds with more readily available ammunition in order to extend supplies.

JSTARS-AND ATTACK HELICOPTER INTEGRATION
MAJ McKAY, AH-1W DIVISION, ASD DEPARTMENT

During WTI 1-03, JSTARS was used effectively to build the situational awareness of AH-1W aircrews in the DAS and CAS roles. JSTARS worked with AH-1Ws during OAS-5, OAS-6, OAAW, FINEX I, and FINEX II. In each of these evolutions, AH-1W mission planners worked closely with the JSTARS aircrew during the planning phase to coordinate JSTARS support. Some of the key planning details that were coordinated between AH-1W and JSTARS aircrews included: establishing communications links, codewords, and critical information items; desired times for coverage; AH-1W routing, checkpoints, and phaselines so that the JSTARS could track the AH-1W movements; and target priorities. During each evolution, JSTARS was able to provide threat updates to AH-1W flights and identify locations of priority targets for AH-1Ws to engage.

(Continued on page 7)

(Continued from page 6)

JSTARS played a critical role in relaying information between the DASC and the AH-1W flight when line of sight communication between the AH-1Ws and the DASC was not possible. JSTARS relayed current threat locations, threat status in the target area, active surface to air threats, execution checklist items, and line-up of OAS assets on station in the target area. All of this information helped raise the situational awareness of AH-1W flights prior to arriving in the target area.

JSTARS also proved invaluable in identifying surface-to-air threats ahead of the Cobra flights while enroute to the target area. During OAAW, JSTARS successfully located Avenger teams that would have blocked the Cobra movement to the target area. The Cobras were given recommended routing to avoid the Avenger teams which prevented the Avenger teams from getting valid shots on the Cobra flight. During common debriefs it was agreed that this was an extremely valuable technique, especially when mobile or unlocated surface-to-air threats are likely. It was critical that the JSTARS aircrew have detailed information on AH-1W routing. A common understanding of key checkpoints and phaselines provided the quickest means for JSTARS aircrews to locate the AH-1W flights. This also helped give the JSATRS aircrew an area to scan for potential threats ahead of the Cobras.

Whenever possible, AH-1W aircrews should request and coordinate JSTARS support. JSTARS has proved equally adept at supporting fixed-wing and rotary-wing OAS assets. When JSTARS support is available, AH-1W aircrews should attempt to establish face-to-face coordination. At a minimum, the following items should be addressed:

1. Desired times for support and location of JSTARS.
2. Working frequencies, callsigns, codewords.
3. Detailed AH-1W routing, highlighting key phaselines and checkpoints.
4. Surface-to-air threats to AH-1Ws that JSTARS should look for.
5. Expected working area/target area.
6. Target priorities.

TBFDS / FARP NVD SPOT MARKING
CAPT A.D. GRINALDS AH-1W DIVISION, ASD DEPARTMENT

During WTI 1-03, a need was identified for standardized AH-1W NVD spot lighting during TBFDS and FARP operations. As the only Marine rotary wing aircraft without crew chiefs, visual ground reference from both the front and rear cockpit is essential for crew coordination, safe operation, and mission accomplishment.

Due to limited forward visibility from the rear cockpit during landing phase, a specific lighting scheme is required to facilitate safe landings in a austere environment. It is difficult for both the pilot at the controls and co-pilot to maintain visual reference with the landing environment. As a result, landing zone identification, drift and closure rates, and obstacle clearance becomes even more critical for the flying pilot without a backup scan from the co-pilot.

In order to maximize crew coordination and safety for the AH-1W while conducting austere landings, the following NVD spot layout should be utilized. It provides both the front and rear seat pilots with positive visual ground reference during dusty landing conditions and facilitates the landing from either seat if one pilot is incapacitated. The MAWTS-1 AH-1W division and Aviation Ground Support department evaluated this lighting scheme under HLL conditions during WTI 1-03 at Stoval FARP during AST-3 with great success.

(Continued on page 8)

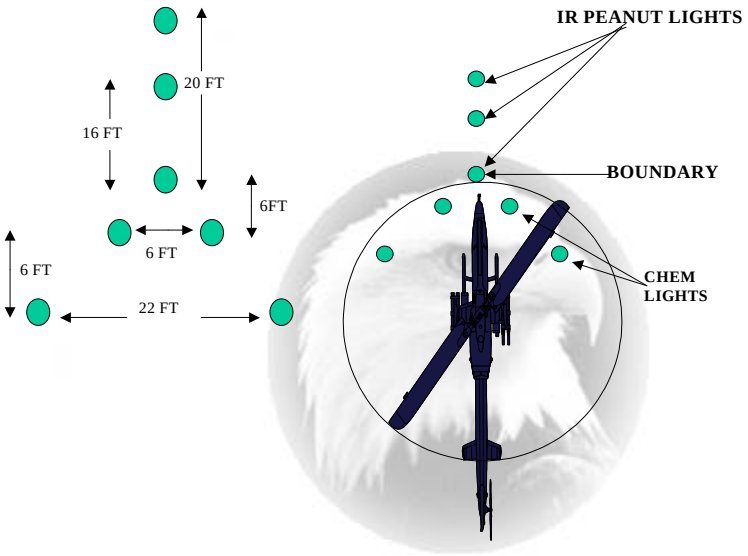
(Continued from page 7)

Close coordination between AH-1W aircrew and aviation ground support personnel is essential to ensure that site selection of landing spots is sufficiently flat to due to relatively high CG and low tail rotor clearance.

Taxi directors are not required for either takeoff or landing phases at a static FARP or TBFDS. Personnel in close proximity to the landing spot will only be obscured in brown out conditions and are placed at risk if aircrew need to execute a waveoff. Pilot workload and obscuration will most likely preclude observation of both taxi directors and ground reference. While static FARP and TBFDS operations are preferred, if a FARP contains a pre-stage, refueling point , and post-stage then taxi directors for refueling operations are helpful.

The NATO Y "bullet trap" configuration must be aligned with the de-arm heading and landing direction traffic pattern to avoid confusion.

"BULLET TRAP" NATO Y



DURING HIGH LIGHT= PEANUTS TURNED TOWARD A/C OR RED CHEMS

DURING LOW LIGHT= PEANUTS TURNED TOWARD A/C OR BLUE OR GREEN CHEMS

RAPID BORE SIGHT PROCEDURES FOR THE AH-1W M-197 TURRET SYSTEM
AH-1W DIVISION, ASD DEPARTMENT

There is currently no maintenance procedure that allows for a rapid or field expedient bore sight for the M197 turret system. This procedure was covered in the NAVAIR 11-45BB-7.1 manual (organizational level maintenance publication for the AH-1J,T&W turret system). The process was omitted when this manual was incorporated in the NAVAIR 11-45BB-9 manual (Intermediate level maintenance for the AH-1W turret system). Because of this, the only method of bore sighting the gun on the AH-1W is with the Shipboard Armament Bore sight Equipment (SABE). The SABE, when used correctly, provides a very accurate bore sight; however, because of the size and complexity of the equipment its use is not always feasible. Average time to set up the SABE and complete a bore sight of the turret system alone averages between four and six hours. Additionally, because of the pack up size of the SABE gear, it is not suited for forward deployment in austere maintenance environments.

(Continued on page 9)

(Continued from page 8)

During WTI 1-03 all 12 supporting AH-1Ws were turret bore sighted with a process known as the High Speed Turret Alignment Target (HiSTAT). HiSTAT is a rapid bore sight procedure based on the process formerly covered in the 11-44BB-7.1. During the bore sight process each aircraft required approximately one to two hours from set up until completion of the process. Although the SABE, theoretically, still provides a more accurate bore sight, accuracy was much improved over the average fleet aircraft. The accuracy of the weapons allowed for gunners to begin shooting in high magnification vice starting in low magnification in order to observe initial impacts. The overall gain of using the HiSTAT is decreased maintenance time and footprint with an observed increase in accuracy. The HiSTAT target is a simple construction made of PVC pipe that can be purchased at any hardware store. The instructions for building and using the HiSTAT are available through Lee Standley for West coast squadrons. During WTI 1-03 ordnance Marines from HMLA-269 were given a HiSTAT system and received training on its use.

IMPLEMENTATION OF TAWS 3.1.1 AND AREPS
CAPT BOHANNON, WEATHER DIVISION, AGS DEPARTMENT

WTI 1-03 saw the implementation of the latest upgrade build in TAWS 3.1.1 (Target Acquisition Weather Software) that has now merged with NOWS 6.2, (Night Vision Goggles Weather Software), and AREPS 2.1 (Atmospheric Refractive Electromagnetic Prediction Software). The primary purpose of the TAWS 3.1.1 software is to provide a performance prediction of the maximum effective range of aircraft weapon sensors in a given environment. NOWS 6.2 software is closely related to TAWS 3.1.1 in that it provides a range capability of night vision devices against various targets in a given environment. NOWS 6.2 software also provides range capabilities of enemy night vision devices. AREPS 2.1 provides a capability that gives the warfighter information as to how both friendly and threat platforms would perform in a given environment. The meteorological environment is a major consideration in how effectively we can employ the sensors of our weapons systems.

WTI 1-03 EMPLOYMENT

The above-mentioned weather related software was effectively integrated into both the planning and execution phase of WTI 1-03 operations. The primary goal was to provide the aviation community with the best performance prediction ranges for the assets employed against various targets. Overall, the software provided unsatisfactory range predictions. Weather was not a factor during the course since flying conditions were excellent 99.0 percent of the time. The software was integrated into the tactical scenario during the WTI 1-03 in a variety of scenarios. Real time performance predictions were provided and what we found was interesting. For example, while using TAWS 3.1.1 for both fixed and rotary-wing assets, the software had major trouble with the FLIR systems to include both fixed-wing and rotary-wing FLIRs. Ranges were completely unrealistic for high-resolution targets. Wide field of view provided realistic detection ranges. Laser sensors were fairly accurate no matter what sensor provided output. We noted for TV systems that the ranges provided were satisfactory. The AV8 Liteing POD provided detection ranges that were accurate, but TAWS 3.1.1 does contain all sensors associated with this system. AREPS 2.1 provides an accurate analysis of the existing environment as far as ducting is concerned but currently provides no forecasting capability in regards to ducting.

WTI 1-03 Data Points

A number of data points were collected during WTI 1-03.

1. TAWS 3.1.1 software needs to be evaluated to ensure all USMC sensors are contained and are available for use. Examples AV-8B LITEING POD, the ATARS system, and Laser upgrades.

(Continued on page 10)

(Continued from page 9)

2. TAWS 3.1.1 continues to provide unrealistic FLIR detection ranges for the F-18 FLIR, AV8B FLIR, and NTS FLIR in the narrow field of view, and in most cases the medium field of view when applicable. Until the software is corrected, it is recommended that the narrow field of view not be used. The medium fields of view with the FLIR systems are only useable 50 percent of the time. Further, TAWS 3.1.1 could not yield ranges for the AV-8B or F-18 FLIR systems above 10000 feet with any degree of consistency.

3. AREPS 2.1 provided realistic atmospheric views as to the state of the atmosphere. Better than 80 percent of the time during the major evolution phase, super refractive conditions were observed. This marginally degraded the capability of the TPS-59, TPS-63 and TPS-73 radar systems. AREPS 2.1 does not furnish a prediction capability for its weapon sensors that continues to be a major shortfall in support to the EA-6B community.

MAWTS-1 will continue to work with agencies to ensure requested sensors are added into the software database. Implementation should be complete by February 2003. Expanded employment of the TAWS 3.1.1 and AREPS 2.1 is anticipated for WTI 2-03.

AV-8B FORWARD OPERATING BASES (FOB) HOT LOAD
MAJ WOODARD, AV-8B DIVISION, TACAIR DEPARTMENT
CWO-3 BAILIFF, ORDNANCE DIVISION

During WTI 1-03, the AV-8B and Ordnance Divisions continued to refine procedures for the hot loading of ordnance and fuel at a Forward Operating Base (FOB). This class the hot loading of MK-82 HE, both in the low and high drag configurations, was added. MAWTS-1 ordnance used PASE (Preload Accessory Suspension Equipment) ITERs (Improved Triple Ejection Rack) to rapid re-arm the AV-8Bs. As sections of AV-8Bs moved to the CALA (Combat Aircraft Loaded Area), one jet would refuel while the other jet re-armed. In all cases, aircraft configurations were planned to be the same to ease the burden on the ordnance Marines. Intermediate stations were used since one jet in each section was carrying the Litening II targeting pod.

Ordnance team training was broken into three phases and was key to overall mission success. The training plan developed by MAWTS-1 allowed the teams to become aware of the numerous hazards related to loading a turning AV-8B, allowed MAWTS-1 to streamline and validate the proposed NAVAIR AV-8B Rapid Rearm Checklist, and prevented any unforeseeable procedural problems with the evolution. Phase one was three hours of classroom instruction on procedures and safety. Phase two consisted of practice loads on a static AV-8B positioned in the CALA, with no CADS used. Procedures were streamlined and all load team movements simulated loading a turning aircraft. This gave the ordnance crew a chance to develop their load teams. Phase two continued until all hands were proficient. The third phase consisted of the teams performing the evolution in the CALA on a turning AV-8B. Phase three continued until all hands were proficient.

No CADS were utilized during phase three. The above training plan, coupled with two successful rapid re-armed sessions at the FOB allowed the ordnance teams to progress safely into night operations.

Lessons Learned:

1. Fueling one aircraft while loading the other aircraft worked the best considering only one ordnance crew was available.

2. Total time on the deck at the FOB was planned at 50 minutes. Actual time to load the ordnance took between 12-15 minutes while fueling the aircraft took about 15 minutes. Adding in taxi time and 10 minutes for buffer kept the jets on or ahead of schedule.

(Continued on page 11)

(Continued from page 10)

3. Early planning between MWSS, Ordnance and the Air Boss is crucial for mission success.

4. Lighting and signaling plans are needed when moving from day to night operations.

During WTI 2-03, MAWTS-1 plans to continue exploring rapid re-arming procedures and expand the process to include MK-20 series cluster bombs and MK-83s with in flight selectable dual electrical/mechanical fuzing from ITERS.

AV-8B LITENING II VIDEO TRANSMISSION
CAPT HUBER, AV-8B DIVISION, TACAIR DEPARTMENT

During WTI 1-03, video transmission capability was demonstrated with a modified Litening II Targeting Pod. The pod, modified by Northrop Grumman, had two major additions to the legacy Litening Pod. A Pioneer UAV data link component package was mounted in two locations within the VCR bay. These components include a transmitter module and a power supply module. In addition, an antenna assembly was mounted on the underside of the pod. The AV8B Harrier Program Office assembled a team including representatives from the AV8B Advanced Targeting Branch from China Lake, NAVAIR, PMA-257, Northrop Grumman, and MAWTS-1. The demonstration was accomplished during evolutions within the normal execution of WTI.

Utilizing VMU-2 ground receiving equipment, uninterrupted video was transmitted from the LITENING II Targeting POD at a range of up to 74 NM between 4500 feet AGL and 20,000 feet MSL. Separate UAV transmission frequencies were used to allow concurrent UAV and video transmission pod operations. The limiting factor for this reception was range boundaries and line of sight in mountainous terrain. Based on the transmitted video, “snapshots” of target locations were taken and mensurated by the FAC utilizing Digital Precision Strike Suite (DPSS) software. In addition, a FAC was able to talk the pilot onto a “targeted” building in an urban environment. This was accomplished by monitoring the video transmission and giving the pilot slew commands via geo-references. This integration preserves all normal operating modes and recording capabilities of the legacy targeting pod with the potential of enhancing the situational awareness of ground commanders or FACs.

TACTICAL EXPLOITATION GROUP (TEG)
CAPT BRENDON HARPER, INTELLIGENCE DEPARTMENT

During the Weapons and Tactics Instructor (WTI) Course 1-03, the Tactical Exploitation Group – Main (TEG-M) deployed for the first time in its new configuration upgrade from 4 –26 Oct 2002. The major objectives of this deployment were to verify the ability of the TEG to conduct imagery data link operations with the F/A-18D Advanced Tactical Airborne Reconnaissance System (ATARS) and the U-2 Advanced Synthetic Aperture Radar System (ASARS) IIa sensors. All imagery tasked and processed from these platforms was in support of the WTI 1-03 flight evolutions.

The TEG is a MEF level asset and provides a tactically deployable capability to provide imagery products for all aspects of operational planning and mission execution by receiving, processing, exploiting, and disseminating reports and secondary imagery derived from electro-optical (EO), infrared (IR), and synthetic aperture radar (SAR) imagery. The TEG was an integral part of the WTI intelligence data network, which also included the Joint Surveillance and Attack Radar System (JSTARS) Common Ground Station (CGS), Tactical Air Command Center (TACC) Intel Watch Section (IWS), Tactical Electronic Reconnaissance Processing and Evaluation System (TERPES), a Flight Line Intelligence Center (FLIC) and the MAWTS-1 Sensitive Compartmented Information Facility (SCIF). The TEG was connected to each site by a Secure Internet Protocol Network (SIPRNET) connection through a Trojan Spirit (TS) II, which overall resembled a “mini-“ Marine Air Ground Intelligence System (MAGIS) / Distributed Common Ground System (DCGS) architecture. The normal TEG system operations were conducted with Marines from each of the MEF’s Imagery Interpretation Platoons (IIP), but required significant field support representative (FSR) support when the major problems arose.

(Continued on page 12)

(Continued from page 11)

Initially, there were some difficulties that prevented the TEG from successfully receiving imagery from either the F/A-18D or U-2 aircraft. Troubleshooting was conducted and some hardware and software maintenance actions were conducted, as well as refining some tactics, techniques and procedures (TTPs) on the operation of the system itself. After all the problems were resolved, the TEG performed nine consecutive data link missions with U-2 and F/A-18D aircraft.

The following are the TEG operational results from WTI 1-03:

Data link missions attempted: 26
Data link missions successful: 10
F/A-18D: 7
U-2 3
Total images datalinked: 295 (269 good, 26 bad)

F/A-18D: 137 (130 good, 7 bad)
U-2: 158 (139 good, 19 bad)
Longest data link range:
F/A-18D: 143 nm
U-2: 258 nm
Data link failures attributed to TEG: 7
F/A-18D: 5, due to not receiving a handshake between Common Imagery Processor (CIP) and aircraft
U-2: 2, due to the CIP Asynchronous Transfer Mode (ATM) configuration
Data link failures attributed to bad F/A-18D data link pods: 6
Data link failures undetermined: 3

Images from all sources posted to the Image Product Library (IPL): 112
Imagery Intelligence (IMINT) reports completed: 61

The following are significant events that occurred with the TEG during WTI 1-03:

11 Oct 02: Received 11 SAR images from the JSTARS CGS via local SIPRNET connection.
14 Oct 02: First successful data link (EO imagery) with F/A-18
17 Oct 02: Received video feed from an AV-8B Harrier Litening Pod via Pioneer UAV ground station antenna connected to the TEG video proxy server.
18 Oct 02: First successful data link with U-2 ASARS-2a.
19 Oct 02: First successful ATARS SAR spot and strip imagery received.
20 Oct 02: Received SAR and Moving Target Indicator (MTI) screen shots from airborne JSTARS via file transfer protocol (FTP) from the CGS. 11 images were imported, 9 were exploited and disseminated.
23 Oct 02: Participated in a Time Sensitive Targeting (TST) event within the WTI Marine Air Command and Control System (MACCS) during a U-2 mission. Net Meeting and Chat software were used to exchange imagery and intelligence reports. Also, SIPRNET connectivity with TERPES was established and national electronic intelligence (ELINT) was displayed on the TEG-E imagery workstations, which provided cueing to prosecute time sensitive targets in a more timely manner.
24 Oct 02: The data transfer capability was tested through a TS II connection. Three files were transferred with an average transfer rate of 2.5 kb/sec.

(Continued on page 13)

(Continued from page 12)

Overall, the deployment and mission execution of the TEG during WTI 1-03 was a success. As with any new system, there will always be the initial training issues and TTPs that will need to be worked through. With the fielding of this new and very capable system, close integration and consistent training will need to maintained between the Tactical Air (TACAIR), Intelligence, and the Command, Control and Communications (C3) communities in order to achieve its full potential and satisfy everyone's mission requirements.

AVIATION MULTIPURPOSE TRAINING SYSTEM (AMTS)
MAJ J.F.HARP, ASSAULT SUPPORT SPECIALIST

AMTS is a computer-based aircrew training system that was introduced in 1998. The system software includes: Combat Visual Identification System (CVIS), Aircraft Survivability Equipment (ASE) Computer Based Trainer (CBT), Electronic Warfare (EW) Threat Simulator, ARC-210 (CBT), and Aircraft Systems (CBT). While AMTS is a valuable tool for aircrew training, it was given to Marine squadrons without adequate training and support in place. This has resulted in an underutilization of the system. All squadrons should have a desktop AMTS machine that utilizes a JAZ or removable hard drive to boot up. Additionally, your CMCC should have a SECRET AMTS laptop in their inventory for training during deployments. The Navy and Marine Corps are pursuing advanced web based training systems for the future. Because AMTS is only funded until FY-04 HQMC and MCCDC will not implement a management and training plan for this system, but will put their efforts into implementing a plan for success with future training systems. No new AMTS systems will be procured for Marine squadrons, but if you would like to upgrade, repair or get help on an existing system within your unit, contact the customer support center help desk at (360) 496-4982 (744 DSN).

AIRCRAFT SURVIVABILITY EQUIPMENT (ASE)
MAJ J.F.HARP, ASSAULT SUPPORT SPECIALIST

AN/AAR-47(V)2

HQMC is currently rewriting the Operational Requirements Document (ORD) for the AAR-47(V)2. This upgrade to the current AAR-47 includes an updated Missile Warning Sensor (MWS), which provides a decreased rate of false alarms, and two Laser Warning Sensors detectors. Platforms scheduled for this system are the KC-130, CH-53E, CH-46E, AH-1W/Z, MV-22, and UH-1N/Y.

AN/APR-39A(V)2

Installs for the APR-39A(V)2 are complete on the UH, and have started on the AH platforms. This system will provide better integration with other ASE, better coverage, Emitter Identification Data (EID) threat libraries that can be tailored to a specific AO and downloaded via SIPRNET, and eliminate the requirement for the APR-44. If you would like to get an account established login to the MSEWDDS SIPRNET site (http://207.84.75.101/) print out the TASO letter and fax it to the number provided, then click on "Connect to MSEWDDS" and sign in.

(Continued on page 14)

(Continued from page 13)

Once signed in, go to the libraries and select your platform to download available EIDs. Platforms scheduled for this system are the KC-130F/R/T, CH-53E, CH-46E, AH-1W, MV-22, and UH-1N (AH-1Z, MV-22, UH-1Y, and KC-130J's will get B(V)2).

AN/ALQ-144A

While all AH-1W and UH-1N aircraft are being outfitted with the AN/ALQ-144A, this system was dropped from the Y/Z program due to cost. If we are to get this system procured for the Y/Z upgrade it is imperative that it continue to receive the necessary attention from fleet operators and Commanders.

AN/ALE-47

The upgrade to the ALE-39 is light years better than the current system. The biggest difference is the Mission Data File (MDF), a program that is loaded into the system to tell it the type and combination of expendable required to defeat a detected threat (No more programming). The pilot simply evaluates the threat, and selects one of seven programs to counter it through Auto or Manual dispensing.

AH-1W AIR NAVAL TACTICS, TECHNIQUES AND PROCEDURES MANUAL(ANTTP)
MAJ DAVID W. BUSSEL, ROTARY WING OFFENSIVE AIR SUPPORT SPECIALIST

The complete re-write of both the AH-1W classified and unclassified Tactics Manuals as well as the Pocket Tactical Manual were conferenced this past summer. We have successfully integrated the manual into a joint venture with the Air Force and Navy. The AH-1W Cobra conference was the first Air Warfare Center (AWFC) / Naval Strike and Air Warfare Center (NSAWC) combined conference. The conference was completed 22 Jul-3 Aug, 2002 at Nellis AFB. There will be a total of five manuals produced, consisting of both a classified and unclassified ANTTP manual, classified and unclassified Naval Aviation Technical Information Product (NATIP) and a Tactical Pocket Guide (TPG). Release date for all five manuals should be by the end of April. The UH-1N conference will be held 9-20 Dec 2002, followed by the CH-46 Conference, 21-31 Jan 2003.

JOINT MISSION PLANNING SYSTEM (JMPS)
MAJ CHRIS PAPPAS III, ADT&E DEPARTMENT HEAD

JMPS continues to develop for its fleet IOC in March of 2004. While PFPS will still be around for a couple years after the arrival of JMPS, we need your help to make JMPS the planning system that suits your needs. While you are installing and using your PFPS 3.2 CDs, keep in mind that it is the baseline for JMPS. Anything it can do, JMPS must be able to do as well. If you do not have your PFPS 3.2 CDs yet, contact NAVMPS at 1 888 TAMPS 4U.

JOINT DATALINK INFORMATION COMBAT EXECUTION (JDICE)
MAJ C.R. DOTY, C4I/TBMCS SPECIALIST

JDICE is a Joint Feasibility Study (JFS) setup to facilitate the improved throughput of information on Link-16 and Situational Awareness Data Link/Enhanced Position Location Reporting System (SADL/ ELPRS). The specific goal is to codify Joint Tactics, Techniques, and Procedures (JTTPs) and Concept of Operations (CONOPS), reducing the latency and error rate caused by the man-machine interface. JDICE will also standardize and formalize JTTPs for new equipment that will be Link-16 and SADL/EPLRS capable between now and 2007.

LIMITED WARFIGHTING EXPERIMENT OF THE (DASC) AIRBORNE SYSTEM
MAJ C.R. DOTY, C4I/TBMCS SPECIALIST

During WTI 1-03 ADT&E, KC-130 Division and the DASC Division conducted a LWE(QA) of the DASCAS. The DASCAS is the replacement to the Vietnam vintage UYQ-3A. Like the UYQ-3A it connects to the antennas aboard the KC-130 to provide the airborne extension of the DASC. It is a huge improvement over the UYQ-3A but still requires modifications, the main fault being the fact that the DASCAS is not compatible with the KC-130J. Commands on the distribution list will be receiving a copy of this study as well as the Krill Lamp study. All others interested can receive a copy for their command by contacting me at dotycr@mawts1.usmc.mil.

ON THE HORIZON
LT RICH FOLGA, AEROMEDICAL SAFETY OFFICER (AMSO)

MAWTS-1 expects to conduct a QA on a wide FOV NVG for rotary-wing aircraft during WTI 2-03. Initial look at the system: unit has a weight, CG, mechanical adjustments and image quality of the AN/AVS-9, with the addition of a 90+ horizontal FOV, mission camera module, and symbology overlay for center channel tubes. Fixed diopter and objective lens components make for weight savings and ease of operation.

DIGITAL CLOSE AIR SUPPORT
MAJ CHRIS PAPPAS III, ADT&E DEPARTMENT HEAD

Digital Close Air Support took a huge step forward with new variable message format (VMF) protocols specifically designed at improving digital communication to the battlefield. While FA-18s will enjoy limited VMF capability once 17C comes out next summer, follow on system configuration sets of 19C and 21C will benefit greatly from this expanded message set, ultimately reducing fratricide potential while increasing lethality. The expanded message set supports the transmission of such items as aircraft position and sensor field of interest, multiple targets and multiple friendly locations per 9 line, as well as providing an ability for the FAC to “see” where GPS weapons are targeted prior to providing a digital cleared hot.

PRECISION TARGETING FOR CAS
MAJ CHRIS MCPHILLIPS, ADT&E

ADT&E has been striving to improve Close Air Support in both the Doctrine and equipment areas. Our goal has been to develop and publish TTPs for CAS that accommodate advances in technology, and develop targeting and communication systems to support the new TTP. With the help of the MCWL a major leap in TACP targeting capability was demonstrated during WTI 1-03.

“Seamless” sensor to shooter “precision” targeting was achieved at the tactical level.

The system used was comprised of the Ruggedized Handheld Computer (RHC) with internal GPS and a modem for digital communications. A modified version of Advanced Close Air Support System (ACASS) software was also installed. A MK-VII laser range finder was connected via cable to the RHC to automatically provide bearing and range to a target. The ACASS software used this data to calculate a target location and elevation based on current GPS position. This target location is displayed to the FAC on a digital map in relation to his own and other friendly positions. With a push of a button, the “modified” ACASS software allows the user to send the targeting data to software also installed on the RHC called Digital Precision Strike Suite (DPSS). DPSS uses stereo image pairing to “mensurate” coordinates. The imagery is the same type used in other mensurating tools such as RAINDROP and is stored on small PMCIA cards, which are inserted into the RHC. Each card may contain up to 3600 square nautical miles depending on the resolution of the imagery.

(Continued on page 16)

(Continued from page 15)

The quality of the coordinates provided by DPSS are comparable to RAINDROP generated coordinates, and on HUD tape review the pilots targeting symbology was usually superimposed on the targets. Once the imagery pairs for the target location are found (45sec) the operator is presented with imagery of the coordinates derived by the ACASS/MK-VII. Typically the coordinates derived using the ACASS and MK-VII are within 50 to 100 meters of actual ground truth location depending on range, and are displayed for adjustment on the imagery. If the target is present in the imagery the operator positions a marker over it and a location and elevation are calculated. Targets not visible must be correlated to objects present in the imagery. An example of this might be a tank stopped at a road intersection. Correlation proved to be a simple process, but data quality is subject to the operator's interpretation of the spatial relationship between the target and image reference point. It was however, always an improvement over the MK-VII/ACASS derived coordinate. The software also proved very effective under artificial illumination conditions. Once the operator is satisfied with the target location on the imagery, the data is digitally transferred back to the ACASS software and the initial target location is updated with the new data. With this new target data a proficient operator can quickly and accurately build a 9-line brief in about 90 seconds. Once complete this brief is sent digitally to an AV8B. The AV8B pilot accepts the brief and executes his attack.

From the start of the process, the FAC is provided a graphic display with current FAC/friendly positions, and target locations. He has derived a rough location and sweetened the target location in most cases, to accuracies well within those required for J-Weapons and at no time has the FAC or pilot manipulated the coordinates. Accurate coordinates aid in effective and efficient CAS regardless of ordnance delivered. Graphic displays of friendly and target locations, aircraft position, and fire support coordination measures improve FAC situational awareness and minimize the possibility of fratricide. DPSS is a remarkable capability and will be integrated into fleet issued RHCs in the future.

IZLID 1000 IR POINTER QUALITATIVE ASSESSMENT
MAJ DAVID W. BUSSEL, ROTARY WING OFFENSIVE AIR SUPPORT SPECIALIST

The following is an unclassified executive summary of observations of the IZLID 1000 Infrared Pointer qualitative assessment conducted by MAWTS-1 during WTI 1-03. The final results of this demonstration will be released in an unclassified format.

A Qualitative Assessment (QA) of the IZLID 1000 Infrared Pointer attached to the AH-1W 20mm turret was conducted during WTI 1-03. The results were very successful. The IZlID 1000 has a power output of 900 mW compared to the 100 mW output of the GCP-2C. Additionally, the IZLID 1000 has a pulsed capability to distinguish it from other IR markers utilized by the GCE. The flight clearance obtained for the QA is effective until 31 Jan 2004. However, we are currently having the two test versions modified for production and will submit the request for the updated flight clearance upon completion. The production model will incorporate the grey power converter box, seen below, into the IR Pointer. Additionally, there will be a decrease in length by 1½-2."

KRILL LAMP QUALITATIVE ASSESSMENT
MAJ C.R. DOTY, C4I/TBMCS SPECIALIST

The following is an unclassified executive summary of observations of the Krill Lamp qualitative assessment conducted by MAWTS-1 during WTI 1-03. The final results of this demonstration will be released in an unclassified format.

During WTI 1-03 ADT&E, ASD and MMT conducted a qualitative assessment of the Krill Lamp, a battery-operated replacement for the Cyalume Chemlight. It was tested in the cockpits and as ground markings at Forward Arming and Refueling Points. Its primary advantage is that one Krill Lamp replaces numerous Cyalume Chemlights. The primary drawback is that it is not disposable and the LED version is not compatible for any operation. The non-LED version is definitely a step in the right direction for TBFDS and static FARP operations. More detailed information on the Krill Lamps Light Level comparison and practicability of the 180 degrees and 360 degree versions will be released in the final Qualitative Assessment.

This page intentionally left blank

MAWTS-1 SUBJECT MATTER EXPERTS
DSN (269-XXXX) COM (928) 269-XXXX

SUBJECT	P.O.C.	EXT
RF SAMS:	Maj Suggs	2643
IR SAMS:	Capt Platz	3469
	Maj Wadsworth	3668
AAA Threat:	Maj Abrams	2968
	Maj Wadsworth	3668
F/W Threat:	Maj Antonio	2024
R/W Threat:	Maj Watkins	2967
UAV Threat:	Capt Zuber	3359
Threat IR AAMs:	Maj Wadsworth	3668
Threat RF AAMs:	Maj Pylant	2276
TOW:	Maj McKay	3361
Hellfire:	Maj Watkins	2967
HARM:	Maj Antonio	2024
JDAM/JSOW:	Maj Rowell	2276
Maverick:	Maj Austin	2752
LGBs:	Maj Palmer	2261
Cluster Munitions:	Maj Rowell	2276
Conventional Ord:	Maj Austin	2752
Reactive Wpns:	Maj Austin	2752
Fuzes:	Maj Pylant	2276
AIM-9:	Maj Wadsworth	3668
	Maj Hackett	3591
ATARS:	Maj Pylant	2276
AIM-7:	Maj Boyles	6025
AIM-120:	Maj Palmer	2261
M61A1/2:	Maj Antonio	2024
Rockets:	Capt Grinalds	3361
	Maj Antonio	5303
APG-65/73:	Maj Austin	2752
	Maj Hudson	3591
	Maj Woodsworth	2261
Armed Reconnaissance	Maj Pylant	2276
Weaponeering:	Maj Austin	2752
20MM:	Maj Mckay	3361
	Capt Grinalds	3361
FLIR/LDT:	Maj Wadsworth	3668
Litening II:	Maj Woodard	2752
RSEAD:	Capt Nothelfer	2952
Self Escort Tactics:	Maj Palmer	2261
TACP:	Maj Darby	2527
TAC(A):	Maj Palmer	2261
TRAP:	Maj Glasgow	2133
ROE:	Maj Doty	3679
NEO:	Maj Gillard	2199
RWC2/ASC(A):	Maj Baggett	2132
TBFDS:	GySgt Wright	3363
Weather Specialists	Capt Bohannon	2534

ADT&E

Mission Planning	Maj Pappas	2930
FW ASE	Maj McPhillips	2498
	Maj Pappas	2930
RW ASE	Maj Harp	2684
NVDs Laser Threat	LT Folga	3652
Urban CAS:	Maj Bussel	3681
TBMCS:	Maj Doty	3681
	Brian Ross	2684
C4I Specialists	Maj Doty	3681
ACTC Specialists	Maj Harp	2684
JALEPV Program	LT Folga	3652

INSTRUCTOR STANDARDIZATION

DIVISION	P.O.C.	EXT
NSI:		
AH-1:	Maj Watkins	2967
UH-1:	Maj Baggett	2132
CH-53:	Capt Oliver	2968
CH-46:	Maj Euler	2199
AV-8B:	Maj McPhillips	2498
FA-18:	Maj Rowell	2276
KC-130:	Maj Patrick	3547
EA-6B:	Maj Bew	3573
ACTI/DMI/DACTI/DEFTACI:		
AH-1:	Capt Barranco	3361
UH-1:	Capt Rampey	2132
CH-53:	Maj Bridgewater	2133
CH-46:	Capt White	3469
AV-8B:	Maj Woodard	2252
FA-18:	Maj Huff	5302
KC-130:	Maj Peck	3547
EA-6B:	Maj Bew	3573
LATI:		
AV-8B:	Capt Huber	2752
FA-18:	Maj Wadsworth	3668
KC-130:	Maj Peck	3547
FAC(A)I:		
AH-1:	Maj Moore	3361
UH-1:	Maj Darby	2132
FA-18:	Maj Palmer	2261

EAGLE ONE

COMMANDING OFFICER
MAWTS1
PO BOX 99200
YUMA AZ 85369 9200

MAWTS-1