EAGLE ONE

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WEAPONS AND TACTICS INSTRUCTOR COURSE 1-01 LESSONS LEARNED

The intent of the Eagle One Newsletter is to communicate lessons learned from the Weapons and Tactics Instructor course out to the fleet quickly. MAWTS-1 will also use the newsletter to push tactical lessons learned from fleet units to Marine Aviation . We will use The Talon to publish classified lessons learned in the future. This newsletter is also published on the MAWTS-1 home page at ***www.tecom.usmc.mil/mawts1****.*

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DUAL HMMWV EXTERNAL
MAJ MCLELLAN, CH-53 DIVISION

During WTI 1-01, the 53 Division executed "shotgun" style external operations utilizing HMMWVs retrofitted with the ¾" diameter front lift provisions. The rigging procedures developed by HMX-1 OT&E and approved by MARCORSYSCOM were incorporated in the interim procedures found in C1, FM 10-450-5/MCRP 4-23E, Vol III Multiservice Helicopter Sling Load: Dual Point Load Rigging Procedures. The externals were executed with great success. In the process of execution, however, we found there can be some further details incorporated in the rigging procedures to ensure we continue to execute safely and minimize any potential damage to the HMMWVs.

1. Vehicle Placement: The two HMMWVs need to be as close as possible to each other. This verbiage is currently in the preparation procedures found in the interim document, however, it cannot be emphasized enough how this one step "sets the stage" for success in this type of external. Positioning the two vehicles as close as possible facilitates the rigging to be secured more effectively avoiding any shifting of the HMMWVs during pick up, in flight or drop off.

2. Preventing Vehicle contact: In reference to placement of the camo netting, the manual currently reads on page 2-47 para. 2-20.1.d:

   (d) Secure the vehicle camouflage net (in the bag) to each vehicle. Attach one camouflage net to the forward door post of one vehicle and the other camouflage net to the hard part of the body covering the fuel tank of the other vehicle.

   It is important to understand that the camo netting that is placed in between the two HMMWVs has to be placed as far down as possible on the body of the HMMWV. If the netting is not placed far enough down on the body, there is the potential for vehicle contact. The highest potential for damage if the netting is not placed correctly is damage to the fording pipe.

3. Vehicle Brakes: The supporting HST was releasing the brakes of both HMMWVs as they dismounted the vehicle after hook up. This procedure was being done to minimize damage to the tires upon drop off, trying to avoid the potential to have the vehicles skid for any distance if the release from the aircraft was delayed. The aircraft commander has to specifically brief HST as to what procedure will be followed, based on the mission and the terrain where the HMMWVs will be dropped off. If the brakes are released upon pick up from an area that is relatively flat and the HMMWV's are inserted to an area that has a gradient; the results may be catastrophic.

Dual HMMWV externals provide a definitive "heavy lift" mission for the CH-53E. With attention to detail and the understanding of potential areas where damage to the HMMWV can occur, this mission can be executed safely, effectively and is a true force multiplier.

REACTIVE SUPPRESSION OF ENEMY AIR DEFENSE (RSEAD)
MAJ DOBSON, ADT&E DEPARTMENT

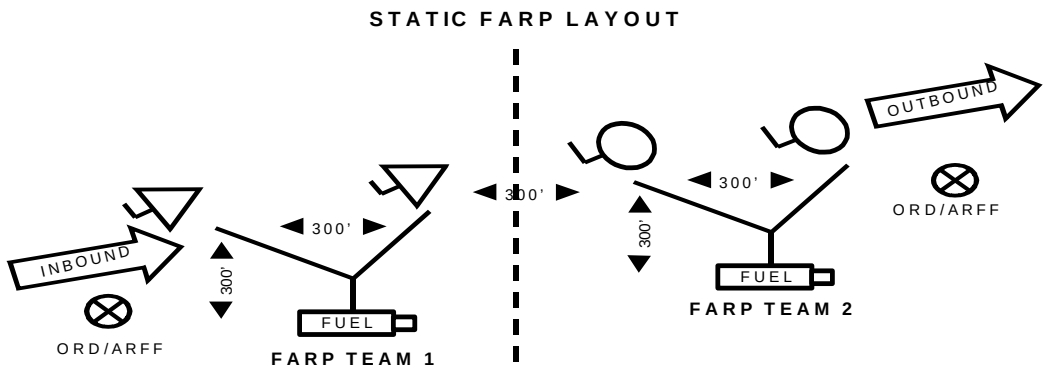
During WTI 1-01 OAS 1, ADT&E conducted a Qualitative Assessment to determine effective means of Identifying, locating, targeting and destroying mobile SAMs. OAS 1 was a simulated CAS exercise, conducted in the R2301 West range.

There was one unsuccessful RSEAD that still showed promising results. Utilizing the Pioneer UAV, the UAV was able to locate a mobile SAM with sufficient accuracy to allow targeting by fixed wing aircraft. This location was passed to the FAC on the deck before the UAV went off station. The FAC in turn passed this location to an EA-6B who were acting as the RSEAD Manager, who in turn passed it to a F/A-18 section who checked on station. In the process of passing the location to the Hornets, the EA-6B crew truncated two significant digits from the SAM location, which resulted in an unsuccessful exposure event and an untargeted SAM.

Finally, the same EA-6B crew coordinated an RSEAD run with another F/A-18 section to try to get a sensor on a new, pop-up SAM. The Hornet was able to derive a location, but did not have sufficient fuel remaining to prosecute the SAM. The EA-6B crew passed this location to the next Cobra checking on station, and the SAM was destroyed 16 minutes and 40 seconds after being detected by organic MAGTF assets.

STATIC FARP LAYOUT
MAJ THOMA, AVIATION GROUND SUPPORT DEPARTMENT

MAWTS-1 was able to validate the "static" FARP layout in conjunction with hot ordnance uploads. The static FARP no longer requires attack aircraft to flow through separate pre-stage, fueling, and post stage areas. It instead allows aircraft to land at a single spot where it is dearmed, fueled, uploaded, and armed without moving. Below is an example of the static FARP layout.



Note 1: Aircraft come in and land directly onto their assigned points
Note 2: Each point works autonomously from the others so you can dearm, fuel, upload, and arm aircraft without having to wait on adjacent points
Note 3: FARP Teams work autonomously and can be kilometers apart and still controlled by a FARP OIC centrally located elsewhere (Roving concept to be tested during future WTI courses)

The following are the recorded times of aircraft flowing through the FARP using the static FARP layout during the AST 1 evolution:

AIRCRAFT	WAIT	DEARM	FUEL	WAIT	LOAD	WAIT	ARM	WAIT	LIFT OFF
AH-1 (Single)	1:34	1:06	4:44	N/A	2:10	N/A	1:48	6:16	18:00
AH-1 (Section)	3:18	1:36	4:06	1:45	2:05	N/A	1:40	3:35	18:05
UH-1 (Single)	0:39	0:51	4:45	N/A	3:51	1:03	1:18	8:55	21:22
UH-1 (Section)	2:17	0:46	4:50	2:33	5.53	N/A	1:19	3:49	21:27

Note 1: Times are in minutes
Note 2: "Wait" times reflect delays caused from either aircrew or FARP crew
Note 3: "Lift Off" is the total time it took from landing to take off

Using the static FARP layout greatly reduced the overall replenishment time of aircraft in the FARP. For example: Replenishing an AH-1 section using a standard hot attack layout normally takes roughly 40 minutes; however, combining the static layout and hot ordnance uploads, replenishment only took 18:05 minutes. This is a significant savings in time, especially when almost 8:38 minutes may be recoverable with increased crew/team proficiency.

HOT TUBE-LOADING
CAPT HAWK, ORDNANCE DEPARTMENT

During WTI 1-01, MAWTS-1 continued with the evaluation of 2.75" rocket hot tube loading on a waiver granted by HQMC. Hot tube loading is the loading of rockets on helicopters while the motor and rotors are turning. While specifically prohibited in the manuals, the waiver allows for the evaluation of this tactically sound procedure. Seven evolutions, including three night evolutions, were scheduled. Six evolutions, including two nights, were completed.

The timesaving of the aircraft re-start alone is significant. However, the sense of urgency to reload and rearm a turning helicopter and get it back in the fight is also greater. A helicopter can be reloaded and rearmed in 4-8 minutes. This is dependant on the reloads required (including crew served small arms ammunition for UH-1 Hueys).

Key to these timesavings is the training of the Ordnance crew. Fifty-one fleet personnel have been through the training syllabus at MAWTS-1. Ground crew training and coordination are necessary for a safe successful evolution.

MAWTS-1 plans to continue to exploit this time saving procedure to include precision guided munitions (PGM) and 20MM for the AH-1Cobras. MAWTS-1 is currently working in concert with NAVAIR to rewrite the NA 01-H1AAC-75-12 and NA 01-110HCE-75-12 checklists to include hot tube loading. This will result in corresponding changes to both the AH-1 and UH-1 Loading Manuals.

AH-1W DEFENSIVE AIR COMBAT TACTICS
CAPT ADAMS, ADT&E DEPARTMENT

During WTI 1-01, the AH-1W Division conducted Defensive Air Combat Tactics (DACT) training, a new syllabus that replaced the Air Combat Maneuvering syllabus. During these sorties, many tactical lessons learned were captured by those who participated and a new generation of DACT pilots was started.

Air-to-Air Weapons limitations and capabilities:

AIM-9 vs Rotary Wing aircraft (AH-1 and AH-6) proved difficult when trying to obtain solid tone (while maintaining employment altitude rules of thumb) until at or just inside of minimum range. These attempts were made during every RW DACT evolution. The use of expendables (Mk46 Mod C) to break the lock of captive AIM-9 missiles was attempted on three sorties. A combination of high-side flares used in conjunction with a descending turn into terrain provided enough of a signature to break lock of a captive missile on two occasions. These break locks took place around 3/4 to 1 mile in trail. Inside of 3/4 mile, or in situations where low-side flares were attempted, we acheived no success in breaking the missile lock. Additionally, air-to-air PGM (Hellfire/TOW) tracking versus maneuvering Rotary Wing (AH-6) and Fixed Wing (F-5, F/A-18) adversaries proved difficult, at times impossible to obtain. PGM shots against non-maneuvering (unobserved) Rotary Wing adversaries proved effective.

TACTS Range Usage:

The TACTS range was used during FW DACT training to validate section tactics as well as validity of AIM-9 shots. Out of 12 total shot attempts, 9 shots were validated based on TACTS debrief sessions. Carrying a captive AIM-9 on station 1 and a TACTS pod on station 4 proved most effective for training. This allowed the aircrew to maintain selection of the captive missile (symbology and tone) and maintain electrical power to the TACTS pod (providing PDU to the TACTS facility). Intra-section communications were recorded and played back during debrief periods to validate tactical calls that were made during 2 v 2 training. All WTI graduates received training on the TACTS DDI systems available in Yuma, Miramar and Cherry Point for future DACT training.

Dissimilar Aircraft Training:

This class had the luxury of an AH-6 to train against as an adversary. Dissimilar aircraft provide a more realistic scenario than merely fighting other AH-1 aircraft. Using disimilar adversaries (AH-64, UH-1, UH-60) is highly recommended for RW DACT training. Dissimilar adversary aircraft have different performance and weapon system capabilities and allow aircrew the opportunity to validate their tactical gameplan.

Use of terrain shadowing to counter FW:

Debriefs from the fixed wing adversaries amplified the fact that late afternoon shadows and terrain provided great concealment from threat fixed wing systems. Any textured surface (rough terrain, scrub brush, desert washes) made acquisition of rotary wing aircraft by fixed wing aircraft difficult.

Training Aids:

The use of expendables to simulate the release of ordnance by adversary aircraft added a great deal of realism to the "beyond weapons parameters" line numbers. The visual signature of the flare provided an indication of a weapon fired from the adversary aircraft, making the engagement more realistic. Weather balloons tethered to terrain were used during one evolution to provide realistic airborne targets to engage. Three red balloons (approximately 15 feet in diameter) were suspended in the 2507S range complex and were used to represent hovering threat helicopters. While difficult to see, they provided a more realistic target since they were suspended approximately 25 to 50 feet in the air. A thorough set of DACT Training Rules were refined and utilized during the course which expedited scenario setups and mitigated the risk associated with DACT training. The foundation of these rules came from OPNAVINST 3710 and T&R Volume 1. Additional rules regarding altitude and communication requirements were added to provided a more realistic scenario. These rules will be published as change 1 to the MAWTS-1 DACT Manual.

DIRECT AIR SUPPORT SHORT OF THE FIRE SUPPORT COORDINATION LINE (FSCL)/BATTLEFIELD COORDINATION LINE (BCL)
MAJ WATKINS, GROUND COMBAT DEPARTMENT

During planning for WTI 1-01 Final Exercise (FINEX) missions, planners often got bogged down during fires planning when determining where deep air support (DAS) would be conducted and where close air support (CAS) would be conducted. A common trend is to say we will only do CAS short of the FSCL. Fire support planners, both ground and air, need to understand that DAS can be conducted short of the FSCL. Though the location for conducting DAS is not tied to any particular fire support coordination measure, during our FINEX evolution, prospective WTI's planned for the use of a Battlefield Coordination Line (BCL) which helped to coordinate the use of DAS short of the FSCL.

Though the BCL will not become a doctrinal FSCM until MCWP 3-16 (Tactics, Techniques, and Procedures for Fire Support Coordination) is signed, WTI planners were able to use the model set forth in the I MEF FSCM playbook. Students established a FSCL which was approximately 50-60km from the forward line of troops. The establishment of a FSCL so far forward would be realistic in a joint environment. Because the FSCL was so far forward, there was the potential that targets could not be engaged rapidly by any fire support asset either because of limited range or the inability to target enemy forces. Student planners were able to incorporate a BCL which allowed for the rapid engagement of targets by MAGTF air assets operating in the DAS role. The established BCL was well inside the FSCL but at the max range of organic artillery assets. Also, Armed Reconnaissance Areas (ARA) were established which were between the BCL and the FSCL.

During execution, ground combat department students, filling roles in the MAGTF Fire Support Coordination Center (FSCC), worked closely with the DASC to push scheduled DAS sorties forward to engage targets well ahead of the ground forces. To facilitate target engagement, the students planned for near continual coverage of F/A-18Ds which could act as Strike Coordination and Reconnaissance (SCAR) platforms to help locate targets well ahead of advancing ground forces and coordinate the attack of those targets by other OAS assets. Often organic reconnaissance assets or a UAV would identify a target set. Students would then work with the DASC to push a SCAR platform (if available) and appropriate OAS assets to engage the target set. If the target set was successfully engaged or was not found at the briefed coordinates, the assets on station then had the flexibility to push to another sub-box of the ARA to look for more targets. Working in this manner, OAS sorties were able to engage many high priority targets artillery and armor and were able to provide additional intelligence back to the FSCC via the DASC.

Despite these successes, it should not be overlooked that DAS can be conducted short of the BCL as well. The only difference here is the requirement for coordination of the DAS missions with the unit owning the airspace short of the BCL. This was conducted successfully at the battalion level during FINEX III. A friendly battalion pushing east in the R2301 area was halted in the vicinity of a MAGTF Objective. Reconnaissance assets noted dust trails approximately 20 km farther to the east but still within their boundaries. These dust trails were identified as suspected armor forces pushing in for a counter attack. Within minutes these suspected armor forces were likely to have artillery in range to influence the friendly forces halted at the MAGTF objective. At about the same time, a section of fixed wing aircraft had just checked on station to provide CAS for the battalion. The air officer, working with the Battalion Fire Support Coordinator was able to push that particular fixed wing section forward to conduct armed reconnaissance (DAS) on the suspected targets. The coordination that took place was for the Air Officer to establish routing for the aircraft, identify the target priorities, and establish the time and area for the aircraft to limit their armed reconnaissance to. In addition, the Air Officer worked with the FSC and Artillery Liaison Officer to deconflict supporting arms. The end result was that the fixed wing CAS section was successfully converted to a DAS mission and an enemy counterattack

was broken up. This same scenario was played out several times during FINEX III using both fixed wing and rotary wing OAS sorties. Though the Battalion FSCC coordination was notionally conducted by MAWTS-1 instructors on the ground, it does highlight the fact that DAS can be conducted short of the BCL, even at the battalion level.

HAVEQUICK USAGE IN THE MACCS
CAPT DEBISH, C3 DEPARTMENT

During WTI 1-01, HAVE QUICK (HQ) was used extensively for the first time by the Marine Air Command and Control System (MACCS). It was used primarily to control fixed wing and rotary wing assets by the (MACCS) agencies. Prior to WTI 1-01, the Communications Division and Avionics Department worked together to formulate a plan for aircraft to seamlessly check in with a MACCS agency. Friction areas that required resolution were three fold, 1) MACCS field units supporting WTI 1-01 had never used HQ, 2) there were no procedures for establishing a common Time Of Day (TOD) for HQ participants, and 3) MAWTS-1 had to coordinate the use of a common frequency management table (FMT) for WTI 1-01.

During the WTI 1-01 Communications planning conference the Communications Division held a symposium on HQ to discuss its use for WTI 1-01. At that time, no MACG-28 units were utilizing HQ. Prior to WTI 1-01, the MAWTS-1 Communications Division temp loaned two AN/GRC-171B(v)4s and began to research and test the use of HQ. The Communications Division developed a step by step handout, which allowed operators to program the radios for HQ operations. The handout also provided instructions on how to load time from a AN/PSN-11 (PLGR) into an AN/GRC-171B(v)4. This was a major break through in attempting to coordinate a common TOD amongst HQ capable agencies and aircraft. The required cable to load the TOD can be ordered via the supply system, but there is no connector on the end of the cable for a connection to the radio. The Communications Division called Rockwell-Collins (the AN/GRC-171B(v)4 manufacturer) and they confirmed the correct pin outs on the face of the radio. Parts are available to build a male connector for the cable, but we have learned the male connector is not necessary to load the TOD into the radio. By attaching electrical pins on the bare wires of the cable and placing the pins in connector holes, “F” and “G” respectively on face of the radio, it allows for the transfer of time. The AN/PSN-11 must have a Time Figure Of Merit (TFOM) of seven or better to send the TOD to the radio. This information was included in the HQ handout and was e-mailed to all HQ capable units within MACG-28. MAWTS-1 received positive feed back prior to WTI 1-01 from MACG-28. MACG-28 had become fairly proficient using HQ by the time they came out to support the course.

MAWTS-1 Avionics Department built an automatic Time Of Day (autoTOD) generator to establish a common TOD for aircraft without onboard GPS or for aircraft that could not obtain the TOD with onboard GPS equipment. The autoTOD consisted of an AN/ARC-182, circuit card, and a HQ cable connected to a PLGR. The autoTOD was placed at the airboss facility by the MCAS Yuma CALA to provide GPS TOD. The antenna for the autoTOD was mounted on a twenty foot antenna mast at the airboss facility. The autoTOD worked flawlessly by generating the TOD every sixteen seconds on a fixed UHF frequency. The autoTOD combined with onboard GPS ensured that all aircraft had the same TOD, which is required to conduct HQ.

MAWTS-1 used the CONUS approved frequency management table (FMT) listed in the CJCSM 6230.05, Joint HAVE QUICK Planners Manual for WTI 1-01. This FMT allowed MACG-28 to train in garrison with the identical FMT they used during the course. It also allowed the Communications Division and Avionics Department to test HQ with aircraft on the flight line prior to WTI. The common FMT worked very well, there was only one evolution that a unit had the incorrect FMT loaded in the radio. This was corrected by deleting the FMT in the radio and loading the correct one. MAWTS-1 theorized there could be potential problems using the CONUS approved FMT. The CONUS approved FMT is not managed by any one agency. The United States Air Force is the lead service for HQ and owns the FMT, but does not assign usage for the FMT. Therefore, it was reasonable to assume that there could be some interference on the HQ nets. As a result, MAWTS-1 released a message to all the major military installations located within a 400 mile radius of Yuma. The message asked all HQ users to coordinate the use of HQ net identifiers (using the CONUS approved FMT) with MAWTS-1 during WTI 1-01. No interference took place during the course.

The MACCS agencies and HQ capable aircraft were able to communicate “active”; this was primarily due to the use of GPS based timing. HQ nets were established for Mission Common, Flight Commons, Tactical Air Traffic Control nets (TACC, TAOC, EW/C, DASC, DASC (A)), and Fighter Air Direction nets. The HQ nets were identified in the Automated Communications Electronics Operating Instructions (ACEOI) and in the radio guard chart of the annex K of the Operation Order. The coordination for the net IDs was published in the SPINS of the ATO. All HQ nets were non-secure for WTI 1-01. Active nets started to lose the timing synchronization between air and ground platforms over a time period of approximately 4 hours. This problem was easily corrected by

updating the TOD in the radio.

MAWTS-1 plans continued use of HQ as more aircraft are upgraded with HQ capable radios (AN/ARC-210). During WTI 2-01, MAWTS-1 plans to incorporate active secure nets as the primary means of communicating from aircraft to the MACCS agencies. For any questions relating to the autoTOD generator or configuring the aircraft radios for HQ, please contact CWO3 Fowler at DSN 951-3345. For any questions relating to HQ procedures or for an electronic copy of the 12 page HQ cheat sheet for the AN/PRC-113 or AN/GRC-171B(v)4, please call Captain Debish at DSN 951-3623.

UH-1N COMMAND AND CONTROL
MAJ OSTROWSKI, ASSAULT SUPPORT DEPARTMENT

Communication: We continue to use NAVAIR approved prototype splitter cords to maximize the use of the four ICS boxes in the UH-1 cabin. Given that two ICS boxes are used by the aircrewmen, the splitter cords allow four Marines (e.g. HUC, AMC, FSC, etc.) to talk on the other two ICS boxes. This arrangement provides flexibility and maximizes the use of 4 ICS boxes.

Mission Coordination Area(MCA): By understanding the importance of comm to the C2 aircraft, we should plan our MCA ACAs (primary and alternate) to ensure they are within the communication parameters of the supported unit. These ACAs must be picked remembering that GCE PRC-119 radios only put out 5 watts of power with a nominal range of 4-5 miles. So simply having line of sight with the GCE may not suffice--the MCA must be close enough to allow the GCE to talk to you. Often times, we have been able to talk SINCGARS secure to the GCE and have them hear us. With the radio power limitations, however, they aren't able reach us. When available, one possible way to improve this is to plan to have the GCE talking from a MRC-145 HMMWV-mounted VHF radio to get extra range (25-30 miles), as that asset has higher power output (50 watts).

Situational Awareness

1. UH pilots were able to very effectively provide enhanced SA to the GCE by using the STAR SAFIRE FLIR to track the entire mission from ingress, to landing, to egress and extract from the objective area. With operable reverse positioning on the STAR, the C2 pilots can look into an objective area from 14km, observe bomb impacts, and lase the impacts to determine at what grid targets are being engaged. This information is an SA builder for GCE Marines, both when they are airborne and after they are inserted.

2. The Pioneer UAV Remote Receive Station (RRS) was installed on the UH-1N to provide real-time video to the mission personnel on board. A description of the RRS is in Chapter 22 of the UH-1N Tacman, but the salient points are as follows: The RRS weighs approximately 150 lbs for the portion of the RRS that is essential to doing the mission. There are additional items that don't need to be hooked up to the RRS so we can save weight by coordinating with VMU and determining what is essential to the C2 mission. It takes approximately 10-15 minutes to install in the UH-1N cabin, but you should figure in at least 2 hours of lead time to allow for any problems or delays. By planning to have comm with the UAV pilot, the C2 Huey can virtually slew the UAV sensor around the target area and provide cueing to an inbound heliborne force, and provide enemy warning to the GCE once they are inserted into their landing zone. As with any mission asset, timely coordination is critical, so conduct a good face-to-face brief with the VMU squadron to identify those critical tasks that you want the UAV to perform for you.

The combination of the STAR SAFIRE and the ability to talk SINCGARS secure on the ARC-210, provides mission personnel aboard the UH-1N superior SA and allows them to truly command from the air. Integrating the UAV with the RRS gives commander's another formidable capability. The more we train to this capability with the VMU squadrons, the better we will be able to serve the GCE.

DEFECTIVE FUEL CONTAINERS
MAJ THOMA, AVIATION GROUND SUPPORT DEPARTMENT

The SIXCON fuel container, which has been in the Marine Corps inventory for many years, has reached the end of its useful life. When mounted on top of the MK-48/14 LVS, they can no longer withstand the rigors of tactical vehicle movement off hard surface roads. During WTI 1-01, there were seventeen instances where the seams of the fuel containers cracked, causing a delay in fuel support, and a potentially disastrous environmental impact. To

weld the seam cracks back together is a time consuming and expensive endeavor.

Because of this, the Marines of CSSD-16, 1st FSSG, came up with a very simple, but effective solution. By placing thin rubber matting (the kind that gymnasiums use in weight rooms) between the bed of the LVS and the frame of the SIXCON, the metal on metal contact of the truck bed and fuel container was greatly reduced. This allowed the SIXCON to rest on some cushioning, which absorbed much of the stress that the containers were subject to. The rubber matting was thin enough to still allow the ISO locks to work, but thick enough to absorb much of the stress and shock that off highway driving creates.

Once the mats were installed, there was not another incidence of the SIXCONS cracking. This is a very low cost solution, and it should easily sustain the Marine Corps' needs until a replacement is procured for the aging containers.

EA-6B DATALINK JAMMING
MAJ DOBSON, ADT&E DEPARTMENT

During a Qualitative Assessment, EA-6B's were able to successfully jam representative datalinks and deny them the ability to pass data or voice communications. When the datalinks used troposcatter data paths, the alignment requirements decreased dramatically. As the datalinks utilized line of sight communications, alignment became a much greater consideration, but jamming was still effective. The implication is that by jamming enemy datalinks, Double Digit SAMs would be limited to shorter-range dispersal or to use landlines, making them immobile. We anticipate the final QA report to be released by January 15, 2001.

OPERATIONS AGAINST MECHANIZED INFANTRY IN A DESERT ENVIRONMENT
MAJ CUTLER, FA-18 DIVISION

Aircrew used the FA-18 APG-65/73 Air-to-Ground RADAR Moving Target Indicator (MTI) Mode to give them early cueing to moving mechanized infantry in the desert. Obviously MTI detects all moving targets, so further identification of the target was required. The majority of the target acquisition was by pre-planned visual or FLIR scan pattern. The NITEHawk FLIR requires some detailed map study to determine the likely lines of communication and marshalling areas for the mechanized threat. The majority of the targets were acquired moving along roads. Moving vehicles were easier to acquire than stationary vehicles, but both were IR significant if the vehicle has been moved (or had its motor running) recently.

An altitude and/or distance sanctuary of 10K' MSL and 8 NM was determined by pre-flight planning to reduce the threat weapons envelope. In execution, either target acquisition or weapons delivery (IR Maverick or Rockeye) forced the aircrew to break that sanctuary. Remaining inside that sanctuary for follow-on target attacks greatly increased the engagements by the threat systems. Re-establishing the sanctuary by exiting the target area by greater than 8nm and returning for a deliberate attack from a different heading made it difficult for the threat systems to engage the aircraft.

Unguided munitions weapons symbology on a moving target, unless the weapons solution is derived from of an MTI track, need to take into account the weapon TOF and the vector of the target. Otherwise the target may be out of the weapon's fragmentary pattern by the time of weapon impact and function.

TADIL-C OPERATIONS
MAJ CUTLER, FA-18 DIVISION

The recent WTI record for TADIL-C Operations for the FA-18 and the MACS Tactical Air Operations Module (TAOM) has been fairly dismal. Flights during WTI found several problems with TADIL-C operations. Trackfile quality varied from MACS unit to unit with trackfiles being up to 70nm off from their actual location. The source of these problems has not been determined. It is believed to be a software problem with the TAOM Removable Interchangeable Media Module (RIMM). The RIMMs have been taken to MCTSSA and downloaded with new RTOS software, but it has not been confirmed whether that fixed the problem.

To help track TADIL-C operations and increase TADIL-C reliability, a TADIL-C Logbook should be maintained by the ground controller. This logbook should contain: aircraft squadron, aircraft side number, aircrew, TADIL-C address (first two significant digits and scratchpad address), MACS unit, controller, database loaded, RIMM# / Image, UHF radio / antenna location, 1-Way / 2-Way operations and link quality description and mission synopsis. The MACS and squadron POCs should review this logbook for discrepancies on a regular basis.

URBAN CAS TECHNIQUES
CAPT SCHMITT, GROUND COMBAT DEPARTMENT

The following assets were utilized in addition to conventional marks for CAS in an urban environment during WTI 1-01. These marking devices were tested in an environment where Battalion mortars and artillery were unavailable due to the close proximity of friendly Marines. They are not intended to replace conventional marks, but provide the infantry and aviation units' readily available organic marking capabilities at the smallest unit.

- IR Pointer
- VS-17 panel or IR Strobe on friendly positions
- 40mm M-203 colored smoke and white star parachutes
- 9mm tracer rounds (AT-4 simulator ammunition)
- Visible spotlight

Various observations were made while using these marks.

- IR pointers required correct geometry and run in heading for the CAS platform to acquire.
- UH-1N can match crew served weapons pointers to FAC pointer on target for a quicker "cleared hot."
- Vertical terrain in an urban environment limits use of IR pointer out to extended range, unless the FAC is elevated.
- Tracers and 40mm smoke/illum were far more effective when marking for rotary wing CAS
- 9mm tracers stand out from 5.56mm and 7.62mm tracers as they have a higher and slower trajectory, and a brighter burn.
- 9mm tracers were effective out to 450m
- M-203 40mm smoke presented a good mark for both day and night, and is employed by the gunner firing the round directly at the target building. At extended ranges, the smoke will burst on the structure's side, and at close range, it will bounce off the building into the street before burning, requiring talk-on from the mark.
- Various colors of 40mm smoke will stand out from obscuration and screening smoke in day battle.
- 40mm Illumination rounds fired directly at a structure will fall into the street at the base of the structure and burn, providing a good mark, however at closer ranges, the risk of the round being damaged upon impact and not burning is greater.
- Firing a 40mm illum round through a window will cause it to burn inside the room, designating clearly which room of a building is the target.
- 40mm Illum can also be lofted in the air to float down on top of a building as a mark, however this requires a high level of gunner proficiency and practice, and may take several attempts.

More marking and target acquisition techniques available to the small unit:

- 60mm Mortars are organic to the Rifle Company, and can provide a quick Illumination or WP mark. In some instances it may be most effective for a Company Commander to assign one 60mm Mortar to follow in support of a TACP for organic marking capability.
- M-249 with tracer belts will provide a distinct mark that will stand out from other tracer fire.
- Grid systems on a common map combined with building numbers and major street names provide a tremendous capability for accurate talk-ons. This was the primary means of CAS employment in an urban environment used during WTI 1-01.

Urban CAS geometry considerations:

- "Right shoulder and Left shoulder" attacks with respect to the FLOT provided quickest FAC acquisition of A/C and A/C acquisition of the target. Attacks parallel to the FLOT caused the FAC and A/C viewpoints to be 90 degrees different, and vertical terrain often caused the target to be masked from the pilot's view.
- Rockets and bombs are best used at distant targets, and UH-1N crew served weapons were the most effective for fires across the street.

When running from the right or left shoulder, UH-1N pullouts will force the crew served weapons to cease firing as the A/C passes 90 degrees to avoid shooting back towards the FLOT.

ASSAULT SUPPORT TECHNIQUES
CAPT HALE, GROUND COMBAT DEPARTMENT

Combat Assault Fires in support of Ground Force Insert in Contact or in Close Proximity to Objective:

During WTI 1-01, specifically the Long Range Raid, AST I, FINEX I, and FINEX II (Combat Town Raid), it proved advantageous to approach the objective at an angle parallel to the long axis of threat forces to mass assault aircraft suppressive fires on the objective during ingress and landing. This minimized exposure of the assault package to observation and massed fires of the enemy against any one aircraft. Additionally the ground forces should disembark to the side out of contact to prevent masking aircraft fires. This is critical as the assault package must maintain the suppressive fires as the package lifts out of the zone. These fires facilitate ground force maneuver and ensure a seamless transition of direct fires from the assault package to the ground force.

Use of Smoke Obscuration for Helicopterborne Insert:

During FINEX II (Combat Town Raid) smoke grenades were used to lay a screen during insert. The smoke grenades were thrown by the crew-chiefs in each aircraft on the objective side (1 or 2 grenades per aircraft) upon landing. The rotor wash allowed the smoke to build across the frontage of the landing force prior to the package lifting out of the zone. The screen achieved was a light haze in concentration dissipating after approximately 3-4 minutes and reduced the enemy's ability to determine force size and initial maneuver. There are some considerations for the safe and effective employment of this technique. When a crew-chief employs the smoke grenades it complicates his ability to simultaneously man the door-gun. The rotor wash causes some of the burning material within the grenade to become airborne which represents an enhanced fire hazard. The grenade and spoon are potential FOD hazards. To minimize these risks the grenades must be thrown on a flat trajectory coming to rest outside the rotor arc of the aircraft (25 feet for CH-46 and 40 feet for CH-53). This also facilitates very effective smoke effects, pushing the smoke screen toward the enemy, vice pulling it into the aircraft. This technique would also be very effective in dummy insert zones to deceive the enemy.

Extract Procedures:

The ground force employed typically numbered between 105 and 120 Marines. In each of the below-listed exercises the assault package consisted of 8 CH-46s. The following extract times (time to land, embark ground forces, and lift out of zone) were noted during WTI 1-01:

Long Range Raid: 8 minutes (daytime single wave extract)
AST I: 17 minutes (daytime single wave extract)
FINEX I: 6 min/wave (nighttime extract by element (2 waves of 4 CH-46s))

Single wave extracts exhibited the following characteristics: loss of control, confusion in the ground force; larger zone-more ground for ground forces to cover to get to aircraft; <u>no ground security and sporadic to no ground-based suppressive fires</u>; aircraft suppressive fires limited or masked by forces moving to aircraft; time intensive – aircraft exposed on the ground.

Extracts conducted in waves by element/division: enhanced control/personnel accountability; smaller zone-less ground for ground forces to cover to get to aircraft; ground security and effective integration and deconfliction of ground and assault aircraft fires; reduced aircraft exposure time on the ground; allows separate ITG for each wave.

Extraction conducted in waves by element/division reduces vulnerability of the force by collapsing the zone and allows the ground forces and assault support to complement each other in the extract phase.

MAWTS-1 SUBJECT MATTER EXPERT'S
DSN (951-XXXX) COM (520) 341-XXXX

SUBJECT	P.O.C.	EXT
RF SAMS:	Maj Denney	3036
IR SAMS:	Capt Jones	2199
AAA Threat:	Capt Abrams	2968
F/W Threat:	Maj Farnam	3580
R/W Threat:	Maj Curtis	3361
Surface to Surface:	Maj Ross	2957
UAV Threat:	Maj Ross	2957
Threat IR AAMs:	Maj Leiblein	6025
Threat RF AAMs:	Capt Bergad	2527
TOW:	Maj Vail	3591
Hellfire:	Maj Watkins	2582
HARM:	Capt Bergad	2527
JDAM/JSOW:	Maj Wolfe	3668
Maverick:	Maj Sofge	2752
LGBs:	Capt Bergad	2527
Cluster Munitions:	Maj Farnam	3580
Conventional Ord:	Maj Sofge	2752
Reactive Wpns:	Maj Gering	2752
Fuzes:	Maj Cutler	2276
AIM-9:	Maj Leiblein	6025
AIM-7	Capt Boyles	2008
AIM-120:	Maj Cutler	2276
M61A1/2:	Maj Reed	3591
APG-65/73:	Maj Wolfe	3668
	Maj Olander	2498
FLIR/LDT:	Maj Cutler	2276
ALE-39:	Maj McGovern	3469
	Maj Olander	2498
ALE-47:	Maj Bond	2261
ALR-67:	Maj Olander	2498
ALQ-157:	Capt Jones	2199
ALQ-164:	Maj Olander	2498
APR-39:	Capt Abrams	2968
APR-44:	Maj Vanderwerff	2684
RSEAD:	Capt Suggs	3573
Self Escort Tactics:	Capt Bergad	2527
TACP:	Maj Watkins	2582
TAC(A):	Maj Farnam	3580
NVDs:	LCDR Blow	3652
Urban CAS:	Capt Adams	3681
	Maj Olander	2498
TRAP:	Maj Mclellan	2968
ROE:	Maj Reimer	5773
NEO:	Capt Fuerst	2199
RWC2/ASC(A)	Capt Baggett	2152
TBFDS:	SSgt Wright	3363

INSTRUCTOR STANDARDIZATION

DIVISION	P.O.C.	EXT
	NSI:	
AH-1:	Maj Moore	3361
UH-1:	Maj Jordan	2132
CH-53:	Capt Abrams	2968
CH-46:	Capt Fuerst	2199
AV-8B:	Maj Gering	2752
FA-18:	Maj Cutler	2276
KC-130:	Capt Patrick	3547
ACTI/DMI/DACTI/DEFTACI:		
AH-1:	Capt Adams	3681
UH-1:	Maj Kolb	2132
CH-53:	Capt Landherr	2133
CH-46:	Capt Grenier	3469
AV-8B:	Maj Woodard	2752
FA-18:	Maj Mahoney	2276
KC-130:	Capt Patrick	3547
EA-6B:	Maj Ball	2952
	Maj Denney	3036
LATI:		
AV-8B:	Maj Schram	5302
FA-18:	Maj Leiblein	6025
KC-130:	Capt Patrick	3547
FAC(A)I:		
AH/UH-1:	Maj Moore	3361
	Maj Ostrowski	2195
FA-18:	Maj Farnam	3580

EAGLE ONE

COMMANDING OFFICER
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