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WEAPONS AND TACTICS INSTRUCTOR COURSE 2-01 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 ***www.tecom.usmc.mil/mawts1****.*

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COLONEL, US MARINE CORPS
COMMANDING

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USE OF DECEPTION IN SUPPORT OF A HELICOPTERBORNE RAID
CAPT HALE, GROUND COMBAT DEPARTMENT

During the FINEX II (Combat Town Raid) of WTI 2-01, deception incorporated into the tactical plan proved to be a decisive factor in mission accomplishment. The tactical scenario provided to the planners was as follows: A terrorist cell believed to be platoon-sized (Marines in an OpFor role) had infiltrated into and taken control of a small town within the rear area of friendly forces. The mission of the raid force was to destroy the terrorist force and recover the terrorist cell leader if possible.

To make the best use of available assets, the mission planners planned to insert a support element northwest of the town to provide a support by fire position, use the support element insert aircraft to conduct a decoy insert northeast of the town, and finally insert the assault element beside the command and control building in the southern edge of the town. The insert of the assault element would be executed ten minutes after the insert of the support element to allow time for the terrorist forces to react to that insert and the decoy landing.

During execution the support element was inserted at 1905 (this insert was unobserved by the OpFor due to terrain masking). The decoy landing was executed at 1908 within line of sight of the OpFor terrorists in town. The audible helicopter signature heard during the support element insert was discounted, as the helicopters were immediately seen executing what was the decoy landing. To add to the deception, eight smoke grenades were deployed by crew chiefs within the three CH-46s. This in conjunction with brownout conditions typical of desert helicopter landings made it difficult to determine if in fact anyone deployed from these aircraft. The OpFor forces did detect this landing and began to move forces through the town to the northeast to respond to this insert. These forces were observed and engaged by the UH-1Ns and the support by fire position. At 1915 the assault element was inserted as planned at the southern end of the town. This element was able to rapidly seize and secure the target building and captives. The assault element was further able to engage a now separated force and destroy that force by element with massed fires and maneuver.

Conclusions: The decoy landing, while not a new concept, can be extremely effective as tactical deception. As the helicopter audible signature will usually be heard, deception may at a minimum deceive the enemy forces as to the real location of the inserted forces and the overall size of those forces. Use of smoke adds to the confusion of the decoy landing. Timing is critical in the use of decoy landings to allow the enemy time to react in ways favorable to friendly fire and maneuver. Use of empty aircraft for decoy landings provides a number of advantages to the aircrew such as better aircraft performance (more speed, power available, and maneuver-ability), both in the air and on the deck, and fewer personnel at risk in the landing zone.

BLOCK 89A EA-6B IN WTI 2-01
MAJ DOBSON, ADT&E DEPARTMENT

Two of the three EA-6B's flown in support of WTI 2-01 were the Block 89A variant. They provided a number of technological improvements in connectivity and navigation, but also their share of training difficulties.

The EA-6B's now have the capability to communicate both Havequick and SINCGARS, both plain and secure. This facilitated better integration with ground and rotary wing assets and allowed for TACAIR to utilize Havequick secure as a mission common net. The EGI also provided enhanced navigation reliability, making EWCAS procedures much simpler. Now ECMO1 can simply give control of the cursors to the backseaters and accept the derived 27 and 29 points. Unfortunately, with this version of the CDNU software, the MILGRID to Latitude/Longitude conversion is turned off. Fortunately, it will be turned back on for version 1.1. Once the 27 and 29 points are derived and labeled, the Pilot can display these points on the EHSI in map mode, providing him enhanced situational awareness. In terms of labeling, MAWTS recommends aircrew continue to use the 27-28-29-30 conventions due to the years of familiarity developed. Aircrew tried other schemes such as TGT, IP, etc, but when the threat was not the target, the question arose "whose IP is that, ours or the strikers?"

On missions where the EA-6B ended up being the communications relay platform of opportunity, particularly when supporting Assault Support missions, the back radio (V/UHF3) paid huge dividends. Realize that when using the back radio and V/UHF selected on the antenna switch, the scanner no longer has an antenna. Communications plans that rely on safety of flight or ADA in the scanner are unfeasible.

CENTER FOR COUNTERMEASURES (CCM)
MAJ ADAMS, ADT&E DEPARTMENT

During WTI 2-01, the Aviation Development Tactics & Evaluation Department sponsored a team from the Department of Defense Center for Countermeasures (White Sands New Mexico) to augment the OPFOR during Offensive Air Support (OAS) evolutions 1 through 4. The intent of the CCM team was to expose the WTI students to countermeasure systems as opposed to develop countertactics to the devices. Hopefully during future classes, we will have the opportunity to test and validate tactics against these systems. While the CCM final report is still pending, the following quicklook items are provided from the exercise.

False Target Generators

A portion of the CCM inventory included a false target generator (FTG). This device was used to protect a "high-value" target in the Yuma Range Urban Target Facility from precision guided munitions (PGM) delivered by aviation assets. The PGMs were simulated by either captive Hellfire Missiles, captive LASER Maverick missiles or Laser Guided Training Rounds. LASER marks were provided by both ground-based and airborne systems. The FTG was very successful in protecting the high-value target, 12 total LGTRs were released during OAS 1. 50% of the attacks were augmented with an active FTG. 6 LGTRs hit the intended target, 6 LGTRs missed the target and landed in the vicinity of the FTG decoy board. The captive carry missiles also experienced the effects of the FTG, which included the spot either randomly disappearing or moving off of the intended target. The FTG also had an effect on the delivery of non-PGM weapons as well. Out of 26 deliveries, 11 hit the intended target and 11 missed the intended target. 4 impacts were not scorable. These misses are directly attributable to aircrew dropping on LASER designations generated by the FTG.

IR Smoke

The CCM used IR smoke to mask targets in the area of the Urban target facility. Due to the sustained winds in the objective area, the effects of this smoke were limited in coverage and duration. Once deployed, aircrew were unable to use FLIR systems to track targets through the IR smoke until the smoke had cleared the area. Had the sustained winds been lower, the effect of this countermeasure would have significantly effected the capability of OAS assets to engage targets.

MANPAD Seeker Van/Smokey SAMs

The CCM brought two seeker vans and a wide variety of Smokey SAM devices in order to add realism to the target engagements. The total number of successful engagements will be contained in the CCMs final report. WTI aircraft used tactical flares (MJU-27, MJU-32, Mk-46) both preemptively and reactively with great success.

Oil Smoke Generator

During OAS 2, the CCM equipped the OPFOR with an Oil Smoke Generator in order to mask their positions. While this would have been an excellent mask from ground based fires, it merely provided a visual mark which the aircrew used to talk on other aircrew to the location of the OPFOR.

Threat Systems

An SA-8 threat system participated in the OAS 3&4 evolutions. The prospective WTIs were afforded the opportunity to "tour" the system during a planning day in order to talk to system operators and see how this system operates. Numbers of successful engagements will be included in the CCM Final Report, however it should be noted that the SA-8 was very effective in engaging low-altitude helicopters.

COMMUNICATIONS CODE WORDS
CAPT DEBISH, C3 DEPARTMENT

There are many terms used in the Marine Corps to identify a type of radio net. The following brevity code words or terminology are all used: "HAVE QUICK, active or frequency agile", "SINCGARS or frequency agile", "secure, covered, cipher text, or green", and "clear, non-secure, uncovered, plain text or red". The purpose of the Multiservice Air-Air, Air-Surface, Surface-Air Brevity Codes handbook is to "ease coordination and improve understanding during multiservice operations". The correct brevity from the multiservice handbook clears up communications code words. "**Go active**" is defined as "go to briefed HAVE QUICK net". "**Go secure**" is defined as "use encrypted voice communications". And "**go clear**" is defined as "use unencrypted voice communications". "Go active" can also be applied to SINCGARS because both HAVE QUICK and SINCGARS are frequency agile systems. In addition, these terms can be abbreviated to **active**, **secure**, and **clear** to describe a net. A common use for this would be in an ACEOI where the frequencies or nets would have an **(A)** to indicate HAVE QUICK or SINCGARS net, **(S)** to indicate encrypted frequency, and nothing to indicate a clear frequency.

THE CHALLENGES OF IDF TARGETING
MAJ JON HACKETT, ASD DEPARTMENT
MAJ KEVIN WOLFE, TACAIR DEPARTMENT
MAJ ERIC WISE, ASD DEPARTMENT

The Offensive Air Support II evolution during WTI 2-01 focused on solving the location problem associated with targeting IDF assets. Doctrinally, aviation assets will be employed against these assets in two different mission profiles – Air Interdiction, AI, against known positions, or Armed Reconnaissance, AR, against assets of unknown location. The OAS II evolution dealt with the more difficult and more likely of the two scenarios – armed reconnaissance. For the play of the problem, "Red" IDF assets consisted of (4) active 155mm Howitzers protected by LAAD Stinger teams. Fixed Wing platforms were constrained by a 10000' AGL hard deck to deconflict with the artillery gun target line and to provide them some level of sanctuary from the Stinger threat.

Traditionally, fixed wing aircraft have found it difficult to find these assets, which are easily concealed, camouflaged, and employ deception (CCD) techniques (protected by decoys and false targets). The relative target ID ineffectiveness of U.S. air power against Serbian tactical vehicles during Operation Allied Force bears witness to this fact. Typically, fixed wing platforms rely on a 1-2 mil eyeball to find 30' targets with slant ranges as great as 20,000'. The combination of CCD techniques, ROE altitude constraints, and limited 1st generation FLIR technology (FA-18 and AV-8B), made the acquisition of IDF sized targets a tremendous challenge to Marine TACAIR.

OAS II provided two elements of rotary and fixed wing assets to assist in the AR effort. Both rotary and fixed wing sorties launched just before thermal crossover and were on station just at or after sunset providing the worst possible environmental conditions for target acquisition and ID.

The first rotary wing package was a hunter-killer division of (2) 1686 AH-1Ws and (1) Star SAFIRE equipped UH-1N. The second package was a section of 1686 equipped AH-1Ws. The hunter-killer division capitalized on the performance of the Star SAFIRE FLIR to locate the IDF assets, then perform a target handoff to the Hellfire equipped AH-1Ws to either engage the IDF or provide a laser mark for fixed wing to engage the assets. The AH-1W section was sent out with the same mission.

Fixed wing packages of both F-18Cs and AV-8BII+ were unsuccessful in locating the IDF assets, even with cueing from other assets (8-digit grid, talk-on), given the environmental- target acquisition factors discussed above. However, they were able to utilize their weapons loads of Mk-20 Rockeye and GBUs in concert with rotary wing platforms which provided terminal guidance and a mark. The successful combination of the Q46 counter-battery radar, rotary wing and fixed wing assets, and a responsive C3 system to tie the packages together proved successful in tying together the location, targeting, and engagement pieces of the IDF problem.

Several lessons learned peculiar to the employment of rotary wing assets against IDF assets in a SCAR scenario were distilled from the OAS II evolution and are as follows:

1. Because of the unknown threat and the size of the objective area, it took the rotary wing packages approximately 45 minutes enroute to move approximately 17nm in order to cover the target area and locate the IDF assets. The elements utilized bounding overwatch, terrain, and overlapping sensor sweeps to clear the Air Reconnaissance Area (ARA) in a thorough and systematic manner. Integration with fixed wing assets did not significantly reduce this time required because of the fixed wing platforms' inability to detect either the IDF assets or the LAAD teams from their perspective.

2. Once the assets were detected, it took anywhere from 4 to 10 minutes to positively identify the various contacts within the target area. The Star SAFIRE proved especially critical in this area. The Star SAFIRE's increased capability over the AH-1W NTS FLIR provided for identification ranges out to 4-5 km. The artillery tubes proved somewhat easier to identify than the various types of wheeled support vehicles because of their distinct shape and firing signature. The artillery tubes were camouflaged with IR absorbent netting which effectively masked their IR signatures from above. The netting proved relatively ineffective against the rotary wing teams, which were able to see clearly underneath the netting.

3. The rotary wing assets' acoustic signatures provided the LAAD teams with initial cueing. By using terrain masking, standoff, and by presenting a low IR signature (nose-on aspect) to the target area, the helicopters were able to avoid engagement by these assets, even when they were visible to the naked eye. The effectiveness of these tactics against an imaging optical or staring focal plane array seeker would be less certain, and will require further study.

UH-1N Star SAFIRE

AH-1W NTS

4. Once the assets were located, several engagement options were available. For purely rotary wing engagements, the Hellfire missile was the weapon of choice, followed by TOW as a backup option. The optimal method for Hellfire employment against the IDF after a hand-off from the UH-1N or AH-1W FLIR platform was to use a Lock-On After Launch (LOAL) mode from defilade to hide the launch signature using buddy lasing from the targeting AH-1W. Such a technique would maximize the element of surprise and confusion against the enemy while reducing the vulnerability of the launch platform. The overall preferred method of engagement was for the targeting platform to assume the role of Strike Coordination/Armed Reconnaissance (SCAR) manager in order to direct fixed wing sorties against the IDF assets.

5. History was proven correct during the WTI OAS II evolution by the target acquisition and ID challenges of IDF assets by Marine TACAIR platforms. Fixed wing assets must develop tactics, techniques, and procedures to aid these platforms to facilitate mission success. As demonstrated by the Time Critical Targeting concept (targeting of mobile targets), cueing (link/voice through secure/clear means) must be provided to narrow down a search area for tactical size vehicle targets. Given limited sensor technology on certain fixed wing aircraft; binoculars or any other tools should be used to aid in target acquisition. Supplemental ROE should be requested to allow for more effective search profiles (lower and faster), if exposure to the threat is warranted.

6. Any platform on the battlefield, whether it be the UH-1N with the Star SAFIRE FLIR, AH-1W with its NTS, JSTARS, or a UAV with their respective sensors, can provide either link/voice connectivity through clear or secure means to any killer platform on the battlefield.

The insight gained through the OAS II IDF problem during WTI 2-01 validates the potential effectiveness of a combined arms approach to locating, targeting, and destroying an enemy's IDF assets. By coordinating the strengths of the MAGTF's HMLA and TACAIR assets against the IDF assets was able to locate and engage these assets in a timely manner to support the MAGTF commander's targeting objectives.

DATA CONNECTIVITY TO THE DASC(A)
CAPT WEAVER, C3 DEPARTMENT

Since 1980 the Marine Corps' only dedicated airborne Command & Control (C2) platform has been the UYQ-3A. The DASC (A) shelter flown in the back of a KC-130 provides three single-channel UHF radios, two single channel HF radios and one frequency hopping capable VHF radio (SINCGARS) with the ability to operate in both secure and clear modes. While Battlefield C2 technology has advanced and moved towards joint interoperability and modern information technology, the capabilities of the UYQ-3A (limited to only voice

communications), have become outdated. Within our current aviation C3 architecture, to have any asset not digitally capable in the Marine Air Command and Control System is unacceptable.

The capability to send and receive data, whether that data be Fire Support Overlays or Near Real Time Air Picture, already resides within the capabilities of existing radios such as the PSC-5 (UHF/SATCOM) and the GRC-171 (UHF) radios. Advanced data controllers will allow the radio to interface with software designed to exploit the data sent and received. To fill this void, the ViaSat Communications Group agreed to loan the VDC 400 data controllers to provide data connectivity in this assessment.

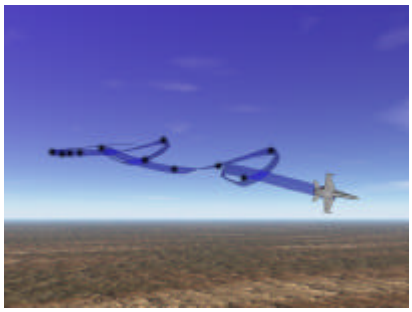
The Command and Control Personal Computer (C2PC) software was chosen for utilization in this assessment. The assessment itself led to marginal success. Initially, concerns were expressed on the wiring within the UYQ-3A, but after continued perseverance text messages and fire support overlays via C2PC were transmitted and received successfully on the ground. During ground testing the assessment met all of the objectives for data in the form previously described using the PSC-5 (SATCOM) and GRC-171 (UHF) radios. When conducting the airborne assessment the test ran into many roadblocks. With the GRC-171's, the difficulties encountered ranged from corrupted crypto fills to faulty KY-58's. The result was that only text messages were sent to the airborne DASC, not C2PC overlays. Although not a complete failure, it still did not render the results anticipated. The SATCOM portion of test also met with obstacles. During the ground portion of the test all objectives were again met in terms of data being sent and received. This test used two PSC-5's with similar antennas and the results were outstanding. However, the airborne portion of test required that the PSC-5 in the KC-130 use an escape hatch omni-directional antenna. This antenna has been previously used successfully for voice connectivity, however, during the test we were unable to acquire the satellite well enough for voice or data transmission. We can also draw from this portion, as an unintended consequence of the test, that this configuration when left on the ground can potentially fill the void in **ship to shore** data connectivity. The focus of the assessment was on connectivity to the Airborne DASC, however with the success on the ground, the employment can be easily applied to multiple scenarios where a large communications footprint is unavailable or not desirable.

What we gained from this assessment is that data connectivity with a ground C3 node and the Airborne DASC is feasible. The tactical relevance on the other hand still requires further evaluation.

LOW ALTITUDE SAM WEAVE EVALUATION
MAJ KEVIN WOLFE, TACAIR DEPARTMENT
MAJ BRETT WADSWORTH, TACAIR DEPARTMENT

Both MAWTS-1 and NSAWC introduced the SAM Weave Surface-to-Air Countertactic at the 2000 Working Group held in Yuma, AZ. The result of a year long Surface-to-Air Countertactic Study, this tactic allows one simple maneuver that is effective against all threats, at all altitudes, and facilitates enhanced situational awareness throughout the maneuver.

While the SAM Weave is equal to or more effective than any of our current threat reaction maneuvers, it poses some challenges in the low altitude environment. While simple to fly, aircrew are denied the low altitude RADALT warnings for most of the maneuver due to the angle of bank and G involved. While more effective against SAMs, both a HUD scan and execution mechanics (AOB, G, LV placement) must be emphasized to aid aircrew from the ever present threat of the ground in the low altitude environment.



Marine TACAIR assets operating in the low altitude environment should primarily exploit terrain masking as well as speed and altitude sanctuaries prior to using any canned Surface-to-Air-Countertactic maneuver. However, should a Hornet, Harrier, or Prowler be targeted in the low altitude environment and the appropriate Reactive Missile Defense results in a *No Joy / Singer* situation (no sight of missile and targeted), then a SAM Weave maneuver in this environment is warranted.

MAWTS-1 IPs, in a joint evaluation with both the Top Gun and Strike Fighter Weapons School Pacific staffs, have developed a plan for executing a modified SAM Weave maneuver in a controlled environment with a minimum of section integrity. The modified SAM Weave involves a HUD intensive scan pattern with some of the pitch attitudes adjusted for manageable attitudes when operating at altitudes of approximately 1500' AGL or less. Currently, MAWTS-1 is putting an administrative Hard Deck of 5000' on the SAM Weave (SCAT or Level S below 5000') until the evaluation is complete. Using these procedures, aircrew will gradually climb in altitude during the maneuver. Conduct for this Low Altitude SAM Weave Evaluation will be similar to LAT in that one aircraft will conduct the modified SAM Weave with a 500' MINALT with a chase aircraft monitoring that airplane for unsafe pitch/AOB parameters.

The SAM Weave has proven to a be a simple and effective maneuver against any SAM guidance law at any altitude. The ultimate result of the SAM Weave Evaluation will be a set of procedures that allows aircrew of any proficiency level to effectively and safely fly the SAM Weave in the low altitude environment.

AV-8B FORWARD OPERATING BASES (FOB)
MAJ SOFGE, TACAIR DEPARTMENT

During WTI 2-01, the Harriers operated from forward bases during two different exercises. The FOBs allowed the AV-8Bs to keep the tempo high and increase the number of sorties available to the TAC during surge operations. At each FOB, twelve sorties were flown with four aircraft in 5.5 hours. Ordnance upload and refueling took 55 minutes on average, time well spent by the pilots receiving intel update briefs from the collocated intel rep and Airboss. Ordnance delivered:

OAS-4: 34 Mk-82, 24 Mk-83, 2 GBU-16 (21.5 TONS)
FINEX 3: 43 BDU-45 (10.75 TONS)

The significant points:

1. Pilot Fatigue: Not a factor. Conditions were VFR and temperature in the mid 80s. Each pilot flew three sorties (2 Day, 1 night) in rapid succession and universally stated they were good for at least one more.

2. Ordnance: An equal mix of Mk-82 and Mk-83 was staged for the first FOB. Through the course of loading, delivering, and occasionally hanging ordnance, the planned A/C configurations changed. This caused some delay for the load teams while authorized loads were confirmed. In hindsight, KISS. For a given tactical problem, choose a single type of ordnance and a single configuration to bring to the battle.

3. Connectivity: A dedicated Airboss is required at the FOB, wired in to the MACCS structure as launch authority remain with the TACC/DASC. Dual-hatting a qualified LSS is a good solution given the relatively small scope of the MAWTS-1 FOBs and provides on-site Harrier expertise.

4. Footprint: While support requirements vary with FOB site from maintenance, MACCS, and AGS standpoints, the ordnance footprint is most significant. To fully realize the OAS advantages of forward basing (maximum ordnance in the target area in minimum time) the ability to simultaneously load multiple A/C is a requirement. In addition to the obvious weapons staging requirements (Net Explosive Weight limitations), fifteen ordnance Marines **with the appropriate qualifications** were required to support 4 A/C at the surge rate.

IR AIMING LASERS AND BORESIGHTING
LCDR BLOW, ADT&E DEPARTMENT

The employment of the AIM-1MLR, the GCP-2A/V2, and the AN/PEQ-3 IR AIMING LASER on helicopter crew-served weapons for both the assault and escort communities during WTI 2-01 greatly enhanced the ability of the gunners to identify and prosecute targets. Although the H-1 community has been using IR LASERS since the early 1990's, this was the first time the assault community has been able to actively employ them and the overall comments from the pilots and aircrews were outstanding. Not only do the LASERS enable the aircrew to positively identify targets, but they are also able to "spot" targets for other aircraft whether it is fixed wing during FAC (A) or aircraft within the same section. The GCP-2A/V2 Lasers' beam puts out a 100mw light that the gunner may adjust from a pinpoint spot up to a 30 degree spot light, and the power is adjustable from high to low with an eye safe mode for force-on-force training. The AN/PEQ-3 AIMING LASER is a dual beam LASER which has a spot light that is adjustable from a pin-point to a flood light along with a pin-point aiming beam. Both beams may be operated together or separate.

Along with the use of the LASER's, the aircrew students were taught the process of boresighting the LASER to the weapon for greater accuracy. When the LASER is boresighted to the weapon it is being mounted to, the probability of first rounds on target is greatly increased, resulting in fewer rounds being wasted by "walking" the rounds into the target. The boresight procedure takes less then 10 minutes and may be completed in the hanger in a LASER safe room by the gunners, or in the FARP with prior coordination. In order to boresight the LASER, you will need to obtain a LASER BORESIGHT KIT from NSWC Crane Division (POC Adam Parsley email

is parsley_a@crane.navy.mil) with the .50 caliber and M240D mandrels and extensions. The GCP-2A/V2 IR AIMING LASER is available through the MAG's and is produced by NVEC-Night-Vision Company (www.nvec-night-vision.com), and the AN/PEQ-3 is produced by Insight Technology.

The LASERS may be used on any range where the use of live-fire weapons or a greater power LASER has already been approved. The aircrew will need to have the LASER SAFETY CLASS in the Enlisted ASP before using the LASERS, and the squadron will need to set in place a LASER SAFETY SOP. The flight surgeon and DOSS may create the SOP with help from the MAG LSO. The steps to get the approval to use the LASER and have the aircrew qualified on them are extremely easy to acquire and the benefits are unsurpassable in the night BCWD environment.

LAU-68 POD / AIRCRAFT ALIGNMENT
MAJ RICHARD JORDAN, ASD DEPARTMENT
CAPT MARIANO HAWK, ORDNANCE DEPARTMENT

During the recent WTI the ordnance division aligned every rocket pod that went out on Huey ordnance evolutions. The effort paid big dividends. During student warm up flights they were able to deliver "CAS" rockets delivered from 1500 to 800 meters with an average first shot error of 101 meters and "marking" rockets delivered from 5000 to 3000 meters with an average error of 254 meters which is within the marking standard. While we look for better effects from each rocket we need to keep in mind this was the warm up sortie. As WTI 2-01 continued both CAS and marking rockets notably improved as did the pilots' confidence. Alignment of the LAU-68 with the aircraft waterline eliminates many of the variables associated with rocket delivery and allowed for consistent first shot accuracy. The process of aligning the pods initially took 15 to 20 minutes per aircraft, but as the class progressed the time was reduced to 10 minutes per aircraft. This is a tremendous opportunity to increase our mission effectiveness and the quality of our training sorties at very little cost.

The procedures for bore sighting are outlined below.

1. *INBOARD BRU-20/21 JAM NUTS:* Install inboard Jam Nuts of the BRU-20/21 below the forward and aft Sway Arm Assembly. Adjust the inboard Sway Pads to approximately 7/8" from the bottom of the Sway Arm to the bottom of the Sway Pads. Leave Jam Nuts loose. Pre-setting the Sway Pads to this distance saves time. (Measurements are taken from the outer most section of the forward and aft Sway Brace Assembly. Push on bottom of Sway Pads, level the pad to the Sway Arm Assembly then measure).

2. *ADJUST LAUNCHER LUGS:* Screw launcher lugs into launcher until they stop, back aft lug out one half turn. Back the forward lug out one full turn. Install launcher on aircraft. After BRU is locked, visually center launcher lugs in BRU Rack Hooks.

3. *MEASURE AIRCRAFT PITCH:* Measure aircraft nose up pitch using the Gunners Quadrant from the AH-1W TSGMLACA (TML Boresight Kit). Place the Gunners Quadrant on the aircraft watermark located on the port side of the cabin floor of the aircraft. Level the Gunners Quadrant bubble and record the pitch angle of the aircraft in (+) mils. Convert the mils reading to degrees (17 mils equals 1 degree) for later use. The mil reading will normally equal 70 +/- 10 mils (4 to 5 degrees).

4. *ADJUST LAU-68/61 PITCH:* Transfer the Gunners Quadrant from the watermark to the top of the loaded launcher. Ensure the Gunners Quadrant is pointing in the same direction as it did on the watermark. Use inboard and outboard Sway Pads to level the Gunners Quadrant bubble to the same reading as the watermark in pitch. Visually ensure launcher lugs are centered in the BRU Rack Hooks. Sway the launcher down while maintaining a level bubble. Do not over tighten the Sway Pads, but ensure the launcher doesn't shift after swayed. If adjustment leads to over tightening, drop the launcher and screw the forward lug in or out a half turn as necessary to obtain a level bubble.

5. *RECORD AIRCRAFT PITCH ANGLE:* Record the mil and degree readings on the aircraft Part A while signing off the aircraft load. The pilot will take this reading and adjust his Attitude Gyro to the same angle as the aircraft and the launcher prior to engine turn up.

6. NOTES: Watermark measurements must be taken every time the aircraft is loaded. This alignment method is reliable for any pilot aiming method, however, expedient boresighting of the CA-513E Reflex Sight per the NA 11-95CA513-1 is also recommended. Once the sight is bore sighted you can keep the sight from vibrating during flight by strapping Velcro between the Sight Assembly and the Mount Assembly. If you have any question

contact CWO3 Bailiff at DSN 365-8257.

As caught on tape by the Star SAFIRE aligned pods put rockets where the aircraft is pointed. The rest is up to the pilot at the controls.

LET THERE BE LIGHT; IMPROVED ILLUMINATION DELIVERY TECHNIQUES
MAJ K. M. HUDSON, ASD DEPARTMENT
MAJ T. A. KOLB, ASD DEPARTMENT

The MAWTS-1 Cobra and Huey divisions have utilized the M278 2.75" infrared illumination warhead (NALC HA06) during WTI 2-01 and several previous WTI classes. The M278 is not discussed in the UH-1 TACMAN, and is incorrectly labeled as the M258 in the AH-1 TACMAN. The M278 produces a spectral response from 580nm to over 1000nm, peaking at approximately 780nm. Unlike the M257, the M278 burns for 180 seconds. The differences in spectral response and time of burn significantly alter both the tactical and delivery considerations for the M278. The AH and UH TACMANs address the safety concerns of the spent rocket motor travelling an additional 700-1000m beyond the flare expulsion charge. These concerns also apply to the M278.

Due to the covert nature of the illumination that the M278 provides, only aided personnel on the ground will benefit from the M278. Once the flare ignites, only the burning squib is visible to the unaided observer, which provides no overt luminance. Tactical employment for airborne use is also different from overt illumination. The M278 does not assist FLIR or CCD performance and therefore will not aid target engagement for the TOW missile. Conversely the M278 will greatly assist target detection and recognition for NVGs. This may aid the pilots in directing the FLIR onto potential targets. The M278 may be used for the illumination of target areas to aid in target detection during LLL periods and therefore increase the target engagement tempo.

The standard delivery parameters for the M278 differ from those used with the M257. In order to utilize the full three minutes of M278 flare burn time, the pitch attitude during delivery must be increased from 15° for the Cobra and 19° for the Huey, to 22° and 26° respectively. The additional pitch required to utilize the longer burn time reduces the rocket's travel down range from the M257's 3500m to 3000m for the M278. Assuming that the engagement is over flat terrain, the additional pitch attitude will cause the M278 to ignite at 2500ft AGL, vice the 1800ft AGL associated with M257's standard delivery. As with any other special-use weapon, covert M278 must be given the same considerations as the overt illumination of the M257, LUU-2, mortar and artillery illumination. All these weapons must work in synch with the ground scheme of maneuver and more importantly, the fire support plan.

An example: A mixed UH/AH section is tasked to provide IR illumination for an immediate TRAP extract. The FAC(A) providing terminal control requests covert "sunshine" at TOT 22. The UH/AH section is 6 kilometers due west of the objective area and is masked by an 1800' mountain located 1500 meters west of the objective area.

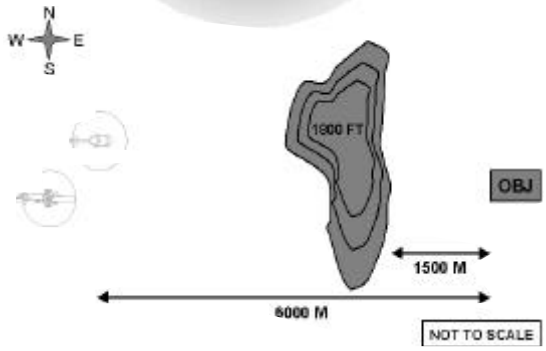


FIGURE 1

Applying the GD3 rocket marking method to this mission, both the UH and AH crews put the target location (*GRID*) into the Flight plans of the CDNU/CDU, which quickly gives a GPS direction and distance to the target. (*DIRECTION, DISTANCE*) After taking the winds into consideration (10 knots from 180° requiring a 5° correction to the south; *DOPE*) the UH/AH section pushes from 6km toward the delivery point at time 20+42 and at 90kts in order to meet the 22 TOT (65 seconds of aircraft travel plus 13 seconds of rocket travel). At 3100 meters the lead Huey brings the nose up to 25° decelerating to 60 kts in the process. Concurrently the dash 2 AH brings the nose to 21°, also decelerating to the 60kt delivery speed. As the section reaches 3000m from the target, both aircraft deliver two M278 rockets on a heading of 095°.

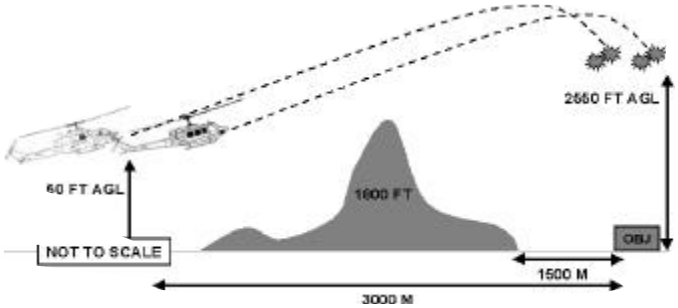


FIGURE 2

The M278s illuminate precisely over the intended spot, no corrections are required. The illumination, delivered from defilade, achieves first shot accuracy within 1 second of the TOT. A simple employment technique, which maximizes the use of the on board aircraft systems. On time; on target!

PRC-117F ISO MARINE AIR TRAFFIC CONTROL MOBILE TEAM (MMT)
GYSGT FRAZIER, C3 DEPARTMENT

During WTI 2-01, Marine Air Traffic Control Mobile Team (MMT), incorporated PRC-117F radios for the first time in support of Tactical Landing Zones, Helicopter Landing Zones, and Forward, Arming and Refueling Points. Air Traffic Control detachments have received three of these radios in support of the recent table of organization changes expanding the detachments to allow for the structure of two MMT's. The basic operational characteristics of the PRC-117F is the successful merging of the PRC-119, PRC-113 and PSC-5. The PRC-117F is manufactured by Harris Communications and is a manpack Line of sight (LOS) radio with VHF, UHF and SATCOM capabilities. The radio allows for mounting of both VHF and UHF antennas simultaneously. It operates on two BA-5590 lithium batteries for approximately 24 hours and it has the ability for data and voice transmissions. The radio has a detachable keypad display unit allowing the operator to attach the keypad to their wrist. This enables the operator the ability to change any radio functions without removing the radio from its pack. The PRC-117F possesses embedded crypto equipment for all functions and is capable of clear and secure communications in VHF, UHF single frequency, SINCGARS and HAVEQUICK modes. The abilities of this radio greatly enhance the capabilities of the MMT while reducing the amount of radios needed without degrading communications capabilities. The MMT traditionally embarks with two PRC-113's, two PRC-119's, a PRC-104, associated antennas and comsec equipment. The team now can operate with a minimum of two and optimally three PRC-117's and a PRC-104.

The radio was used primarily for the control of air traffic during WTI 2-01. The radio performance exceeded the expectations of the operators. The ability to control power output in relation to signal strength greatly enhances the operators ability to reduce or increase the range of his radios in accordance with the mission. Harris Communications did not publish range information for the PRC-117F in the associated literature so field testing results will have to suffice until hard figures are established. The radio has a beacon mode feature that acts as a homing beacon. This mode was tested for possible aircraft navigation, however the beacon performs much like an Emergency Locator Transmitter on an aircraft and should only be utilized for emergency situations.

There are some positive and negative points of operation of the radio that should be addressed. Radio operations will cease when the available battery power falls below 24 volts. Battery condition can be monitored via the keypad display unit test mode. This situation could be avoided if the power output is decreased from 10 watts to either 8 watts or 5 watts but this reduces the range of the radio.

Actual ranges for radio transmissions in the UHF spectrum with aircraft fluctuated too much to give an accurate range, but generally a distance of 5-7 miles were well within the operating distance with aircraft operating at or below 300' AGL. Reception ranges at times extended as much as 15-20 miles dependant on the power output of the source transmitter. The radio will maintain its crypto fill and the Word of the Day (WOD) when turned off but will lose the Time of Day (TOD). The WOD and the TOD are required for HAVEQUICK operations and the TOD must be properly synchronized for HAVEQUICK operations with other platforms. This TOD loss or non-sychronization is critical to HAVEQUICK operations in remote environments. This problem is rectified if other agencies are able to send the TOD to the operator or it can be inserted using a PSN-11 (PLGR). The radio needs to be utilized with AM modulation when operating in the UHF spectrum and FM modulation in the VHF spectrum. The PRC-113 and the PRC-119 are already set for the proper modulation, but the PRC-117F with the capabilities

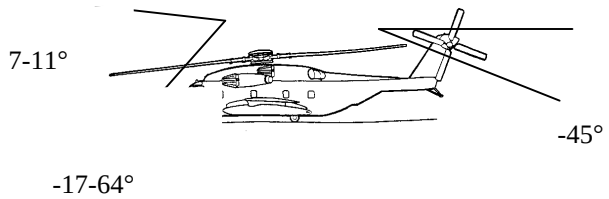
of both frequency ranges has to be programmed with specific AM or FM modulation. Improper modulation selection will result in either a no communication or a receive nly situation with the aircraft. When operating in secure mode the digital squelch must be on, while in clear mode the digital squelch must be off with the analog squelch set on “noise” with a recommended level of medium.

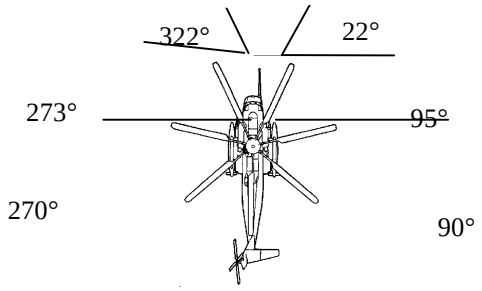
The radio has SATCOM capability, however the current configuration purchased by the Marine Corps for the Air Traffic Control detachments does not include the antenna for this function and was not used during WTI 2-01. The MMT course will continue to evaluate the radios capabilities and applications for today’s tactical environment. The MMT course will test the ability of the radio to operate effectively in the HAVEQUICK and SINCGARS secure mode during WTI 1-02.

CH-53E RAMP MOUNTED WEAPONS SYSTEM TAC-DEMO
MAJ MCLELLAN, ASD DEPARTMENT

During WTI 2-01 MAWTS-1 CH-53 Division successfully conducted a tactical demonstration of a Ramp Mounted Weapon System (RMWS). The net effect was an increase of 180° greater defensive fire capability oriented around the aircraft’s 6 o’clock position. The weapon utilized was the current issue Marine Corps XM-218 modified with the GAU-16 backplate assembly (currently available in HMLA squadrons) and the Air Force E-13 gun mount system. The aircraft was a FMF CH-53E configured with an USAF MH-53J Pave-Low ramp.

The CH-53E in its current configuration has 131° of defensive fire capability. The areas of vulnerability are the area +/- 51° of the 12 o’clock and aft of the 3-9 o’clock. With the addition of the RMWS the tail area is covered with an additional 180° of defensive fire capability +/- 90° of the 6 o’clock





There was a significant increase in situational awareness due to having the third aircrewman on the ramp. This enhanced the aircrews lookout doctrine in an area that is typically vulnerable due to airframe size. Crew coordination initially took several minutes to develop the correct flow but towards the middle of the flight the aircrew were successfully passing targets from both left and right door guns to the tail gunner keeping nearly constant suppressive fire on targets. 4000 rounds were fired: 2000 during the day and 2000 at night utilizing the GCP-2.

Loading and unloading of the Ground Combat Element (GCE) was accomplished both during the day and at night utilizing the ramp in the level position then releasing the leveling restraints and lowering the ramp to the deck. Releasing the leveling straps is the preferred method at night and can be accomplished in one additional minute on short final so as not to increase time on the deck. The weapon system on the ramp did not prove to be too great an obstacle and actually ensured the GCE exited the aircraft to the right side of the aircraft away from the tail rotor.

Escort integration was accomplished during a long range raid scenario placing the RMWS configured CH-53 at the end on the flight, this allowed the escorts to focus more towards the 10-2 o’clock of the flight. As with all live fire evolutions the incorporation of the RMWS will require detailed pre-mission planning and training to determine all of the implications.

Airframe changes required to make Marine ramps compatible with the RMWS are minimal, as there were no changes to the internal configuration of the Airforce ramp. It was determined the airframe could be changed from the RMWS to cargo/troop configuration in approximately 11 minutes. Of particular note was a lack of noticeable vibration from RMWS. With the incorporation of the E-13 mount with built in recoil dampers (shock absorbers) there was a significant decrease in the vibration of the weapon system. Further study and investigation through an aircraft that is instrumented to determine the extent of the vibrations should be validated prior to fleet wide dissemination. Airframe clearance issues were a concern. A laser boresight kit was

utilized to ensure airframe clearance with the dorsal fins laterally and the tailskid aft prior to firing. There was 10" of clearance on the dorsal fins and 24" of clearance from the tailskid.

TBFDS OPERATIONS
CH-53, ASD DEPARTMENT

During WTI 2-01, the CH-53 Division executed Tactical Bulk Fuel Delivery System (TBFDS) operations in the desert environment on four occasions. Although this mission is not a new capability to the 53 community, several potential tactical applications were utilized during WTI 2-01 that warrant dissemination to the rest of the Assault Support Community.

TBFDS Execution: The average time spent setting up the TBFDS site at night was 15 minutes, while the time spent breaking the site down was an average of 40 minutes. Approximately 11,000 pounds of fuel was dispensed to escort aircraft on each evolution. Additionally, there were plans to execute a "hot tube reload" of the AH-1s in the TBFDS site with an additional 53 carrying ordnance at an austere site. This would not only have increased the AH-1s time on station but would have increased their payload as well.

TBFDS Aerial Refueling: One mission required the 53 to leave its TBFDS site to aerial refuel then return to its original site. 66 minutes elapsed from the time the last H-1 received fuel until TBFDS was back on station ready to pump gas. In order to accomplish this the zone set-up was left in place, hoses disconnected and capped off from the FARE pump, then the CH-53E flew 20 miles to meet the KC-130 cargo airframe on the refueling track. 23 minutes elapsed on the hose for a total take of 11,000 pounds of fuel. The time off station could be decreased by moving the track closer (threat permitting) or utilizing a KC-130 tanker frame with an increased pump rate.

TRAP Execution: The only day TBFDS mission accomplished was highly successful. The 53 sprinted ahead of its AH-1W escort and had the TBFDS site setup within 11 minutes. It took approximately 9 minutes to download 2,600 pounds of fuel to 2 AH-1s, then 30 minutes to break down the site. In a combat environment this time could be reduced to 15 minutes if the hoses were emptied in zone as opposed to draining them back into the TBFDS tanks.

APP Operations/Site Set-up: The desert environment creates a unique problem associated with the use of the Auxiliary Power Plant (APP) used to start the engines on the CH-53 as well as to power the TBFDS. The sand and debris kicked up by the aircraft receiving fuel can potentially damage the APP rendering it, and the aircraft, inoperative.

When planning the TBFDS site, adequate consideration must be given to site selection (Soil composition and winds), and planned use of the APP. Plan to bring a PRC-113 radio to conduct TBFDS communications, and plan use of the APP only when the receiving aircraft are hooked up to the TBFDS hoses. This will ensure that the APP is not operating when the receiver aircraft are kicking up debris and dust while they air taxi in and out of the refueling site. Another option is to leave an engine on line. If you leave the engine on line at 100%, you have no need for the APP, but the turning rotors will present an extra distraction/hazard, and it will burn more fuel.

UNMANNED AIR VEHICLE
MSGT BONNER, C3 DEPARTMENT

During WTI 2-01 Marine Unmanned Air Vehicle Squadron 1 flew the Pioneer Unmanned Air Vehicle (UAV) in Time Sensitive Objective missions with an EA-6B Prowler, E-2 Hawkeye and E-3 AWACS. These missions were primarily in support of Electronic Surveillance (ES) and Suppression of Enemy Air Defense (SEAD).

The Pioneer UAV was integrated with the EA-6B Prowler to locate radiating targets in the objective area. The ES mission was planned to have the Prowler plot bearing information of possible targets from a bullseye. The Pioneer would then fly that radial, searching for the exact location of the target. Once the target was located the UAV Mission Commander would then pass a 6 digit grid to the EA-6B. As this mission was beginning to unfold the EA-6B was called to another objective, so an adjustment to the plan was made. The Pioneer UAV flew over suspected target locations, obtained grids and passed that information to the EA-6B over UHF using call signs and code words.

The Pioneer UAV was also integrated with the E-2 and E-3 for Time Sensitive Operations. The UAV was tasked with locating Enemy Air Defense sites and passing that information to the airborne assets. Using techniques and procedures similar to the ES mission, the location of SAM sites were passed using TATC and VPN.

URBAN SURFACE FORCE ESCORT
MAJOR ADAMS, ADT&E DEPARTMENT
MAJOR KOLB, ASD DEPARTMENT

During WTI 2-01, the AH-1W and UH-1N Divisions conducted the escort of surface elements through a dense urban environment at night. This escort was a portion of the Assault Support Tactics (AST) 3 evolution, conducted in downtown Phoenix, which simulated a two-site non-combatant evacuation operation (NEO). The escort simulated the final movement of the ambassador from his residence at the embassy to the evacuation site, in this case the Phoenix International Raceway.

Escort Capabilities and Limitations:

Initial escort package included 2 AH-1Ws and 1 UH-1N. The flight had to navigate from the evacuation site to the "embassy" (in this case the Maricopa County Sheriff's Office), visually acquire the convoy, and then clear the vehicles along a pre-planned route. Appropriate street maps were essential during both planning and execution phases. Even though the planners had a detailed metropolitan street atlas of the planned routes, the prospective WTIs chose to use a map that was of too small a scale to be useful in navigating in the urban area.

The vehicle was marked with 4 visible "VIPR" lights (white, red, blue & green) oriented to flash in an upward direction. Even though there was a great deal of ambient urban lighting, these lights provided a very distinguishable mark that was useful to keep track of the convoy.

The use of AN/AVS-9R Night Vision Goggles (NVG) provided a greater ability to break out details from within the brightly lit urban areas than those aircrew equipped with AN/AVS-6 NVG.

Attack patterns need to be briefed in detail in order to effectively support ground forces in a dense urban environment. Attacks for aviation delivered ordnance needed to be made along an axis parallel to the route traveled by the convoy. Even though there were only one and two story buildings along the planned route, they still provided obstacles that prevented maintaining line of sight from perpendicular positions. The UH-1N had two snipers onboard and was equipped with the Star Safire/Navigation Thermal Imaging System (NTIS). In addition to the snipers the UH-1 was armed with 1 x M240G and 1 x GAU-16. Both AH-1Ws were equipped with Night Targeting Systems (NTS) and had a notional loadout of 4 TOW missiles, 7 x 2.75" HE rockets and 400 x 20mm PGU-28B. This ordnance load provided a great spectrum of response options – from one sniper bullet to a TOW missile. The sensor package provided good coverage of the route as well as the capability to provide suppressive fires when required. With the UH-1 in the flight, there was always an option to land and embark the ambassador if the route became impassable.

The escort pattern that worked best was a dual altitude, counter-rotating pattern (see figure 1). This provided good observation and reconnaissance of the planned route but proved challenging to control during target engagements. Once a fire support call was made, there needs to be a detailed plan to maximize the ability of the aircraft to engage targets and not be concerned with aircraft deconfliction (use linear features for deconfliction vice altitudes).

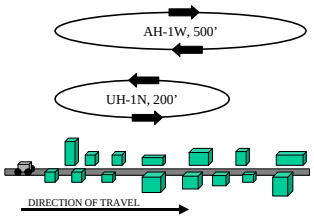


Figure 1. Counter-Rotating Escort Pattern

The responsibility for route clearance and navigation was not delineated specifically during the brief. In execution, the attention of the pilots was consumed by clearing the route in addition to ensuring that the other aircraft were not flying through the same airspace. As a result, during some of the called attacks it was difficult if not impossible to get timely fires in support of the convoy.

One way to solve the problems encountered during the evolution would have been to utilize the following pattern (see Figure 2). By placing a single H-1 in a high overhead position, he can be tasked with observation along the route and providing direct guidance to the convoy. He can also direct the actions of the aircraft below him in the case that fire support is required. From this high position, he can readily anticipate potential problems

along the route, scan for roadblocks or threats and divert CAS aircraft to investigate items of interest.

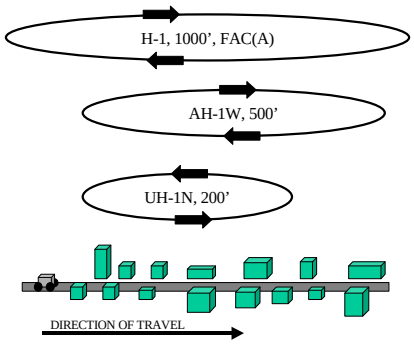


Figure 2. Proposed Solution to Difficulties Encountered

Escorting vehicles in an urban environment is a challenging endeavor. A number of lessons learned were taken from this evolution and will be applied during future AST 3 evolutions.

UH-1N LONG RANGE MARK
MAJ T. A. KOLB, ASD DEPARTMENT

When conducting terminal control, one of the keys to getting the CAS ordnance on target is the accuracy of the mark. Though target marking may be accomplished via many different methods, (i.e. laser designator, indirect fires, talk-on, etc) the ability to consistently provide an accurate, long range, 2.75" rocket mark is invaluable to the UH-1N and AH-1W. The question has been asked whether the Huey or the Cobra can deliver a consistently accurate rocket mark from 3000-6000 meters? Additionally, how can the HMLA community utilize the full array of improving aircraft systems and capabilities in delivering the long range mark? The following procedures, refined during the past WTI class, may proffer a more positive answer than one may initially think. This article will discuss the UH-1 procedures specifically, but the theory is compatible to the AH-1W with minor platform equipment adjustments.

On the modern battlefield, consistent accuracy in delivering a 2.75" rocket mark and survivable delivery ranges may seem to be mutually exclusive. The UH-1N CA-513 reflex sight, though effective when properly boresighted, is becoming obsolete due to disrepair, removal, and neglect. Our challenge as UH-1 pilots is to develop and refine procedures that will maximize the equipment and software improvements that have been incorporated in our airframe over the past few years. This article outlines a method for 2.75" rocket marking that has proven to be successful in consistently delivering accurate marks from survivable distances and from tactically survivable flight profiles. The acronym GD3 (Grid, Direction, Distance, Dope) simplifies the procedures for delivering such a mark.

The first step in using the GD3 marking method is obtaining the target *GRID*. The grid may be obtained from many sources; the FAC or FAC(A), the map, or a laser grid. The grid must then be entered into the scratchpad of the CDNU as a waypoint, which is then used in the DIRECT TO (DIR) function. If the aircraft is equipped with a Star Safire, the target grid may be lased into the target list, then placed in the DIR function. The DIR function will align the number two BDHI needle with the target, which is an invaluable tool in remaining oriented while orbiting in a battle position (BP), especially if terrain, smoke, or the light level is obscuring the line of sight to the target. (See figure one) By using the DIR function of the CDNU, the second step of GD3, *DIRECTION*, is continuously visually depicted via the number two needle of the BDHI. It should be noted that the CDNU is versatile enough to accomplish this task through multiple methods, and it is beyond the scope of this article to attempt to discuss all possible deviations.

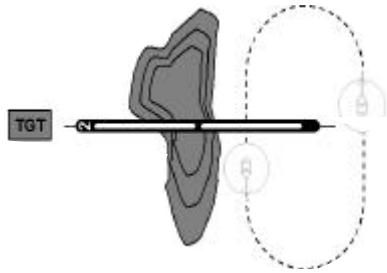


FIGURE 1

The next step in using GD3 is to obtain the *DISTANCE* information from the marking aircraft in the BP to the target. This can be accomplished very simply using the DIR function of the CDNU if all systems are operating 4.0. The distance data may be cross referenced with the map, and/or verified with the laser range finder when accuracy of the CDNU and GPS information is in question. Setting the CDNU scale to metric will provide the distance to target information in 100 meter increments.

The next and most involved step of GD3 is the *DOPE*, or rocket pitch delivery data available from the rocket charts in the UH-1 TACMAN. Choosing the chart that most accurately depicts the marking aircraft's delivery airspeed, the rocket dope can be calculated. Using the aircraft's relative altitude above the target, (AGL corrected for target elevation) and the distance to the target, the corresponding trajectory line will delineate the sight angle in mils, and more importantly, the pitch angle in degrees. The rocket trajectory line will also provide the time of flight information that is essential for delivering a timely CAS mark. The time of flight is subtracted from the desired CAS mark, which is an additional 20-30 seconds prior to the CAS time on target (TOT).

Putting the GD3 method into practice, we can complete the following example. Deuce 14 and 15 are a section of UH-1s conducting a FAC(A) mission. They are holding at 100 feet AGL and 60 knots several kilometers from the target area. As soon as a target is identified, the grid for the target in entered into the CDNU, and the DIR function gives a direction of 090° and a distance of 4500 meters. Additionally the AGL altitude of 100 feet is added to the target elevation difference of 100 feet for 200 feet of relative altitude between the aircraft and the target. Using the rocket chart pictured in figure two (page 6-37 UH-1 TACMAN Vol. I) we see that these parameters fall directly between the H and I trajectory lines. (See figure two) We then extrapolate the pitch angle of 8.8^{o} and a time of flight of 12 seconds. As the CAS aircraft is IP inbound, the marking aircraft may need to take additional variables into account, (i.e. wind considerations) before delivering the mark on the heading of the number two needle 42 seconds prior to the CAS TOT. Correcting for wind is based on the empirical evidence that the rocket trajectory, and therefore rocket accuracy, is degraded by the wind's effect for times of flight greater than 6 seconds.

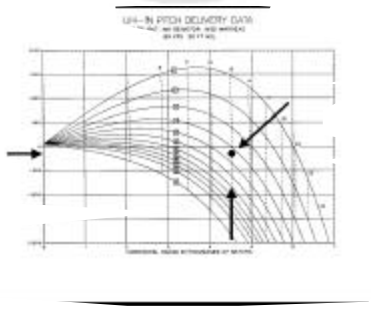


FIGURE 2

Note that for each planned mark, these values may vary slightly, so we will do the entire process for each planned mark. Additionally, the survivability of delivering this mark may be enhanced by firing the marking rocket from defilade. If the distance to the target and surrounding terrain support such a shot, the trajectory may look as depicted in figure three.

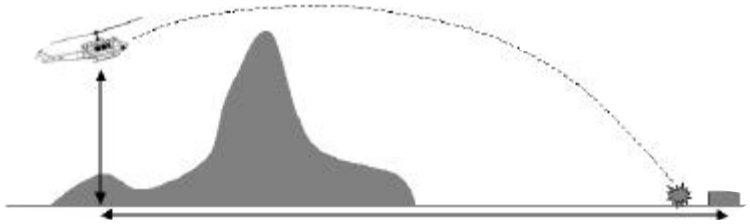


FIGURE 3

The introduction of the GD3 marking method would be incomplete if it did not address the limitations associated with its use. The GD3 method may seem to involve a high pilot workload, but this can be reduced with a reasonable amount of preflight planning. Information such as delivery airspeeds and altitudes may be predicted for a FAC(A) mission even if the exact location of the target area is not known. Using both 60 and 90 knots, 100 and 200 feet of relative altitude, we can accumulate the delivery data for multiple ranges directly from the rocket charts. (see figure four) Without this preflight planning, completing the entire GD3 the process during the dynamic environment associated with terminal control may be unrealistic, especially with an inexperienced pilot. In this case, parts of the GD3 method may be used when time does not permit all steps being completed from start to finish.

	100 FEET PITCH / TOF	**200 FEET PITCH / TOF**		
DISTANCE	**60 KTS**	**90 KTS**	**60 KTS**	**90 KTS**
1000M	---	---	---	---
2000M	2.9^o / 4 Sec	3.1^o / 4 Sec	1.9^o / 4 Sec	2.0^o / 4 Sec
3000M	4.8^o / 6 Sec	5.0^o / 6 Sec	4.3^o / 6 Sec	4.5^o / 6 Sec
4000M	7.5^o / 10 Sec	7.9^o / 10 Sec	7.0^o / 10 Sec	7.4^o / 10 Sec
5000M	11° / 14 Sec	11.5^o / 14 Sec	10° / 14 Sec	11° / 14 Sec

FIGURE 4

This chart may seem cumbersome and complicated, so streamlining may be required. Figure five is an example of a simple, kneeboard-friendly version of the data encapsulated from figure four, which will alleviate the high workload in flight. Extrapolation is required for nonstandard altitudes and distances.

60 - 90 KTS	**100 FEET**	**200 FEET**
2 K / 4 Sec	3°	2°
3 K / 6 Sec	5°	4°
4 K/ 10 Sec	8°	7°
5 K/ 14 Sec	11°	11°

FIGURE 5

The GD3 marking method was validated during the 2-01 WTI class. A snapshot of our data comes from the UH-1 warm up flight which utilized the Cactus West scored rocket range. Utilizing the GPS mark function to determine distance from the target, the students fired 7 long range rockets each: 1 from 2000m, 2 from 3000m, 2 from 4000m, and 2 from 5000m. The average miss distance was 234m, well within the J-CAS standard of 300m for an acceptable CAS mark. The GD3 technique provides a legitimate and survivable method to deliver a consistent mark by maximizing the current technology available in the UH-1N. GD3 is also an appropriate marking tool for the AH-1W in cases dealing with non-LST capable fixed wing CAS aircraft, bent designators, or battlefield obscuration. Hit my smoke!

FARP HOT RELOADING
CAPT HAWK, ORDNANCE

MAWTS-1 continued with the evaluation of hot tube-loading, reloading of rockets on helicopters while the motor and rotors are turning, under waiver authorized by HQMC. Seven evolutions, including five night operations, were successfully completed with 198 Mk 66 Mod 4 2.75" motors hot tube-loaded. These hot tube-loading procedures, verified over the last three WTI courses, were validated on site by NAVAIR this course. These procedures will be formalized into the NA 01-H1AAC-75-12 for the AH-1 (dtd 1 MAY 2001) and the NA 01-110HCE-75-12 for the UH-1 soon to follow (both of these checklists should be downloadable by summer's end).

In addition, the waiver approved and MAWTS began the initial steps to hot reload 20mm and TOW missiles. Just as with the rockets, the crawl, walk, run approach is being used to ensure appropriate steps are established and in place to conduct these operations safely. One walk-through each for the 20mm and the TOW missile were completed successfully to verify steps and get initial times. Early indications are that both these procedures can be quickly and safely accomplished to enhance the warfighting ability of AH-1 attack helicopters. Waivers for the further development of these procedures, as well as evaluation of hot reloading of ECM dispensers, will be requested for WTI 1-02.

In concert with the continued development of hot reloading procedures, training of fleet Ordnance personnel continues. To date, 72 organizational and intermediate level Aviation Ordnance Marines have completed the training syllabus at MAWTS-1. These Marines take this knowledge back with them and begin the process of passing this training on to their squadron mates. This training is essential to ensure that established procedures are adhered to alleviate any possible mishaps. This training is in keeping with CMC policy for hot reloading. CMC msg dtg 230001Z APR 01 sets USMC policy for hot loading/reloading.

TBMCS
CAPT D. N. SPRENKLE, C3 DEPARTMENT

During WTI 2-01, MAWTS-1 successfully used TBMCS 1.0.1 in its Future Operations role where we built a total of fourteen Air Tasking Orders (ATO). Below are some of our lessons learned.

TRAINING

The first and most obvious obstacle we encountered was our lack of formal training in using TBMCS to build an ATO from start to finish. While Major Carusone and Captains Weaver and Sprenkle had training at the Joint Airspace Command and Control Course, the three day TBMCS Basic Operator Course (TBOC) at North Island, and operator experience from several developmental tests, none of this training equipped us to build the ATO from the keel up. The courses are not designed to teach Future Ops procedures and many of the basic steps in ATO creation such as creating an ATO shell, saving airspace as a group and tying it to an Airspace Control Order, and disseminating the ATO had to be learned after the formal school.

Fortunately, Jack Sexton from the Mitre Corporation was able to spend five full days at MAWTS and was our one and only source of instruction on ATO creation with TBMCS. Jack was able to run through the entire build process with us and cover those small, little known steps that have a great impact on the final product. As a result, we have captured some lessons learned and consolidated them in a five part training package which will be addressed later.

OBSERVATIONS

1. New data entered from EMR (Current Ops) into the AODB must be coordinated with Future Ops. If not, there is a high potential that ABP inputs from Future ABP inputs will be incomplete (not all missions will be seen in Current Ops on future ABPs).

2. TBMCS does not implement all ATO 98 USMTF fields. MAWTS-1 is asking for a complete list and will forward to the fleet.

3. Fleet units need to review the ATO 98 format to ensure Marine Corps mission types are listed. As an example, we found the DASC(A) and Armed Recce missing as mission types and had to substitute Airborne Command (ABC) and Battlefield Air Interdiction (BAI) respectively.
Any suggestions to the ATO 98 format can be made by contacting Buck Connelly at MCTSSA, DSN 365-2510.

4. The System Chart does not allow the input of different types of datum for conversion.

MAWTS-1 PRODUCTS

In an effort to assist the fleet in developing a skill/knowledge base, MAWTS-1 will provide a CD based training package that contains the following items:

1. Detailed diagram of the ATO creation process (Future Ops Officer Guide)

2. Detailed step by step procedures for Theater Air Planner and Airspace Deconfliction for ABP build.

3. ATO 98 class on MAWTS-1 Academic Support Package, which shows how to read ATO 98 and highlights the differences from ATO 95.

4. Detailed ABP database (ready to build missions) with completed lab data sheets (transition sheets)

5. Standard USMC ATO Transition sheets to integrate planning and production. These will highlight minimum required information for mission creation.

MAWTS-1 SUBJECT MATTER EXPERT'S
DSN (269-XXXX) COM (520) 269-XXXX

SUBJECT	P.O.C.	EXT
RF SAMS:	Capt Suggs	2952
IR SAMS:	Capt Jones	2199
AAA Threat:	Capt Abrams	2968
F/W Threat:	Maj Bergad	2261
R/W Threat:	Maj Watkins	2582
Surface to Surface:	Maj Ross	2957
UAV Threat:	Maj Ross	2957
Threat IR AAMs:	Maj Leiblein	6025
Threat RF AAMs:	Maj Bergad	2261
TOW:	Capt McKay	3361
Hellfire:	Maj Watkins	2582
HARM:	Maj Bergad	2527
JDAM/JSOW:	Maj Boyles	2008
	Capt Rowell	2276
Maverick:	Maj Sofge	2752
LGBs:	Maj Bergad	2527
Cluster Munitions:	Capt Rowell	2276
Conventional Ord:	Maj Sofge	2752
Reactive Wpns:	Maj Sofge	2752
Fuzes:	Maj Huff	2024
AIM-9:	Maj Leiblein	6025
AIM-7	Maj Boyles	2008
AIM-120:	Maj Huff	2024
M61A1/2:	Maj Reed	3591
APG-65/73:	Maj Wadsworth	2008
	Maj Sofge	2752
FLIR/LDT:	Maj Wadsworth	2008
ALE-39:	Maj Dowling	2643
	Maj McPhillips	2752
ALE-47:	Maj Wadsworth	2008
ALR-67:	Maj McPhillips	2752
ALQ-157:	Capt Jones	2199
ALQ-164:	Maj McPhillips	2752
APR-39:	Capt Abrams	2968
APR-44:	Capt Harp	2133
RSEAD:	Capt Suggs	3573
Self Escort Tactics:	Capt Bergad	2527
TACP:	Maj Watkins	2582
TAC(A):	Maj Bergad	3580
NVDs:	LCDR Blow	3652
Urban CAS:	Maj Adams	3361
TRAP:	Capt Glasgow	2133
ROE:	Maj Reimer	5773
NEO:	Capt Gillard	2199
RWC2/ASC(A)	Capt Baggett	2152
TBFDS:	SSgt Wright	3363

INSTRUCTOR STANDARDIZATION

DIVISION	P.O.C.	EXT
NSI:		
AH-1:	Maj Hackett	2967
UH-1:	Maj Jordan	2132
CH-53:	Capt Abrams	2968
CH-46:	Capt Woods	2199
AV-8B:	Maj McPhillips	2752
FA-18:	Maj Huff	2024
KC-130:	Capt Patrick	3547
ACTI/DMI/DACTI/DEFTACI:		
AH-1:	Maj Adams	3361
UH-1:	Maj Wise	2132
CH-53:	Capt Landherr	2133
CH-46:	Capt Grenier	3469
AV-8B:	Maj Woodard	2752
FA-18:	Maj Lieblein	6025
KC-130:	Capt Patrick	3547
EA-6B:	Maj Bew	3573
LATI:		
AV-8B:	Capt Huber	2752
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 Bergad	2261

EAGLE ONE

COMMANDING OFFICER
MAWTS1
PO BOX 99200
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MAWTS-1