10th INTERNATIONAL COMMAND AND CONTROL RESEARCH AND TECHNOLOGY SYMPOSIUM
THE FUTURE OF C2

Air Warfare Battlelab Initiative for Stabilized Portable Optical Target Tracking Receiver (SPOTTR)

Topic Track: Decision Making and Cognitive Analysis
Paper #149

Using SPOTTR to Enhance C2 in a Close Air Support Scenario

Lt Col Mark M. Pendley

Air Warfare Battlelab
360 Gunfighter Ave
Mt Home AFB, ID 83648

Tel: 208-828-3519
Fax: 208-828-3525
DSN: 728-3519

Mark.Pendley@mountainhome.af.mil

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
JUN 2005		**00-00-2005 to 00-00-2005**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Air Warfare Battlelab Initiative for Stabilized Portable Optical Target Tracking Receiver (SPOTTR)	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **Air Warfare Battlelab,360 Gunfighter Avenue,Mt Home AFB,ID,83648**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES
The original document contains color images.

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT **unclassified**	b. ABSTRACT **unclassified**	c. THIS PAGE **unclassified**		**11**	

Air Warfare Battlelab Initiative for Stabilized Portable Optical Target Tracking Receiver

Abstract

This paper will address a current problem in Close Air Support (CAS) targeting and a solution that should greatly enhance our C2 operations in the Global War on Terror. During CAS operations, a Joint Terminal Attack Controller (JTAC) is a qualified Service member who, from a forward position on the ground, directs the actions of combat aircraft engaged in CAS and other offensive operations. Oftentimes the CAS pilot is required to have the target in sight before weapons delivery. The target "talk-on" from the JTAC to the CAS pilot can take too long for timely target engagement. This paper will address a concept to improve our C2 operations by speeding up the targeting process, using SPOTTR in combat operations.

Problem Statement

During a CAS scenario, our forces may be engaged in close proximity with the enemy. The ground commander can request either immediate or pre-planned CAS to support his scheme of fire and maneuver. It is imperative to correctly ID the intended target to prevent fratricide or collateral damage. One of the most difficult tasks in CAS is properly identifying the target before striking it. This is particularly true in an urban CAS scenario. The JTAC is assigned the task of controlling the CAS aircraft to hit the ground commander's requested target(s). The JTAC will have the target in sight, but getting the CAS pilot's eyes on target can take too long if just using the radio to talk the pilot from a known point on the ground to the target. The perspective from the air is much different than the one on the ground. Over the years, there have been several instances in combat and peacetime CAS operations where the target is not positively identified in a timely manner due to long talk-on times.

Concept to Improve C2 in CAS

Stabilized Portable Optical Target Tracking Receiver (SPOTTR)

Laser guided munitions are being used more frequently in the combat battlespace. To improve the C2 process of quickly engaging a CAS target in single digit minutes, SPOTTR is an Air Warfare Battlelab initiative to integrate an off the shelf laser spot tracker into gyro-stabilized binoculars. It will triple as a visual magnifier, night vision device and a laser spot tracker.

When a CAS pilot intends to use a laser guided munition on a target, he must fire a laser spot on the target before weapons impact. It is important for the JTACs to be able to detect the laser energy so they can verify the correct target is being lased prior to weapons delivery. By moving the SPOTTR to correspond with the displayed directions in the eyepiece, the user is directed to the laser spot location.

CAS Scenario

During a CAS scenario, the ground commander requests CAS assets to support his scheme of fire and maneuver. There are three types of CAS Terminal Attack Control: Types 1, 2 and 3. JTACs use Type 1 control when the situation requires them to visually acquire both the attacking aircraft and the target under attack. Type 2 control will be used when the JTAC maintains control of individual attacks, but either visual acquisition of the attacking aircraft or the target at weapons release is not possible or required. Type 3 control may be used when the tactical situation indicates that CAS attacks impose a low risk of fratricide. When commanders authorize Type 3 control, JTACs grant a “blanket” weapons release clearance to an aircraft or flight attacking a target or targets which meet the prescribed restrictions set by the JTAC. The JTACs will broadcast the type of control in use upon aircraft check-in. Type 1 is the default method of control because it is the most restrictive and therefore the least likely to result in incorrect targeting. Type 1 CAS would be the most likely type of CAS for SPOTTR use.

When the CAS aircraft “check in” with the JTAC, they will give a standard check-in briefing that includes the mission number, number and type of aircraft, position and altitude, ordnance on board, time on station, and abort code. The JTAC will ask the flight lead if he has a laser equipped targeting pod on board. In this scenario, the CAS aircraft are equipped with laser equipped targeting pods and laser guided munitions. The JTAC then gives the pilots a situation update to include unit mission, enemy disposition, threat activity in the target area, weather (if required), friendly positions and any fire support coordination measures that will de-conflict artillery from aircraft. After the situation update, the pilots will be directed either to hold, or to copy a “9-line” brief that describes the target and other information. The standard 9-line format is as follows:

1. Initial point (IP). A known position on the ground.
2. Heading from the IP to the target.
3. Distance from the IP to the target in nautical miles.
4. Target elevation in feet above mean sea level.
5. Target description.
6. Target location coordinates.

7. Type of mark, smoke, laser, etc.
8. Location of friendlies from the target, cardinal direction, and distance in meters.
9. Egress direction and/or control point after attack.

Since this is a standard format, to maintain brevity, all the JTAC gives is the information for each line. Lines 1-3 can be N/A if in a reduced threat scenario, and the JTAC clears the attack aircraft to hold high over or near the target area. However, lines 1-3 can still be used at the discretion of the JTAC. In this scenario, the attack aircraft have checked in and received a situation update from the JTAC.

The following is an example of how the 9-line will be transmitted to the aircraft:

JTAC: "Tank 21, this is Groundhog 11, type 1 in effect, call when ready for 9-line."

Attack Aircraft: "Groundhog 11, Tank 21 ready to copy."

JTAC:

"MAZDA

010

9.9

450

Eight enemy tanks heading south on a north-south dirt road

NB 865427

None

South 1200 meters

Egress east to CHEVY

Final attack heading 320 to 030"

Attack Aircraft: "450, NB 865427, final heading 320 to 030"

JTAC: "Read back correct, report 5 miles east of target."

Attack Aircraft: "Roger, IP inbound."

The JTAC will give any other remarks relating to the attack. The CAS pilots are required to read back lines 4 and 6 and any mandatory read-back items. The attack pilot validates the target location by plotting the coordinates on a map and cross

checks the designation is coincident with the expected target. Once near the target area, the pilots will try to ID the target with their eyes and/or on board sensors.

Now comes the hard part. As stated earlier, what the pilot sees is frequently not what the individual on the ground can see. The target may be camouflaged so that an individual at altitude cannot see it, whereas the JTAC can readily see it and, in fact, is not aware of the camouflage that is hindering the pilot's eyes getting on the target. Alternatively, the pilot may see excellent visual references such as bodies of water or large flat buildings that, in fact, are just over a very slight rise in the terrain, preventing the JTAC from being able to use those references to talk the pilot's eyes on to the target.

This is where SPOTTR can have a dramatic impact on the successful execution of this mission. Instead of spending a lot of time on the radio (likely preventing the use of that frequency for other missions) going back and forth as to what each individual can or cannot see, the JTAC will ask the pilot to fire their laser at what they believe is the target, or at an easily identified point on the ground. The JTAC will use SPOTTR to track the laser spot and then he can radio the pilot to further refine the laser spot position on the ground by using cardinal directions and distances. The JTAC will look through SPOTTR to confirm the correct target is being lased. If the laser energy is not on the correct target, the JTAC can find the laser spot and direct the pilot to move the laser to the correct target. Once the correct target is being lased, the JTAC can clear the CAS aircraft for weapons delivery.

JTAC: "Tank 21, you are lasing the center of the convoy."

Attack Aircraft: "Tank 21 is in hot from the south for the middle tank." (*Explanation: "I am maneuvering to deliver weapons.")*

JTAC: "CLEARED HOT." (*Explanation: The pilot is cleared to release weapons on the target*.)

JTAC: (*After weapon impact*) "Tank 21, direct hit! Tank 22, your target is the southernmost tank, leading the convoy."

Attack Aircraft: "Tank 22 is laser on."

JTAC: "Tank 22, you are lasing the correct target, call in with direction."

Attack Aircraft: "Tank 22 is in hot from the south."

JTAC: "CLEARED HOT."

Expected C2 Benefits

SPOTTR should shorten the kill chain by enabling JTACs to see what the CAS aircraft are lasing before employing a laser guided munition. It should reduce the time for target talk-ons, and reduce fratricide and collateral damage.

Figure 1 – SPOTTR detects reflected laser energy from the attack aircraft in the lower right quadrant with a Pulse Repetition Frequency (PRF) of 19.71 Hz. The JTAC does not actually see reflected energy (no yellow glow around the targeted tank) – only the quadrant tracking symbol.

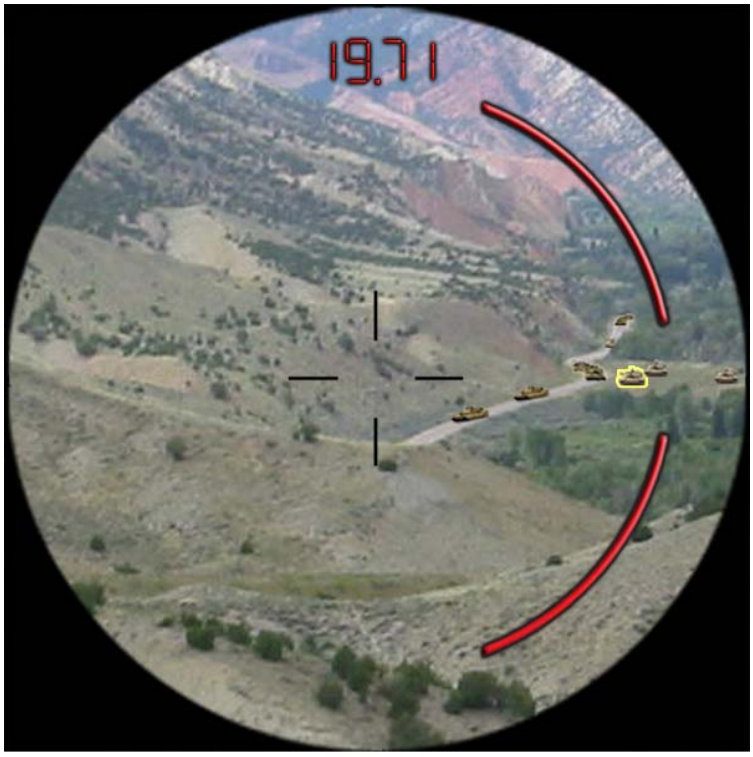

Figure 2 – As the JTAC moves the Field of View (FOV) downward, SPOTTR updates to show reflected laser energy directly to the right.

Figure 3 – The JTAC moves the FOV to the right. As the target reaches center, SPOTTR switches to inner circle indicators which indicate the cross hairs are close to the laser spot.

Figure 4 – JTAC successfully centers the target in the cross hairs, and clears the attack aircraft for weapons delivery.

Figure 5 – The JTAC can change the upper display to indicate signal strength. Three bars indicate a strong signal. The signal strength can be useful in verifying output of JTAC ground laser designators.

References

Air Force Battlelab Initiative, *Stabilized Portable Optical Target Tracking Receiver,* 14 June 2004

Joint Publication 3-09.1, *Joint Tactics, Techniques and Procedures for Laser Designation Operations*, 28 May 1999

Joint Publication 3-09.3, *Joint Tactics, Techniques and Procedures for Close Air Support,* 3 Sep 2003