

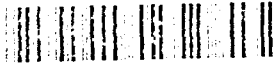
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**TASK FORCE 1-41 INFANTRY:
FRATRICIDE EXPERIENCE
IN SOUTHWEST ASIA**

BY

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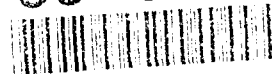
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Task Force 1-41 Infantry:
Fratricide Experience in Southwest Asia

DESERT STORM PERSONAL EXPERIENCE MONOGRAPH

by

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ABSTRACT

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The war in the Persian Gulf was a quick, decisive victory for coalition forces. However, despite military success on the battlefield, the high frequency of fratricide was a cause for professional and public concern. Although fratricide is not a new battlefield phenomenon, improved technology has resulted in greater battlefield lethality at extended ranges without concurrent advances in friendly identification capabilities. This has exacerbated the problem of fratricide. Army concerns resulted in a significant effort under the umbrella of the Army's Fratricide Prevention Action Plan. The Army Materiel Command (AMC) and the Training and Doctrine Command (TRADOC) are jointly exploring solutions to improve the Army's situational awareness and combat identification capabilities through a combination of training and technological fixes. This paper is a description and analysis of three incidents of fratricide suffered by the 1st Battalion, 41st Infantry Regiment during Operation Desert Storm. Each incident is examined, in the context of the environment and circumstances of the battlefield at the time of occurrence, to determine the proximate and contributing causes of the engagement. The paper concludes with recommendations to maintain the focus of the Army's efforts through the Fratricide Prevention Action Plan, avoid over reliance on technological solutions, and expand situational training efforts.

INTRODUCTION

American euphoria after the victory of coalition forces over Iraq was replaced by consternation and frustration over the frequency of fratricide.¹ In August 1990, the Department of Defense officially notified the families of 35 U.S. soldiers and marines that their loved ones died from friendly fire. Public discussion was carried out in every forum from newspapers to television, radio talk shows to gossip magazines. The public, initially lulled by news broadcasts depicting the false sterility of Air Force gun-camera tapes, wanted to know how a high technology army could kill or maim their own soldiers.

During the war in the Persian Gulf, I commanded Task Force 1-41 Infantry. My task force suffered three fratricidal engagements at the cost of six soldiers killed and thirty-two wounded. The purpose of this paper is to determine if the Army's efforts to develop solutions to the problems of fratricide will achieve their purpose. This paper describes the conditions and situations in which the fratricidal engagements occurred, analyzes and determines the cause(s) of each incident, and compares the causes with preventive actions under consideration or adopted by the Army. The final sections contain conclusions and recommendations.

BACKGROUND

Fratricide is not a new battlefield phenomena. In a seminal study in 1982, Lieutenant Colonel Charles R. Shrader conducted a research study for the U.S. Army Combat Studies Institute placing fratricide in an historical perspective.² The extremely low number of U.S. combat casualties during the war with Iraq (615 killed and

wounded) compared to previous mid and high-intensity conflicts highlighted the incidents due to friendly fire. Where previously U.S. forces experienced friendly fire casualties at a rate of about two percent of total casualties, the Southwest Asia friendly fire casualty rate was twenty-three percent. Although the two percent rate can be argued to be higher, no one argues that twenty-three percent is acceptable.³

Senior leaders were not blind to the dangers of fratricide in the Gulf War. In January 1990 the theater commander, General Schwarzkopf, asked for help in devising combat vehicle marking systems for use the theater. The Army Vice Chief of Staff, General Sullivan, directed the Training and Doctrine Command (TRADOC) and the Army Materiel Command (AMC) to develop combat identification devices for use in the war. The two commands formed the Combat Identification Task Force which fielded quick solutions consisting of thermal tape, Budd and DARPA lights.⁴ They arrived too late to apply in most units. Thermal tape has since proven to have limited value to mark vehicles at ranges over one thousand meters. Budd and DARPA lights provide a visual marker under passive night vision devices but are not visible through the thermal systems used by Army ground and air combat systems.

The most common marking system was a black inverted "V" painted on the sides of vehicles. It was developed in response to fears of engaging coalition vehicles identical to those used by the Iraqis. Another common marker was red aircraft marking panels tied to the back or top of all vehicles. Although many field expedients

were tried, limited visibility markings tended to be filtered flashlights tied to bustle racks and vehicle rears.⁵ As with the Budd and DARPA lights, these markings were not visible through thermal sights.

In the aftermath of the war the Army moved aggressively to identify causes of friendly fire and find preventive measures. The Army is working to enhance capabilities in situational awareness and positive combat identification. *SITUATIONAL AWARENESS* is the real-time accurate knowledge of one's own location (and orientation), as well as the locations of friendly, enemy, neutrals, and noncombatants. This includes awareness of the METT-T conditions that impact the operation. *POSITIVE IDENTIFICATION* is the immediate, accurate, and dependable ability to discriminate between friend and foe through optical sights and thermal imaging systems. Optimally this ability extends to maximum engagement and acquisition range, and neither increases vulnerability, nor decreases system performance.⁶

A great deal of progress has occurred in the two years since the end of the Gulf War. A sixty-five minute fratricide prevention training video was produced by the U.S. Army Combined Arms Command (CAC). The Center for Army Lessons Learned (CALL) produced two fratricide prevention pamphlets, while the Army Materiel Command Combat Identification Task Force began testing selected combat identification (IFF) devices for combat vehicles. TRADOC established a Fratricide Prevention Action Plan Task Force that meets on a regular basis to institutionalize approved solutions

across the domain of doctrine, training, leadership, organization and materiel for soldiers (DTLOMS). The overriding question remains: Will it be enough?

TASK FORCE 1-41 INFANTRY

The 1st Battalion, 41st Infantry Regiment (1-41 Infantry) was the infantry battalion of the 2d Armored Division (Forward) stationed in Garlstedt, Germany. The Division (Forward) was a separate brigade. It had two M1A1 (Heavy) tank battalions (2-66 Armor, 3-66 Armor) and an M2 (Mod III) infantry battalion (1-41 Infantry). Its M109 equipped field artillery battalion was the 4th Battalion, 3d Field Artillery Regiment (4-3 FA). The Division (Forward) also contained a military intelligence company (588th MI), an engineer company (D/17th EN), and an augmented forward support battalion (498th FSB). Brigadier General Jerry Rutherford commanded the Division (Forward); Colonel David Weisman was the Brigade Commander (3d Brigade).

The division focused on warfighting skills. BG Rutherford emphasized the tenets of FM 25-100, the Army's training bible. He made extensive use of command post exercises (CPXs), leader field exercises (HUMMEXs), situational training exercises (STXs), and after action reviews (AARs). He insisted on unit compliance with USAREUR Regulation 350-1. These actions produced a balanced, lethal, combined-arms capable combat force. The division's performance was of graduate level quality during its annual gunnery and CMTC rotation in March and April 1990, the best available peacetime measures of readiness.

In the year prior to deployment to Southwest Asia, 1-41 Infantry had been through three Brigade HUMMEXs, four Brigade CPXs, five Battalion CPXs, two practice gunneries and a qualification gunnery (Tables VIII & XII), Squad and Platoon evaluations (ARTEPS), and squad through company level STXs. The battalion spent the last two weeks of October 1990 at the Wildflicker Training Area polishing dismounted infantry tactics and small arms qualification. On 8 November 1990, shortly after the battalion's return to home station, the division was notified for deployment to Southwest Asia.

The battalion staff was experienced and well trained with particularly talented field grade officers serving as the operations officer and executive officer. The command sergeant major was a Vietnam veteran with a broad Infantry and Special Forces background. The battalion was characterized by a proactive stance in planning operations.

The battalion uncased their colors at the port of Jubayl in Saudi Arabia on 9 January 1991. The battalion's equipment arrival at the port coincided with the start of the air war on 17 January. On the 23 January the main body moved to the Ad Dibdiba area of northern Saudi Arabia and by 25 January was set in a forward assembly area (FAA ROOSEVELT). On 31 January the battalion task organized with 3-66 Armor to become a balanced task force. The new organization added D Company, 317th Engineers, and two ground support radar (GSR) sections. 1-41 Infantry detached A Company and D Company to 3-66 Armor and attached A Company and B Company from

3-66 Armor. B Company was the armor company habitually task organized from 3-66 Armor to the battalion; A/3-66 Armor was rapidly integrated without incident. This success was because SOPs were standardized among the battalions within the division and the company commanders had all completed at least one year of command time.

Shortly after arrival in Southwest Asia the battalion received, for planning, a brigade cross-boundary counter-reconnaissance mission. The task force operations order for the mission was issued to the company commanders on 26 January 1991. The plan had several parts. The brigade (Task Force IRON) was first to conduct a breach of the sand berm marking the Saudi Arabia and Iraq border. The next task was to clear forward in zone approximately twenty kilometers and, on order, pass forward artillery units to fire scheduled preparatory fires for the breach of Iraqi defenses. The final task was to conduct a rearward passage through the breaching force from the 1st Infantry Division. The zone represented the main attack effort of the VII Corps' forced penetration of the Iraqi defense. The original plan called for a general movement forward of the boundary by other friendly forces to deceive the Iraqis as to the main effort.

Preparations to execute the counter-reconnaissance mission included task force rehearsals, map exercises, reconnaissances of the area of operations, and constant reviews and updates of the intelligence products covering the area. On 8 February the task force command group met with the command group of the 1st Infantry

Division's aviation brigade and its AH-64 battalion. During the meeting the ground plan was briefed and a copy of the task force graphics was provided to the Apache Battalion Commander, Lieutenant Colonel Hayle. LTC Hayle explained the operational problems his unit had encountered in previous support missions near the Saudi/Iraqi border. Fratricide, a matter of concern to all parties, was heightened by an incident where friendly ground forces engaged one of his helicopters. He explained that while on a mission his pilots depended on their on board navigation systems rather than operational graphics. It was clear that the ground commander needed to be very certain of friendly positions when passing targeting information to supporting AH-64s. During the meeting LTC Hayle reiterated the effect of Ground Support Radars (GSR) on the AH-64 radar warning system. Discussions about coordination included employment considerations for aircraft entering the task force sector and for using smoke grenades in an emergency to mark friendly vehicles. The meeting ended with an agreement that some AH-64s would orbit the task force's assembly area. This arrangement allowed tank, Bradley, and helicopter crews to view one another's vehicles through thermal sights before executing their missions.

TASK FORCE IRON

The afternoon of 12 February the task force was ordered to move west to take up positions about 10 kilometers south of the Saudi-Iraq border. By 1800 hours on 14 February Task Force IRON was in position. Task Force 1-41's mission was to breach the berm

at 1200 hours on 15 February in ten different locations. Once the berm was breached, B and C/1-41 Infantry, followed by B/3-66 Armor, would move through the gaps. Once through the berm, these units were to conduct a vigorous reconnaissance in force to the north. A/3-66 Armor was in brigade reserve and secured the engineer elements as they improved the cuts through the berm.

At 1200 hours, 15 February the task force began the breach and by 1243 hours was across the berm with the far side secured to a depth of three kilometers. During the remainder of the afternoon the Task Force slowly cleared forward in zone to Phase Line MINNESOTA. This phase line was about eight kilometers north of the berm and was drawn on the 25 east-west grid line. The task force deployed into defensive positions as evening approached and remained there through the night. The scout platoon screened the right flank of the task force, stationed in a line running northeast to southwest. Their vehicles were spaced approximately 1000 meters apart; the southern most vehicle was in contact with the brigade scouts to the task force's right rear.

The task force had sporadic long range sightings the evening of 15 February. Those were engaged by indirect fire but with no observable results. Held in position on 16 February, the task force spent the next day clearing the ground covered the previous day. After nightfall on the 16th, enemy vehicles began to appear in the task force zone. After initial reports of lost friendly vehicles from the right flank unit were resolved, the task force began to engage enemy to its front with indirect and then direct

fire. Shortly before midnight, C/1-41 Infantry engaged a group of three enemy vehicles with TOW missiles at a range of almost 4000 meters but with no observable effect. These vehicles appeared to back off, then to move laterally forward in bounds from west to east using the terrain to cover their movement. AH-64 helicopters were called to gain the height to look down into the terrain to destroy the enemy vehicles.

As the helicopters came on station and were being briefed on the disposition of friendly forces, the scout platoon leader was directed to turn off his GSR. First Lieutenant Perry Rearick knew that the GSR crew's radio was not working and directed the platoon sergeant to move to the GSR's location to ensure the radar set was turned off. The sergeant, Sergeant First Class Richard Miller, moved to the GSR and watched the crew shut the radar down. He returned to his vehicle and reported the GSR status to the platoon leader.

Within minutes of ensuring the GSR set was off, SFC Miller's Bradley was struck by an antitank missile. Seconds later another missile struck the nearby GSR M113. Both vehicles were consumed by fire caused by the two missiles fired by the AH-64s. The two scouts in the back of the platoon sergeant's vehicle were killed in the explosion. The three remaining scouts and all three of the GSR crewmen were injured by the impact of the missiles.

The task force continued its mission in Iraq until the morning of 18 February. At 1230 hours the task force withdrew from Iraq through the 2d Brigade of the 1st Infantry Division and into

Tactical Assembly Area MANHATTAN. The next five days were spent refitting and preparing for reemployment at the start of the ground war. The task force conducted an intensive after-action review (AAR) covering the Task Force IRON operation. The brigade conducted a follow on AAR during which the operational lessons from the employment were captured. The difficulties of target acquisition versus target identification, and the importance of maintaining vehicle orientation were a significant portion of the discussions about friendly fire.

BATTLE OF NORFOLK

The task force entered the ground war on 24 February. The brigade mission was to pass through the breaching force to expand the breachhead and to pass the 1st (UK) Armored Division through friendly lines. The follow-on mission was a division-sized movement to contact against units of the Iraqi Republican Guard. The task force moved into position behind the 2d Brigade of the 1st Infantry Division on the 24 February. At 0800 hours on 25 February, the task force passed through the 2d Brigade into the attack.

During the attack to expand the breachhead, resistance came from dismounted soldiers and light vehicles attempting to flee to the north and overrun by the task force. On two occasions the scout platoon used indirect fire to engage dismounted soldiers attempting to resist. On both occasions the enemy soldiers surrendered before the scouts had to resort to direct fire. Similarly, A\3-66 Armor engaged a platoon sized dismounted force

with indirect fire resulting in enemy surrender to the company.

The attack on 25 February was during daylight, significantly reducing problems of target identification. The vehicle orientation problems experienced during the limited visibility operations characterizing the Task Force Iron operations were absent during this operation. The situational awareness lessons learned during Task Force IRON operations were reflected by task force and company command nets busy with target deconfliction processes.

By 1200 hours the expanded breachhead was secured. At 1500 hours the task force began passing elements of the 1st (UK) Armored Division through the forward lines. By 0200 hours on 26 February, the British forces had cleared the task force sector. Meanwhile, the Brigade had been ordered to continue the attack northeast deeper into Iraq.

The task force crossed the line of departure in a brigade-sized movement to contact at 0530 hours on 26 February. The Brigade moved in a wedge formation with Task Force 1-41 on the right flank. The task force moved in a diamond formation with B/3-66 Armor in the lead, B/1-41 and C/1-41 Infantry on the left and right flanks respectively, and A/3-66 Armor in rear security. Movement to the northeast continued unabated through most of the day. About 1600 hours the division ordered the brigade to turn east and prepare to pass through the 2d Armored Cavalry Regiment (2 ACR). The 2 ACR had found elements of the Iraqi Republican Guard. After a short, intensive battle the ACR was instructed to prepare

to pass the main force into battle against the enemy.

About 2300 hours on 26 February the task force, in concert with the brigade, passed through elements of 2 ACR in text book style. By 2330 hours, the entire brigade was arrayed on the enemy side of the passage points and immediately found enemy defensive positions manned by tanks and infantry. Abandoning the wedge that had been employed up to that point, the brigade commander ordered the flank task forces, 1-41 Infantry on the right and 3-66 Armor on the left, to move up on line with 2-66 Armor in the center. The brigade frontage was twelve kilometers; each battalion's zone covered a four kilometer front. Task Force 1-41 Infantry attacked in a box formation: A and B Companies of 3-66 Armor were on the right and left front corners respectively. B/1-41 Infantry followed B/3-66 Armor and C/1-41 Infantry followed A/3-66 Armor. The brigade was attacking due east almost directly into the Iraqi flank.

The enemy was disposed in three echelons in defensive positions running generally northwest to southeast. The first echelon of the defense consisted of prepared positions for both armored vehicles and dismounted infantry. The second echelon was composed of hasty positions with less armor and more dismounted infantry. The third echelon was mostly infantry in unprepared positions supported by a few armored vehicles. The enemy armor was a mix of T-55s and T-62s. There were also numerous wheeled vehicles. The area was rife with vehicles destroyed by the Air Force. This left many cold targets on the battlefield.

Additionally, the Iraqis responded to aerial fires by not manning their vehicles unless there was a ground threat. Consequently, many cold targets became hot as the Iraqis discovered they were under ground attack and reoccupied their vehicles. These factors all combined to create a difficult target-identification environment.

As a result of contact by 2-66 Armor and the task force shortly after completing the passage, B/3-66 was ordered to shift slightly to the right. Meanwhile the vehicle belonging to Captain Lee Wilson, commander of B/1-41 Infantry, had gone down in the passage lane. Wilson jumped to his second platoon leader's vehicle and led his company to the right to regain contact with B/3-66. In the process of jumping, he left his Global Positioning System (GPS) behind and thereafter was operating without navigational aid.

Wilson soon realized that he was too far to the right and reported on the task force command net that he was out of sector. Simultaneously his lead platoon, who spotted the rear platoon of A/3-66 Armor, confirmed his report. The rest of the task force was advised of the situation. Over the task force command net Captain Bill Hedges, commander of B/3-66 Armor, and Wilson coordinated a link up behind Hedges' company trains. Wilson's third platoon led the company back to the north to resume their proper place in the formation.

Shortly before 0200 hours the third platoon reported seeing M1A1 tanks to their left front. Wilson quickly moved to the front of the company to link up with what he thought was the company

trains of Hedges' company. As he arrived forward a RPG bounced across the ground in front of his vehicle and exploded. A second RPG passed over the rear deck of the vehicle to his left rear; a third RPG exploded on the turret of the vehicle on the right and wounded the platoon sergeant. As the company began to search for the source of the fire, murderous tank fire hit the second platoon from the left. Wilson's vehicle was hit by sabot fire, knocking him out of the turret and leaving him unconscious on the front deck of the Bradley. The platoon sergeant moved his vehicle to the cover Wilson's vehicle afforded. The remaining two vehicles in the platoon took multiple hits of tank sabot and HEAT rounds, and became catastrophic fire losses. SSG Hearn of the third platoon, searching for the source of the attack, observed and reported over the radio that it was coming from friendly vehicles in 2-66 Armor. As the company began taking evasive action, a call went out on the company nets to hold fire because the incoming fire was friendly.

As casualties were treated and evacuated, Wilson and his leaders reorganized the company and began clearing enemy positions and bunkers in the area. This action continued until dawn of the 27th. B Company suffered twenty-four wounded and five killed, and lost three Bradleys in this action.

Meanwhile, the rest of the task force continued the attack to the east. Shortly before dawn on 27 February, A and B/3-66 Armor, which were leading the task force through rolling terrain eastward, encountered a grouping of enemy vehicles and dismounted infantry in hasty defensive positions. A/3-66 Armor immediately took them

under fire. On the left flank, Hedges and his right-flank platoon moved out of low ground onto a small ridge running northeast to southwest. As Hedges topped the ridge an RPG, fired from the front, glanced off the turret of his vehicle. At the same time, the Iraqi defenders responded with tank and small arms fire directed towards A/3-66 Armor and Hedges' right flank platoon. Seconds later a sabot round hit the left side of Hedges' vehicle. Hedges, his loader and driver evacuated the vehicle as it began to burn. The vehicle was struck at least two more times as the crew, under small arms fire, struggled to safety. The gunner, struck by the initial sabot round, was lost as the vehicle was destroyed by fire. Meanwhile, the tank on Hedges' immediate right turned to face northeast and took a sabot round that penetrated the front glacis wounding the driver.

In the same action, A/3-66 Armor, commanded by Captain Gary Bishop, was also under tank fire from the front and left flank. Bishop's company silenced Iraqi guns to the front, but the fires from the left flank persisted. The first two rounds from the left missed. Then a sabot round hit the turret of a vehicle in the third platoon and wounded three of the crew. The gunner, confused by an order to evacuate the vehicle, moved to the top of the turret. A second round struck the tank, passed through the driver's compartment and knocked the gunner down. As he came off of the tank the gunner found the vehicle commander wounded in front of the stricken vehicle. He evacuated the wounded man to the safety of a nearby tank as machinegun fire raked the area.

In first platoon the turret of another vehicle was hit by the fire from the left flank that wounded the gunner with shrapnel. While the vehicle commander and loader evacuated the vehicle, the wounded gunner, disregarding the small arms fire sweeping the area, went to the front of the tank to assist the driver dismount the tank. Once all crew members were safely out of the tank they sought the cover of nearby vehicles. A third tank was hit on the left rear deck. The round penetrated the armor but passed harmlessly over the engine.

During this exchange multiple reports came over the task force command net reporting initial contact. These calls were closely followed by calls for a cease fire by friendly forces to the left flank. The firing from this quarter stopped after a call for cease fire by Task Force 1-41 on the Brigade command net.

This exchange resulted in the destruction of four M1A1 tanks, one soldier killed in action, and eight wounded in action. Subsequent investigation revealed that the fires from the left flank came from the right flank company of 2-66 Armor.

After dawn, bunker lines and enemy positions were cleared by the task force. At approximately 0830 hours B/1-41 Infantry was detached to provide security for support elements moving up through the enemy positions while the remainder of the task force continued the attack east into Kuwait.

ANALYSIS

The Gulf War is unique in terms of the ability to go back and reconstruct with some degree of accuracy the situation under which

a fratricidal engagement occurred. The war with Iraq was short and decisive in terms of contact with the enemy, so early attention was paid to how and why casualties occurred. Secondly, the technology of the munitions used by U.S. tanks left evidence of its use on engaged vehicles.⁷ Finally, in the case of engagement by the AH-64, gun-camera tapes were available immediately after missions for pilots and their chain of command to review. In short, the same technology that increased lethality on the battlefield also helped identify mistakes made on the battlefield.

Army efforts to examine the causes of and solutions for the prevention of fratricide have focused on the arenas of training and technical fixes. The Army's Training and Doctrine Command (TRADOC) leads the effort in training solutions while the Army Materiel Command (AMC) pursues technology to provide better identification of friend or foe (IFF). Both organizations continue to pursue and institutionalize approved solutions to the fratricide problem.

The Army's efforts proceed from the implicit assumption that fratricidal engagements are accidental and, further, that direct-fire fratricides occur because of mistaken identity.⁸ TRADOC approached the problem by developing of a training video which highlights actions taken during planning, preparation and execution of combat operations that can reduce the risk of fratricide. This process to assess and reduce risk focuses on the battalion staff and below.⁹ It was followed by a newsletter and pamphlet by the Center for Army Lessons Learned.¹⁰ These documents contain a detailed discussion of and methods for reducing the risk of mis-

identification. The company level pamphlet contains a quantitative methodology for identifying the degree of risk.

AMC has focused on technological fixes. The main thrust has been to explore how a firing vehicle can query a target and receive a response that will identify it as either a friend or an unknown. A series of tests were begun in April 1992 with five systems selected from a wide range of contractor candidates.¹¹ The results of these tests showed promise for a viable solution but holds inherent risks in applying that technology. Performance demands carry significant cost factors.

Receiving less attention is an examination of the events that led to fratricidal engagements in Southwest Asia. If the solutions proposed to prevent fratricide are not related to unfolding situations, then the effort to develop them will be less effective. The following analysis of the three fratricide incidents described above is focused on the sequence and impact of events as they occurred.

TASK FORCE IRON

The fratricidal engagement during the counter-reconnaissance mission of Task Force IRON involved an AH-64 helicopter firing on a Task Force 1-41 Infantry Bradley M3 and an M113 GSR vehicle. The coordination for the ground commanders to hand targets off to the air commander was conducted on the brigade command net. The engagement was captured on the helicopter's gun-camera; therefore, this engagement is unique. The video tape carries the conversations of the crew on the firing aircraft, the transmissions

between the helicopters, the transmissions between the helicopter and the ground commanders, and the results of the engagement.

What happened is clear. The gunner aboard the firing platform confused the grid for the target passed to him from the ground with the grid of the target he actually fired. In essence he confused two lines of location information in the heads-up display generated by the AH-64's computer. At the surface this equates to gunner error and implies a training deficiency. It was, of course, more complicated than that, as an analysis of the sequence of events shows.

The amount of space on the battlefield was a factor. The AH-64s were called forward in response to a series of probing actions by the enemy focused on the right half of the task force sector. The sector was wide--thirty kilometers. Task force vehicles were spread out. As much as one kilometer separated some sections of two vehicles on the platoons inside the companies. The right flank of the task force was open. The unit to the right, the 1st Cavalry Division, was about ten kilometers to the rear of the task force's front lines. The scout platoon was screening the right flank of the task force with single vehicles, separated from each other by one to one and a half kilometers. The right boundary was concave, so that the coordination point on the boundary at the forward trace was about four kilometers further east than the coordination point at the Saudi-Iraqi border.¹²

As the AH-64's came on station the task force tactical operations center (TOC) gave them an inflight briefing describing

the disposition of friendly forces. This briefing included a statement that no friendly forces were forward of the 25 grid line (PL MINNESOTA). After the helicopters entered the task force's area, the TOC had them confirm the front line trace. Although the flight commander, LTC Hayle, confirmed the front line trace, the gun-camera tapes make it clear that he was misoriented.¹³ From the vantage point of the helicopters, the vehicles on the front line trace and the right flank appear to be a continuous line that arches to the right. The lone exception is two vehicles, sitting close to one another, that appear to be about two kilometers forward of the front lines. These vehicles are the Bradley from the scout platoon and the GSR M113 sitting at the right-flank coordination point. The position and heading of Hayle's helicopter in relation to the positioning of the friendly vehicles on the ground gives a strong visual perception that the scout and GSR vehicles are not a part of the friendly force.

This confusion was compounded by the operating procedures the Apache unit used. In coordination with the Apache unit prior to execution of the Task Force IRON mission, the task force was told the aircraft would not carry the task force's graphics.¹⁴ Rather, the task force was to provide a grid line beyond which there were no friendly forces. The helicopters would use this information in their navigation computers to avoid engaging targets on the friendly side of the front line trace. As a result, the visual perception from the helicopter was not countered by a graphical depiction of Task Force 1-41's force dispositions.

Before the AH-64s arrived, C/1-41 Infantry engaged a three-vehicle configuration of the enemy with a TOW missile at a range of close to 4000 meters -- beyond positive visual identification under thermal sights. The Company Commander described these as box-like configurations with one bigger than the other two.¹⁵ After Hayle was on station and directed to look in the vicinity of the area engaged by Charlie Company he reported two box-like targets, one bigger than the other. He also reported that it appeared that the smaller of the vehicles was dead and soldiers were cross loading from the smaller to the larger¹⁶ The engagement description by Charlie Company and Hayle's target description coincided nicely. In fact, the target description from the company's TOW engagement, SFC Miller's move to the GSR to check the status of the radar set, and the physical disposition of forces as perceived from the air had all come together.

After the TOC briefed the helicopter flight, they were handed off to the task force commander who passed the grid for the last sighting of the enemy vehicles engaged by Charlie Company: NT 915270. After a brief search, Hayle reported acquiring two vehicles at that grid. In actuality, he had acquired the Bradley and GSR M113 at grid NT 965247, some four kilometers east and two kilometers south of the targeted area. The confusion in the two grids was a technical mistake. LTC Hayle was sitting in the gunner's seat of his Apache and had decided to destroy the targets himself, rather than have one of the other two helicopters in the flight work the engagement. The heads-up display from the gun

camera tapes show the aircraft current location, the location entered for the target area (915270) and the location of the targets which Hayle had lazed and stored in the target computer (964246). In his words, he "read the wrong line of information."¹⁷ However, the gun camera tapes indicate that Hayle was relying on more than the computer for locating the position of the target. During the target confirmation process he refers to the target lying on a cardinal direction (70 degrees) from his location at a range of about 4300 meters and concludes that the targets are on the 27 grid line.¹⁸ As previously noted, the right flank of C/1-41 and the concave nature of the scout screen made it appear from his vantage point that the two vehicles were forward of friendly lines.

There were three occasions prior to engagement that offered the opportunity to avoid the fratricidal engagement. The first came when Hayle's wingman got a grid for the targets which placed them on the 25 grid line. In response, Hayle decided to move closer to the targets. As they began their approach the radar alert went off inside the aircraft. They abandoned the approach but lost track of the fact that there was a discrepancy in target grids. The effort shifted to attempts to identify the targets.

The second opportunity was presented when Hayle correctly located and identified the right flank Bradley of Charlie Company. As though he sensed something was wrong, he gave the brigade commander the grid for this vehicle as NT 946245 and said, "and these other vehicles are to its right. He's looking right at them." The use of "to the right" and the grid of the Charlie Company

vehicle led to the conclusion that he was talking about a new set of vehicles. Weisman's response, "I don't care about them, can you still engage those vehicles at the 27 grid line?", is rejoined by Hayle's confident, "Roger, I can shoot them easy."

The final opportunity to correct the mistaken location came as Hayle prepared to engage the targets. He was still uncertain whether or not the vehicles were enemy or friend. He asked his wingman to back him up. First he gave his current location and the cardinal direction he is going to fire. Then he said, "and the target grid is ... uh, let me call it up here, its...uh..." The gun-camera tape shows the heads-up display, but he did not announce the grid. He was distracted by something in the cockpit momentarily and then moved into locking the Hellfire missile on the target. The grid mistake was not discovered and the two vehicles were destroyed.

There are several important contributing factors to the fratricidal engagement. In deciding to engage the targets himself, Hayle relinquished his ability to effectively control the fight. The discrepancies in target grids between his wingmen and himself were lost on him because he became immersed in the targeting and engagement process. In short, he developed tunnel vision and did not key on important information available to assist in determining whether or not to fire on the targets.

The ground commanders were not privy to the discrepancies between the helicopters. Hayle did not report any concerns about the target location on the Brigade command net.¹⁹ Consequently,

once satisfied that the target had been properly located, the ground commanders pressed Hayle to conduct the engagement so the flight could be moved to engage other targets in the sector.

After the engagement was over and it became apparent that the vehicles engaged were friendly, Hayle asked the crews of the other two helicopters to verify that they had the target at the 27 grid line. Both responded that their instruments had shown the targets at the 25 grid line.²⁰ There is no explanation provided on the tapes for why they did not press this information on Hayle before the engagement.

THE BATTLE OF NORFOLK

The Battle of Norfolk was fought by the 1st Infantry Division during the period 26 and 27 February. At the conclusion of this fight the Division broke through the Republican Guards and moved into blocking positions between Kuwait City and Basra. The action was a hasty night attack against a series of enemy positions oriented to the southwest. VII Corp's 2d Armored Cavalry Regiment triggered the action by its discovery and engagement of Republican Guard formations. The VII Corps Commander, General Frederick M. Franks, turned the Corps east, passed it through 2 ACR, and attacked into the flank of the enemy.

Among several fratricide incidents across the Corps, the two most serious incidents occurred in the 3d Brigade and were inflicted on Task Force 1-41. These incidents occurred while the brigade was engaged with the enemy under limited visibility during a hasty attack when minimal information was available about enemy

dispositions. Unlike for the AH-64 incident, the description here rests on postwar accounts of events from the participants.

The first incident occurred in B/1-41 Infantry at approximately 0200 hours on 27 February. As in the case of the AH-64 incident, a combination of events in a confusing environment resulted in a friendly force engaging friendly vehicles. The environment within which the fight occurred was particularly nasty.

Throughout the day of 26 February, friendly aircraft worked enemy forces in the vicinity of Objective NORFOLK. Consequently, the area was littered with destroyed vehicles. Interspersed among the destroyed vehicles were many Iraqi armored and wheeled vehicles, as well as Iraqi infantrymen who had escaped the ravages of coalition air. The constant danger of air attack led the Iraqis to adopt a procedure of not occupying their vehicles until they were under ground attack.²¹ As a result, as the Brigade completed the passage of lines, to the immediate front were a mix of cold and hot targets. As it became clear to the Iraqis that they were under ground attack, their crews began to move to their vehicles to enter the fight. Cold targets therefore were not necessarily dead ones. Ultimately this led to a 360-degree fight within which cold targets missed or bypassed by lead units became hot targets engaged by the follow-on forces. This target-rich environment resulted in multiple engagements by forces moving behind front line units.

The combination of weather and the effects of engagements combined to obscure the battlefield. The weather on the evening of 26 February was cloudy and windy with some light rain and then fog

in the early morning hours of the 27th. The battlefield became increasingly dirty as smoke from burning vehicles began to fill the air. The combination of the weather, explosions as vehicles were engaged, light reflected from the smoke of burning vehicles, and the sounds of small arms and vehicle fires created a chaotic environment well beyond the experience of most of the participants.

As B/1-41 Infantry entered the battle, they experienced a series of events which would eventually lead to a friendly fire incident with 2-66 Armor. The shift of B/3-66 Armor to the right, the mechanical failure of Wilson's vehicle, the jump to the second platoon leader's vehicle, and the loss of the Global Positioning System occurred one after the other and led to the company's drift out of position to the right. Wilson's recognition of the error led to a linkup plan that moved his company back to the northeast. Movement in this direction was against the grain of the rest of the friendly forces moving on the battlefield. As the company neared the linkup point, M1A1 tanks were spotted and assumed to be the company trains of B/3-66 Armor. Wilson moved forward with the second platoon and came under enemy RPG and small arms fire with his company oriented north by northeast. These events, from the loss of the vehicle through contact with the enemy, occurred sequentially.

As B/1-41 Infantry was struggling to get back into position, a separate set of sequential events was occurring in 2-66 Armor's zone of attack. 2-66 Armor, on the north (left) flank of the task force, reported on the Brigade command net that their field trains

were receiving fire from bypassed enemy elements. B/1-41 Infantry entered the northern portion of the task force zone and came into contact with the enemy just as 2-66 Armor concerns about enemy action in their rear area was heightening.

The RPG and small arms fire directed at B/1-41 Infantry were observed by the armor company in the rear of the 2-66 Armor formation. Through thermal sights, the impact of the RPGs on the Bradleys gave the appearance of tank fire directed at the armor company. 2-66 Armor's concerns of by-passed enemy, the cross-grain movement of Bravo Company, combined with the perception that the 2-66 Armor company was being fired at was enough to initiate the engagement by 2-66 Armor.²² Bravo Company's third platoon, searching for the source of fire, identified the firing vehicles as friendly and fired red star clusters to signal they were a friendly force. That stopped the firing.

Bravo Company evacuated casualties and cleared enemy positions around their area while the rest of the task force, less one platoon of tanks detached from B/3-66 Armor to B/1-41 Infantry, continued the attack toward Objective NORFOLK. As the task force closed to within two kilometers of the objective it was struck again by friendly fire from 2-66 Armor.

The brigade had been continuously moving since 0430 on the morning of 26 February. Contact with the enemy, although continuous after the passage of lines, had slowly dwindled as the brigade plowed through the main defensive positions and moved into the rear of the defense. As the brigade approached NORFOLK,

contact was mostly with dismounted infantry supported by a few armored vehicles.

As the task force lead companies moved through some rolling terrain, it came into contact with several Iraqi tanks and dismounted infantry in hasty defensive positions. A/3-66 Armor, took these forces under fire. On the left flank CPT Hedges, moving between and on line with his two platoons, topped a small ridge running northeast to southwest. His vehicle was engaged by an RPG which glanced off the turret. The task force began to receive tank and small arms fire from the front and tank volley fire from the left flank. The tank fire from the front was silenced almost at once. The fire from the left flank continued. Bishop reported the initial contact on the task force command net and then reported he was receiving friendly fire from the left flank.

In 2-66 Armor, the right flank company observed the fires to their right. As with the case of B/1-41 Infantry, the RPG burst on Hedges' tank was interpreted as an enemy tank firing. The right half of Hedges' company and most of Bishop's company were detected under the thermal sights of the armor company. The opening engagement was a platoon volley fire into the task force's left flank. Subsequent fires were joined by additional tanks in the 2-66 Armor company. The engagement ranges were in excess of 2000 meters.

Bishop received multiple reports from his platoons that the fire from the left was coming from M1A1 tanks. The initial call on the task force command net brought both companies to a cease fire.

However, the fires from the left flank continued. A call for cease fire on the Brigade command net brought the fires to a halt.

CONCLUSIONS

Accident investigations search for the proximate cause of the incident. In the process of investigation, the circumstances surrounding the accident are examined to see what contribution they made, if any, to the proximate cause of the accident.

The fratricide incidents described in this paper were accidents. While a proximate cause in each incident is evident, examining the circumstances and events surrounding each case provides a fuller explanation of not only what happened, but of how and why it happened. There are cogent reasons for pursuing all of the answers to the incidence of fratricide beyond regulation requirements. The first and paramount reason is prevention of needless loss of soldiers' lives. Secondly, fratricide losses represent combat power unavailable for operations against the enemy. Across the theater these losses amounted to seven tanks, 20 Bradleys, and seventy-two soldiers.²³ In Task Force 1-41's case the loss was nine combat vehicles and thirty-two soldiers. Only the scout Bradley and crew were replaced during the war. Thirdly, units experiencing losses by fratricide face morale problems and may become hesitant in battle. On the last day of battle, soldiers in the task force were concerned about relative positioning of the task force and 2-66 Armor. Lastly, full investigation to reveal the facts helps avoid the erosion of public trust and confidence in U.S. military forces. Media attention to LTC Hayle's fate after

the AH-64 incident and newspaper reports of B/1-41 Infantry's fight in the Battle of Norfolk were inaccurate and biased.²⁴ The Army was late with accurate information and therefore missed the opportunity to keep the record straight.

TASK FORCE IRON

The proximate cause of the fratricidal engagement of the task force's scout and GSR vehicles was pilot error. Hayle misread a line of information on his heads-up target location display. That answers the "what" question. The answers to the "how" and "why" begin in the cockpit of the helicopter. Misreading the line of information may have been a training problem. Hayle was acting as the gunner and his error may reflect inadequate gunner-skill proficiency. The difficulties he experienced just before missile launch with locking the computer on the targets reinforce this conclusion. Another factor may be a predictable, degraded ability to perform technical tasks while under stress of imminent contact.²⁵ Finally, once into the role of gunner, Hayle developed tunnel vision on the targets and was not acting in his role a flight commander. He did not recognize indicators that there were problems with the target grid, nor communicate his misgivings and problems to the ground commanders. His demeanor and tone on the brigade command net was one of sure confidence.

Additional contributors include a series of events which, taken in the aggregate, created an environment within which the

fratricide could occur. The concave shape of the right boundary was not inherently dangerous. The combined movement of the scout vehicle to join the GSR at the intersection of the boundary and the front line, the curve of the right flank and the position of the helicopter became dangerous: Hayle's perception of a continuous front line isolated the two vehicles as forward of friendly forces. Not using ground forces' operational graphics while flying support missions compounded the danger. The confirmed target grid and the coincidence of Hayle's target description of two box-like vehicles and C/1-41 Infantry's earlier engagement of three box-like vehicles were sufficiently similar to convince the ground commanders that Hayle had found the right targets. Finally, when Hayle and his wingman decided to move closer to the targets, the aircraft radar alert sounded and they broke off their approach.

BATTLE OF NORFOLK

The proximate cause of the engagement of B/1-41 Infantry during the Battle of Norfolk was mis-identification on the part of 2-66 Armor -- the product of two sets of sequentially related incidents in combination with the battlefield environment.

One set was loss of position, resulting in unusual movement on the battlefield. When Wilson lost his vehicle in the passage lanes he lost contact with B/3-66 Armor. When he jumped to a new vehicle without his GPS, he lost his navigational aid. As he moved forward to reestablish contact he drifted out of position. His discovery

and efforts to correct the initial movement error led to a cross-grain movement pattern. This movement created a pattern of vehicles on the battlefield that invited others to mistake friends for foes.

Meanwhile a separate set of sequential events was occurring in 2-66 Armor's zone of action. Their trains elements reported small arms fire in the context of reports that some enemy vehicles bypassed by lead elements were still active. The combination of reports generated an increasing anxiety that the battalion's rear was not secure. Consequently, the reserve company was predisposed to aggressively attack any enemy forces found in the rear.

These separate sets came together at night on a dirty, confusing battlefield. Enemy engagement of B/1-41 Infantry with RPG and small arms fire bridged the two sets of events to set up the fratricidal engagement.

As with B/1-41 Infantry, the proximate cause of the fratricidal engagement of A/3-66 Armor and B/3-66 Armor was misidentification by 2-66 Armor. Although environmental circumstances contributed to the incident, there are few contributing events. The left flank of Hedges' company was in visual contact with the right flank of 2-66 Armor. The fight which broke out between the enemy and the two lead companies of the task force was well removed from 2-66 Armor. The key factor appears to be perception on the part of the right flank 2-66 Armor company that the RPG impacting on the turret of Hedges' vehicle was an enemy tank firing in their direction. Crew fatigue and anxiety from a prolonged night contact

probably played a role in the error.

FRATRICIDE AND THE U.S. ARMY

The Army's efforts to develop solutions to the problems of fratricide have coalesced around efforts to examine ways to identify and reduce the risk of fratricide. The methodology has been to use the TRADOC doctrine, training, leadership, organization, materiel and soldiers (DTLOMS) domain as the structure within which to focus efforts to enhance the field's capability for situational awareness and positive identification. The vehicle for examining proposed solutions and implementing approved products is the TRADOC Fratricide Prevention Action Plan.²⁶ All solutions thus far proposed or developed include three underlying assumptions: First, well trained and disciplined soldiers, staffs, and leaders will face less fratricide risk. Second, well planned, thoroughly prepared, forcefully executed operations carry less fratricide risk. Third, the technology that has increased the risk of fratricide can be used to reduce that risk. Technical applications have been proposed for both the training arena and combat operations.

Some applications, both training and technical, are in the field now. Heightened awareness, risk assessment techniques and considerations, GPS devices, and improved training have reduced the incidence of fratricide at the Combat Training Centers.²⁷ However, the direct causes and the ratio of their contribution to the incidents shown in Figure 1, remain largely unchanged.

FRATRICIDE INCIDENT REPORTS²⁸

FY 92 CTC RESULTS
Direct Causes

#1	22.6%	Combat ID Failures
#2	21.9%	Inadequate Control Measures
#3	18.4%	Fire Control Planning Failures
#4	15.0%	Reporting/Communication Failures
#5	9.3%	Crew/Weapon Errors
#6	8.2%	Land Navigation Failure
#7	4.6%	Battlefield Hazards

Figure 1.

One reason for this lack of change is that many of the proposed technological applications are not yet fielded. For example, full fielding of positive navigational aids such as GPS should significantly affect fratricides from land navigation errors. Incorporating positive combat identification devices would reduce the incidence of combat identification failures. By extension, technology offers solutions, from electronic mapboards to vehicle information systems, that would reduce the risk of all of the direct causes cited above.

This approach appeals to the American predilection for turning to technology to fix problems, but difficulty lies in applying the technology within achievable parameters. The more rigorous the requirements, the more the costs; higher costs hamper application to the whole force. For example, a thermal beacon would provide an inexpensive signature to identify friendly vehicles to one another. A drawback is that the beacon also marks them for an enemy with thermal capability. Additionally, vehicles without the marker cannot be called enemy; rather, they are unknowns. Vehicles without thermal markers, or with markers that fail, may end up at greater risk than if the marker was not used at all. The logical

answer then is to step up to a query and response system (IFF). Reliability and distribution still remain a problem: No response still leaves the target an unknown, and a sophisticated enemy will be able to emulate an unsecured system. The technology to circumvent these problems becomes inordinately expensive.

The second reason for continued problems with fratricide is associated with the combination of unforeseen events which set up the conditions within which fratricide can occur. While these contributing factors or preconditions have been treated in various fratricide awareness and training formats, the influence of the events which can create them has not.²⁹ For example, the TRADOC Fratricide Action Plan calls for putting friendly targets among enemy targets on firing ranges. The NTC introduces a friendly robotics vehicle during the live fire exercise at the NTC. This portrays an outcome -- a friendly force showing up at an unexpected place on the battlefield. It does not train recognition of events that lead to the outcome: "How did it get there?"

A more realistic approach would be to provide a series of independent or sequential events that, if recognized as they occurred, could lead to the realization that a potentially dangerous situation was developing. For example, during a company combined arms live fire exercise (CALFEX), insert a report that the flank unit is in contact on the shared boundary. Follow with a report that the flank unit has elements out of communications. Subsequently present a set of targets near the company boundary in conjunction with a separate and removed set of enemy targets.

Scenarios of this nature would train leaders and crews to relate events and information to identify potential sources of fratricide risk. Extending fratricide prevention training to the context of battlefield events unifies situational awareness training and gives perspective to the scope and requirements for materiel solutions.

RECOMMENDATIONS

The Army has moved diligently and insightfully to solve the problems of fratricide. While a harsh truth is that the fog and friction of war will continue to result in fratricide, there is every reason to believe that the frequency of occurrence can be dramatically reduced.

Much has already been done. The increased emphasis on training to enhance awareness of and measures to reduce risk are paying off in fewer fratricide incidents at the combat training centers (CTC). Armywide fielding of global positioning systems, interim combat vehicle marking systems and technical training aids will further reduce fratricide risk. However, the Army must continue to pursue solutions across the range of doctrine, training, leadership, organizations, and materiel to preserve the lives of soldiers.

The effort must be balanced between training and technology. Solutions that overly depend on technical fixes will quickly run into problems -- reliability, enemy interception and emulation, and cost. Some forms of interim combat identification devices are needed now. However, research and development programs which take fratricide potential and prevention into account early will be more

effective and cost less than added solutions applied after fielding.

An expanded situation training effort is necessary. Creative and realistic scenarios utilizing independent and sequential events to create situations ripe for fratricide have not received sufficient emphasis. If there is any truth to the maxim that the plan does not survive the first shot, then early recognition of developing risks takes on increased importance.

Finally, the Army must continue to utilize the TRADOC Fratricide Action Plan as the central means to review, adopt and implement solutions. In an era of decreasing resources and shifting priorities, a central point of contact is critical to ensure continued visibility and progress. Loss of focus will diffuse the effort to place effective solutions in the hands of soldiers. The price will be the loss of soldiers at the hands of their comrades on the next battlefield.

Some would argue that we do all these things already and such basic prescriptions are of little value. But leaders at every level from the squad leader to the Chief of Staff of the Army must search their consciences before declaring that they have done everything possible. Every officer and NCO must be personally involved and perpetually dedicated to ensuring that the soldiers under their supervision are properly trained, properly disciplined, and properly informed. Indeed, they must in effect take the pledge that "no soldier under my supervision will be either a victim or a perpetrator of friendly fire if I can help it."³⁰

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ENDNOTES

1. Combined Arms Command. TRADOC Fratricide Prevention Action Plan. Fort Leavenworth, Kansas: U.S. Army Combined Arms Command. Oct 91. The official definition of fratricide was adopted during a General Officer Steering Committee meeting on 17 December 1991. Until this time, there was not a common definition of fratricide in the U.S. Army. The official definition excludes damage to equipment which does not involve injury to personnel.

FRATRICIDE: The employment of friendly weapons and munitions with the intent to kill the enemy or destroy his equipment or facilities, which results in unforeseen and unintentional death or injury to friendly personnel.

2. LTC Charles R. Shrader, AMICICIDE: The Problem of Friendly Fire In Modern War, Fort Leavenworth, Kansas: Combat Studies Institute, U.S. Army Command and General Staff College, Dec 1982. Under the auspices of the U.S. Army Combat Studies Institute, LTC Shrader conducted extensive historical research into the problems of fratricide. His efforts provided a foundation for the fratricide prevention efforts initiated after the Gulf War.

3. Ibid., pp.x-xii. Shrader notes that there has been no consistent process by which injuries owing to friendly fire are captured and reported. This fact follows from periodic changes in the casualty reporting system, reluctance of commanders to report friendly fire incidents for various reasons, and the incidence of fratricide that goes unrecognized owing to the circumstances. He arrives at an average figure of two percent while acknowledging that it could be higher.

4. The Budd light was developed by a civilian contractor to mark combat vehicles for aircraft. The DARPA light was developed by the Defense Advanced Research and Procurement Agency for the same purpose. Both devices are near infra-red (IR) strobe emitters visible at night up to six to eight kilometers using image-intensifying night vision devices. The Budd light is a small device requiring a nine volt battery for operation. The DARPA light is larger, requiring seven "C" cell batteries, but has an adjustable beam. Neither beam is visible when seen by thermal systems.

Thermal Tape is technically known as No Power Thermal Target (NPTT) material. When viewed by a thermal sight at close range, NPTT material offers a distinct image that appears as the reverse polarity of the thermal image. When viewed by thermal sights in the white hot mode, the tape is seen as a black image on white vehicle background. To be discernable at 200 Ometers, large panels (two feet by two feet) are necessary. Thermal tape does not permit vehicle or unit recognition at long engagement ranges.

5. A significant effort was made by the 2d Armored Division (Forward) chain of command to develop a vehicle marking system for use in night operations. A wide range of field expedient alternatives were examined and tested for suitability. Medical hot pads, charcoal briquettes in #10 cans and taped headlights are examples of solutions that were visible through thermal sights. Two significant problems prevented their use. First, the marker had to be placed so that the heat of the vehicle did not obscure the marker's heat signature. Second, the intensity of the marker had to be sufficient to be visible in the thermal sight from expected engagement ranges. None of the expedient markers proved satisfactory. Marking the vehicle with a flashlight or chemical light was adopted. This system was distinguishable through passive night vision devices but not through thermal systems.

6. Center for Army Lessons Learned, FRATRICIDE: Reducing Self-Inflicted Losses, Fort Leavenworth, Kansas: U.S. Army Combined Arms Command, No. 92-4 April 1992, 9.

7. Prior to the ground war the brigade was issued the M839 depleted uranium sabot tank round. Known by its nickname, the "silver bullet," it leaves trace radiation as evidence of its passage through a target. Immediately after the war, the Army Materiel Command sent an investigation team to examine all of the vehicles damaged in the war by fire. This team discovered radiation in the entry and exit points of many of the vehicles hit by tank fire in the Gulf War.

8. The definition of fratricide excludes the case of intentionally calling fire in on friendly positions. An example of this would be calling indirect fire on one's own position in close contact with the enemy in order to prevent being over run or to break contact and withdraw. Another example would be directing the engagement of a friendly vehicle which is engaging other friendly vehicles that cannot be stopped by other means.

9. "Fratricide Awareness and Prevention." Fort Leavenworth, Kansas: U.S. Army Combined Arms Command, PIN: 709861DA RELEASE: TVT 20-988, March 1992.

10. FRATRICIDE: Reducing Self-Inflicted Losses, op.cit. Center for Army Lessons Learned, Fratricide Risk Assessment for Company Leadership, Fort Leavenworth, Kansas: U.S. Army Combined Arms Command, No. 92-3, March 1992.

11. In April and May 1992, the Army Materiel Command's Combat Identification Task Force conducted a technology demonstration at Fort Bliss, Texas. Five technology variants developed by contractors were demonstrated, for day and night operations, under simulated battlefield conditions. The intent was to demonstrate that a query and response system was technically feasible. The systems were based on two technologies; lasers and radio

frequencies. Initial results were promising; however, performance and costs varied widely, according to sophistication of the devices.

12. The Task Force spent the night of 15-16 February on Phase Line MINNESOTA, which was drawn on the 25 east-west grid line. The company commanders faced extended frontages up to 12 kilometers. Company positions consisted of sections of two vehicles separated from the next section by 500 meters to as much as a kilometer. The vehicles were strung out in an irregular line, with some as far south as the 24 grid line and others almost on the 25 grid line. Each company commander was required to personally check his positions with GPS to ensure no one was forward of the 25 grid line. I had confidence in the disposition of forces on my forward trace.

The right boundary of the task force was along an open flank. It did not form a north-south line from PL MINNESOTA to the Saudi-Iraqi border. The phase line and the boundary intersected at NT 950250. The border and the task force boundary intersected at approximately NT 910130. The boundary was drawn as a concave curve between these two points of intersection. The scout platoon manned this screen line, spread out across an eight kilometer flank. They were tied in with the brigade scout platoon just behind the Iraqi-Saudi border. The brigade scouts were tied into the 1st Cavalry Brigade on the task force's right rear flank. The GSR vehicle was positioned just inside the right boundary and just behind PL MINNESOTA.

13. Department of the Army, Apache Tape. Washington, DC: Office of the Chief of Staff for Public Affairs, 17 February 1991. Prior to engagement, the crews of the helicopters describe to one another what they are seeing on the ground. The view on the tape of the forward trace does not show a sharp turn in the front lines at the intersection of PL MINNESOTA and the right boundary. By coincidence the right flank vehicle of C/1-41 In located one and one half kilometers from the boundary and the second scout vehicle south of the phase line describe a gentle arc. Viewed from the air, at a 70 degree cardinal heading, these two vehicles appear to be on the same line. In effect the front line trace and the scout screen from the second scout vehicle merge into a continuous line. The GSR and M3 appear to be forward of the rest of the vehicles. Hayle concludes the targets are enemy based on this perception. After the engagement, as the crews attempt to determine if the vehicles were forward of friendly lines, they examine the visual trace again. Even though two of the crews acknowledge their target grid is behind the 25 grid line, they still believe the targets are well forward of friendly vehicles.

14. Seven days prior to the mission, the Task Force S3 and I met with LTC Hayle at the Brigade TOC to discuss the mission. After briefing the plan LTC Hayle was given a copy of the Task Force operational graphics. Although he took the graphics, he told us

that if called to support us that he wouldn't have the graphics with him. The reason for this was space in the cockpit. Rather, when he came into our area we were to provide him a grid line beyond which there would be no friendly troops. The Apache crews would use their on board navigation instruments to ensure that they engaged nothing short of the grid line we provided. He also reiterated that GSRs caused his radar warning alert system to activate; therefore, we needed to ensure that the GSRs were turned off when he came into our zone. Last, he told us that one of his aircraft had been fired on by a friendly Bradley on a previous mission. He wanted to preclude a reoccurrence if he came to fly for us. We agreed to have some of his aircraft circle my TAA so that the crews of his aircraft and my vehicles could look at each other through thermal sights. This discussion led to emergency marking systems at night. He advised us that they had discovered that smoke grenades were very effective for marking vehicles at night. Prior to leaving the TAA for the mission, I directed every track commander to have two smoke grenades immediately available in the turret of his vehicle.

15. About 2100 hours on 16 February pyrotechnics went up over the Iraqi defensive lines, shortly thereafter all of the companies on the front lines began reporting hot spots at extreme range to their front. An hour after the initial rash of sightings, following efforts by the chain of command to ensure accurate reporting -- the number of reports dropped sharply. Reports of movement from B/1-41 Infantry in the western sector became intermittent. B/3-66 Armor and C/1-41 Infantry continued to report movement focused in the eastern portion of B/3-66 Armor's sector and western portion of C/1-41 Infantry sector. Multiple reports of three groups of vehicles, three to eight vehicles in each group, moving in a southwesterly direction were received from both companies. The tanks were unable to accurately range the vehicles with their range finders. Estimated ranges varied from ten to twelve kilometers and the vehicles were moving southwest. Undulations in the terrain resulted in the vehicles dropping out of sight, then reappearing at decreasing ranges. The appearance of these vehicles was consistent with intelligence reports of the presence of security force patrols sent out from the Iraqi defensive positions after dark.

As the vehicle sightings in the western portion of the Task Force sector continued, the operations officer of the 1st Cavalry Division's left flank brigade entered the Task Force command net. At approximately 2200 hours he advised the Task Force that a vehicular patrol from his unit was forward and out of contact. Subsequently he reported that he was receiving reports of vehicles forward of his brigade and moving in a southwesterly direction. These reports came at the same time that the two west flank units in the task force were reporting movement to their front.

Both companies requested permission to engage by indirect fire. I decided as long as there were reports of lost friendly vehicles by the flank units, we would not engage without positive

identification. My intent was to wait until the vehicles were within direct fire range and identifiable through thermal sights. Consequently I directed the companies to continue to track the targets and attempt to get good ranges to the targets.

This process continued for the next hour and a half -- ultimately, until the targets were within five kilometers of the task force front lines. As they closed, the vehicles appeared to split up into groups of two or three and move laterally along the front. They did not close to a distance which allowed for positive identification. At approximately 2300 hours the adjacent Brigade S3 reported that all of his patrols were accounted for and he had no friendly forces forward for the Saudi-Iraqi border. At approximately 2330 hours C/1-41 Infantry reported three vehicles -- all box shaped, with one bigger than the other two -- at a range of three to four kilometers. He requested permission to engage with TOW and I granted his request. The target was engaged with no secondary explosions and therefore no clear indication of hit or miss.

At the same time that this engagement was developing I reported to the brigade commander that the vehicles were moving laterally on my west front and that the terrain was sufficiently rolling to provide them cover from ground observation. I believed the elements to my front were using their knowledge of the terrain to mask their movements. After a brief discussion, COL Weisman and I decided we should ask for attack helicopter support. That request was relayed to division and shortly thereafter approved by the division commander.

16. Apache Tape, op.cit. During the target confirmation process LTC Hayle described the targets to the ground commanders. His description was identical to the target description given by the C/1-41 Infantry commander earlier in the evening at the same general location. Upon hearing Hayle's description, I reiterated the C/1-41 Infantry target description to COL Weisman and recommended immediate engagement.

17. "They Call It Friendly Fire", The Phil Donahue Show, New York, November 199117.. Donahue asked LTC Hayle what happened to cause him to engage the friendly vehicles. Hayle's response was, "I read a wrong line of information."

18. Apache Tape, op.cit. As LTC Hayle was trying to confirm the location of the targets he used the relationship of the target to his aircraft to estimate the location. He was on the 23 east- west grid line. Observing the target at a range of 4300 meters along an azimuth of 70 degrees, he concluded that the targets were on the 27 or 28 grid line.

19. Apache Tape, op.cit. The tape captures all communications between the aircraft and all other stations. This includes the vehicle intercommunications system. The benefit of the tape is that all of the communications can be heard together while watching the scene on the ground. Unfortunately, the ground commanders were not privy to the exchanges in the cockpit of the helicopter or between the helicopters. The information exchange that indicates there were problems confirming the target location was not available to the ground commanders. Hayle's transmissions to the ground do not reflect the concerns.

20. Apache Tape, op.cit. After the engagement and initial reports on the ground reporting the engagement of the scout and GSR vehicles, I moved the AH-64s to the western side of the task force's sector. As they moved west, Hayle asked the other two crews if they had the targets at the 27 grid line or not. Both crews said that they had the targets at the 25 grid line, but they were sure that both vehicles were forward of friendly forces.

21. Prisoners of war from the Battle of Norfolk described surprise at being attacked at night after the storms of 26 February. They initially believed that the ground attack was a continuation of the air attacks they had been subjected to throughout the previous weeks. The accuracy, devastation and surprise of the air attacks led to a decision not to man armored vehicles unless there was a threat of ground attack. Initially engaged without being able to see what was shooting at them, the Iraqis did not realize they were under ground attack until U.S. armored vehicles moved into their defensive positions. With this realization, many crews attempted to remount their vehicles and engage the attacking forces.

22. LTC John S. Brown, USA. The Battle of Norfolk, (video tape), Media Branch, U.S. Naval War College, March 1992. LTC Brown, the commander of 2-66 Armor, produced a video tape describing the Battle of Norfolk. In the segment describing the engagement of B/1-41 Infantry, he proposes that the tank crew's targets were T-55s lying between 2-66 Armor and B/1-41 Infantry. His description includes a possible gunner thermal image that could have led to gunners engaging the Bradleys by mistake as they engaged the tanks.

23. Office of the Assistant Secretary of Defense for Public Affairs, News Release on Friendly Fire, 13 August 1991, pp.1-2.

24. Robert Johnson and Caleb Solomon, "Gulf War Casualty: 'Friendly Fire' Downs the Soaring Career of a Gung-Ho Colonel", The Wall Street Journal Southwestern Edition, 10 September 1991, p. A1. Patrick J. Sloyan, "Desert Scars", Sunday Newsday 10 November 1991, 4,5,58-59,60.

25. Paul Webb, Bioastronautics Data Book, (NASA SP-30006, 1964). NASA tests reflect decreased pilot ability to perform technical tasks as stress levels are increased.

26. "Fratricide Action Plan," Fort Leavenworth, Kansas: U.S. Combined Arms Command, October 1991. The Fratricide Action Plan is a pivotal document for management, approval and implementation of fratricide solutions developed by the Army. The action plan began with the recommendations of the TRADOC-AMC Combat Identification Task Force. It is a living document which is monitored by a general officer steering committee chaired by the Deputy Commander, Combined Arms Command.

27. Center for Army Lessons Learned, "FY 92 Fratricide Incident Reports: Results and Analysis," briefing, Fort Leavenworth, Kansas: U.S. Army Combined Arms Command, November 1992. This briefing presents the initial comparisons of changes in the incidence of fratricide from FY 90 to FY 92. It includes comparisons of incidents by direct and indirect causes from the NTC, JRTC, and CMTTC.

28. Ibid., 1.

29. Fratricide: Reducing Self-Inflicted Losses, op.cit., 11.

30. Charles R. Shrader, "Friendly Fire: The Inevitable Price", Parameters, XXII, No. 3 (Autumn 1992), 42-43.

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