Issue 48: September 2015

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REDLEG Update

The United States Army Field Artillery Branch's Newsletter

FROM the CMDT's DESK

Proactive Fires

Bringing Digital Capabilities Back to the Field Artillery Squadron

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Purpose: Founded in 2011, the *Redleg Update* provides past and present Field Artillery leaders with a monthly update of informational highlights to assist in their individual, collective and professional training efforts, as well as report on activities occurring throughout the Field Artillery community.

Official Distribution: The *Redleg Update* is distributed by the Commandant of the U.S. Army Field Artillery to key members of the Field Artillery chain of command across the U.S. Army. Past and current editions are also archived on FKN @ https://www.us.army.mil/suite/files/34549741

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RFIs, Notes, and Notices: To submit a Request for Information (RFI), please email the POC listed below.

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We appreciate those who have provided announcements, notices, articles and lessons learned.

Additionally, if you have a story of interest or wish to initiate a discussion on any topic or issue facing the Field Artillery community, contact Mr. John Folland, (580) 558-0831, or the editor of the *Redleg Update*, Ms. Sharon McBride, Field Artillery STRATCOM officer, (580) 558-0836.

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ON THE COVER:

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From the Commandant's desk

Proactive Fires

In this month's edition I want to focus on "*Proactive Fires.*" I'll define *Proactive Fires* as actions taken within the artillery profession of arms to achieve battlefield dominance and overmatch. *Proactive Fires* requires mastery of the Decide, Detect, Deliver and Assess (D3A) targeting methodology advanced by innovative and adaptive Leaders that aggressively employ all resources available. *Proactive Fires* provides our Maneuver forces uncontested freedom of movement and maneuver to seize, exploit and retain the objective.

A method to achieve *Proactive Fires* is utilization of the rapidly expanding unmanned air frames within our formations to assist in our ability to D3A against the enemy's High Payoff Targets (HPTs). History is wrought with examples of technological advances that impact warfare. Aircraft, since 1910, have provided Field Artillery formations the abilities to provide devastating Fires via reconnaissance, detection, observation of fires, and battle damage assessments.

With the downsizing of the Army, there is considerable concern we have reduced capability to mass indirect fires. There are fewer cannons in the Brigade Combat Team FA Battalions, rocket battalions are now entirely in the active and National Guard Field Artillery Brigades (FABs), along with all Echelons Above Brigade (EAB) cannon battalions in the Army National Guard. However with our ability to accurately target, we can mitigate the reduction in indirect fire platforms with accurate fires while simultaneously employing other types of effects, to include Joint, Coalition and nonlethal fires to achieve the Maneuver Commander's intent for fires.

We have intentionally set the target accuracy bar high for our Fire Supporters. Their mission, for dynamic targets, is to produce a CAT1: <6M TLE, at least 80 percent of the time. It is imperative that we as both Leaders and Fire Support subject matter experts, look across the Warfighting Functions to find innovative means to assist our Fire Supporters in delivering accurate target locations with expedited sensor to shooter links.

In this *Redleg Update,* our Field Artillery Historian, Dr. Boyd Dastrup, produced an article chronicling the Field Artillery's quest to utilize aerial assets to *Proactively* detect and destroy our enemies' warfighting capabilities **{See Page 4}****.**

I challenge all of our Field Artillerists to look at their means to utilize the Army's organic UAS capabilities (Raven/Shadow/Grey Eagle) to establish Aerial Observation as a means to accurately target and expedite mission processing through innovative sensor to shooter linkages. I encourage all of you to share your TTPs and lessons learned with the entire force as we learn to use this rapidly expanding capability.

Today, we are regaining our proficiency through our Division Artillery (DIVARTYs) and by refocusing on specific Field Artillery training in support of the Maneuver Commander. *Proactive Fires* is a complex and graduate level concept that Artillerists across the Force must learn and employ.

COIN operations allowed us the time and space to relearn techniques, tactics and procedures to fight an elusive enemy. However, to defeat a near-peer competitor it will require expert individual and crew efficiency and a complete understanding of *Proactive Fires*. Anything less puts Maneuver forces in grave danger, and invites increased risks to our FA formations.

As a branch we need to challenge ourselves, challenge our professional understanding, and once again use every means to acquire and engage the enemy with all fires to *Proactively* engage the enemy, seize the initiative, set our conditions, impose our will, and win wars by ensuing freedom of movement for Maneuver.

King of Battle!
Fires Strong!

Brigadier General William A. Turner

A BRIEF OVERVIEW OF AERIAL OBSERVATION

By Dr. Boyd Dastrup

Before World War One American field artillerymen employed ground observation as their primary method of target acquisition which only gave them observation capabilities to the visible horizon and were examining the possibilities of employing balloons, dirigibles, and aircraft for aerial observation to see on the other side of the hill or behind enemy lines. Even though aviation was in its infancy and untested in combat, a number of officers eagerly sought to exploit it for acquiring targets. As early as 1910, the publication of the War Department's Field Service Regulations (1910) specified the formation of an aerial company in each corps-size unit upon mobilization but left the mission open. Four years later, the new edition of the Field Service Regulations (1914) proclaimed strategic reconnaissance, tactical reconnaissance, and field artillery observation as the fundamental missions of aviation and implied the use of armed aircraft to protect friendly observation aviation as a fourth mission. To this end, the First Aero Squadron arrived at Fort Sill on 28 July 1915 to conduct experiments in aerial observation of artillery fire.[1]

In an article published in the Field Artillery Journal during the first months of 1916, Major (later Major General) William S. McNair, a field artilleryman, enthusiastically endorsed aerial observation and aviation and focused his attention on the ease of adjusting fire onto targets employing terrestrial or aerial observers. "If a battery [or any other enemy position for that matter] can be brought . . . under the observation of an observer provided with a means of communicating his observations to the adjusting battery, . . . the target will be in great danger of annihilation," he wrote.[2]

Continuing with the drive to many aerial observation a reality, in 1917 the Air Service, then part of the Signal Corps, constructed an airdrome south of Fort Sill and called it Henry Post Army Airfield after Lieutenant Henry B. Post who had been killed in an airplane accident near San Diego, California, in 1914 in an attempt to establish an altitude record. Subsequently, the War Department sent the 3rd Aero Squadron and opened the School for Aerial Artillery Observers in the fall of 1917 and later the Air Service School in August 1918 to train field artillery aerial observers.[3]

Balloons have limited mobility to spot shell bursts from long distances... U.S. Army photo released.

Combat action early in the war attested to the optimism and conclusions about aerial observation and target acquisition. Even though a balloon or a dirigible provided observers with an unprecedented matchless view of the battlefield, aircraft during the war spotted field artillery positions and other targets for the first time from angles never considered possible before. Unlike balloons and dirigibles that generally hovered high in the air behind friendly lines, were tethered to the ground, had limited mobility, and had difficulties spotting shell bursts from such distances, aircraft actually ventured over enemy territory to give commanders the ability to attack deep targets that previously had been unseen and invulnerable to enemy action, to exploit long-range field artillery, and to spot shell bursts more easily.[4]

Even before World War One had ended, field artillery commanders confronted aviators over the quality of aerial observation.[5] Insisting that the Air Service was more concerned about making aces than furnishing responsive aerial observation, Chief of Artillery for the American Expeditionary Force (AEF), Major

General Ernest Hinds wanted aviators to reorder their priorities to make aerial observation more important.[6]

The inability to rectify the problem led to reforms after the war. As a part of a larger War Department effort to examine recent military operations and to glean the lessons learned, Hinds assembled a board of officers in December 1918 to study the experience gained by field artillery units during the war.[7] Under the direction of Brigadier General Andrew Hero, Jr., the Hero Board met from December 1918 through March 1919.[8] According to the board, aerial observation offered extensive capabilities for locating deeply defiladed targets and adjusting fire on them. However, it failed to fulfill the needs of the Field Artillery.[9] Aircraft assigned to furnish field artillery observation missions flew from airfields in the rear up to the front where they contacted division artillery by radio. Upon the completion of a mission, partially trained observers and pilots flew back to their airfields to await another assignment. Given this system of aerial observation which provided positive results in isolated cases, field artillerymen never met and knew the observers and pilots and lacked any control over them because they belonged to the Air Service. Also, shortages of aircraft and competition from other pressing missions prevented field artillery units from getting timely air observation because aircraft were always being diverted from field artillery missions to higher priority missions.[10]

In view of the problems with aerial observation that persisted throughout the war and in agreement with the AEF's Superior Board and the Infantry Board that were meeting at the same time, the Hero Board outlined a solution that contrasted remarkably with the remedy proposed by the Chief of Artillery of the AEF.[11] The board advised:

That an observation squadron be permanently assigned as a part of each combat division and that the aerial artillery observers . . . be officers of artillery trained as observers and members of the unit for which they are adjusting. . . . For observation and adjustment of artillery fire, the necessary aeroplanes should be under the direct orders of the artillery brigade commander and should be trained with the brigade.[12]

The Hero Board urged making aerial observation organic to the division. This arrangement would give the division commander the ability to allocate critical and often limited aerial observation resources as he saw fit for target acquisition, adjustment of field artillery fire, reconnaissance, and liaison and remove command and control from the aviators who often had a conflicting agenda with the ground forces and certainly did not understand the Field Artillery's nor the Infantry's requirements.[13]

Late in 1918, an anonymous contributor to the Hero Board wrote, "All aerial observers and the entire F.R.S. [Flash Ranging Service] and S.R.S [Sound Ranging Service] must be composed of artillery personnel and must be absolutely under the control of the artillery. We shall never get successful results by the methods that have been pursued in this war." [14]

Another contributor to the study, Brigadier General Adrian S. Fleming of the 158th Field Artillery Brigade who was also commandant of the School of Fire for Field Artillery in 1917-1918, advised, "The only solution I see is to assign certain aeroplanes and balloons to the artillery for the purpose of observing and permit them to do no other work." [15] Like the anonymous contributor, Fleming championed organic field artillery air observation. It would ensure responsive and aggressive target acquisition because the aircraft and aerial observers would be under the command of field artillery officers and could not be diverted to other missions without permission.[16]

New field artillery technology that was appearing in the 1920s made organic field artillery air observation even more critical for effective target acquisition and adjustment of artillery fire.[17] First Lieutenant William B. Leitch, a student at the Field Artillery School, wrote in 1925:

With constant improvements it our ordnance and munitions, the Field Artillery is able to reach out further and further into enemy territory. Because of this increase in the range of our weapons and of our natural desire to see the other side of the hill, the need for more and better observation becomes apparent. Few [ground] observation posts approach the ideal. Good ones are very often hard to find. Frequently the best available are useless for the full accomplishment of the mission of field artillery. It is such a situation as this last that has caused us to turn to the airplane as an auxiliary means of observation. . . . The Field Artillery has simply acquired another eye. [18]

Besides visualizing the importance of aerial observation, Leitch advocated using field artillerymen as aerial observers because they understood field artillery requirements.[19]

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The ranges of field guns of the early 1930s forced the enemy to locate its positions farther away and to camouflage them more extensively for protection and prompted field artillerymen to intensify their efforts to obtain organic aerial observation.[20] To find and hit such deeply defiladed targets required aviators and field artillerymen to cooperate more than they had previously done because terrestrial observers could only see to the visible horizon and could not see as far as the friendly guns could shoot.[21] In the fall of 1931, a former Chief of Staff of the Army and a field artilleryman, General Charles P. Summerall (1926-1930), composed an article entitled "Organization, Armament and Employment of Field Artillery" in the *Field Artillery Journal.* In the article he explained the requirement for organic aviation for the division but never advocated organic aerial observation for the Field Artillery.[22] Four years later, Chief of Field Artillery, Major General Harry G. Bishop (1934), condemned the policy that prohibited field artillery officers from "taking to the air and commanding their fire units directly."[23] Such a practice of aerial observation would not stand the test of war, according to Bishop, and it should be replaced by field artillerymen serving as observers and organic field artillery observation aviation.[24]

Later, the Chief of Staff of the Army, General Malin Craig (1935-1939), expressed his dissatisfaction with existing aerial observation practices and the small number of observation aircraft to the Deputy Chief of Staff, Major General Stanley D. Embick (1936-1938), in his effort to ensure the availability of aerial observation to support the ground forces.[25] In a letter to Embick in June 1938, he complained:

I suppose there is no doubt about the value of controlling fire from the air. This requires rapid and accurate transmission of information from the Artillery Observer to the firing unit so that changes can be made instantly.[26]

With this in mind, Craig directed Embick to ensure that the Chief of the Air Corps, Major General Oscar Westover (1935-1938), provided the appropriate aircraft for field artillery aerial observation.[27] When Westover failed to accomplish the directed assignment, the Chief of Field Artillery, Major General Robert M. Danford (1938-1942), increased his pressure to improve field artillery aerial observation in 1939.[28]

Pressure for adopting organic field artillery observation aviation continued unabated as the Field Artillery agitated for better air observation and as the debate intensified over the proper use of airpower. The Air-Ground-Procedure Board, convened by the Commandant of the Field Artillery School, Brigadier General Augustine McIntyre (June 1936-Jul 1940) concluded in May 1940 that the Field Artillery should have its own observation aircraft with pilots and mechanics who were field artillerymen. Equally important, the board urged creating organic field artillery observation aviation and organizing a school for air observers at Fort Sill.[29]

Maintaining the pressure for organic field artillery aerial observation, the Executive to the Chief of Field Artillery, Colonel Fred C. Wallace, wrote the Adjutant General of the Army, Major General Emory S. Adams (1938-1942), in July 1940 at the direction of Danford about the Field Artillery's interest in an airplane for use in observation. Aerial observation was crucial because ground observers could be pushed forward with infantry or cavalry, but they could not see beyond the visible horizon. In the defiladed areas in the rear of the hostile lines, targets, such as troop concentrations, field artillery batteries, and headquarters, would present a threat to front line troops.[30]

Continuing along the same line, the colonel noted the requirement for each field artillery battalion to have at least one aircraft ready for use or immediately available at all times. "One flight of not less than seven aircraft with pilots and maintenance crews should be an organic part of the equipment and personnel of each artillery brigade headquarters (square division and corps artillery) or regimental headquarters (triangular or armored division)," Wallace outlined.[31]

The General Staff resisted proposals for organic field artillery air observation during the rest of 1940 and into early 1941 even though the Germans were having success with it and even though the British were seriously considering implementing it.[32] In response to Danford's repeated requests for organic field artillery observation aviation, Adams explained in February 1941 that maintaining specialized arms and organizing them into units was the most economical on personnel, material, and operating facilities. Before any changes to Army organization would be made, the Field Artillery had the burden of proving the current organization to be unsatisfactory and unable to

provide adequate support.[34]

Shortly afterwards, the Field Artillery School convened a committee under Colonel P.M. Hanson in May 1941 to consider the rationale for organic observation aviation once again. The committee called organic observation aviation as the best means of meeting the Field Artillery's aerial observation requirements. To the committee the increased mobility of the combat forces in recent years demanded organic field artillery air observation. Such observation would give the Field Artillery the ability to track a mobile enemy more easily over a greater distance and detect more targets for massed indirect fire than ground observation, sound ranging, or flash ranging could find.[35]

The Field Artillery employed fixed wing and rotary wing aircraft to conduct aerial observation missions... U.S. Army photo released.

Supporters of organic air observation for field artillery, such as Hanson's group, and their opponents agreed on one major issue but disagreed on another. To accomplish its mission with effectiveness and speed under conditions of modern warfare, field artillery units required aerial observation to take advantage of long-range weapons. No one really challenged that. The debate, however, raged over ownership.[36]

The Field Artillery strongly wanted ownership because it feared a repetition of its World War One experience where field artillery units had inadequate air observation support from the Air Service, and this concern was justified. From the Field Artillery's perspective, this reinforced the existing anxiety of being dependent upon another arm for aerial observation. Air observation for field artillery missions could easily be superseded by others given the limited number of aircraft available; and the Air Corps's preoccupation with strategic bombardment and pursuit aircraft certainly reinforced the concern.[37]

Prompted by the dissatisfaction expressed by the Field Artillery School, the Office of the Chief of Field Artillery, and other field artillerymen, Aeronca, Piper, and Taylor aircraft manufacturers offered their light aircraft complete with pilots to senior commanders participating in the Louisiana army maneuvers of 1941 for testing in field artillery observation and liaison roles. The Commanding General, 1st Cavalry Division, Fort Bliss, Texas, Major General Ennis P. Swift, dubbed the light aircraft "Grasshoppers" because they hopped down the makeshift runways like grasshoppers. During the maneuvers, the aircraft flew over four hundred thousand miles, completed more than three thousand missions without losing one plane, and demonstrated the ability to conduct air observation, courier, and reconnaissance missions.[38]

Although the light aircraft proved their worth, field artillery officers who participated in the Louisiana maneuvers of 1941 still expressed their dissatisfaction with existing air observation practices and organization. Because air observation belonged to the aviators, they never knew when it would be available. Aviators disrupted observation by diverting aircraft to other missions at the last minute or by ignoring field artillery requirements. Moreover, there were never enough airplanes for field artillery missions.[39]

Late in the summer of 1941 after visiting the artillery school in England that was teaching the use of light aircraft for organic air observation, Danford came away impressed. Influenced by this visit, his observation of the Louisiana Maneuvers of the summer of 1941 where Army Air Corps air observation was erratic, and the fire direction center that cried for organic field artillery air observation to exploit it.[40] On 8 October 1941 which was eighteen months

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after his first official request of July 1940 that had met with intransigence by the War Department who had opposed decentralizing aviation and strongly championed strategic bombardment at the expense of other missions, Danford renewed his bid for organic field artillery observation aviation.[41]

In that pointed correspondence of 8 October 1941, Danford outlined his solution. He wanted at least seven airplanes with pilots and maintenance crews to be authorized as an organic part of each field artillery unit in each infantry, motorized, armored, and cavalry division and corps artillery brigade. Equally important, he desired to organize organic field artillery aviation immediately to test the concept.[42]

With strong support from the Field Artillery School and field artillerymen as a whole, and from Secretary of War, Henry Stimson who had been a field artillery regimental commander in the Great War and the Assistant Secretary of War, John J. McCloy, Danford continued lobbying intensely for organic field artillery aviation. On 5 December 1941 he made another formal proposal to the War Department to test such aviation. After receiving permission to test organic aerial observation, Danford issued a directive on 23 December 1941 to the Field Artillery School to test the concept.[43]

After the pilots had undergone six weeks of training early in 1942 under the Director of the Department of Air Training at the Field Artillery School, Lieutenant Colonel William W. Ford, field trials of organic field artillery observation followed as debates over the merits continued in the War Department. Conducted during March and April 1942 at Fort Bragg, North Carolina, and Camp Blanding, Florida, during actual field maneuvers, the trials produced positive results. Participants enthusiastically supported organic field artillery air observation. A board of officers convened to pass judgment found organic field artillery aerial observation to be essential for effective field artillery operations.[44]

Subsequently, on 6 June 1942, a War Department directive established organic field artillery observation aviation to supplement but not replace the Army Air Force's responsibility for aerial adjustment of field artillery fire from high-performance aircraft in its observation squadrons. The department directed making a team of two liaison airplanes with two pilots and a mechanic organic to each light and medium field artillery battalion and two teams in each field artillery brigade headquarters and headquarters battery and division artillery headquarters and headquarters battery to satisfy Danford's organizational demands. Over the next two decades following the war, the Field Artillery employed fixed wing and rotary wing aircraft to conduct aerial observation missions in the Korean and Vietnam Wars.[45]

Although the Field Artillery School never seriously questioned the demise of organic field artillery air observation in 1979-1980 with the creation of the new aviation organizations in the corps and division, it challenged fielding priorities of the OH-58D. The Chief of Program Management and New Systems Division in the Directorate of Training and Doctrine, Major Mark Ison, who was a field artilleryman and also an aviator, recognized the helicopter's potential for field artillery use and enrolled the support of the school's Assistant Commandant, Brigadier General Thomas J.P. Jones, in 1983-1984 in an effort to boost the field artillery mission to a higher position on the list of priorities. From the Field Artillery School's perspective, fielding the aircraft primarily in a field artillery role made more sense than employing it to support air cavalry or attack helicopters because it could obtain a maximum effect against an enemy with an economy of force. Rather than using a team of costly AH-64s and OH-58Ds to locate and destroy enemy armor with laser-guided munitions, one OH-58D in a field artillery role could coordinate enough indirect fire on the same target with the same effectiveness at far less expense by tying up fewer men and less equipment. In addition, using a single OH-58D in a field artillery role afforded a better chance of exploiting the element of surprise against an enemy than a team of aeroscouts and attack helicopters would.[46]

Tests of the OH-58D in 1984-1985 and not a compelling argument from the Field Artillery School, however, prompted the Army to restructure fielding priorities. Ironically, the tests showed that the helicopter was satisfactory in its field artillery role. In view of this, the Army revamped its priorities for the helicopter. It made the field artillery mission the top priority and planned to give the OH-58D to field artillery units before attack helicopter and air cavalry units received their aircraft.[47]

Regardless of fielding priorities, the Field Artillery School and a subordinate organization of TRA-

A Bell OH-58 Kiowa, a single engine, single rotar helicopter used for observation, utility and direct for support. U.S. Army photo released..

DOC, the U.S. Army Combined Arms Center at Fort Leavenworth, Kansas, clearly understood the OH-58D's potential. In a white paper of 1986, the school wrote that the combination of the aerial fire support observer and the OH-58D would enhance fire support significantly and magnify the total force's ability to execute AirLand Battle doctrine.[48] As the U.S. Army Combined Arms Center explained in May 1987, the combination of the aerial observer and the OH-58D "has the potential to significantly enhance fire support for the tactical commander."[49] Ultimately, the OH-58D would render timely and accurate observed fire for conventional and semi-smart munitions for the deep, main, and rear areas of combat operations, would provide real-time information for targeting and intelligence to the division commander, would supply fire support coordination for attack helicopter battalions, and would furnish fire support coordination across the spectrum of conflict.[50]

Over the next several years, further testing, operations, budget cuts, and the decision to arm all OH-58Ds and reconfigure some as multi-purpose light helicopters prompted the Army to rearrange the helicopter's mission priorities. In 1988 budget cuts

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forced the Army to reduce its purchase of OH-58Ds to 477. When budget cuts in January 1989 reduced the procurement to 207 aircraft, the need to review fielding priorities definitely arose.[51]

In the face of fewer aircraft, the Army reexamined its distribution plan. In June 1989 the Army directed TRADOC to develop an aircraft distribution plan and to consider the OH-58Ds slotted for field artillery missions for redistribution. Threatened with loss of helicopters dedicated to field artillery missions, the Assistant Commandant of the Field Artillery School, Brigadier General Fred F. Marty (1987-1989), fought to retain the aircraft. In a July 1989 message to the Aviation School, he solicited support to keep the field artillery mission and retain a field artilleryman as the observer if the field artillery mission could not be salvaged. The Aviation School accepted Marty's proposal and agreed to work with the Field Artillery School in satisfying their respective but conflicting needs.[52]

In mid-September 1989, just a month before the Field Artillery completed fielding its allotted OH-58Ds, the Army's revised fielding and employment plan drastically undercut the Field Artillery School's position. The plan removed field artillery OH-58Ds from all but one division artillery support platoon. Faced with losing seventy-five of eighty-one aircraft, the Commandant of the Field Artillery School, Major General Raphael J. Hallada (1987-1991), argued strenuously against such action. In a message to TRADOC on 15 September 1989, he cautioned that the action "would seriously degrade the Division commander's ability to acquire and engage the enemy with indirect fires and maintain a current intelligence picture of the enemy situation." [53]

In early October 1989 a revised fielding and employment plan outlined distributing all of the Field Artillery's OH-58Ds to the air cavalry mission. Although Hallada vigorously protested this decision, TRADOC responded that arming the OH-58D, using it as a multi-purpose light helicopter, and purchasing only a limited number forced an reexamination of fielding priorities and chose not to support the general. In addition, the Army was also thinking of optimizing

Joint Effects Targeting System. U.S. Army released photo

the use of its scarce OH-58D assets by scrutinizing the possibility of expanding the OH-58D's combat role to include scout and armed reconnaissance.[54]

The revised OH-58D fielding and employment plan recognized increased competing demands for the aircraft and effectively canceled the field artillery mission. Top priority now went to fielding armed OH-58Ds to air cavalry units for armed reconnaissance, to the XVIII Airborne Corps and 82nd Airborne Division for critical multi-purpose light helicopter needs, and to corps target acquisition reconnaissance companies and training units. In light of the new priorities, the Army opted to redistribute all field artillery OH-58Ds to satisfy the other pressing concerns and decided to use OH-58A/Cs to the division aviation brigade for the field artillery mission. Although the Field Artillery still had access to aerial observation in the division aviation brigade, it lacked the capability of lasing over-the-hill targets for precision munitions.[55]

Because radars did not provide over-the-horizon observation capabilities and could only detect active enemy indirect fire systems, because the Arab-Israeli War reinforced the difficulty of flying manned aircraft into enemy airspace defended by sophisticated air defenses, and because manned aircraft were becom-

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ing more expensive, the Field Artillery School and the Army meanwhile lacked the luxury of depending upon manned aircraft, loitering near or over enemy territory for reconnaissance and target acquisition as they had done since World War Two. This noted deficiency prompted the school and the Army to initiate work in 1974 on a remotely piloted vehicle called the Aquila. Upon fielding, the Aquila would provide real-time target acquisition information and lase targets for the Cannon-Launched Guided Projectile, commonly called Copperhead, a precision 15-mm. munition under development. Although tests revealed the Aquila's ability to provide reconnaissance and to acquire and designate targets for Copperhead, escalating costs prompted Congress to deny further funding. Rather than having several remotely piloted vehicles being developed for each of the services, it wanted only one effort and directed the Secretary of Defense in December 1987 to consolidate the various efforts into one to provide an affordable remotely piloted vehicle. This decision effectively forced the Army to abandon the Aquila.

With the demise of the OH-58D for artillery targeting and the ambitious Aquila remotely piloted vehicle program, the Field Artillery lost aerial target observation capabilities, faced the reality of depending upon other branches for that crucial capability after having it since World War Two, and shifted its focus to ground-based target acquisition system that would culminate in the yet to be fielded Joint Effects Targeting System and other sensors.

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[7]Boyd L. Dastrup, *King of Battle: A Branch History of the U.S. Army's Field Artillery* (Fort Monroe, VA: Office of the Command Historian, U.S. Army Training and Doctrine Command, 1992), pp. 180-84.

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[22]General Charles P. Summerall, "Organization, Armament and Employment of Field Artillery," *Field Artillery Journal,* Sep-Oct 1931, p. 516.

[23]MG Harry G.Bishop, *Field Artillery: King of Battle* (Boston: Houghton Mifflin Company, 1935), p. 132.

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[36]War Department, Field Manual 1-20, Tactics and Techniques of Air Reconnaissance and Observation, 1941, pp. 50-51; War Department, Field Manual 1-20, Tactics and Techniques of Air Reconnaissance and

Observation, 1942, p. 50.
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[39]Summary of Reports of FA Commanders on Air Observation for Field Artillery during Maneuvers Summer and Fall 1941, Tab D, US Army Office of the Chief of Field Artillery, Air Observation for Field Artillery, 1941;Raines, *Eyes of Artillery*, p. 33.
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[41]Epstein, "Army Organic Light Aviation," p. 16; Raines, *Eyes of Artillery*, pp. 31-33
[42]Raines, *Eyes of Artillery*, pp. 56-67.
[43]Raines, *Eyes of Artillery*, pp. 56-67; Report, Test of Organic Air Observation for Field Artillery, Training Phase, Fort Sill, Ok, 15 Jan-28 Feb 1942, pp. 1-6, MSTL; Memorandum for Chief of Field Artillery, subj: Air Observation, 10 Dec 1941, in Report, Test of Organic Air Observation for Field Artillery, Training Phase, 15 Jan-28 Feb 1942; Memorandum, 2 Jan 1942, in Report of Test of Organic Air Observation for Field Artillery, Training Phase, 15 Jan-28 Feb 1942, MSTL; Memorandum for Chief of Army Air Forces, subj: Air Observation, 10 Dec 1941, in Report, Test of Organic Air Observation for Field Artillery, Training Phase, 15 Jan-28 Feb 1942; Riley Sunderland, *History of the Field Artillery School - 1911-1942*, p. 235, MSTL.
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THIS MONTH IN HISTORY "SEPTEMBER"

7 September 2011, General Raymond T. Odierno, a field artillery officer, became the 38th Chief of Staff of the U.S. Army.

13 September 1954, The Artillery School began classes in the newly constructed Snow Hall. The classes were taught in the academic (B) wing of the building.

15 September 1911, The School of Fire for Field Artillery officially opened its doors to its first class of officers.

17 September 1946, The Replacement and School Command under the orders of the Army Ground Forces tasked the Field Artillery School to develop a plan to consolidate the Field Artillery School, the Antiaircraft Artillery School, and Coast Artillery School to save money and personnel, but never directed the school to consolidate the schools at one location.

18 September 1917, the School of Aerial Observers at Fort Sill began its first class for training airplane and balloon aerial observers for duty in France.

19 September 1966, Col A.D. Pickard, Chief of the Artillery Branch, Officer Personnel Directorate, Office of Personnel Operations, initiated "The Artillery Branch Study" to determine if the integrated Artillery branch composed of Field Artillery and Air Defense Artillery was responsive to the Army's needs. The study recommended separating the Field Artillery and Air Defense Artillery.

PFC Wesley Sleigh 4/2 FSE lasing targets with the FS3 ***Photo by CPT Scott Haywood, 2d Cavalry Regiment***

Bringing digital capabilities back to the Field Artillery Squadron

By CW2 Ryan Groves, 2d CR Targeting Officer and CW2 David Zamora, 1SBCT, 1AD Counterfire Officer

The journey of regaining fire support proficiency began in July 2014 with the arrival of our new Squadron Commander focused on fire support (LTC Deric Holbrook). The FY 14 MTOE changes that brought the Fire Support Elements (FSE) back to the Field Artillery Squadron and an energized staff in the 2CR Field Artillery Squadron. When combined the conditions were set for success to regain digital capabilities and core competencies.

The establishment of digital fire support communications can be a simple process influenced by a number of complex factors. In August 2014, the Field Artillery Squadron 2D Cavalry Regiment set out to reestablish digital fire support communications, encountering a number of unforeseen obstacles. This situation could be paralleled to what happened on April 11, 1970, when NASA launched its 7th manned mission to space and third planned mission to land on the moon. Apollo 13, however, had a different fate, encountering a number of obstacles that required engineering expertise and troubleshooting procedures to bring the Apollo 13 crew home safely. Over the course of six months, as digital communications were being reestablished, it felt as if the FA Squadron was trying to assist Apollo 13 on their mission home. While a number of the obstacles that we encountered were not directly related to digital communications, they influenced our unit's ability to effectively regain confidence and support along our digital quest. Some of the obstacles encountered include MTOE changes, neglected equipment, untrained Soldiers, multiple contracts, lack of Stryker specific work packages to support maintenance operations, and an overall lack of understanding as to how the Mission Equipment Package (MEP) operates when paired with the M1131A1 Stryker.

After several months of focused training and maintenance, the Field Artillery Squadron 2D Cavalry Regiment had established digital links among all 13 FSVs, but had a difficult time maintaining digital

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capabilities with all 13 FSVs in a single training exercise. As the weeks turned into months all identified faults were job ordered for repair. At times, multiple hindrances and obstacles all pointed in the direction of failure; however, we achieved many successful milestones to include a better understanding of how unpretentious goals can contain complex problem sets.

The FY14 MTOE changes brought the Fire Support Elements (FSE) back to the Field Artillery Squadron. A number of manning, equipping, training, and maintenance deficiencies across the FSE formations were identified. The greatest obstacles encountered equated to neglected fire support equipment and decayed knowledge of basic digital fire support tasks. Having the entire Fire Support system consolidated under the FA Squadron allowed us to provide a focused energy to solve our manning, equipping, training, and maintenance problems.

Training for Digital Fire Missions – Phase I

After reconsolidating of all the Fire Supporters and equipment from the Infantry squadrons, the regiment's FS combat power became more effective and our focus shifted towards individual observer skills and proper manning. To maximize the effectiveness of our Fire Support Elements training objectives, the Regimental Fire Support NCOIC developed a roster that tracked each individual by skill set: Joint Fires Observer, Target Mensuration Only, Joint Firepower Course, Collateral Damage Estimation, Battle Staff Course, Electronic Warfare 1J, and a number of other courses. The individual skill sets were then paired with longevity and rotational needs. As the FSE's were manned by skill sets, a detailed training plan was developed to fill knowledge gaps.

With individual collective task being completed, the line of effort shifted towards team-focused training. We thought our FSVs were fully functional, but discovered the Mission Equipment Package (MEP) that provides the digital capability had been neglected for the better part of a decade and required extensive maintenance. Several factors contributed to this neglect. The FA Squadron was activated after the modular re-alignments moved Fire Supporters to the Infantry Squadrons, and Regiment continuously transitioned from OIF to OEF deployments since its activation. Fire Supporters had never been consolidated under the FA Squadron in 2d Cavalry Regiment. In addition to this, the FSVs are amongst the oldest Strykers in the Army and have not deployed or properly reset in seven years. The combination of these factors led to decayed technical knowledge on the operation

PFC Oakley, Corey 4/2 FSE observing 155 mm rounds from OP5.

and maintenance of the Stryker and MEP.

The first subcomponent of the MEP that we identified as a training deficiency was the Stand Alone Computer Unit (SCU) that runs the Forward Observers Software (FOS). To correct this deficiency, we contacted FCoE and coordinated an MTT from CGI Federal. The initial onset of requesting a MTT was identified during the Stryker War Fighting Forum and further developed through repetitive contact between FCoE and the Leadership of Field Artillery Squadron

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Photo by CPT Scott Haywood, 2d Cavalry Regiment

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2D Cavalry Regiment.

This training focused solely on the SCU operations. To facilitate training a large group of fire supporters the CGI instructor dismounted the SCUs and conducted the training in a classroom environment. This environment allowed Fire Supporters to gain confidence in the SCU. In hindsight, we practiced poor habits by failing to integrate the SCU into the MEP, not exercising the tactical network instead relying on single channel / plain text frequencies and external power supplies. Given that the SCU is an interface that allows communication between MEP components we should have placed more focus towards how the MEP components interact. While this is not part of the outlined training for the SCU and FOS, this is one of the moments when we felt as if we were trying to land Apollo 13 on the moon, rather than accomplish a basic digital call for fire.

Our complex problems began shortly after the FOS trainer departed in late September 2014. The

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new FOS software was not compatible with the outdated Fire Support Sensor System (FS3) software; this limited us to manually generating targets on the SCU to send them to the AFATDS. Further research into the problem determined that our software issues spanned several components of the MEP. We identified dated software on the Target Station Control Panel (TSCP), and the Mission Processing Unit (MPU). In addition to the software issues, a number of hardware issues were identified that included NMC wiring harnesses, improperly installed cables, and missing cables.

Deadlining the Regiment's Fire Support System – Phase II

Our NCOs' and Soldiers' training on the M1131A1 Stryker and its capabilities to this point had been limited to automotive training. The fire supporters lack of knowledge on the M1131A1 stems from years of constant deployments, that exclusively focused on the use of theater provided equipment (TPE) as it pertained to the non-standard missions that required limited FS knowledge. As we visualized the magnitude of the problem, the Squadron Commander decided to deadline all 13 FSVs; the MEPs' state of disrepair was too much to consider them fully mission capable (FMC). To establish a baseline to begin repairing the FSVs, we reached out to field service reps from Communications-electronics Command (CECOM) and Tank Automatic and Armament Command (TACOM) in hopes of obtaining Stryker specific schematics of the wiring diagram, which would allow us to initiate troubleshooting procedures. Up until this point we had been using schematics that were developed for the M117 and M1200 Armored Knight platform.

Although our CECOM and TACOM representatives worked well together, isolating the faults in each Stryker was challenging because each fault repaired during a CECOM Technical Inspection uncovered another fault, drawing TACOM back in for troubleshooting. In addition, no single source of documentation exists for troubleshooting the M1131A1 Stryker FSV MEP. All work packages that had been provided by CECOM and TACOM were generally reference material developed for the M117 and M1200 Knight platform. While the provided material did reference Stryker specific issues, it failed to identify corrective actions, part numbers, and detailed schematics to begin proper trouble shooting procedures. To further complicate the process, Fire Support Teams continued to identify new problems during weekly Digital Sustainment Training (DST). We turned in every FS3 for software updates and learned that annual services and software updates had been overlooked for at least five years.

Fixing the Problems and Regaining Expertise – Phase III

Once we had finally fixed the majority of the cables, every FSV in our formation had the same fault. With CECOM and TACOM assistance, we identified that TSCPs and MPUs were running outdated software. We found the problem! Our concern quickly returned; we learned the MEP components are managed by several different contracts. Disappointment set in when we learned that the FSV Technical Manual did not contain instructions to re-load the new software. By this time we had established weekly teleconferences with PM Stryker, TCM Fires, and DRS Technologies who designed and engineer several of the MEP components. The weekly teleconferences

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SGT Thomas, Brian 4/2 FSE working digital communications with the AFATDS.

Photo by CPT Scott Haywood, 2d Cavalry Regiment

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with all enablers allowed us to isolate the new fault identifying outdated software on our Target Station Control Panels (TSCPs) and Mission Processing Units (MPUs), which caused compatibility issues among all MEP components. TCM Fires and PM Stryker provided a link to download the software and the procedures to update the TSCPs and MPUs.

We immediately hit roadblocks installing the software. After a week of trial and error, we finally had one vehicle take the software update for the TSCP but could not replicate this process across our formation. Our FSV repair team spent two more weeks in the hull of the Stryker attempting to load the MPU and TSCP Software. PM Stryker and DRS Sustainment Systems asked us to send one MPU and TSCP to the DRS lab in St. Louis for testing to identify the procedural issues we were experiencing.

Simultaneously, our weekly teleconferences prompted PM Stryker to send a technical inspector from DRS Technologies to evaluate the problem set firsthand. While he completed technical inspection of the FSVs, DRS in St. Louis found a hardware fault linked to all MPUs and TSCPs. The upgraded software package they had published required higher data storage rates than our outdated MPU and TSCPs supported. DRS quickly loaded the new flashdrives at their lab and shipped them to the technical inspector to install before he departed.

To complement the technical inspections, PM Stryker sent a training team that arrived one week after the DRS inspector. Initially, we thought the weeklong delay between inspections and training would be sufficient. The technical inspections produced more faults, requiring parts that could not arrive in time to repair vehicles for training. To overcome this challenge, we designed a training program that rotated 2-3 crews through a condensed version of training on our best Strykers over a two-week period.

Lessons Learned

We had five of 13 FSVs fully digitally capable and 13 of 13 trained crews after three weeks of intensive training and maintenance. Weekly Digital Sustainment Training (DST) over the next four weeks, focused on operator level training, communication parameters, and tactical network establishment.

The aforementioned poor habits from the SCU training plagued DST. We thought that putting everyone on the same single channel / plain text net would make crawling through digital training easier. In fact, our efforts to simplify the training with TTPs from classroom SCU training over-burdened the net and prevented us from seeing our success. Once we established and transitioned to the Regiment's digital architecture, we had 10 Stryker's sending digital calls for fire from the FS3, through the MEP and SCU, to the AFATDS.

Apache 80 FIST Team on OP5

Photo by CPT Scott Haywood, 2d Cavalry Regiment

In hindsight, we did not allow enough time between the technical inspections and training. Had we waited two-three weeks between the inspection and training, we could have had 13 of 13 vehicles FMC and allowed the crews to train on their own vehicle as a team. One month after the trainers and technical inspector departed, our fleet of FSVs has established digital connectivity from sensor to shooter with all 13 FSVs. We currently sit at 13 of 13 FMC FSVs.

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To ensure our crews remain trained and have confidence in the equipment, we have developed several short training videos, created a FSV MEP smart book, and are in process of developing two ranges in the USAREUR training areas to determine our Average Grid Error through long-range confidence checks.

Assisting the FA Community

Units looking to replicate our success must begin by assessing the mechanical maintenance status of their fleet. Once all mechanical maintenance issues have been addressed units should verify that all versions of software that pertain to the MEP are current. From this point, a solid baseline can be established that allows technical inspections to properly directed towards the MEP. Using TACOM, CECOM, PM Stryker and the other enablers is critical to this step. It is difficult to isolate faults and repair the Stryker MEP when Soldiers and NCOs do not have the expertise or documentation to guide them along the process.

As the technical inspections near completion units will have a solid foundation to develop training and repair plans that foster team development, working on the actual equipment they will deploy with. This is important as every individual Stryker will present its own unique maintenance quirks. As the crews train on their own equipment, those quirks can be addressed and handled in a proper manner. This not only decreases the maintenance status, but crew members learn troubleshooting procedures first hand.

As technical inspections near completion, the FSE's focus should shift towards training. This process should not be rushed and is based on identified faults and repair timelines. Training for each Stryker Crew should last at least five days. Day one should focus on how the MEP is properly started, how to identify and correct known faults, and proper shut down procedures. Day two should incorporate the actions learned during day one and provide a solid introduction into bore sighting and FS3 operations. Day three should recap all training provided up to this point and incorporate the units' digital architecture; establishing communications between troop level SCUs and AFATDS. Day four should be used to identify any training shortfalls and cross section training goals and preparation for a digital COMEX should be completed. Day five should focus on crew level operations that support an instructor led digital COMEX. While the COMEX is facilitated by the instructor, crews should have the baseline knowledge to operate independently.

In summary, I decisively believe involvement from all levels of leadership, our civilian counter parts and all fire support related MOS's must take ownership and share collective wisdom in order to evolve and adapt the fires war fighting function. Positive attitude is a must throughout the ranks; every member of the FA team is important to mission success, and must understand their role which is essential to overall mission accomplishment.

TCM Fires Cells website is *https://www.us.army.mil/suite/page/111551*. **At this website you will be able to access the Mounted Fire Support Platform Workbooks. These workbooks include a detailed trouble shooting guide for each of the three Mounted Fire Support Platforms (M1200 Armored Knight, BFIST and Stryker FSV). The Point of Contact at TRADOC Capability Manager (TCM), Fires Cells is Mr. Scott McClellan,** *scott.d.mcclellan.civ@mail.mil* **or 580-442-8755.**