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14. ABSTRACT
The kill box is a modern multi-service tactics techniques and procedures (MTTP) handbook for an inherently joint fire support coordination measure, but the historical knowledge of the naval service at integrating joint fires failed to reach full inclusion in the early revisions of the Kill Box MTTP. This study seeks to identify the root cause of a delay just short of a decade for the incorporation of command and control of kill boxes which were an inherent success to operations of the naval service in Operation Iraqi Freedom. The study derives conclusions from primary source data, oral histories, and historical analysis.

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MASTER OF MILITARY STUDIES

The Importance of Presence - The Naval Service's Impact on Kill Box Multi-service Tactics Techniques and Procedures

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MASTER OF MILITARY STUDIES

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Title: The Importance of Presence - The Naval Service's Impact on Kill Box Multiservice Tactics Techniques and Procedures

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Thesis: The Navy and Marine Corps failed to include its interests of command and control in the *Kill Box MTTP* because the naval services did not invest personnel in the quantity or the rank needed to speak on par with their land-based service counterparts.

Discussion: In 1973 the Army's Training and Doctrine Command and the Air Force Tactical Air Command began a dialog which set the stage for the creation of the Air Land Forces Agency (ALFA) in 1975. Throughout the 1980s ALFA developed procedures for the employment of "today's military against today's threat." The Navy and Marine Corps interest began in the mid-1980s when ALFA's procedures began to span into areas of interest to the naval service and culminated with the naval service sending representatives to join ALFA in 1992. The agency changed its name to the Air Land Sea Application (ALSA) center, but the charter of developing procedures for today's warfighter remained the same. The kill box is a modern multi-service tactics techniques and procedures (MTTP) handbook for an inherently joint fire support coordination measure, but the historical knowledge of the naval service at integrating joint fires failed to reach full inclusion in the *Kill Box MTTP*. This study seeks to identify the root cause of a delay just short of a decade for the incorporation of command and control of kill boxes which were an inherent success to operations of the naval service in Operation Iraqi Freedom. The study derives its conclusions from ALSA provided primary source data, oral histories with ALSA working group participants, and historical analysis of individual service cultures on kill box development.

Conclusion: The interest of the naval service in keeping command and control of aviation and surface fires tightly bound together in the *Kill Box MTTP* suffered due to lack of naval participation in ALSA's working groups. Naval service subject matter expert participation averaged only 29 percent of total attendees at the working groups which authored the *Kill Box MTTP's* original edition and subsequent revisions. The study recommends the naval service invest comparable personnel in rank and number as the land based services, make greater use of civilian professionals who are experts in the topic under review for an MTTP, and that ALSA take steps to ensure democratic votes at working groups do not sway the inclusion of procedures in an ALSA MTTP handbook.

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Preface

In developing the content of this study, I intended to put forward a body of research that a future researcher on the topic of kill boxes might be able to access to further their studies through the Marine Corps History Division's Oral History Branch. None of these would be possible without the dedication and patience of the following individuals: David Neuenswander, Gregory Defore, Nathan O'Neil, William Dagenhart, Kevin Cole, Ramon Pattugalan, Leah Watson, and Kathleen Kuehn. They all have my gratitude for supporting my effort with their time to ensure I could capture the stories of kill box experts. From the Air Land Sea Application center, Craig Pachlhofer and John Bradley were the indispensable sources for all of the raw material from ALSA, without which none of the quantitative data would have been possible.

Historical service culture from the United States Marine Corps came primarily from two sources: First, I would like to thank Major Yuichiro Yamada from the Japanese Ministry of Defense and Christi Bayha for their assistance in tracking down the last known microfilm of an after action report from the Second World War Marine Aviation Command and Control community. Second, I would like to thank Dr. Fred Allison from the Oral History Branch for providing many beneficial histories for my research and acting as the scholarly reviewer for the process of attaining permission to conduct oral histories.

For sparking the interest in fires for a company grade officer my true mentors in my profession have always been, and will remain the professional Staff Non Commissioned Officers whom have shaped my understanding of the Marine Air Command and Control System. Christopher Bond, Jerimiah Johnson, and Gene Gibbs will forever have my gratitude for their patience and dedication towards fostering professionalism in their officer corps.

Finally and of most importance to my family, I dedicate the work done on this project to our late son, Vincent Deacon Freeland. Your mother and I will never outlive our love for you. To our infant daughter Stella, you came into the world just as I started this study. Thank you for sleeping as much as you did and only when I needed to write the most. Lastly, and most importantly, I want to thank my wife and fellow laborer in the oral history of the Marine Corps, Kayla Freeland. Your dedication to history, despite stress and hardship, is an inspiration to me.

Chapter 1 – Tactical Solutions Creating Operational Problems

Coordination measures are employed to facilitate planning and efficient execution of operations while simultaneously providing safeguards for friendly forces. JP 3-52 Joint Airspace Control – November 2014

For a quarter century, the Goldwater Nichols act of 1986 has compelled the military to plan for, train to, and operate jointly in armed conflict.[1] However, the national law drives defense-wide reforms covering strategic organization and equipment acquisition as opposed to complementary tactics. In peacetime, the services often measure success by retaining authorities, equipment, and capabilities instead of sacrificing parochial interests to enhance overall joint effectiveness.[2] The result of short-sighted protectionism is that tactical interoperability remains unresolved until it is too late to train the joint force. The Army and Air Force Tactical Air Command (TAC) recognized the importance of joint cooperation in the post-Vietnam era and founded the Air Land Forces Application (ALFA) agency in 1975.[3] The charter of ALFA was not to duplicate enduring joint doctrine efforts, but rather, to examine at a detailed level ". . . today's capabilities against today's threat."[4] It was not until after Operation Desert Storm that the Navy and Marine Corps formally joined ALFA with a single service member each, transforming it into the Air Land Sea Application (ALSA) center.[5] The kill box is just one of the multi-service tactics techniques and procedures (MTTP) handbooks produced by ALSA, but it provides a clear study of how a service will fail to incorporate its interests in an MTTP when they do not participate adequately. The Navy and Marine Corps failed to include its interests of command and control in the *Kill Box MTTP* because the naval services did not invest personnel in the quantity or the rank needed to speak on par with their land-based service counterparts.

This thesis will approach the naval service's involvement in the ALSA MTTP process through the lens of the service culture history which led to the creation of kill boxes, and will conclude with the *Kill Box MTTP*'s development from 2004-2019. The first chapter will cover the history behind the land and naval service cultures coming from the Second World War which informed the early missions and measures of integrating surface and aviation fires. The second chapter will discuss the culmination of the kill box's informal history in Operation Iraqi Freedom, and the final chapter will lay out the method ALSA used to develop the *Kill Box MTTP* in the fifteen years which followed the fall of Baghdad. The data used to assert the thesis' recommendations and conclusions are drawn directly from ALSA's archives, through multi-service interviews, and from material published by key participants in the *Kill Box MTTP*'s production.

After fifteen years of official development of the kill box, it is a truly joint measure intended to focus joint fires to accomplish a Joint Force Commander's (JFC) objectives in targeting with a well composed ALSA MTTP. In every revision cycle of the *Kill Box MTTP* all four services have recommended its continuation as a relevant handbook which does not duplicate existing doctrine.[6] The 2014 edition of Joint Publication (JP) 3-09, *Joint Fire Support*, does not lay out any procedures within a kill box but defines them as ". . . a three-dimensional [fire support coordination measure] with an associated [airspace coordinating measure] used to facilitate the integration of fires. A kill box is a measure, not a mission."[7] Regardless where kill boxes exist on the battlefield they facilitate the delivery of joint fires without further coordination with the kill box's establishing authority because all coordination comes from publishing either a purple or blue kill box to the joint force through combat orders.[8] Blue kill boxes (BKB) are

designed for aviation fires only, whereas purple kill boxes (PKB) have two tiers of airspace to integrate aircraft flight and indirect fire weapons.[9]

The history of the kill box is the history of two questions created by the addition of air to surface fires in armed conflict during the Second World War: First, where does a land forces' tactical control of the battlespace end? Second, when and at what point does aviation need to integrate its effects with the fires and movement of friendly land forces? As the military tried to answer these two questions, they created friction that delayed the delivery of fires on enemy targets to protect friendly forces. This thesis defines that friction as a "tactical void." The military uses coordination measures to provide efficiency by fostering either integration or deconfliction. These two terms are inextricably bound to tactical voids but are commonly used incorrectly to describe the conduct of fires. The *DoD Dictionary* defines integration as involving ". . . actions to create a force that operates by engaging as a whole."[10] Integration eliminates or limits the impact of tactical voids by aligning combined arms effects.

In comparison, deconfliction does not have an official joint definition in the *DoD Dictionary*, but the MAGTF Staff Training Program (MSTP) defines deconfliction as the ". . . process of resolving an existing incompatibility, interference or a potential unintended collision between friendly assets."[11] In MSTP's definition, deconfliction is reactive to an existing conflict, and therefore deconfliction creates tactical voids as a side effect to protecting friendly forces. Integration is a proactive activity that requires training, tactics, and agreed procedures, and none of integration's prerequisites existed at the start of the Second World War when aircraft began to drop ordinance extensively. With no alternative, the military resorted to deconfliction of fires because up to that point the land and naval services viewed military aircraft as only practical for artillery spotting or conducting reconnaissance.[12]

Tactical Voids in Europe

The Second World War is an appropriate conflict to view the development of individual service culture solutions to tactical voids and individual service perspectives on the development of the kill box. Although the naval and land forces of the United States had their predominant theaters of war, they operated within them roughly equivalent technologies and developed their methods to employ them. Integration with the movement of friendly forces does not necessitate that the forces be actively maneuvering. In the Second World War, fratricide claimed the life of Lieutenant General Leslie McNair while he inspected Army fighting positions when aircraft dropped munitions north of the road from Periers to Saint Lo in France during Operation Cobra.[13] The Army planned for the road to be a bomb safety line (BSL), a measure placed approximately five to ten miles in front of friendly forces behind which aircraft could not release ordnance.[14] During Operation Cobra the Army marked the ends of the BSL with red smoke every two minutes, but this failed to prevent the loss of 188 Americans when smoke and dust obscured the battlefield.[15] German forces became quickly aware of allied tactics for marking BSLs and would deliver smoke over American positions to confuse Army Air Service (AAS) aviators.[16] As the war in Europe progressed, German forces began to exploit the gap between allied lines and the BSL with the knowledge that they were relatively safe from everything except artillery.[17]

The AAS addressed the BSL's tactical void by establishing additional missions and measures to root out Germans. The close cooperation line (CCL) was a measure placed just beyond the front lines of friendly forces, and detailed mission planning permitted specifically tasked aircraft to deliver fires within the space. Allied forces utilized two forms of control between the CCL and BSL. The first was a British innovation called "Rover"; a Royal Airforce and American controller team moved from brigade to brigade as required to provide for control

of aircraft coming into an area of operations. The second was “Pineapple,” wherein the AAS would task aircraft to seek enemy transport columns within the space of between the BSL-CCL.[18] The AAS later evolved Pineapple into a mission called "Horsefly" which would loiter in search of targets and coordinate air strikes in a precursor to the modern forward air controller airborne (FAC[A]).[19] The desire to protect the movement of friendly forces from aviation delivered fires created a pernicious tactical void which shifted frequently. When land forces gained new territory, the Army requested a new line, resulting in BSLs which were sometimes out of date within 10 minutes of their recognition by the AAS.[20] The descendant of the BSL, the fire support coordination line (FSCL) exhibits these same problems which in nearly every occasion of its use is placed at such a distance to permit unrestricted movement of friendly forces.

Tactical Voids in the Pacific

The American military paid little attention to the idea of friendly artillery conflicting with aviation because the dangers were unknown or unrecognized before operations in the Pacific. The confines of island fighting coupled with the massing of vast quantities of firepower became a cause for concern on the part of aviators. LtGen Vernon Megee, a naval aviator and the founder of the modern Marine air command and control system (MACCS) recalled that by the end of the war every squadron had an aviator who would claim he “ . . . saw one of those 16-inch shells go right under his wing.”[21] The first fight where fate forced the integration of air and surface fires was at the battle of Peleliu where the flight line was in such close proximity to friendly artillery and enemy targets that Marine aircraft would not even raise their landing gear after takeoff. When they returned to land, Marine aviators calculated their approaches to ensure they were below the trajectory of friendly artillery so that Marines on the ground always had fire support.[22] As island

fighting became more formalized naval planners incorporated less ad hoc “restrictive fires plans” for naval and surface fires to act as safety measures for aircraft in 1945.

The Fifth Amphibious Corps (VAC) Iwo Jima battle plan restricted surface fires to permit aviation to support ground forces with an assurance that the trajectories of artillery and naval guns would not cross strike flight paths. When the appropriate artillery commander established plan “Victor” all indirect fires would have a maximum apogee of 1100 feet, and under plan “Negat” no indirect fires were permitted.[23] In common with modern PKB procedures, the 1100 feet ceiling of surface fires was only within the restricted area and contained an expectation of buffer space for the aircraft in flight to be above 1500 feet.[24] These plans were assigned an area of effect, which at their minimum was a 2,500-yard radius circle centered on the target area. See figure 1 for a representation of the minimum affected area under plans Victor and Negat. An example from the Iwo Jima order reads:

> "All Naval Gunfire and Artillery observe Plan VICTOR, Target Area 5135 BAKER 1020 to 1040.” means – “No Naval Gunfire nor Artillery trajectories of over 1100 feet are allowed over a circle of 2500 yards radius whose center is the center of target area 5135 BAKER from 1020 to 1040."[25]

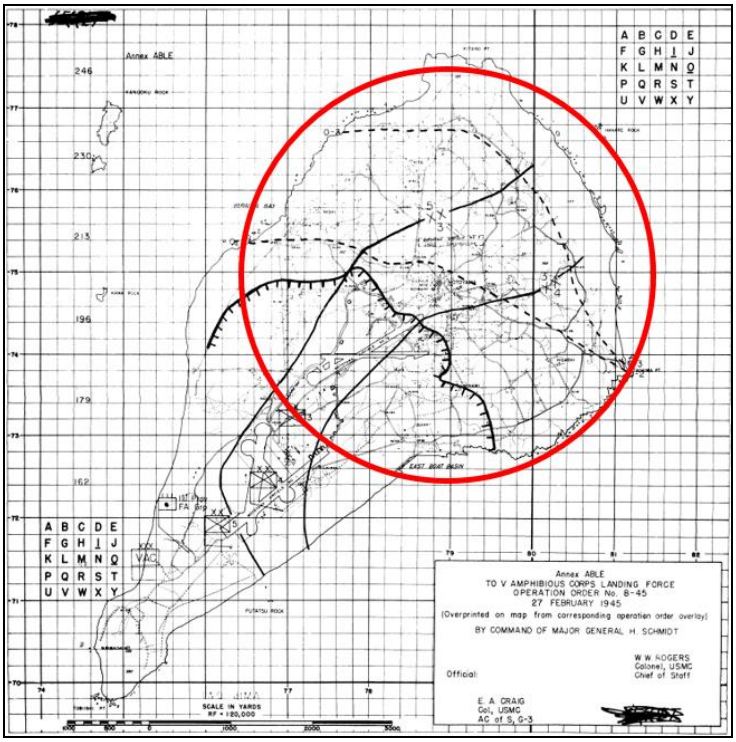

Figure 1 - Minimum Area of Effect of Restrictive Fire Plans on Iwo Jima
Source: Fifth Amphibious Corps, Operation Plan 3-44 Iwo Jima Operation, 1944, Box 6, Folder 3, Collection 3040 Archives and Special Collections Branch, Library of the Marine Corps, 88; Fifth Amphibious Corps, *Special Action Report on the Iwo Jima Campaign*, Special Action Report, May 20, 1945, 41, https://www.dtic.mil/DTICOnline/downloadPdf.search?collectionId=tr&docId=ADA637891. Map adapted by the author from the special action report to show a minimum area of effect in red derived from operation order.

All branches of the joint force learned valuable lessons about the impact of restricting fires for the benefit of aviation during the battle of Okinawa. An artillery study at Quantico after Second World War placed the concentration of surface fires on Okinawa second only to the artillery batteries of the European Eastern Front. The volume of fires necessitated detailed integration with aviation.[26] Okinawa's operation plan contained Victor and Negat and represented the first time in the war in the Pacific that the Army explicitly included the coordination of air and surface fires in their orders.[27] Colonel Frederick Henderson remarked that the restrictive fire plans created a tactical void because they ". . . were supposed to protect our own close air support planes from friendly artillery fire, but more often served to protect the

Japanese from our fire."[28] The sentiment amongst the artillery community was that these new measures to protect aircraft were invoked too often and prevented land forces from using their most responsive fires for far too long. The Army canceled their use except in extreme circumstances on the 16th of May, 1945.[29] The naval service, through four years of war and practical application, believed they had found the solution to a tactical void. A highly trained and prepared agency responsible for integrating aviation and surface fires could maximize their effects. Colonel Kenneth Weir, commander of Landing Force Air Support Control Unit 1 on Okinawa stated the importance of integration in after action notes published in the September 1945 Marine Air Intelligence Bulletin.

> During this operation, artillery and naval gunfire was called off in areas where air was striking more often than would have been necessary had certain information been available. If the air support units could have been given the maximum ordinates and azimuths of the artillery and naval gunfire falling into an area in which air strikes are to be made, aircraft, in many instances, could attack or continued to attack without holding up artillery or naval gunfire. It is believed all supporting arms would be in favor of such a procedure.[30]

The concept of placing an integrating command and control link between aviation and surface fires to eliminate a tactical void is vital to how the naval service views the employment of aviation and surface fires, and amphibious aviation command and control shaped the way the naval service viewed the kill box coordination measure fifty-eight years later during Operation Iraqi Freedom.

Chapter 2 - Modern Tactical Voids

Chapter 1 defined a tactical void and provided the framework from the Second World War where efforts to deconflict aviation fires with the fires and movement of land forces created shelters for the enemy. The naval service gleaned important lessons regarding fires integration through a command and control agency, and the land forces first struggled with the concept of creating tactical voids with coordination measures to deconflict operations. Chapter 2 argues that tactical voids are an enduring issue in the Goldwater-Nichols era and that tactical voids are magnified in larger scale conflict when an active effort is not made to integrate joint fires and effects. This chapter also presents the naval services significant historical contribution of command and control and fires integration to the *Kill Box MTTP*.

One significant tactical void in the modern era is the space between the furthest extent of the Joint Force Land Component Commander's (JFLCC) ability to shape the battlefield and the FSCL where the Joint Force Air Component Commander (JFACC) may deliver fires without further coordination with forces on the ground. The JFACC possesses tactical control of their assets over much greater distances than the JFLCC who must contend with providing enough subordinate flexibility to take decisive action beyond the range of centralized control. In 2001, the JFACC for Operation Desert Storm, Air Force General Charles Horner, discussed refuge for the enemy created by measures to coordinate air fires with ground forces. In the opinion of General Horner, the JFLCC planned the FSCL at far too great a distance because junior planners from the land component assumed that the air component would apportion sorties to the Army to cover the space. However, in reality ". . .they'd get less air because then the air has to go some place else because there's not enough forward air controllers to manage the strikes."[31] The insufficient number of FAC(A) qualified aviators and the considerable distance to the FSCL

from the forward line of troops (FLOT) created another scenario which the Iraqis could exploit like the Germans in Second World War. The JFLCC placed the FSCL well beyond the Tigris River on the final night of the Gulf War, but there were no friendly forces beyond the river. The FSCL's placement limited aviation fires and allowed the Iraqi army to retreat to Basra. Figure 2 shows the total sorties conducted within Gulf War kill boxes. To General Horner, the joint force should have placed the FSCL on the Tigris which would leave Republican Guard forces lying beyond it exposed to aviation.[32]

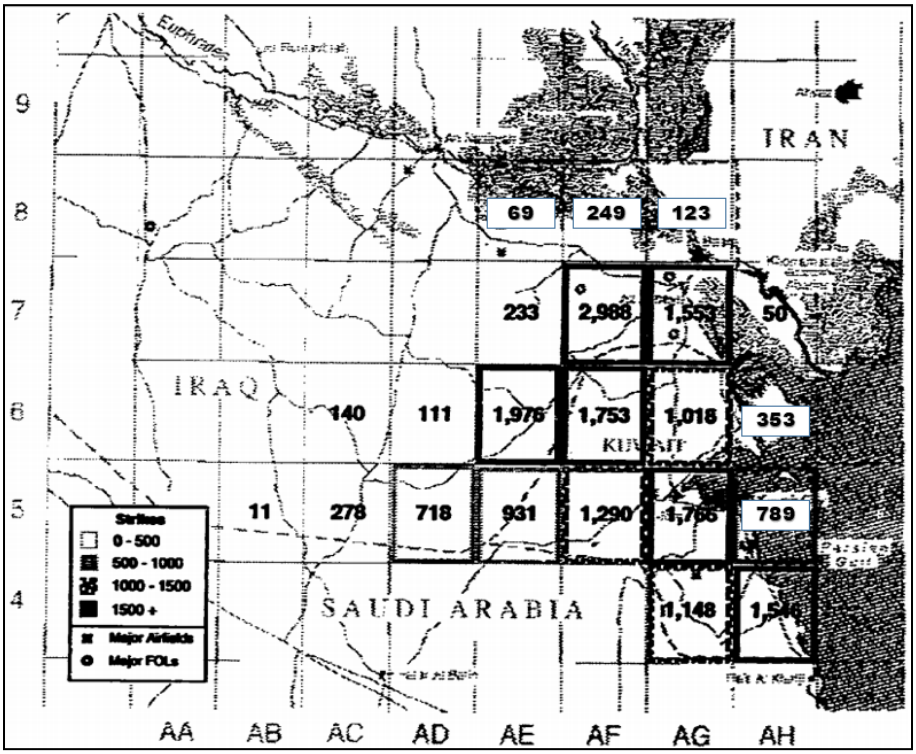

Figure 2 – Total Sorties to Kill Boxes in the Kuwaiti Theater of Operations
Source: Elliot Cohen and Thomas Keaney, *Gulf War Air Power Survey*, vol 2 (Washington, DC: United States Air Force, 1993), PDF e-book, Part 1, 214. The author made visual enhancements to the best available image from the source. Note the low sortie count to the north and west in the vicinity of the Tigris River and Al Basra.

Assigning Missions to Address a Tactical Void

Modern doctrine within the Air Force recognizes air interdiction (AI) as the mission which prevents the enemy from bringing assets to bear against friendly forces. Landward

operations in the naval services define the same mission as deep air support (DAS) of which AI is a subset, albeit with a different definition.[33] The problem with defining a mission as a solution to a tactical void is the inherent uncertainty of the FLOT which during a linear conflict represents the forward extent of friendly forces. As the situation on the ground changes, aviators conducting AI missions may run the risk of delivering unobserved fires in a scenario wherein a controller on the ground should have conducted terminal attack control. This example rarely occurs due in part to the caution in planning at the operational level of war to ensure that measures are in place to prevent unnecessary risk to forces. The Air Force views the Army's tendency to require terminal attack control for all aviation fires short of the FSCL as a tactical void they could address.[34] In the 1970s the Air Force and the North Atlantic Treaty Organization (NATO) developed a subset of AI called battlefield air interdiction (BAI). NATO could conduct BAI short of the FSCL with only coordination with the maneuver commander, and typically at his behest.[35] However, a BAI mission would switch to CAS if the ground scheme of maneuver changed to require detailed integration with fires and movement.[36] The 1982 concept of joint attack of the second echelon (J-SAK) emphasized the importance of attacks against supporting and reserve elements within the Soviet second echelon and was a proponent of BAI as an asymmetric force multiplier. The J-SAK pamphlet divided AI and BAI into these terms:

> The primary difference between planning for air interdiction and battlefield air interdiction is the land commander's interest and the emphasis he places on the process by which targets are identified and prioritized. Targets identified for attack by battlefield air interdiction assets are those that have a near term effect on the scheme of maneuver of friendly ground forces.[37]

The mission of BAI short of the FSCL effectively ended in 1992 after vast sorties of CAS replaced it on the Desert Storm air tasking order (ATO). General Horner instead offered "push-CAS" which funneled as many CAS sorties as possible to the JFLCC for tasking as they saw fit.[38] Classifying all missions in support of the JFLCC as CAS would require a large number of

aircraft tasked with the FAC(A) mission to support operations when a qualified controller was not present with the ground forces. Aircraft allotted for Push-CAS could press forward into the deep fight along the Kuwaiti border for AI missions. However, a push-CAS mission would have to bypass potential targets if they observed Iraqi assets short of the FSCL and beyond the range of a terminal attack controller linked into the JFLCC. There was no place better for an Iraqi to be in the Gulf War than the tactical void short of the FSCL.[39]

Push-CAS missions who transitioned to AI flew through kill boxes to the Kuwaiti border in search of a controller who would identify and pinpoint targets. Central Command Air Force (CENTAF) used existing measures for Saudi airspace defense to facilitate Desert Shield's plan to counter Iraqi incursions, see figure 2. CENTAF labeled kill boxes as "fire support measures" in three discrete categories, open, closed, and avoidance.[40] CENTAF intended open kill boxes for AI missions, in comparison with closed kill boxes where detailed integration required a FAC. An avoidance kill box was an inverse restrictive fire plan Negat that closed airspace to aircraft in favor of surface and naval fire support. The gridded kill boxes formulated the basis of reference for the next two decades in Central Command.[41] Despite the kill box's utilization in Desert Storm, it was the last two weeks of March 2003 which sparked multi-service interest in codifying the kill box. Unlike Desert Storm where major land operations halted, Operation Iraqi Freedom's march on Baghdad strained the concepts of the FSCL as a measure to integrate air-delivered firepower with maneuver and targeting requirements from JFLCC forces.[42]

Playing DASC Bingo

Marines in the MACCS learn the story of the success of their community in Operation Iraqi Freedom very early in their careers. The typical line of the story is that aircraft coming off station from the Fifth Corps (V Corps) area of operations (AO) would check into the Marine

tactical air operation center (TAOC) after concluding their assigned tasking from the ATO. Along the way home the itinerant sorties would request to switch control to the direct air support center (DASC) for tasking. The senior crewmembers from each MACCS agency would have a telephone conversation regarding the requirement for "purple air," and invariably the DASC would have tasking available somewhere in the deep fight. Eventually, aircraft were taking detours on their way home to enter the First Marine Expeditionary Force (I MEF) AO.[43] A generic telling of this story suffices to engender pride in the efficiency of the MACCS within the mind of young MACCS Marines as a testament to the ideas set forth by Colonel Weir in 1945. However, there is a broader truth behind the success of the MACCS in the last days of March 2003 that involves operational planning and doctrine to address a tactical void with kill boxes.

Marines began to formalize the aviation fires short of the FSCL after Operation Desert Storm due to the JFLCC's placement of the FSCL well beyond the range of MAGTF surface fires. I MEF added the first definition of a Marine Corps specific coordination measure called the battlefield coordination line (BCL) to the *I MEF Fires Playbook* in August 1999.[44] The BCL is placed short of the FSCL, typically at a range of non-rocket assisted artillery with an airspace coordination area (ACA) above the entirety of the space between the BCL-FSCL. MAGTF aircraft flying within this space may deliver fires without a FAC, and surface fires may cross the BCL so long as their trajectories do not enter the ACA.[45] The BCL combines command and control with the historical principle of restrictive fire plan Victor. Except for the potential of a BKB making an area beyond the BCL inaccessible to surface fires, kill boxes did little to change the shallow area of the deep fight for the naval service. Marines came to appreciate the massed firepower provided by advertising a block of airspace to the joint force. Chief Warrant Officer

(CWO) 4 Quint Avenetti remarked that although he was highly skeptical of the kill boxes' benefit to the naval service he also had to state:

> . . . that establishing a purple kill box in MAGTF battlespace short of the FSCL would only facilitate the "push" of joint air to a target rich environment that may be beyond the capability of the MAGTF [air combat element]. In this case the establishing authority as well as associated [command and control] must be given to the MAGTF commander not the JFACC or even the JFLCC and the kill box must be command and controlled by the TAOC. The potential for this type of scenario would be in a high intensity conflict is very real and should not be discarded out of hand.[46]

The BCL provided flexibility to the I MEF AO that planners within the Operation Iraqi Freedom combined air operations center (CAOC) sought to attain throughout the entire theater of operations. The killbox interdiction – close air support (KI/CAS) concept of operations (CONOPS) permitted all kill boxes beyond the FSCL to be treated as open for AI while the status of all kill boxes short of the FSCL remained at the discretion of an appropriate maneuver commander.[47] In effect, the Air Force offered the ability for the Army to have BAI at their disposal, but the Army was neither trained to, nor interested in the process of coordinating fires with the Air Force beyond CAS.[48] Marines and sailors did not see anything novel regarding KI/CAS because as one Marine Corps target acquisition officer observed, in a linear conflict the kill box did not provide ". . . anything beyond the already doctrinal fire support measures that we had."[49]

The disparity between the V Corps and I MEF AO hinged on the historical lineages discussed in chapter 1. From the commencement of combat operations on the 20th of March 2003, V Corps strove to shape the conflict with a distant FSCL for maneuver, long-range fires, and a concept for tactical aviation they labeled "Corps CAS." Army organic fires and their anticipated rate of march caused the JFLCC to set the FSCL at a considerable distance from the FLOT, and the air support operations center (ASOC) was correspondingly required to direct strikes in the entire space short of the FSCL utilizing CAS procedures despite the provisions of

the KI/CAS CONOPS.[50] The distance was beyond the command and control capability of the ASOC and created a snarl of aviation waiting for tasking. See figures 3 and 4 for a comparison of the BCL and Corps CAS. The Third Infantry Division (3d ID) after action report (AAR) attempts to pin the blame of a distant FSCL on having I MEF to their northern flank with organic aviation.[51] However, this assessment does not consider either the BCL's existence or the MAGTF air combat element's (ACE) capability and desire to shape beyond the FSCL. On the third day of combat operations, the battle captain of the I MEF tactical air command center (TACC) discussed what was already becoming evident to aviators:

> In the Marine Corps we'll keep boxes open between the BCL and the FSCL and you can bomb in it so long as. . .[a command and control agency] knows that there's no troops there and has cleared you hot. If you move over into V Corps [AO], you have to call the Air Force, you have to get a portion of the kill box open to bomb targets that are sitting out there, and that becomes very important, especially if you're [going to] move fast. If you need to blow up targets that the grunts may not have visibility on. . . I wouldn't call this risk, I'd call this aggressive management; we've put the FSCL so far out there, the grunts can't see that far. . .[52]

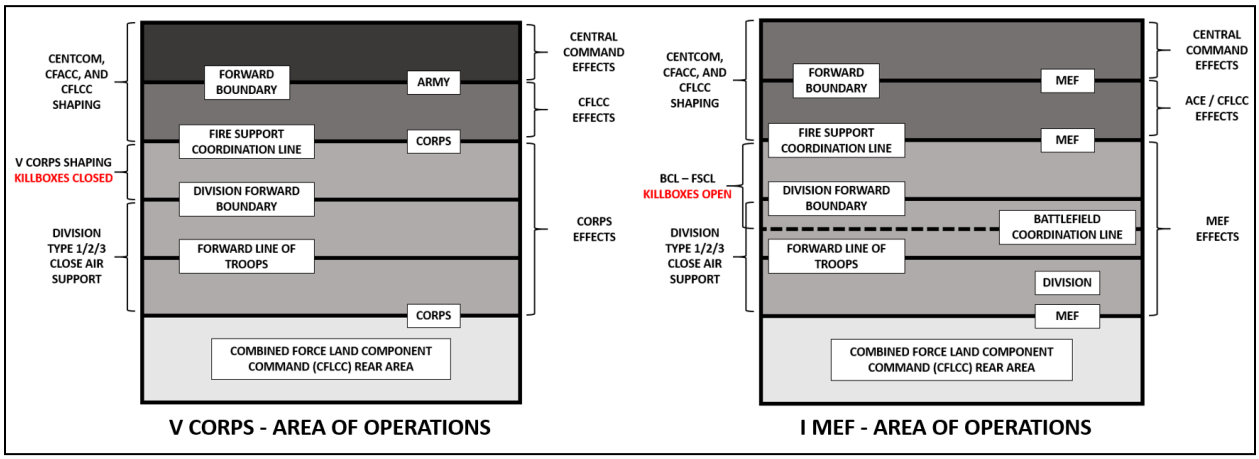

Figure 3 - The Corps CAS Concept and the Battlefield Coordination Line

Source: Charles Kirkpatrick, "Joint Fires As They Were Meant To Be: V Corps and the 4th Air Support Operations Group During Operation Iraqi Freedom," *The Land Warfare Papers, No 48* (October 2004): 6, https://www.ausa.org/publications/joint-fires-they-were-meant-be-v-corps-and-4th-air-support-operations-group-during. Adapted by the author for visual clarity and comparison with the I MEF BCL.

3d ID's Operation Iraqi Freedom AAR perspective glowingly refers to the CAS provided from the JFACC as being beyond adequate and rarely delayed outside of weather. "CAS was so responsive at times the . . . ASOC held CAS in waiting for division clearance."[53] In one extreme case, only 20 percent of aircraft tasked to support the fight against the Iraqi 11th Infantry Division in the vicinity of An Nasiriyah dropped munitions before they reached their minimum fuel, or the brevity codeword "bingo."[54] Lt Col Gregory DeFore, USAF, a planner within the Operation Iraqi Freedom CAOC described the response of aviators seeking gainful employment on a 2010 message board:

> After a day or two, the pilots learned to check in with an artificially short play time. They were building in a false bingo, to allow fuel for crossing from the left to the right side of the fight. When they checked in with the DASC, they were usually pushed across the BCL . . . to plink tanks. No micromanagement required, simply "you are cleared to 88AS, look for tanks, [armored personnel carriers], or artillery" and off they would go, happy to kill and break things. Meanwhile the DASC . . . was free to focus on the CAS fight, knowing the tanks in front of the Marines were getting the crap kicked out of them.[55]

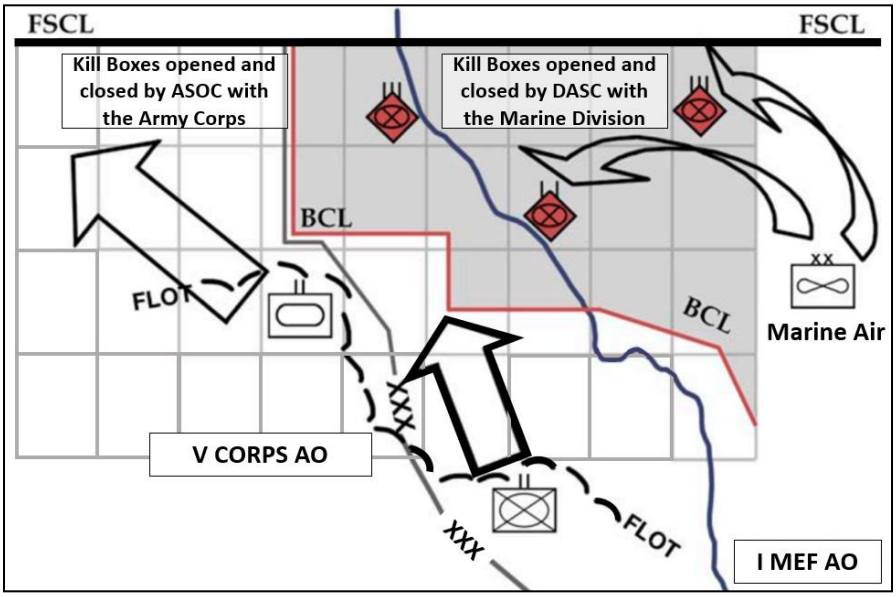

Figure 4 - III MAW TACC View of Coordination Measures

Source: Patricia D. Saint, *23 Days to Baghdad: US Marine Aviation Combat Element in Iraq, 2003*, (Quantico, VA: History Division, United States Marine Corps, 2015), PDF e-book, 54. Author's amplifications regarding kill boxes on the map provided to Patricia Saint by III MAW. The physical location of the airspace coordinating agency in the V Corps and I MEF AO directly correlated to the speed and likelihood in which airspace control agencies opened kill boxes for AI/DAS.

The methodology of KI/CAS in the I MEF AO meshed perfectly with the BCL and even reinforced MACCS ability to shape the battlefield. The TACC rapidly translated I MEF intent for targeting and delegated the authority to permit joint aircraft to deliver fires without tactical control beyond the BCL.[56] Three days into the war it was clear how effective the BCL made the CAOC's KI/CAS planning when aviators began to circulate the strategy of giving a DASC bingo to get into the tactical void.[57] During a two-week after-action conference at Nellis Air Force Base in July 2003 General T. Michael Moseley, the JFACC for Operation Iraqi Freedom listed some of the problems he viewed in the execution of the air war in Iraq. In stark contrast to the glowing self-reflection of Corps CAS, the JFACC castigated ". . . a relatively poor performance by the ASOC supporting V Corps in comparison with the ASOC's more professionally manned and more efficient Marine Corps counterpart."[58]

The Origin of the Working Groups

The enshrinement of the kill box in doctrine had its first advocate in V Corps Commander LTG William Scott Wallace. General Wallace departed V Corps to take the helm of the Army's Combined Arms Command at Fort Leavenworth in June of 2003. One year after the march to Baghdad the general requested the ALSA center to analyze the KI/CAS procedures after a successful working group to develop an MTTP on time-sensitive targeting. The initial working groups intended to capture lessons learned on kill box procedures from Operation Iraqi Freedom an insert them into an MTTP.[59] The original production of the 2005 *Kill Box MTTP* started the clock at ALSA for the three-year revision process wherein a team member assigned to manage the MTTP conducts research and seeks subject matter experts (SME) to provide service level feedback. See figure 5 for the ALSA MTTP revision process.

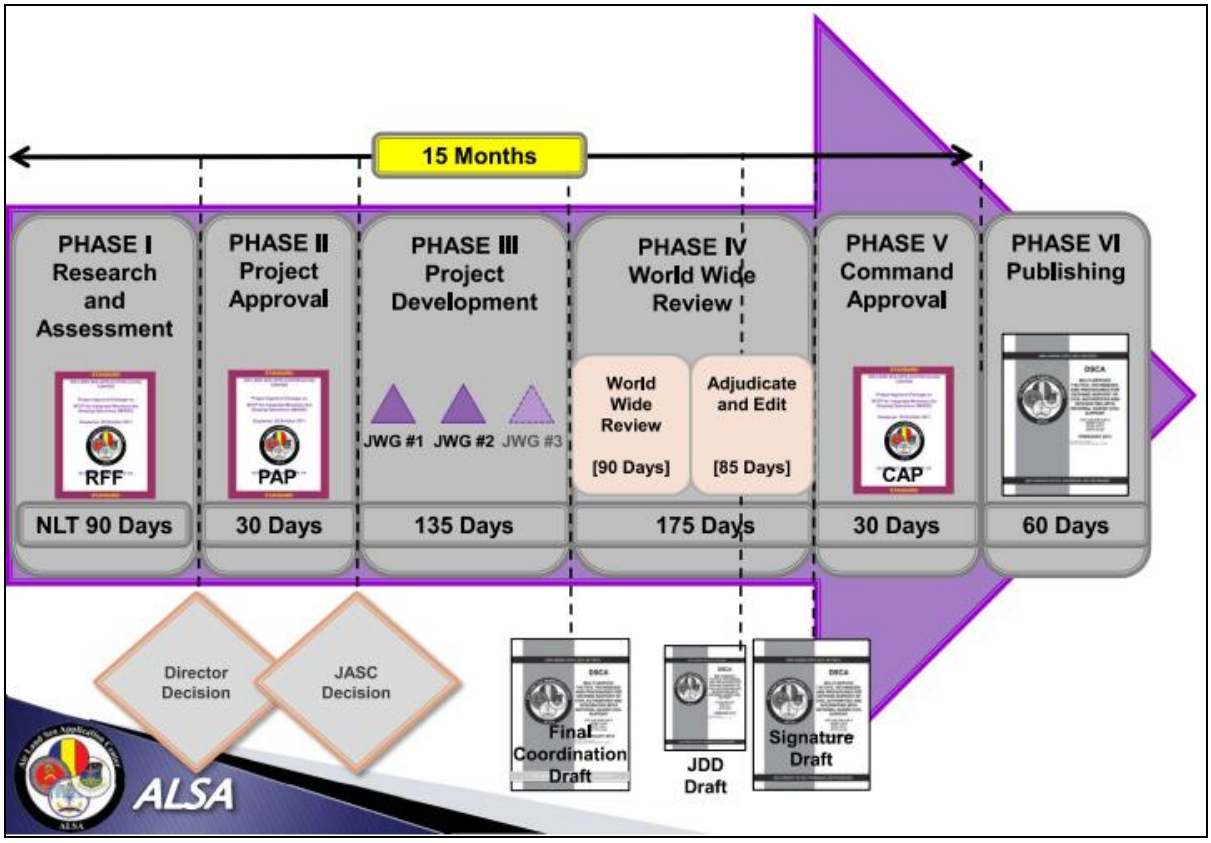

Figure 5 - The Air Land Sea Application Center's MTTP Revision Process

Source: Air Land Sea Application Center. *ALSA Roadshow*, (Air Land Sea Application Center, Langley, VA, November 18, 2018), PowerPoint presentation, https://www.alsa.mil/Portals/9/Documents/roadshow.pdf.

Chapter 3 – Working Group Results

Chapter 1 covered the origins of deconfliction and integration of aviation fires in the Second World War. The principles learned by the joint force in the early 1940s created the basis for reaching detailed integration with the fires and movement of friendly land forces. Chapter 2 covered conflict specific kill box fundamentals at the turn of the twenty-first century which displayed the naval service's prowess at integrating fires. Chapter 3 will discuss the method which ALSA and service doctrine sponsors used to revise the MTTP, and the shortfall of the naval service to guarantee that its knowledge of command and control became a part of the *Kill Box MTTP* from the beginning.

No service culture's influence is more pronounced in the *Kill Box MTTP* than the Air Force. The importance of AI and its variations as a means to address tactical voids and to meet a JFC's targeting priorities created the early progenitors of the 2003 kill box. Col David M Neuenswander, USAF stated that early in its development and use in Operation Iraqi Freedom ". . . kill box was inextricably linked to air interdiction. . . "[60] The members of the Operation Iraqi Freedom CAOC who authored the KI/CAS CONOPS were instrumental to the later evolution of the MTTP, and caused their service to be introspective to the application of airpower in support of the maneuver commander while striving to hold to the 1943 edition of FM 100-20 statement that ". . . land power and air power are co-equal and interdependent forces; neither is an auxiliary of the other."[61] A co-equal relationship is evident in a BKB short of the FSCL to support a maneuver commander. Today the Army possesses both the capability and, when a corps is well trained, the proficiency to shift BKBs short of the FSCL to purple to facilitate land force maneuver and fires while providing as much decentralized execution as possible to JFACC assets operating in support of the maneuver commander's intent. [62]

Throughout the MTTP's development, the Air Force advocated elevating the kill box to a mission as well as a measure. In the 2002 workup for Operation Iraqi Freedom, CAOC planners conducted an all service gathering at the 547th Intelligence Squadron on Nellis AFB. After discussing the value of USAF tactics called "Hunter Killer" and "Pointer Scout" dating back to Vietnam inside kill boxes a naval aviator approached Lt Col Defore, and suggested the use of the term, strike coordination and reconnaissance (SCAR), because it was already ". . . in the pubs . . . " To foster unanimity in the execution of KI/CAS in Operation Iraqi Freedom, Lt Col Defore and his team fully integrated the use of SCAR procedures, even after discovering that his assumption that "in the pubs" meant that SCAR was joint doctrine was, in all actuality, only service specific.[63] In November 2008 ALSA published the first edition of the *SCAR MTTP*, but the Air Force continued advocacy for a separate mission to define a kill box such as "Killbox Interdiction" or "Kill Box Operations."[64] ALSA's 2012 research paper positioned that defining the kill box as an operation required the role of an ". . . airborne kill box coordinator similar to (if not synonymous with) the [SCAR]."[65] Although the members of the joint force overruled the Air Force's advocacy for the kill box as an independent interdiction mission, the kill box coordinator (KBC) eventually made it into the MTTP as a prescriptive role. The KBC remains a contentious issue for the naval service who view it as a redundancy to the role that SCAR plays in the relationship of a kill box and amphibious aviation command and control. To the naval service, the KBC is a layer of deconfliction which may create a tactical void by delaying fires integration.[66]

LTC Karl Wingenbach, USA, participated in the first working groups in 2004 and published an article in *Field Artillery* immediately after his experience. Colonel Wingenbach echoed the Army's cultural interest in maintaining control of targeting when voicing what he

thought remained a lingering problem for the kill box. "What complicates matters in every theater, is that the kill box is used as a measure to facilitate rapid attack of targets and as an area reference system."[67] To the present date, the usage of the kill box as a reference system in theater TTPs perpetuates confusion as airmen and soldiers continue to use the terms Global Area Reference System (GARS) and kill box interchangeably during Warfighter exercises.[68] Mr. Bo Bielanski was also present at the 2004 working group and co-authored a September 2008 article with Colonel Neuenswander for ALSA which stated command and control agencies should not ". . . send an aircraft to a kill box unless they are supposed to kill something."[69]

To retain control of targeting short of the FSCL the Army reasserted the usage of joint air attack teams (JAAT) in 2015 as a preferred methodology to supplant SCAR and portions of the *Kill Box MTTP*s. JAAT was a tactical concept to pair Army attack and scout helicopters with Air Force tactical aviation and was developed concurrently with the operational concept of J-SAK.[70] The interests of the Army were to bring more emphasis to the employment of rotary wing aviation into the execution of deep fires while keeping it under the control of the Army. Under SCAR within a kill box, rotary wing aviation will become a taskable asset to the SCAR platform, and the proponents of bringing JAAT principles back to the joint force desired at the very least for SCAR platforms short of the FSCL to act as an extension of the maneuver commander. In the last edition of the JAAT MTTP ". . . the maneuver force commander . . ." was ". . . the individual responsible for determining when a JAAT is necessary. . ."[71] JAAT and J-SAK were products of the age of AirLand Battle, and in the view of airpower planners AirLand Battle was ". . . Army doctrine, written for Army operations . . . Soldiers and airmen view war in very different ways, primarily because armies are restricted in many ways that aerospace forces

are not."[72] Figure 6 shows a variety of integration and deconfliction methods for the performance of a JAAT.

Figure 6 - The Joint Air Attack Team

Source: Training and Doctrine Command and Tactical Air Command, *Joint Air Attack Team Operations*, USREDCOM Pamphlet 525-5 (Langley, VA: Air Land Forces Agency, October 31, 1983**),** 23-28. JAAT focused heavily on the primary role of the helicopter and the importance of surface fires integration for successful air operations.

The success of the kill box in the Marine sector of Operation Iraqi Freedom provided lessons to the joint force about the best approach for fighting in the tactical void between the FLOT and the FSCL. Marines have traditionally lacked the surface fires of the Army, and the naval service views its aviation as an additional form of artillery or naval gunfire.[73] Integration of fires through flexible command and control is a means to reduce tactical voids to an acceptable level of risk. The success of the BCL as a service level procedure to facilitate joint fires in Operation Iraqi Freedom bears remarkable semblance the comparisons drawn between the methods of joint fires in the Pacific theater of Second World War. In his 1976 oral history

Colonel Henderson, artillery corps commander for the battle of Okinawa, discussed how Marines were much more willing to dismiss the stricture of doctrine and experiment.

> The interesting thing, I think, was that we all started out . . . with this basic innovation of how to shoot, but the Marines were way faster than the Army in adapting it, improvising on it, and adding to it. It was very interesting to me to compare on every one of those operations . . . where there was Marine and Army artillery side by side . . . The Marines were actually shooting faster and better than the Army and it was because of the [non-regulation] things we were doing.[74]

Working Group Dimensions

The naval service harmed its interests by not participating actively in the development of the *Kill Box MTTP*. Although Marines and sailors were present at every ALSA *Kill Box MTTP* working group, they always were too outnumbered or outranked to honestly voice the broad perspectives of the varied occupations in the naval community. ALSA assigns staff members to a portfolio of MTTPs when they arrive, but if an MTTP is a new project agreed to by the Joint Actions Steering Committee (JASC), then ALSA designates an action officer.[75] Regardless if an MTTP is a new project or entering a revision its action officer's first task is to research the subject material to provide a baseline direction for the project. The action officer drafts a research paper and sends it out with a tailored request for feedback (RFF) for each MTTP, and SMEs across the joint service respond to the RFF's range of questions. Some RFF questions are standard to all MTTPs, some are topic-specific, and each service is permitted to add optional questions for their own SMEs. The comments in the RFFs are illustrative to the individual service perspective before the working groups. For instance, all four service's RFFs leading to the 2009 edition of the *Kill Box MTTP* discussed the importance of command and control as an aspect the 2005 edition lacked, but each service had a completely different perspective regarding the variation of command and control which would best apply to the kill box.[76]

The first working group brings action officers and SMEs together to discuss the matters covered in the RFFs and research paper as a way forward on MTTP revision. The working group becomes the de facto author of the new MTTP, with the action officer as the editor. In an ideal scenario, the same SMEs will attend the second working group to publish a final coordination draft (FCD) which the action officer sends to the service doctrine centers which form the JASC. ALSA has no role in whom the doctrine centers task to review the FCD, but receives its responses through the comment resolution matrix (CRM). Inputs to the CRM are mostly anonymous unless the commenter adds contact information to their additions to the matrix. The action officer edits the final version sent for signature and is the final adjudicator for what material is in the final version sent out for worldwide review by the joint force.[77]

Adjudication of the CRM in an ALSA MTTP differs from the joint doctrine process wherein the SMEs will gather to cast their vote on each item of a CRM collectively.[78] Because the timeline for MTTPs is half the required time for joint doctrine, the JASC delegates the authority to adjudicate the CRM to the MTTP's action officer. As issues of contention arise in the development of a standard TTP amongst competing service cultures, the action officer relies heavily on interactions in working groups to understand the desired outcome from all services. In the adjudication of contentious issues on the CRM ". . . the [action officers] are on the phone talking to SMEs and the doctrine centers to find a consensus."[79] If there are irreconcilable differences between service TTPs, ALSA prefers to publish the differing opinions with the belief that the best TTP will rise to the top by the next MTTP revision.

Although no formal SME voting process occurs in the conduct of an ALSA MTTP working group, there is absolutely an importance in being represented as a service. The 2009 edition of the *Kill Box MTTP* contained the following directions for the dimensions of a kill box:

> The location and size of the kill box are determined by the expected or known location of targets in a specified area. The dimensions of a kill box are normally defined using an area reference system (i.e., Global Area Reference System [GARS]) but could follow well defined terrain features or be located by grid coordinates or by a radius from a center point.[80]

This definition represents two sides of the Army-Air Force service culture divide. The Air Force desired a method to establish a kill box that was repeatable and easily defined by digital systems, whereas the Army sought a means to establish and control the targeting conducted in support of their operations. This point of contention between the landlocked components of the joint force came to a head in the 2013 working groups. The Air Force desired the terrain association removed entirely, and the Army desired for it to stay. According to LCDR Nathan O'Neil, a naval SME at the working group, the ALSA action officer conducted a consensus vote of SME preference by a "show of hands."[81] The resulting wording in the 2014 *Kill Box MTTP* was that the ". . . dimensions of a kill box target area are defined using an area reference system . . ." such as the GARS.[82] Any service could have issued a veto for the removal of terrain association in the review of the FCD, but no doctrine sponsor voiced opposition on the CRM. The action officer was left to adjudicate the dimensions of a kill box by a show of hands of the members present at a working group.

Since the argument about how to draw a kill box represents a conflict of Air Force and Army culture, it might be fair to assume that the matter was unimportant to the naval service. However, evidence from the Marine Corps' senior tactical aviation school shows that there was a vested interest in greater naval involvement in this particular TTP. As of January 2019, Marine Air Weapons and Tactics Squadron One (MAWTS-1) still trains its students that geographic boundaries are acceptable for the establishment of kill boxes as an FSCM.[83] The Marine Corps' service culture, like the Army, views aviation in its deep fight as a tool to create future opportunities for exploitation by ground forces, so it would have made sense for the naval

service to support the Army's position. The participants from the naval service made up only six of the seventeen SMEs at the 2013 working groups, so the best that the service could hope for in a vote would be to decide a split opinion between the land-based services.[84]

Limited Presence Means Lost Opportunity

The data from SME rosters and CRMs show between 2004 and 2012 the naval service did not invest heavily in personnel for working groups and instead attempted to compensate for low participation through significant inputs to CRMs. The personnel assigned were often far younger in rank and experience than their land-based counterparts, see Appendix A for a breakdown of working group participation. Marines and sailors who were outnumbered by and junior to the working group's soldiers, airmen, and civilian contractors were likely easy to outvote. Anecdotal evidence speaks to the experience level and professional uniformity of naval service SMEs, but the data from ALSA contradicts any kind words about the sea services.[85] The lopsided effort from the naval service to try to create MTTPs by correspondence resulted in a high degree of rejected CRM recommendations. For instance, in the 2009 *Kill Box MTTP* rewrite, the naval service sent only 25 percent of the total working group members, but submitted 68 percent of all comments to the final CRM and accounted for 82 percent of all recommendations rejected by the action officer. See figure 7 for details on the 2009 CRM and Appendix A for a full description.

2009 Comment Resolution Matrix Data

Service	Comments	Rejections	Percent Rejected
USAF	6	0	0%
USA	92	8	9%
USN	64	6	9%
USMC	145	36	25%
OTHER	2	1	50%

Figure 7 – 2009 *Kill Box MTTP* Comment Rejections.
Source: Air Land Sea Application Center, *2009 Kill Box Consolidated Adjudicated Comments Matrix* (ALSA, Langley, VA, May 3, 2009), Adobe Acrobat document.

A skeptic might argue that the content of the 2009 MTTP's CRM material from the naval service was flawed on account of the authors or rejected for immaterial reasons, but analysis of the rejections argues to the contrary. Before the process began for the 2009 edition, the Director of Operational Test and Evaluation conducted a Joint Fire Support Coordination Measures Joint Test (JFCM-JT) starting in 2005 to evaluate the kill box and standardize its use at the operational level of war. The JFCM-JT final report recommended renaming the kill box as a joint fires area (JFA) and finalized its analysis with a draft JFA TTP. ALSA's research paper for the 2009 revision cycle determined that approximately 85 percent of the JFA TTP was material derived from the 2004 *Kill Box MTTP*. The only new gaps the JFA TTP filled were in the area of command and control procedures.[86] ALSA working groups throughout 2008 focused on the lack of command and control guidance provided in the original MTTP. The naval service submitted 68 percent of the total comments on the 2009 CRM, but many of these comments were grammar and formatting oriented. ALSA states that most recommendations on a CRM are merely edits to the document and that comments oriented to MTTP content make up only a small percent of submissions in a typical revision.[87] The author assesses that of the 42 total naval recommendations rejected by ALSA's action officer twelve applied to the central issue of

command and control and were justified by the action officer due to concurrence contrary to the Marine Corps' opinion in the working group.

The success of the naval service's AO in Operation Iraqi Freedom should have made its way into the MTTP at the first mention of a need for better command and control procedures. The Marine Corps objected to the addition of a KBC between the SCAR and a ground control agency, but the action officer rejected Marine protests because the roles and responsibilities of the KBC were ". . . determined via four-[s]ervice consensus during . . ." the working groups.[88] Despite the Navy's participation in "four-service consensus" in the 2008 working group, they failed to voice their objections to the KBC until the 2014 revision.[89] Rejection of the naval service's opinion is not to make the argument that ALSA's action officer improperly executed their duty, but rather that the naval services' participation rate of less than 31 percent in the 2008 working groups contributed directly to their opinion being drown in a sea of land-based voices. Figure 8 shows the disparity of participation which ultimately led to the inclusion of the KBC.

2008 WG1 Service Representation

	SMEs	Avg Rank	Avg by Domain
USA	8	4.4	4.4
USAF	12	4.4	
USN	4	3.5	3.2
USMC	5	2.8	

SMEs by Domain

Naval	9	20	Land Based

2008 WG2 Service Representation

	SMEs	Avg Rank	Avg by Domain
USA	5	4.8	4.5
USAF	4	4.3	
USN	1	3.0	4.0
USMC	1	5.0	

SMEs by Domain

Naval	2	9	Land Based

Figure 8 – SME Participation and Seniority in the 2008 Working Groups
Source: Air Land Sea Application Center, *2008 Kill Box JWG Attendee Listing* (Air Land Sea Application Center, Langley, VA, July 11, 2008), Excel document. Data from ALSA compiled by the author. Methodology explained in Appendix A.

Conclusions and Recommendations

The *Kill Box MTTP* provides an effective framework for joint solutions to the tactical void between the FLOT and the FSCL. Even with the inclusion of the KBC the naval service

can designate a SCAR in both roles flexibly. The problem for the Navy and Marine Corps is ensuring that they are vocal enough to impact the MTTP process. While the obvious recommendation is to send more naval SMEs to ALSA working groups, uniformed personnel and travel funding are limited assets. Beyond an increase in working group attendance, the author presents the following recommendations: First, the land-based services extensively use professional civilians as representatives for service interests at a much higher rate than the naval services. These members have extensive experience in their fields and speak with authority. For example, personnel who authored the KI/CAS CONOPS were employed as representatives for the Air Force to develop the *Kill Box MTTP* throughout multiple revisions. The naval service should strive to increase the participation of dedicated civilian professionals as naval advocates in the ALSA MTTP process. Second, the Navy and Marine Corps should seek to expand the billets assigned to ALSA. The naval service represents only two of the fifteen uniformed billets at ALSA's Langley Air Force Base facility, making the scope of action officers extremely limited. The Navy's representative is a naval aviator, occasionally from the aviation command and control community, and the Marine Corps' billet is a joint terminal attack controller from the artillery community. The required experience for the current naval positions was sufficient for the *Kill Box MTTP*, but there are multiple interests from the naval service who remain unrepresented.[90] Lastly, ALSA action officers should reinforce their efforts to guarantee that the influence of working groups is more representative than democratic. ALSA must institute procedures that embody the spirit of the JASC when taking a poll of SMEs. Regardless of the appearance of triviality for any single working group decision, the only vote that should count is that of each service as a whole when seeking consensus no matter how big or small the issue.

Despite the significant influence of the naval service in the evolution of the kill box as an FSCM, the Navy and Marine Corps muted its stake in the *Kill Box MTTP* by remaining on the sidelines during the first decade of its development. Naval procedures for command and control to facilitate fires integration were only partly adopted. What made the execution of kill box procedures in the I MEF AO during Operation Iraqi Freedom successful was the combination of the BCL with trained command and control crews able to rapidly task aviation in areas with a reasonable degree of knowledge as to the fires and movement of friendly forces. The sea services involvement in the past actions that created tactical voids and the solutions to ameliorate them should be better represented in the MTTP process and serves as an indicator that the Navy and Marine Corps must take more significant interest in ALSA.

Appendix A – ALSA Kill Box MTTP Data

ALSA provided data to the author in four primary categories, as seen in figure 9.

ALSA Document	ALSA Purpose	Research Use
Research Paper	For distribution to subject matter experts (SME) prior to the execution of working groups (WG) to ensure all participants begin from a common understanding.	Used to identify where ALSA stood on the previous MTTP edition and the ground rules from the Joint perspective going into WGs.
Request for Feedback	Initial guidance requested from ALSA or service doctrine sponsors to ensure the planned direction of the MTTP is in line with service interests.	Individual service and agency responses to questions from ALSA or their service doctrine sponsor provided qualitative data on service culture interests. SMEs listed on the document provided potential interviews.
Subject Matter Expert Rosters	Formed in the conduct of the working groups. Attendees sign in and provide contact information.	Primary source for seeking oral history interviews, as well as service participation numbers data.
Comment Resolution Matrices	Collected from service representatives during review by the joint services after working groups. Delineates changes each service desires in the MTTP.	Service and agency requested changes. As these are used post working group to adjudicate changes to the MTTP.

Figure 9 – ALSA Provided Reference Categories
Source: Data from ALSA compiled by the author.

The CRMs represent the aggregated comments from service doctrine sponsors after the ALSA action officer disseminates the final FCD. Adjudication for all comments by the action officer for the CRM derives from either the concurrence of the working groups or by the action officer communicating with SMEs through the contact information provided within the individual service's RFF responses or during working groups. The action officer provides a comment to rationalize their rejections. See figure 10 for the author's distillation of CRM data.

2005 Comment Resolution Matrix Data

Service	Comments	Rejections	Percent Rejected
USAF	37	2	5%
USA	32	4	13%
USN	9	0	0%
USMC	4	0	0%
OTHER	5	3	60%

2014 Comment Resolution Matrix Data

Service	Comments	Rejections	Percent Rejected
USAF	68	6	9%
USA	26	3	12%
USN	48	16	33%
USMC	10	3	30%
OTHER	11	0	0%

2009 Comment Resolution Matrix Data

Service	Comments	Rejections	Percent Rejected
USAF	6	0	0%
USA	92	8	9%
USN	64	6	9%
USMC	145	36	25%
OTHER	2	1	50%

2018 Comment Resolution Matrix Data

Service	Comments	Rejections	Percent Rejected
USAF	7	0	0%
USA	25	1	4%
USN	0	0	No Comments
USMC	6	1	17%
OTHER	1	0	0%

Figure 10 – Aggregated Comment Resolution Matrix Data

Source: Air Land Sea Application Center, *2005 Killbox Consolidated Comment Matrix* (Air Land Sea Application Center, Langley, VA, February 17, 2005), Word document; Air Land Sea Application Center, *2009 Kill Box Consolidated Adjudicated Comments Matrix* (Air Land Sea Application Center, Langley, VA, May 3, 2009), Adobe Acrobat document; Air Land Sea Application Center, *2013 Kill Box Consolidated CRM* (Air Land Sea Application Center, Langley, VA, June 7, 2013), Word document; Air Land Sea Application Center, *2017 Consolidated Comment Matrix Kill Box* (Air Land Sea Application Center, Langley, VA, April 10, 2017), Word document. Data from ALSA compiled by the author. The "other" service denotes non-voting members who ranged from joint forces representatives to members of Central Command or United States Forces Korea.

Working Group Participation Data

A varying number of participants in and out of uniform attended the ALSA working groups from 2004-2017, so the author used the following methodology to calculate the average rank weight of SMEs in attendance:

Rank Range	General Weight
O-1 to O-6	Equal to Grade
WO-1 to WO-2	2
WO-3	3
WO-4 to WO-5	4
Civilian Contractor	5
SNCO	3
NCO	1

Figure 11 - SME Participant Relative Weight

Source: Compiled by the author and used to calculate the "Avg by Domain" column in Working Group Participation figures 8, 12, 13, 14, and 15.

2004 Working Groups

Largely due to the momentum from Operation Iraqi Freedom, attendance was high for the 2004 working groups, the second working group contained thirteen repeat participants from the first. ALSA values repeat attendance by SMEs, and internal notes earmark personnel for contact due to their attendance.[91] Of the six Marines who attended the first working group, two were MACCS officers, one fixed wing aviator, and one artillery officer. Two additional officers without a specified community attended from Amphibious Ready Group 2 and the Marine Corps Combat Development Command. The Navy sent four fixed-wing tactical aviators, an E-2C Hawkeye aviator, a representative from the Navy's post-September 11th research group, "Deep Blue", and a land strike platform surface warfare officer.[92]

2004 WG1 Service Representation

	SMEs	Avg Rank	Avg by Domain
USA	8	4.6	4.4
USAF	20	4.3	
USN	7	3.7	3.6
USMC	6	3.5	

SMEs by Domain

Naval	13	28	Land Based

2004 WG2 Service Representation

	SMEs	Avg Rank	Avg by Domain
USA	5	5.0	4.8
USAF	14	4.6	
USN	6	3.5	3.6
USMC	4	3.8	

SMEs by Domain

Naval	10	19	Land Based

Figure 12 - 2004 Working Group Participation
Source: Air Land Sea Application Center, *2004 Killbox JWG Attendees* (Air Land Sea Application Center, Langley, VA, August 27, 2004), Excel document. Data from ALSA compiled by the author.

2008 Working Groups

The 2008 working groups saw a significant drop in participation by the naval service. The Navy sent several aviators from the Hawkeye and tactical aviation community. The five Marine representatives were entirely from the aviation command and control community and consisted of three first lieutenants. A single Marine Lieutenant Colonel aviation command and

control officer and an E-2C community Lieutenant attended the second working group. No Marine aviators or surface fire artillery Marines were present at either group.

2008 WG1 Service Representation

	SMEs	Avg Rank	Avg by Domain
USA	8	4.4	4.4
USAF	12	4.4	
USN	4	3.5	3.2
USMC	5	2.8	

SMEs by Domain

Naval	9	20	Land Based

2008 WG2 Service Representation

	SMEs	Avg Rank	Avg by Domain
USA	5	4.8	4.5
USAF	4	4.3	
USN	1	3.0	4.0
USMC	1	5.0	

SMEs by Domain

Naval	2	9	Land Based

Figure 13 -2008 Working Group Participation

Source: Air Land Sea Application Center, *2008 Kill Box JWG Attendee Listing* (Air Land Sea Application Center, Langley, VA, July 11, 2008), Excel document. Data from ALSA compiled by the author.

2013 Working Groups

In 2013 ALSA aggregated their working groups into a single SME roster, but attendance by all services dropped significantly. During this conference only one member of the six naval service SMEs was a tactical aviator, four members were from aviation command and control fields, and two Marines were from the artillery community.

2013 WG Service Representation

	SMEs	Avg Rank	Avg by Domain
USA	5	4.2	4.2
USAF	6	4.2	
USN	3	3.7	3.7
USMC	3	3.7	

SMEs by Domain

Naval	6	11	Land Based

Figure 14 - 2013 Working Group Participation

Source: Air Land Sea Application Center, *2013 Kill Box JWG* (Air Land Sea Application Center, Langley, VA, February 1, 2013), Excel document. Data from ALSA compiled by the author.

2016 Working Groups

The ALSA combined the *SCAR MTTP* and *Kill Box MTTP* working groups for the 2016 rewrites, and naval occupation specialty participation reflected the adjustment. Naval service attendance remained low, with a mix of three naval aviators (one Navy and one Marine fixed wing and a Marine rotary wing aviator), one MACCS officer, and two Marine artillery officers.

2016 WG Service Representation

	SMEs	Avg Rank	Avg by Domain
USA	8	4.0	4.2
USAF	6	4.3	
USN	1	3.0	3.4
USMC	5	3.8	

SMEs by Domain

Naval	6	14	Land Based

Figure 15 – 2016 Working Group Participation

Source: Air Land Sea Application Center, *SCAR / Kill Box MTTP Joint Working Group SME Roster* (Air Land Sea Application Center, Langley, VA, July 21, 2016), Excel document. Data from ALSA compiled by the author.

Appendix B – MTTP Revision Timeline of Key Events

Each research paper submitted by an ALSA action officer contains a timeline of key events. The following are the compiled list of key events from the initial 2005 edition and the 2009-2018 revisions of the MTTP.

2005 Kill Box MTTP Timeline

Working Group 1	20-23 July 2004
Working Group 2	24-27 August 2004
Publication	13 June 2005[93]

2009 Kill Box MTTP Timeline

Program Approval	22 February – 4 April 2008
Program Development	5 April – 14 August 2008
Working Group 1	13 – 16 May 2008
Working Group 2	8 – 11 July 2008
Worldwide Review	15 August – 13 October 2008
Adjudicate/Edit	14 October – 6 January 2009
Command Approval	7 January – 20 February 2009
Publication	4 August 2009[94]

2014 Kill Box MTTP Timeline

Program Approval	1 October - 9 November 2012
Program Development	20 October 2012 - 1 March 2013
Working Group 1	13-16 November 2012
Working Group 2	29 January - 1 February 2013
Worldwide Review	1 March - 15 April 2013

Adjudicate/Edit	15 April - 30 July 2013
Command Approval	30 July - 13 September 2013
Publication	16 April 2014[95]

2018 Kill Box MTTP Timeline

Program Approval	14 December 2015 - 15 January 2016
Program Development	15 January - 4 June 2016
Working Group 1	25-29 January 2016
Working Group 2	15-17 March 2016
Working Group 3	9-13 May 2016[96]
Worldwide Review	5 June - 4 August 2016
Adjudicate/Edit	5 August - 24 October 2016
Command Approval	25 October - 9 November 2016
Print	10 November 2016 - 9 January 2017
Publication	18 June 2018[97]

Appendix C – Oral History Questionnaire

The primary subjects of the oral history conducted to support this thesis were SMEs who directly participated in an ALSA working group. This study used the grounded theory of oral history.[98] Each subject responded to the top-level questions in order, and the interviewer rephrased questions for elaboration later if the subject referenced pertinent information earlier than expected. Any second or third level questions were branches used by the interviewer for follow up as required, but the interviewer's goal was to permit the oral history subject to drive the discussion without having to utilize follow-ups. All six oral histories conducted for this study are available in the oral history archives at Marine Corps University.

Question Outline

1. Please state your name and a little about yourself.
    a. What organization (branch of service, contractor) are you affiliated?
    b. How long have you been (or were you) affiliated with your organization?
2. Can you tell me something about the first time you heard the term kill box?
    a. Can you describe your first impression of the purpose of a kill box?
    b. What did you think had the most significant impact on the way a kill box was employed (or conceptualized) when you first came to know of it?
    c. Do you think there was anything wrong with the way the joint force conceptualized the kill box when you first came to know of it?
    d. **IF** First Contact Was Operational: Can you describe how effective you felt the use of the coordination measure was?
3. How did you get involved in the *Kill Box MTTP*?
    a. Can you describe your billet assignment at the time?
    b. Why would you say you became affiliated with the *Kill Box MTTP*?
    c. Were there any other people at your organization who were affiliated with or contributed to the *Kill Box MTTP*?

4. What do you remember about your (first) participation in the ALSA *Kill Box MTTP* working group?

    a. How would you describe the greatest point of friction amongst the participants?

        i. How would you describe the way the working group adjudicated the point of friction?

        ii. Do you think that the decision impacted the quality of the MTTP?

    b. Were there any organizations represented that you did not expect to see?

    c. Was there anything about the kill box that you felt was unresolved after the working group?

5. **IF** Subject Was a Multi Occasion Participant: What was different about your second review of the MTTP?

    a. Do you think you prepared differently for your second MTTP working group?

    b. Was there anything about your experience with the first working group that you brought into the second?

    c. Do you feel you addressed everything you hoped you would in this working group?

6. How did you feel about the most recent edition of the *Kill Box MTTP* you read or used?

    a. Where did you think it differed most from the edition you worked on?

    b. **IF** the Subject has not read or used a new MTTP: How do you feel the edition you worked on impacted operations since?

7. How do you feel airspace control affected by the kill box coordination measure?

8. How do you feel targeting is affected by the kill box coordination measure?

9. How do you feel fires integration is affected by the kill box coordination measure?

10. I'll give you a second here to make any last statements before we wrap up. Is there anything you would like to add?

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[1] Robert George and Harvey Rishikof, eds., *The National Security Enterprise: Navigating the Labyrinth* (Washinton, DC: Georgetown University Press, 2011), 22.
[2] Ian Horwood, *Interservice Rivalry and Airpower in the Vietnam War*, (Fort Leavenworth KS: Combat Studies Institute Press, 2006, 2.
[3] Malcolm E. Ryan Jr, "The TAC/TRADOC Dialogue" (unpublished article, September 29, 1975), ALSA library, File Folder 1973-1980,

[4] Ryan.
[5] Air Land Forces Agency to Joint Actions Steering Committee Members, Memorandum of Agreement, June 10, 1992. This document is the first official designation of the Navy and Marine Corps as members of the ALSA center, the organization remained ALFA for several months after until the first JASC meeting wherein the members voted on a new naming convention from a list of proposed names.
[6] Air Land Sea Application Center, Research Paper on Multi-Service Tactics Techniques and Procedures for Kill Box Employment, research paper, 2008, 8-9; Air Land Sea Application Center, Research Paper on Multi-Service Tactics Techniques and Procedures for Kill Box Employment, research paper, 2012, 8-9; Air Land Sea Application Center, Research Paper on Multi-Service Tactics Techniques and Procedures for Kill Box Employment, research paper, 2015, 4.
[7] Department of Defense, *Joint Fire Support*, JP 3-09 (Washington, DC: Department of Defense, December 12, 2014), A-9.
[8] Air Land Sea Application Center, *Kill Box Multiservice Tactics Techniques and Procedures*, MCRP 3-31.4 (Langley, VA: Air Land Sea Application Center, June, 2018**),** 9. The MTTP states that appropriate locations for publishing a kill box are in the airspace control plan, air operations directive, and special instructions for airspace considerations. For surface fires consideration the MTTP states the JFLCC should present kill boxes in their operations order.
[9] Air Land Sea Application Center, 2018 Kill Box MTTP, 2. PKBs specifically facilitates the attack of ". . . surface targets with subsurface-to-surface, surface-to-surface, and air-to-surface munitions. . ."
[10] Department of Defense, *DoD Dictionary of Military and Associated Terms*, DoD Dictionary (Washington, DC: Department of Defense, February 19, 2019), 115.
[11] MAGTF Staff Training Program, *MAGTF Fires Reference Guide*, MSTP Pamphlet 3-0.3 (Quantico, VA: United States Marine Corps, May 2011), 4.
[12] Stephen Stein, *Torpedoes to Aviation: Washington Irving Chambers and Technological Innovation in the New Navy, 1876-1913* (Tuscaloosa, AL: University of Alabama Press, 2007), E-book, 161; United States War Department, *Field Service Pocket Book, United States Army, 1914*, War Department Document, No. 475 (Washington, DC: Government Printing Office, 1917), 20. Washington Irving Chambers arranged for the first takeoff of an aircraft from a naval vessel, but deemed that early aircraft ". . .were useful only for scouting and artillery spotting." The Army took a similar view of early aviation in its 1917 revision of the 1914 Basic Field Manual wherein only reconnaissance and artillery spotting are listed as roles for aircraft.
[13] Charles Shrader, "Friendly Fire: The Inevitable Price," *Parameters* 22, no. 3 (September 1992): 33-34, https://search-proquest-com.lomc.idm.oclc.org/docview/1306227770. Munitions were dropped north of the road because the lead aircraft in formation could not see the terrain due to obscuration and misidentified another road north of the Periers-St Lo road as the BSL.
[14] Richard Hallion, *Strike From the Sky: The History of Battlefield Air Attack, 1911– 1945* (Washington, D.C.: Smithsonian Institute Press, 1992), E-book, 184.
[15] Shrader, 33.
[16] Frank Craven and James Cate, eds, *The Army Air Forces in World War Two*, vol 2 (Washington, DC.: Office of Air Force History, 1983), PDF e-book, 200.
[17] Hallion, 181.
[18] Hallion, 181.
[19] Hallion, 182.
[20] Frank Craven and James Cate, eds, *The Army Air Forces in World War Two*, vol 3 (Washington, DC.: Office of Air Force History, 1983), PDF e-book, 785.
[21] Vernon Megee, "Oral History Transcript Session 2 – General Vernon E. Megee, USMC (Retired)," interview by Benis Frank, *Marine Corps History Division*, May 17, 1967, Part 1, 21-22, Marine Corps History Division – Oral History Branch.
[22] Megee, 17.
[23] Fifth Amphibious Corps, Operation Plan 3-44 Iwo Jima Operation, 1944, Box 6, Folder 3, Collection 3040 Archives and Special Collections Branch, Library of the Marine Corps, 130-133. After action reports from LtGen Megee refer to a plan "Mike" which does not exist in the Iwo Jima Operation Order, and Korean Operation Plans include a plan "William" which requires artillery operations to have observers call to check fire only upon sighting low flying aircraft. See: Fifth Marines, Command Diary for May 1953, Collection 3040, Archives and Special Collections Branch, Library of the Marine Corps, 71.
[24] Fifth Amphibious Corps, 88.
[25] Fifth Amphibious Corps, 88; Fifth Amphibious Corps, 132.

[26] Frederick Henderson, "Oral History Transcript – Brigadier General Frederick P. Henderson, USMC (Retired)," interview by Benis Frank, *Marine Corps History Division*, May 17, 1976, 151, Marine Corps History Division – Oral History Branch.
[27] Benis Frank and Henry Shaw, *History of US Marine Corps Operations in World War Two*, vol 5 (Washington, DC.: Marine Corps Historical Branch, 1968), PDF e-book, 377.
[28] Frank, 383. Although not cited by name in the volume, Colonel Henderson was the Marine Corps Artillery Corps Commander on Okinawa, so the quote is rightly attributed to him by name here.
[29] Frank, 377. The 10th Army included Victor and Negat as restrictive plans for Operation OLYMPIC, the invasion of Kyushu. Most likely due to concurrent planning with the execution of operations on Okinawa.
[30] Headquarters, United States Marine Corps Aviation Division Intelligence Section, *Marine Air Intelligence Bulletin August-September 1945*, Constitutional Data Collection, Japanese National Diet Library, Tokyo, Japan, Box 5, Folder 15, Collection 127-78-0050, 24.
[31] Charles Horner, "Oral History: Charles Horner," interview by PBS Frontline, *WGBH Educational Foundation*, January 9, 1996, https://www.pbs.org/wgbh/pages/frontline/gulf/oral/horner/1.html.
[32] Horner. During this interview the JFACC uses the terms FSCL and "bomb line" interchangeably. The BSL remained in American doctrine into the Vietnam War until it was supplanted by the FSCL. In its time, the BSL was often known colloquially as the "bomb line" or "no bomb line".
[33] The naval service's definition of Deep Air Support (DAS) is aligned more closely with the Army and Air Force definition of Air Interdiction (AI). DAS is broken into the subsets of Armed Reconnaissance (AR), AI, and Strike Coordination and Reconnaissance. Naval AI is conducted against targets which are known and planned in advance, whereas AR missions are conducted against targets of opportunity which are either unknown, or unlocated. For the purposes of this paper the author uses the Air Force's definitions.
[34] Kyle Rykaczewski, *Enabling Proactive Joint Fires* (6th Combat Training Squadron, Las Vegas, NV, January 10, 2018), PowerPoint presentation.
[35] Robert Owen, *Deliberate Force: A Case Study in Effective Air Campaigning*, (Maxwell, AL.: Air Force University Press, 2000), 319. The most natural form of coordination is the assignment of a mission on an ATO, and checking in with the delegated airspace control agency. However this concept blurs with integration and deconfliction. See the MSTP MAGTF Fires Reference Guide for an excellent breakdown of these concepts.
[36] Owen, 203.
[37] United States Readiness Command, *Joint Operational Concept Joint Attack of the Second Echelon*, US REDCOM Pamphlet 525-4 (Tampa, FL: United States Readiness Command, December 13, 1982), 1-9. The J-SAK pamphlet is one of the early editions of an ALFA product which the Joint Actions Steering Committee were signatories.
[38] Diane Putney, *Airpower Advantage: Planning the Gulf War Air Campaign, 1989-1991*, (Washington, DC: Air Force History and Museums Program, United States Air Force, 2004), 257; Although BAI did not play a large role from the air force perspective in Desert Storm, the concept was revived, if in name only, for Operation Deliberate Force's "BAI Boxes" which functioned for the same purpose as a Desert Storm Kill Box, see Owen 156.
[39] Elliot Cohen and Thomas Keaney, *Gulf War Air Power Survey*, vol 2 (Washington, DC: United States Air Force, 1993), PDF e-book, Part 2, 259.
[40] Putney, 257.
[41] Gregory Defore, "Oral History – Lieutenant Colonel Gregory Defore, USAF (Retired)," interview by Joshua Freeland, *Marine Corps History Division*, March 26, 2019, 22:35, Marine Corps History Division – Oral History Branch.
[42] Gregory Fontenot, E. J. Degen, and David Tohn, *On Point: US Army in Operation Iraqi Freedom* (Fort Leavenworth, KS: Combat Studies Institute Press, 2004), 29.
[43] Jeffery Winters, "History of the Marine Air Command and Control System," (lecture, Weapons and Tactics Instructor Course, Yuma, AZ, March 19, 2013)
[44] Michael Kennedy, and Larry Holcomb, "Genesis and Development of the Battlefield Coordination Line," *Marine Corps Gazette* 86 no. 4 (April 2002): 68, https://search-proquest-com.lomc.idm.oclc.org/docview/221453532.
[45] Kennedy, 66.
[46] CWO4 Quint Avenetti, Marine Corps Artillery Detachment, Fort Sill, Joint Fires Coordination Measures Joint Test and Evaluation October 5-7, trip report, November 6 2005. CWO4 Avenetti states the Tactical Air Operations Center as the agency controlling Kill Boxes short of the FSCL, but the agency controlling a kill box within the MACCS is situation dependent to the capability to command and control the airspace.
[47] Benjamin Lambeth, *The Unseen War: Allied Air Power and the Takedown of Saddam Hussein* (Annapolis, MD: Naval Institute Press, 2013), E-book, 255. The Kill Box went through several iterations in naming similar to the Air Force's cultural discussion on whether Airpower should be one word of two separate words.

[48] David Neuenswander, "Oral History – Colonel David Neuenswander, USAF (Retired)," interview by Joshua Freeland, *Marine Corps History Division*, March 28, 2019, 18:53, Marine Corps History Division – Oral History Branch.
[49] William Dagenhart, "Oral History – Chief Warrant Officer Five William Dagenhart, USMC (Retired)," interview by Joshua Freeland, *Marine Corps History Division*, February 10, 2019, 5:25, Marine Corps History Division – Oral History Branch. CWO5 Dagenhart went on to note that the kill box was beneficial in the type of fight that Iraq became in June of 2003. The utility of the kill box as an FSCM for a nonlinear conflict is beyond the scope of this thesis.
[50] Lambeth, 257.
[51] United States Army Third Infantry Division, *Third Infantry Division After Action Report Operation Iraqi Freedom*, after action report, 2003, 102.
[52] Jeffrey White, "Oral History Transcript – Colonel Jeffrey White, USMC," interview by Mike Visconage, *Marine Corps History Division*, March 23, 2003, 17-18, Marine Corps History Division – Oral History Branch.
[53] Third Infantry Division, 138.
[54] Jody Jacobs, Leland Joe, David Vaughan, Diana Dunham-Scott, Lewis Jamison, Michael Webber, *Technologies and Tactics for Improved Air-Ground Effectiveness* (Santa Monica, CA: Rand, 2008), PDF e-book, 24; Fontenot, 88.
[55] Skidder, October 4, 2010, reply to VMI Marine, "Contracted CAS," http://www.socnet.com/showthread.php?t=85068. Skidder is Lt Col Defore's callsign, and he attributed the comment in this thread to himself in personal communication with the author. "88AS" was a 2003 CENTCOM naming convention for a specific kill box.
[56] Jacobs, 20-21, White, 18.
[57] White, 19; Skidder.
[58] Lambeth, 243. "Professionally manned" by the estimation of Gen Moseley refers to the designation of an occupation specialty within the Marine Corps for aviation command and control. Marines assigned to the MACCS will perform in the occupation field for the majority of their career as opposed to a temporary assignment.
[59] Air Land Sea Application Center, 2008 Research Paper, 1. Kill box procedures were also used by the joint force in Operation Enduring Freedom, but these procedures informed the measure for irregular warfare which is beyond the scope of this thesis.
[60] Neuenswander, 13:24.
[61] United States War Department, *Field Service Regulations: Command and Employment of Air Power*, FM 100-20 (Washington, DC: Government Printing Office, 1943), 1.
[62] Nuenswander, 18:53.
[63] Defore, 53:20. Lt Col Defore argues this event at the Nellis "threat museum" may be the origin of the SCAR MTTP.
[64] Warfare Center, United States Air Force, United States Air Force Warfare Center to Air Land Sea Application Center, request for feedback response, August 29, 2012.
[65] Air Land Sea Application Center, 2012 Research Paper, 2.
[66] Marine Air Weapons and Tactics Squadron One, United States Marine Corps, Marine Air Weapons and Tactics Squadron One to Air Land Sea Application Center, request for feedback response, November 16, 2015.
[67] Karl Wingenbach, "Kill Box: The Newest FSCM," *Field Artillery* 10 no. 4 (June-July 2005): 15, https://search-proquest-com.lomc.idm.oclc.org/docview/218360677/6B0000CBAC0049C9PQ/8
[68] Training and Doctrine Command, United States Army, Training and Doctrine Command to Air Land Sea Application Center, request for feedback response, November 16, 2015. Mentioned in block B3 of the RFF.
[69] David Neuenswander, Bo Bielinski, and Russ Smith, "Kill Box Update," *Air Land Sea Bulletin* 3 (Autumn 2008): 13, https://apps.dtic.mil/dtic/tr/fulltext/u2/a513208.pdf.
[70] Training and Doctrine Command and Tactical Air Command, *Joint Air Attack Team Operations*, USREDCOM Pamphlet 525-5 (Langley, VA: Air Land Forces Agency, October 31, 1983**),** iii. JAAT procedures emphasized the employment of an Army aviator, Air Battle Captain as an element of the JAAT which would be a capability to place the Army into a position of managing a kill box. The Army's lack of tactical aviation otherwise relegated them to a supporting role within a kill box under a SCAR platform.
[71] Air Land Sea Application Center, *Joint Air Attack Team Multiservice Tactics Techniques and Procedures*, MCRP 3-23A (Langley, VA: Air Land Sea Application Center, June, 1998**),** I-1.
[72] Edward Mann, *Thunder and Lightning: Desert Storm and the Airpower Debates*, (Maxwell, AL: Air University Press, 1995), 176.
[73] William McBride, *Technological Change and the United States Navy, 1865-1945*, (Baltimore MD: Johns Hopkins University Press, 2003), 148; Fifth Amphibious Corps, 131. The Iwo Jima Operation Plan included a subsection

titled "Coordination of Artillery, Air, and Naval Gunfire." VAC's plan stated ". . . support aircraft . . . are, in effect, additional artillery with the corps," and the commander of corps artillery was the integrator of all artillery fires. Prior to Second World War Admiral Moffett expressed his views of naval aviation as simply ". . .a form of a gun." for use to support the greater fleet.

[74] Henderson, 94.

[75] In its early days ALSA's predecessor, ALFA, established the JASC to review the progress of working groups and provide new direction. Membership on the JASC began with the heads of TAC and TRADOC and was expanded to NWDC and MCCDC as the naval services joined the organization.

[76] Air Land Sea Application Center. *ALSA Roadshow*, (Air Land Sea Application Center, Langley, VA, November 18, 2018), PowerPoint presentation, https://www.alsa.mil/Portals/9/Documents/roadshow.pdf; Craig Pachlhofer, email message to author, March 11, 2019.

[77] Pachlhofer.

[78] Pachlhofer.

[79] Pachlhofer.

[80] Air Land Sea Application Center, *Kill Box Multiservice Tactics Techniques and Procedures*, MCRP 3-25H (Langley, VA: Air Land Sea Application Center, August, 2009**),** 1.

[81] Nathan O'Neil, "Oral History – Lieutenant Commander Nathan O'Neil, USN," interview by Joshua Freeland, *Marine Corps History Division*, February 10, 2019, 18:12, Marine Corps History Division – Oral History Branch.

[82] Air Land Sea Application Center, *Kill Box Multiservice Tactics Techniques and Procedures*, MCRP 3-31.4 (Langley, VA: Air Land Sea Application Center, April, 2014**),** 6.

[83] Dustin Byrum, *General Employment of SCAR, FAC(A), and TAC(A)* (Marine Aviation Weapons and Tactics Squadron One, Yuma, AZ, May 8, 2018), PowerPoint presentation. Slide 16 of the brief provides guidance that kill boxes may be defined by geographic boundaries such as a target area of interest or an engagement area.

[84] Nathan O'Neil, email message to author, March 18, 2019. Clarifying his comments in the oral history, LCDR O'Neil stated that the naval service voted in block with the Air Force to align kill boxes strictly with GARS. Only one of the six naval service members present at the working group was a navy tactical aviator; the others were three command and control officers and two artillery community chief warrant officers. See Appendix A for further data.

[85] Defore, 60:30.

[86] Air Land Sea Application Center, 2008 Research Paper, 5.

[87] Pachlhofer.

[88] Air Land Sea Application Center, *2009 Kill Box Consolidated Adjudicated Comments Matrix* (Air Land Sea Application Center, Langley, VA, May 3, 2009), Adobe Acrobat document, 10.

[89] Navy Warfare Development Center, United States Navy, Navy Warfare Development Center to Air Land Sea Application Center, request for feedback response, August 29, 2012. Block B1 of the form states ". . . the current [k]ill [b]ox [e]mployment pub introduces possible confusion onto the battlefield by identifying a Kill Box Coordinator that serves the same function as the SCAR."

[90] For example, Marine infantry, surface warfare, and naval engineers are absent from ALSA.

[91] Air Land Sea Application Center, *2004 Killbox JWG Attendees* (Air Land Sea Application Center, Langley, VA, August 27, 2004), Excel document. This attendance roster specifically color coded individuals whom attended both working groups.

[92] Christopher Cavas, "US Navy Study Group Being Dissolved," Defensenews.com, April 7, 2016, https://www.defensenews.com/pentagon/2016/04/07/us-navy-study-group-being-dissolved/. One of the Navy's four tactical avaitors was, in fact, an Air Force F-16 pilot assigned to the Navy's Strike Fighter Weapons School Atlantic.

[93] Air Land Sea Application Center, *2004 Killbox JWG Attendees*; Air Land Sea Application Center, *Kill Box Multiservice Tactics Techniques and Procedures*, MCRP 3-25H (Langley, VA: Air Land Sea Application Center, June, 2005**),** 89. ALSA's archives do not contain a research paper for the initial publication, so the conclusive dates for review and approval are unclear.

[94] Air Land Sea Application Center, 2008 Research Paper, 9-10; Air Land Sea Application Center, *Kill Box Multiservice Tactics Techniques and Procedures*, MCRP 3-25H (Langley, VA: Air Land Sea Application Center, August, 2009**),** 74.

[95] Air Land Sea Application Center, 2012 Research Paper, 9-10; Air Land Sea Application Center, *Kill Box Multiservice Tactics Techniques and Procedures*, MCRP 3-31.4 (Langley, VA: Air Land Sea Application Center, April, 2014**),** 82.

[96] Air Land Sea Application Center, *SCAR – Kill Box, JAAT Joint Working Group Report*, after action report, 16 February, 2016, 1. ALSA added a third working group to this revision due to a significant push from the United States Army to revive JAAT processes into the Kill Box MTTP. The first Kill Box MTTP working group combined

with the SCAR MTTP working group to discuss the value of JAAT. The third working group did not occur as the first working group developed two courses of action for the JASC to decide upon.

[97] Air Land Sea Application Center, 2015 Research Paper, 4-5; Air Land Sea Application Center, *Kill Box Multiservice Tactics Techniques and Procedures*, MCRP 3-31.4 (Langley, VA: Air Land Sea Application Center, June, 2018**),** 87.

[98] Mary Larson, "Research and Design Strategies," in *History of Oral History*, eds. Thomas Charlton, Lois Myers, and Rebecca Sharpless (Lanham, MD: Rowman & Littlefield Publishers, 2007), 109.

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Air Land Sea Application Center. *2013 Kill Box Consolidated CRM*. Word document. Air Land Sea Application Center, Langley, VA, June 7, 2013.

Air Land Sea Application Center. *2013 Kill Box JWG*. Excel document. Air Land Sea Application Center, Langley, VA, February 1, 2013.

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