

*COUNTER FIRE!* A GAME TO TRAIN TACTICAL FIRE DIRECTION  
AND ARTILLERY BATTALION OPERATIONS

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MASTER OF MILITARY ART AND SCIENCE  
Wargame Design

by

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## ABSTRACT

*COUNTER FIRE!* A GAME TO TRAIN TACTICAL FIRE DIRECTION AND ARTILLERY BATTALION OPERATIONS, BY SAMUEL H. DEJARNETT SR., 205 pages.

*Counter Fire!* is a competitive wargame designed to train artillery leaders and staff in tactical fire direction and visualization of United States Army artillery battalion operations. The composite artillery battalion is a battalion of two M119A3 and one M777A2 batteries supported by a forward support company and a headquarters battery. Its mission is to provide fire support for the Infantry Brigade Combat Team. The game can be played by two players or more on two teams. The players fill the role of the artillery battalion commander and make decisions on what maneuver operations to support while balancing survival of the battalion and counterfire operations.

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## ACRONYMS

AAR	After Action Review
ABCT	Armored Brigade Combat Team
ADP	Army Doctrine Publication
AFATDS	Advanced Field Artillery Tactical Data System
AP	Action Points
ATP	Army Techniques Publication
BEB	Brigade Engineer Battalion
BSA	Brigade Support Area
BSB	Brigade Support Battalion
CALL	Center for Army Lessons Learned
CGSC	Command and General Staff College
COA	Courses of Action
CTC	Combined Training Center
DS	Direct Support
DSA	Division Support Area
HQDA	Headquarters Department of the Army
FAT	Field Artillery Task
FASP	Field Artillery Support Plan
FDO	Fire Direction Officer
FSCOORD	Fire Support Coordinator
IPRTF	In Place Ready to Fire
LSCO	Large Scale Combat Operations
MCOO	Modified Combined Obstacle Overlay



OPORD	Operations Order
PAA	Position Area for Artillery
TRADOC	Training and Doctrine Command
TTPs	Tactics, Techniques and Procedures
IBCT	Infantry Brigade Combat Team
WEG	World Wide Equipment Guide

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# CHAPTER 1

## INTRODUCTION

### Background

Much of the current world is watching the Russian and Ukrainian armed forces battle back and forth in Eastern Ukraine.<sup>1</sup> The Stingers, Javelins, and drones take credit for much of Ukraine's success in the headlines, but much of the fighting actually centers around the effectiveness of artillery. Often devolving into artillery duels, the fighting in Ukraine showcases that effective employment of batteries saves friendly lives and can mean the difference between victory or defeat.<sup>2</sup> So many people claim that artillery is going extinct but, the conflict in Ukraine is teaching the world it cannot assume artillery will be replaced by airpower. Army leaders cannot just sit and watch as artillery is applied to such great effect in modern combat. The Armies of Europe were outclassed once before while watching the development of wargaming.

While the rest of the world watched, Prussia transformed its military into a professional fighting force. Through rigor, discipline, and study, Prussia trained professional soldiers and looked for ways to train professional officers to lead them.<sup>3</sup> In order for its leaders to gain experience before going to battle, Prussian leaders developed

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<sup>1</sup> Adam Pasick, "A Grinding Artillery war in Ukraine: Ukraine Goes on the Offensive against Russian Forces," *The New York Times*, May 06, 2022, [www.nytimes.com/2022/05/06/briefing/a-grinding-artillery-war-in-ukraine.html](https://www.nytimes.com/2022/05/06/briefing/a-grinding-artillery-war-in-ukraine.html).

<sup>2</sup> Ibid.

<sup>3</sup> Matthew B. Caffrey, Jr., *On Wargaming: How Wargames Have Shaped History and How They may Shape the Future*, Newport Papers 43 (Newport, RI: Naval War College Press, 2019), 17.

*Kriegsspiel*, literally translating to mean wargame. Prussia recognized that leaders could be trained with *Kriegsspiel* to make better decisions on the battlefield.<sup>4</sup> The Prussians could test leaders, test tactics, and evaluate performance without sending troops to the field. The practice of testing leaders in simulated combat before the actual battles proved vital for the country's survival and development of junior officers.

Maneuver leaders in coming centuries pushed the limits of wargaming. Wargames continued in Europe and spread across the world training leaders before their first fights and evaluating possible courses of action without bloodshed.<sup>5</sup> As sustainment, joint operations, and politics developed people developed wargames to train leaders about these new conditions.<sup>6</sup> Maneuver units became combined arms units augmented with fire support, intelligence engineers and sustainment elements. Sustainment leaders considered issues with sustaining these new units. And so, leaders made wargames that incorporated these aspects. And towards the point of the thesis leaders saw joint fires as a necessity for maneuver warfare, so they included fire support in the games. Before the World Wars, Germany considered what military actions might trigger policy changes or political actions in Europe.<sup>7</sup> So, they included political aspects in their wargames. Wargames

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<sup>4</sup> Caffrey, *On Wargaming*, 17.

<sup>5</sup> Ibid.,

<sup>6</sup> Ibid., 30.

<sup>7</sup> Williamson Murray, "Armored Warfare: The British, French, and German Experiences," in *Military Innovation in the Interwar Period*, ed. Williamson Murray and Allan R. Millett (Cambridge: University of Cambridge Press, 1996), 8. While the Germans considered the political actions of invading France through Belgium, each time they got Belgium's actions incorrect. Murray points out that the Germans expected the Belgians to allow movement through their country without resistance. This was however

became more complicated and complex as warfare developed. Leaders adapted to complexity by training with these more complex games.

With politics, air-forces, navies, logistics, and counter insurgency operations all becoming more prominent, leaders developed specialized wargames for all of them.<sup>8</sup> A cursory inspection of the local game shop or online dealer will show countless examples of commercial wargames. Rifle squad tactics, combined arms maneuver, air to air combat, politics, and commerce all have their own wargames. A wargame that focuses on the artillery is difficult to find. Artillery operations more often exist as an aspect of other games. The effects of artillery have been important enough to be included in other games, but there is no wargame that concentrates on the specific challenges of employing artillery units on the battlefield.

The lack of focus on using wargames to improve artillery leaders is a detriment to the branch. Field Manual (FM) 6-0, *Commander and Staff Organization and Operations* even conflicts with itself saying that wargaming is focused on the people conducting the game but the purpose is to identify friction points in the plan and increase synchronization.<sup>9</sup> While Course of Action (COA) Analysis is also referred to as

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not the case. It was specifically detrimental to their campaign in WWI as it slowed them down enough to prevent the fall of France. The innovations Germany made in maneuver warfare post WWI were able to overcome this oversight however.

<sup>8</sup> Caffrey, *On Wargaming*, 30-40.

<sup>9</sup> Headquarters Department of the Army (HQDA), Field Manual (FM) 6-0, *Commander and Staff Organization and Organization* (Washington, DC: Army Publishing Directorate, Change 2, April 2016), 9-33 – 9-34, [https://armypubs.army.mil/epubs/DR\\_pubs/DR\\_a/NOCASE-FM\\_6-0-002-WEB-6.pdf](https://armypubs.army.mil/epubs/DR_pubs/DR_a/NOCASE-FM_6-0-002-WEB-6.pdf). Between these two pages the FM states that the focus of the wargame is not the tools but the personnel and that the outputs and results of a good wargame are synchronization products. Later in the chapter

wargaming in the Army, COA Analysis is focused on improving and assessing potential COAs for an operation.<sup>10</sup> The COA Analysis step of the military decision-making process is supposed to assist leaders in visualizing issues with their plan and correcting these issues through synchronization of unit actions.<sup>11</sup> But, COA analysis is often skipped leaving leaders to discover issues in their plan during execution and missing out on valuable training.<sup>12</sup> Skipping COA analysis means that even when Army doctrine demands artillery leaders conduct a wargame the process is often abbreviated or ignored. The CTCs have identified issues in wargaming for years and submitted lessons learned to the Center for Army Lessons Learned (CALL).<sup>13</sup> When leaders skip COA analysis the leaders lose not just essential planning steps but training as well

A contributing factor to skipping COA analysis could be that there are no clear rules for conducting a wargame in Army doctrine. Neither Army Techniques Publication

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it mentions that the wargame should increase the commander's and staff's visualization of the battle. Doctrine clearly considers COA analysis a wargame but, sees its purpose as plan improvement, not improvement of the staff or leaders conducting the wargame. What it may mean is that the wargame is more dependent on personalities to run the game and not on rules or systems.

<sup>10</sup> Headquarters Department of the Army (HQDA), Army Doctrine Publication (ADP) 5-0, *The Operations Process* (Washington, DC: Army Publishing Directorate, July 2019), 2-4, [https://armypubs.army.mil/epubs/DR\\_pubs/DR\\_a/ARN18126-ADP\\_5-0-000-WEB-3.pdf](https://armypubs.army.mil/epubs/DR_pubs/DR_a/ARN18126-ADP_5-0-000-WEB-3.pdf); HQDA FM 6-0, 9-26.

<sup>11</sup> HQDA, FM 6-0, 9-33.

<sup>12</sup> Operations Group, The National Training Center (NTC), *Mastering the Fundamentals: For BCT and Below Formation* (Fort Leavenworth, KS: Center for Army Lessons Learned, May 2021), 126, <https://api.army.mil/e2/c/downloads/2021/05/18/a6de0cc2/21-19.pdf>.

<sup>13</sup> Ibid.

(ATP) 3-09.23, *The FA Cannon Battalion* nor FM 6-0 give specific rules on how to conduct a wargame for a Field Artillery Support Plan (FASP).<sup>14</sup> With no effective direction on how to wargame and no commercial wargames that address the topic, artillery professionals need a wargame that can effectively address specific challenges on their employment, maneuver, engagement, sustainment, and survival. This study will produce a wargame that fulfills wargaming's original purpose as realized by the Prussians and utilized by teachers for centuries.<sup>15</sup> With *Counter Fire!*, artillery units will be able to train the staff and leaders to visualize the battle and therefore make better plans and decisions.

### Problem Statement

How can direct support artillery battalion operations be modeled in a competitive wargame in order to train artillery battalion staffs? Leaders are missing out on learning lessons before their first fights at CTCs or in combat. Just like officers in Prussia, modern artillery officers can learn valuable lessons from wargaming operations before they step

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<sup>14</sup> Headquarters, Department of the Army (HQDA), Army Techniques Publication (ATP) 3-09.23, *Field Artillery Cannon Battalion* (Washington, DC: Army Publishing Directorate, September 2015), 3-4, [https://armypubs.army.mil/epubs/DR\\_pubs/DR\\_a/pdf/web/atp3\\_09x23.pdf](https://armypubs.army.mil/epubs/DR_pubs/DR_a/pdf/web/atp3_09x23.pdf); HQDA, FM 6-0, 9-36; FM 6-0's paragraph 9-153 has a list labeled "Rules and Responsibilities." But does not list rules like would be found in a commercial wargame. In fact, it does not give rules for conducting a game but rules for the interaction of the personnel conducting the wargame. This list does more to delineate roles and responsibilities more than a how to conduct a game.

<sup>15</sup> Ralph Koster, *A Theory of Fun for Game Design*, 2nd ed. (Sebastopol, CA: O'Reilly, 2013). Koster's research into the history of games and their purpose to teach people goes back to teaching hunting and gathering skills. Humans have used games like Hide-and-go-Seek to teach basic skills like tracking to children throughout recorded history.



on to a battlefield. *Counter Fire!* is a game that can assist leaders in making decisions and visualize actions on the battlefield from the point of view of the composite artillery battalion.

### Purpose of the Study

The purpose of *Counter Fire!* is to simulate the operations of a field artillery battalion in a competitive wargame to be used for training of artillery staffs and leaders. Army doctrine loosely defines wargaming as a part of course of action analysis with action-reaction-counter action and incorporating all warfighting functions.<sup>16</sup> The description of COA analysis is the same across warfighting functions.<sup>17</sup> The doctrine tells leaders to identify problems, apply combat power and effects, and adjudicate results, but fails to give the unit rules or mechanics to adjudicate the wargame.<sup>18</sup> *Counter Fire!* creates an original set of wargame rules that can be used to train artillery staff and leaders.

### Research Questions

Primary Research Question: How can direct support howitzer artillery battalion operations be effectively modeled in a competitive wargame IOT train artillery staff?

Secondary research Questions:

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<sup>16</sup> HQDA, ADP 3-09.23, 3-4.

<sup>17</sup> HQDA, FM 6-0, 9-26.

<sup>18</sup> Ibid.

1. What parts of the battle does the artillery battalion commander affect and control?
2. How can maneuver units be modeled without becoming the focus of the game?
3. What are the most important staff functions to include in an artillery centric wargame?
4. What tasks of the artillery battalion need to be included in an artillery wargame?
5. What game mechanics are useful to create a competitive artillery wargame?

### Assumptions

The first assumption made in this study is that playing wargames can be a valuable training tool for artillery leaders. There is plenty of research and articles about why wargaming has been conducted and why wargaming is a valuable aspect of leader development, so the thesis will build off of those arguments and make the assumption that the benefits of visualization through gaming apply to the artillery as well.

The second assumption is that wargaming does not need to involve every member of the battalion to be effective. Essentially, CTC rotations and force-on-force exercises are wargames.<sup>19</sup> They are versions of games like laser-tag that model battlefield effects with large numbers of participants from the individual rifleman to brigade commanders.<sup>20</sup> As such, the game *Counter Fire!* operates on the assumption that you can train the

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<sup>19</sup> Caffrey, *On Wargaming*, 44.

<sup>20</sup> Ibid., 101.

individuals of the staff without including the entire battalion in the process. Army doctrine and training strategies agree that individuals can be trained without the participation of the entire unit. The value of reduced force rehearsals is accepted across the Army and need not be argued here.<sup>21</sup> The Army already has the “Gated Training Strategy” which requires small units to go to the field and conduct live wargames.<sup>22</sup> Training Circular (TC) 3-09.8 has more information on the training and certification requirements for artillery teams and crews.<sup>23</sup>

The final assumption is that artillery units in the game will be proficient at technical fire direction. Technical fire direction is the ability of the unit to generate accurate firing data. Generating accurate firing data originates in the fulfillment of the five (5) requirements for accurate predictive fire. The five requirements are the basic data and computational procedures that artillery units must complete to have effective indirect fire.<sup>24</sup> Without fulfilling these requirements there would be no way to predict where the

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<sup>21</sup> HQDA, FM 6-0, 10-3.

<sup>22</sup> Headquarters, Department of the Army (HQDA), Training Circular (TC) 3-09.8, *Fire Support and Field Artillery Certification C1* (Washington, DC: Army Publishing Directorate, March 2020), 1-23, [https://armypubs.army.mil/epubs/DR\\_pubs/DR\\_a/ARN30053-TC\\_3-09.8-001-WEB-1.pdf](https://armypubs.army.mil/epubs/DR_pubs/DR_a/ARN30053-TC_3-09.8-001-WEB-1.pdf).

<sup>23</sup> Ibid.

<sup>24</sup> Headquarters, Department of the Army (HQDA), Training Circular (TC) 3-09.81, *Field Artillery Manual Cannon Gunnery* (Washington, DC: Army Publishing Directorate, April 2016), 1-2, [https://armypubs.army.mil/epubs/DR\\_pubs/DR\\_a/pdf/web/tc3\\_09x81.pdf](https://armypubs.army.mil/epubs/DR_pubs/DR_a/pdf/web/tc3_09x81.pdf); The TC3-09.81 is the basic manual used to teach artillery theory to junior officers and fire direction specialists in the United States Army. While automated data systems such as AFATDS have taken over much of the computational procedures the specific data and tracking weapon characteristics is still human based in practice. This reference describes those technical steps in detail for understanding and the execution of manual gunnery with firing charts, tabular, and graphic firing tables.

rounds would land after firing. As such, gross inaccuracy would leave too much unpredictability in firing and make a model of indirect fire useless.

### Definition of Terms

Red and Blue teams/units - The two players' teams and units will be referred to as Red and Blue. Red will generally represent the OPFOR and Blue the friendly/US forces.

Action Points (AP) - A value assigned to the unit that represent the amount of time and effort used to execute any given action in a turn.

After Action Review (AAR) - The AAR is a meeting centered on a unit or leader learning from their own actions both positive and negative. Often conducted in a formal setting shortly after a training event.<sup>25</sup>

Armored Brigade Combat Team (ABCT) - Similar to the infantry brigade combat team but with armored and mechanized infantry battalions.<sup>26</sup>

Advanced Field Artillery Tactical Data System (AFATDS) - AFATDS is the primary computing system that the U.S. field artillery uses to compute technical firing data.<sup>27</sup>

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<sup>25</sup> Headquarters, Department of the Army (HQDA), Field Manual (FM) 1-02.1, *Operational Terms* (Washington, DC: Army Publishing Directorate, March 2021), 1-2.

<sup>26</sup> Ibid., 2-1.

<sup>27</sup> Ibid., 2-2.

Center for Army Lessons Learned (CALL) - The CALL is a digital archive of lessons that the Army has recorded from combat and CTC rotations. CALL exists for leaders to access and learn from the mistakes and success of other units and leaders.<sup>28</sup>

Composite Battalion - A composite battalion in the United States Army artillery is a battalion of composed of two batteries of the M119A3 105mm howitzers and one battery of M777A2 155mm howitzers. The composite battalion will be the basis for the Blue and Red units in the game.<sup>29</sup>

Combat Training Center (CTC) - Large training centers used across the world. These are generally large training areas that host brigade and larger training events. The training at these locations is generally focused on Battalion and higher coordination and staff training.<sup>30</sup>

Counter Fire! - Is the name of the game that this thesis describes the design process for.

Counterfire - The process of engaging enemy fire support assets or capabilities that are used to engage friendly forces. Counterfire is not limited to artillery versus artillery.<sup>31</sup>

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<sup>28</sup> Ibid., 2-4.

<sup>29</sup> HQDA, ATP 3-09.23, B-1.

<sup>30</sup> U.S. Army Combined Arms Center, “Observer, Coach, Trainers,” accessed July 17, 2022, <https://usacac.army.mil/sites/default/files/documents/cact/mctp/Observer,%20Coach,%20Trainers.pdf>.

<sup>31</sup> HQDA, ATP3-09.23, 5-8.

Courses of Action (COAs) - The plan of all the individual actions that the units will take during an operation. A COA normally includes a form of maneuver or defense for maneuver forces, and a fire support plan. In the artillery battalion the COA is the sum of actions needed to provide fires in support of the maneuver units.<sup>32</sup>

Cue - To turn a radar on so that the radar is radiating and able to detect objects with ballistic trajectories.<sup>33</sup>

Delivery - The act of employing fire support assets in order to affect an enemy. Delivery could be the dropping of a bomb, firing of artillery or mortars, or employing an electronic asset to achieve an effect, be it lethal or non-lethal.<sup>34</sup>

Direct Support (DS) - a support role in which the supporting unit responds to requests for support first from the supported unit, then from its higher headquarters, then its own subordinates.<sup>35</sup>

Field Artillery Task (FAT) - An action that the field artillery battalion is ordered to do in the higher unit operations order.<sup>36</sup>

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<sup>32</sup>HQDA, FM 1-02.1, 1-25.

<sup>33</sup> HQDA, ATP 3-09.23, 5-9.

<sup>34</sup> Ibid., 1-5.

<sup>35</sup> HQDA, FM 1-02.2, 1-32.

<sup>36</sup> Headquarters, Department of the Army (HQDA), Field Manual (FM) 3-09, *Field Artillery Operations and Fire Support* (Washington, DC: Army Publishing Directorate, April 2014), A-1, [https://armypubs.army.mil/epubs/DR\\_pubs/DR\\_a/pdf/web/ARN21932\\_FM\\_3-09\\_FINAL\\_WEB.pdf](https://armypubs.army.mil/epubs/DR_pubs/DR_a/pdf/web/ARN21932_FM_3-09_FINAL_WEB.pdf).

Fire Support Coordinator (FSCOORD) - A person that is primary advisor of fire support to the Brigade commander and FA battalion commander. The Division FSCOORD is the same for the Division artillery and Division Commander.<sup>37</sup>

Large-Scale Combat Operations (LSCO) - LSCO is high intensity conflict between conventional forces that can span multiple campaigns or series of operations.<sup>38</sup>

Modified Combined Obstacle Overlay (MCOO) - The MCOO is an overlay that is made for analog maps that label restrictive and severely restrictive terrain. The MCOO includes natural and man-made obstacles that are emplaced by the friendly and enemy forces.<sup>39</sup>

Observer Coach Trainer (OCT) - a mentor to a unit at a CTC who advises them on doctrine and encourages further thoughts on decisions made. Assists the unit in AARs after the training rotation.

Operations Order (OPORD) - The document that formally compels a unit to execute actions on the battlefield. The OPORD is the complete plan with all the subordinate Annexes needed to communicate an operation to subordinate units.<sup>40</sup>

Position Area for Artillery (PAA) - An area designated for the artillery batteries or battalions to use to establish firing points where the batteries can shoot and move

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<sup>37</sup> Ibid., 1-4.

<sup>38</sup> Headquarters, Department of the Army (HQDA), Field Manual (FM) 3-0, *Operations* (Washington, DC: Army Publishing Directorate, October 2017), 1-1, [https://armypubs.army.mil/epubs/DR\\_pubs/DR\\_a/pdf/web/ARN6687\\_FM%203-0%20C1%20Inc%20FINAL%20WEB.pdf](https://armypubs.army.mil/epubs/DR_pubs/DR_a/pdf/web/ARN6687_FM%203-0%20C1%20Inc%20FINAL%20WEB.pdf).

<sup>39</sup> HQDA, FM 1-02.1, 1-68.

<sup>40</sup> Ibid., 1-75.

without interfering with other units. These areas are still owned by the unit responsible for the area of operations.<sup>41</sup>

Tactics, Techniques and Procedures (TTPs) - These are accepted practices that the Army has identified in doctrine or standard operating procedures that hold merit and should be spread across the Army.<sup>42</sup>

Target - An enemy formation or piece of equipment that is the object of a fire mission.<sup>43</sup>

Infantry Brigade Combat Team (IBCT) - The standard U.S. Army mixture of three (3) infantry battalions, one (1) cavalry squadron, one (1) field artillery battalion, one (1) brigade support battalion, and one (1) engineer battalion.<sup>44</sup>

### Scope

*Counter Fire!* will address some of the main problems that face wargaming for artillery professional development. *Counter Fire!* will focus on key decisions and responsibilities of the battalion commander and the artillery battalion staff. *Counter Fire!* will be on the tactical level of war. The game will simulate a single battle, not a campaign or series of operations, and take place over a simulated 48-hour time frame. Because decisive battles still center around the infantry and armor units, maneuver units cannot be truly removed from the game. However, *Counter Fire!* will focus on how the artillery

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<sup>41</sup> Ibid., 1-79.

<sup>42</sup> Ibid., 2-3.

<sup>43</sup> HQDA, FM 1-02.1, 1-99.

<sup>44</sup> Ibid., 2-11.



battalion sets conditions for successful combined arms maneuver by achieving its field artillery tasks (FATs). The players will not control the maneuver, only key elements of the artillery battalion.

### Limitations and Delimitations

There are a number of limitations that could not be avoided in the development of the game *Counter Fire!*. The limitations were elements inherent to the research and project. They prevented more in-depth or extensive research, writing, and game design.

The first limitation is that of classification. The theses published by the Command and General Staff College (CGSC) are developed in, around, and with partners from different countries and with different security clearances. For this reason, no classified material is used or referenced. To prevent classification or distribution limits actual damage probabilities for targets and ammunition could not be referenced. The damage mechanisms and odds for munitions effectiveness against targets exist in classified databases. Similarly, many of the training standards for tasks are controlled unclassified information. The collective and individual training standards information requires specific release and approval. The restriction of these approvals limits the accuracy of some models in the game. However, to paraphrase George E.P. Box, all games are wrong, but some are still useful.<sup>45</sup> This limitation was mitigated by making reasonable inaccuracies that still supported the purpose of facilitating decision making.

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<sup>45</sup> Todayinsci, "Science Quotes by George E.P. Box," Today in Science History, accessed May 12, 2022, [https://todayinsci.com/B/Box\\_George/BoxGeorge-Quotations.htm](https://todayinsci.com/B/Box_George/BoxGeorge-Quotations.htm). The quote from George Box was often repeated by Dr. Sterrett during the course of designing *Counter Fire!* and most game design classes in CGSC. All combat training tries to emulate combat without being it truly and is therefore wrong.

The second limitation nests with the first. The availability of 1:50,000 maps limited the scope of playtesting. Many such maps are still labeled For Official Use Only or have distribution restrictions. The lack of 1:50,000 map availability meant that *Counter Fire!* could only be tested on maps that are readily available at the CGSC or from personal supplies. Therefore, only two 1:50,000 maps were used for playtesting.

Thirdly, *Counter Fire!* is a manual game. The lack of computer programming experience and access to programming software means that only physical pieces are included and that more complex automated calculations of physics could not be used to create more realism in the game. The lack of automation also means that the game needs at minimum two players. Since *Counter Fire!* is a competitive wargame there must be two sides competing and a real player must provide the competitor instead of computer simulated intelligence. Another option could be creating a “mechanical” system such as the Mechanical Marquis in the game *Root*, however a solitaire game removed key training objectives, opportunity for the intelligence section of the staff, and would require more time than available for the study.<sup>46</sup>

The final major limitation is that because of time, the game cannot be proven to have the desired effects of training an artillery staff. The thesis focuses on designing the

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Once a game player understands this quote game design can truly be appreciated and used to educate the player on a variety of topics.

<sup>46</sup> Cole Wehrle, *Root: A Game of Woodland Might and Right*, Board Game (Saint Paul, MN: Leder Games, 2018); Later expansions of *Root* that came out during this study introduced a Mechanical decision-making system for the Marquis de Cat faction. This allowed players to play *Root* as a solitaire style game or with only two players working against the Marquis de Cat. This mechanic made a decision matrix style system that dictated the Marquis’ actions each turn based on specific circumstances in the game.

wargame, not testing its effects on the personnel the game is designed to train. The arguments presented will be based off of providing a tool that meets the same intent as alternate forms of training or engaging in real combat. *Counter Fire!* presents models of problems the Army has identified that the artillery commander must address to have an effective plan. If the staff can understand these problems, then they can better advise the commander on how develop and implement a plan.<sup>47</sup> *Counter Fire!* presents an option for leaders to train staffs at a much lower cost than lives on a battlefield, monetary requirements of a CTC or field exercise, or justifying an administrative operation as tactical staff training.

Delimitations were areas that specifically avoided in order to produce a useful competitive wargame in the time and program of the Command and General Staff College Officer Course Master of Military Arts and Sciences program. The largest of these will be listed here and some addressed later in areas for future research.

First, *Counter Fire!* will only address a Direct Support (DS) composite battalion in the game. Focus on the composite artillery battalion concentrates the models on specific tactical capabilities and maximizes time on one of the most common artillery battalions in the United States Army. The composite battalion allows the models to be adaptable to other types of units with continued development and research. From the base statistics given to 105mm and 155mm towed batteries, an intelligent researcher or artilleryman could create useful models for the self-propelled howitzers, and other calibers of munitions.

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<sup>47</sup> HQDA, FM 6-0, 2-1.

*Counter Fire!* will not cover maintenance operations. Given that the span of the wargame is just 48 hours maintenance would not be able to have large effects on the battlefield. Vehicles and equipment significantly damaged would not be able to be repaired or replaced rapidly enough in the course of a two (2) day battle. While CTCs have systems to repair equipment and return personnel within 48 hours, regeneration is generally used to give the maintainers and small units more training. *Counter Fire!* is focused on training the staff at planning and not on soldier training below the battalion staff level.

The unit's level of training will not be considered in *Counter Fire!*. The level of training for each unit could depend on the previous years of training or lack thereof. Different leaders and previous missions could prevent the artillery battalion from reaching the standards set out in TC 3-09.8. Training takes on an even greater level of complexity if opposing forces training is considered. Research into artillery training of other countries could be worth a thesis by itself. For these reasons training levels for the units will not be directly addressed.

*Counter Fire!* only has one set of cards that simulate targets and observation on the battlefield and one set of units for the Red and Blue players. The single source for targets and limited task organization allowed the game to be made quickly and enabled balanced game play. The online Worldwide Equipment Guide (WEG) controlled by the Army's Training and Doctrine Command (TRADOC) has orders of battle for simulated threat artillery battalions. However, many of these have more systems that overwhelm the U.S. counter parts. If the shared FAT cards reflected enemy orders of battle, then that would mean the Red player would be committing fratricide. A single set of cards for

targets, tasks, and the selected task organization for the Red and Blue player enabled the game to be designed and tested in the time available. Not including specialized orders of battle and a common set of FAT cards allowed the design process to concentrate on the interactions between mechanics and how game mechanics related to the purpose of the study.

Finally, the FSCOORD is both a staff officer and commander. The FSCOORD commands the artillery battalion and is responsible for planning fire support for the brigade. The FSCOORD therefore has responsibilities that fall outside the focus of *Counter Fire!*.<sup>48</sup> To keep the game focused on the artillery battalion, the game omits much of the FSCOORD's fire support responsibilities. Items such as fire support coordination measures, integration of close air support, and other effects-based capabilities that participate in the battle are omitted. The focus of *Counter Fire!* is on the composite artillery battalion. Other games at the brigade and higher echelons concentrate on fire support and targeting.

### Significance of the Study

Matthew B. Caffrey's *On Wargaming* shows that through history wargaming has been an integral part of developing leaders between and during wars.<sup>49</sup> The United States has ended its war in Afghanistan, and ended major combat operations in Iraq. Now, the Army is focusing on Large Scale Combat Operations (LSCO) and great power

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<sup>48</sup> HQDA, FM 3-09, 1-4.

<sup>49</sup> Caffrey, *On Wargaming*, 43-45.

competition with countries like China.<sup>50</sup> Artillery leaders need to be concerned with ensuring that they maintain an advantage over our adversaries to support national strategic defense goals. China has the edge with regards to artillery.<sup>51</sup> China has more firing units, with longer range, and formidable acquisition systems.<sup>52</sup> The United States is developing weapon systems with similar ranges.<sup>53</sup> The Army is fielding extended range cannon systems that will increase the number of howitzers on the battlefield.<sup>54</sup> But, these measures may fall short of matching or achieving over match. The U.S. Army must then also develop the best leaders that know how to employ their systems to better effects than our adversaries.

Caffery established that wargaming has been an effective way to train and develop leaders for future conflicts.<sup>55</sup> The artillery has lagged behind in wargaming capabilities. Evidenced by the lack of emphasis on wargaming in Army doctrine and planning documents, many leaders do not value or practice wargaming outside of field

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<sup>50</sup> U.S. President, *Interim National Security Strategic Guidance* (Washington, DC: The White House, March 2021), 8.

<sup>51</sup> Office of the Secretary of Defense (OSD), *Military and Security Developments Involving the People's Republic of China: 2020*, Annual Report to Congress (Washington, DC: Department of Defense, 2020), 46.

<sup>52</sup> Ibid.

<sup>53</sup> Army Futures Command (AFC), AFC Pamphlet 71-20-6, *Army Futures Command Concept for Fires 2028* (Austin, TX: Army Futures Command, September 15, 2021), 34, <https://api.army.mil/e2/c/downloads/2021/10/06/869ca62b/afc-concept-for-fires-2028-oct21.pdf>.

<sup>54</sup> Ibid., 13-14.

<sup>55</sup> Caffrey, *On Wargaming*, 335.

exercises.<sup>56</sup> Artillery leaders are missing key opportunities to train themselves and analyze techniques before entering a battlefield or a CTC.

*Counter Fire!* is a tool that the artillery can use for training. *Counter Fire!* provides a set of rules and a model that leaders can use to analyze the specific problems facing the artillery battalion's mission and tasks. Analysis of these key tasks by warfighting function could then be integrated to develop leaders in the artillery battalion. While other wargames consider artillery as an outlier or fringe aspect of the operation, effective fire delivery is the central problem in *Counter Fire!*. The control of the artillery units enables a unique opportunity for artillery leaders that is not currently available in other games.

The second significance of designing an artillery wargame is the start of possibly reconsidering how artillery is viewed and employed. Caffery cites German wargaming for identifying lessons learned that influenced the development of "Blitzkrieg" doctrine.<sup>57</sup> Dr. Richard McConnell brought up the effectiveness at recognizing exceptional information and its effects on battles in "Connecting the Dots."<sup>58</sup> With these significant contributions in mind, an artillery centric wargame creates the opportunity for leaders to identify shortcomings in the current plans, Tactics, Techniques and Procedures (TTPs), and train leaders to anticipate friction in combat.

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<sup>56</sup> Murray, "Armored Warfare," 8.

<sup>57</sup> Caffrey, *On Wargaming*, 45.

<sup>58</sup> Richard A. McConnell, "Connecting the Dots: Developing Leaders Who Can Turn Threats into Opportunities," *Military Review* 100, no. 3 (May-June 2020): 27-35, <https://www.armyupress.army.mil/Journals/Military-Review/English-Edition-Archives/May-June-2020/McConnell-Connecting-the-Dots/>.

## Summary

Wargaming is a valid method of training and developing leaders and TTPs for future forces. Through history, professional militaries have done so or failed and suffered the consequences.<sup>59</sup> The issue being that while maneuver, sustainment, and politics were identified as key aspects to wargame and each have found specialized wargames to identify issues and key lessons, artillery has been relegated to only a supporting role.<sup>60</sup> Artillery must be the focus of its own wargames in the future. There are many lessons that the artillery community can learn from developing games that concentrate on its own warfighting function.

*Counter Fire!* focuses on the field artillery composite howitzer battalion as the United States Army employs the artillery battalion in an Infantry Brigade Combat Team (IBCT). The focus on the composite artillery battalion allows the game to highlight the specific problems without needing extensive rules for all systems available to armies of the world. The scope narrows down the purpose of the game and what the game will attempt to accomplish.

The limitations, delimitations, and weaknesses discussed are areas for future research topics. Given more time, *Counter Fire!* could be expanded to include many of these aspects to increase its complexity and realism. Analysis of self-propelled artillery systems and armored formations could be the focus for a follow-on game or expansion.

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<sup>59</sup> Caffrey, *On Wargaming*, 46-48.

<sup>60</sup> Ibid., 56.



## CHAPTER 2

### LITERATURE REVIEW

#### Introduction

*Counter Fire!* was built through assembling doctrine and mechanics from a variety of games. A few pieces of doctrine and games stood out from other sources. The following chapter presents the best sources from *Counter Fire!*'s design.

The sources are organized by the research questions that each source helped answer. Many of the sources helped answer multiple research questions so only three questions are highlighted. Not all literature that contributed to the study is reviewed here but the most influential work is. The chapter starts with reviewing the most important pieces of doctrine. These sources laid the groundwork for understanding the important actions of artillery in warfare and what technical and tactical aspects must be considered when making a FASP. The Army's artillery doctrine defined the artillery's required actions, staff importance, and responsibilities of the artillery battalion commander. Maneuver doctrine did the same for the maneuver units and guided the development of how to include infantry units without making them the focal point of the game. Thirdly, games that influenced how to model artillery operations and develop rules are reviewed. The doctrine and games are the foundational tools for the model used and how each mechanic should interact to create a game that trains artillery leaders.

#### The Battle and Important Characteristics

What aspects of the battle does the direct support artillery battalion commander control?

The best reference for the responsibilities of the artillery battalion commander is ATP 3-09.23, *The Cannon Fires Battalion*. In *The Cannon Fires Battalion*, the Army defines what the battalion commander is responsible for and who on the staff helps the commander accomplish these tasks. Specifically, chapters 3-5 cover planning operations and what the commander and staff need to consider to support the maneuver plan.<sup>61</sup> These chapters served as the basis for identifying specific topics the game should cover.

Key topics from ATP 3-09.23 (.23) started with Chapter 3. The .23 has a fairly comprehensive list of considerations across warfighting functions, staff sections, and technical expertise that the FA battalion commander must consider. Of specific significance to the game were: positioning areas for artillery (PAAs), the identification of field and combat trains, sustainment options, the field artillery support matrix, and basic schedule of fires. The ATP makes this list readily accessible and approachable but fails to instruct how to make the selections for PAAs, what a support matrix looks like, a description of common trains compositions, or what to put on the support matrix.

The second key topic was that of counterfire operations and the responsibility for radar emplacement. Specifically, how to minimize risk to the battalion while maximizing howitzer range, survivability, and acquisition capabilities.<sup>62</sup> Including counterfire operations forces the battalion commander and staff to consider how to preserve the radars. The howitzers represent critical capabilities for the battalion. However, the commander must employ the radar to achieve the field artillery tasks and support the

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<sup>61</sup> HQDA, ATP 3-09.23, 3-1, 5-1.

<sup>62</sup> Ibid., 3-8.

maneuver commander's intent. A game that trains the staff or leaders of an artillery battalion must consider counterfire and how the howitzers and radars will integrate.

The final and most important aspect that doctrine places in the battalion commander's lap is tactical fire direction.<sup>63</sup> ATP 3-09.23, *The Field Artillery Cannon Battery* lumps most actions of the cannon battalion into tactical fire direction.<sup>64</sup> Chapter 5 links the battalion's warfighting functions to how the battalion provides fire support to the maneuver unit. Chapter 5 relates ammunition consumption, target priorities, how many guns are in place ready to fire (IPRTF) and even down to rules of engagement considerations to tactical fire direction. Most of the key aspects and functions of the DS battalion are apparent in Chapter 5 of ATP 3-09.23.

ATP 3-09.23 gave *Counter Fire!* focus and identified topics that must be left for future research. While many doctrinal references exist for the field artillery battalion's actions and responsibilities, ATP 3-09.23 covers the majority of them and clarifies discrepancies from other sources.

### Modeling the Maneuver Units

The artillery needs to support the maneuver units in both offensive and defensive operations. *Counter Fire!* draws most of its models for what the maneuver units should look like and affect the battle from Army Doctrine Publication 3-90, *Offense and Defense*. *Offense and Defense* gives planning guidance and different considerations for offensive and defensive operations that are not specific to the type of unit. Each type of

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<sup>63</sup> HQDA, ATP 3-09.23, 3-3.

<sup>64</sup> Ibid., 3-4.

operation is given chapters that then break down considerations for the maneuver, fire support, sustainment, intelligence, and other warfighting functions.<sup>65</sup>

The ADP 3-90 served as a launching point for understanding the maneuver and other warfighting functions. The descriptions in the publication were particularly useful in providing the general concepts of the decisive maneuvers for a battle and listed references to other publications that could be cross referenced for more detailed explanations, enabling modeling and coding.

### Game Mechanics

What game mechanics are useful for creating the wargame?

Most wargames focus on everything but the artillery, however a number of games have made innovations that can be used outside of the original games. *Race to the Rhine*, was a genius yet simple system with its supply centered planning, and measurement of haul capacity while using cards for combat. The replication of haul capacity using simple trackers and tokens can be repurposed for any number of games. In *Assassin's Mace* the player must understand strike warfare on the operational level and integrate multiple assets. The game makes tracking resources easy with dry erase counters on pieces that enable a player to simply visualize the complexity of the battle. *Band of Brothers* is a

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<sup>65</sup> Headquarters, Department of the Army (HQDA), Army Doctrine Publication (ADP) 3-90, *Offense and Defense* (Washington, DC: Army Publishing Directorate, July 31, 2019), 3-1 – 5-2. These chapters cover both the offensive and defensive planning factors and characteristics before delving into enabling functions such as reconnaissance and security tasks. While not being all inclusive or detailed it outlines the key aspects of both offensive and defensive operations that are not unit specific. More details can then be referenced from this publication to the more detailed field manuals and techniques publications.

squad based tactical game in which the player must overcome the limited activation of units and the opponent's interruption of the player's turn. The World War I game *Verdun: Steel Inferno 1914* is an artillery centric game, but the player is still controlling the maneuver units instead of the artillery batteries. Its fists full of dice and barrage cards were highly influential on the combat results of *Counter Fire!*.<sup>66</sup>

Artillery operations can grind to a halt without the proper supply of ammunition.<sup>67</sup> *Race to the Rhine* captured these dilemmas well on the operational level. *Race to the Rhine* requires the player to stock, draw, spend, and transport resources on a point-to-point map while spending these resources to pursue the German armies cross the Rhine.<sup>68</sup> The German forces and civilian challenges are generated by a card drawing system and each have a value of resources in ammo, fuel, or food to successfully complete the card.<sup>69</sup> The corps' data cards also presented a simple mechanic for how

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<sup>66</sup> Walter Vejedovsky, *Verdun 1916: Steel Inferno*, Board Game (Paris: Fellowship of Simulations, 2020). *Verdun* uses barrage cards to simulate the large artillery barrages characteristic to the battles of WWI. The player must use these in support of infantry attacks to succeed. Card draws and other supporting aspects of the game make the barrages more effective. However, the player does not control positioning, counterfire operations or sustainment of the artillery. Artillery support just happens in accordance with the drawn cards. The barrage cards available do change based on the phase of the attack in accordance with historical logistics achievements through.

<sup>67</sup> Author's observations at Fort Polk, LA in JRTC Rotations 2020-2021. Similarly, from the author's experience as a battery commander deployed from 2018-2019 in the Middle East.

<sup>68</sup> Jaro Andruszkiewicz and Waldek Gumienny, *1944: Race to the Rhine*, Board Game (London: Phalanx Games, 2014).

<sup>69</sup> Ibid.

many supplies they could carry.<sup>70</sup> The players stored different shaped resource markers on top of the storage squares on the corps data cards. The resources could only be replaced by either moving the corps to a resupply point or hauling the supplies to the corps. Using trucks clogged the route so that the route could not be used a second time.<sup>71</sup>

The spend, draw, transport, and receive cycle in *Race to the Rhine* forced the player to plan supply multiple turns in advance or watch progress grind to a halt because all units are out of ammo, fuel, or food, or cannot draw the supplies.<sup>72</sup> The player then has to tackle the challenge of how to get these planned supplies to the corps, working around the mismatched haul capacities of the trucks against the corps. The mismatched haul capacities and importance of planning supplies in advance matches lessons from JRTC and the challenges of hauling rounds in the batteries and forward support companies of artillery units.<sup>73</sup>

The United States Marine Corps Association took on the challenge of trying to make a wargame that tackled the challenges of future warfare in the Indo-Pacific Command (INDOPACOM) theater. *Assassin's Mace* specifically addressed strike warfare.<sup>74</sup> Airstrikes used counters for strike packages and dry erasable markers to count defensive and offensive missile capabilities. Each type of offensive missile used a

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<sup>70</sup> Andruszkiewicz and Gumienny, 1944.

<sup>71</sup> Ibid.

<sup>72</sup> Ibid.

<sup>73</sup> Author's observations at Fort Polk, LA in JRTC rotations from 2019-2021.

<sup>74</sup> Tim Barrick, *The Operational Wargame Series: Assassin's Mace*, Board Game (Annapolis, MD: unpublished, 2020).

different sized die to replicate its effectiveness. Missiles could be downgraded from one die to another from the twelve-sided die (d12) all the way down to a four-sided die (d4).<sup>75</sup> Each unit also had a combat defense value that the roll of the dice had to beat to score a hit. The tracking of rounds by erasable markers and using a defense score that could be increased with defensive missiles was an intriguing concept. The erasable counters were a novel technique that incorporated materials the staff already had on hand to play the game. This lowered the intimidation of the game and encouraged more people to play and train.

*Fluvius Bellum* was another large-scale combat game that included simplistic innovations. Firstly, the game is played on a grid based 1:50K military map.<sup>76</sup> The map was a key component of making the game approachable and understandable to non-gamers. The second key aspect of *Bellum* was its system of representing dispersed units. Using a large marker to represent the center of screens and force-marching units, and small blocks to represent their dispersed units was a simple mechanic that could simulate any number of formations.<sup>77</sup> The grid map also presented a mechanical challenge for travel. *Bellum* allowed diagonal movement at no penalty.<sup>78</sup> This presents a rule that players could exploit as you could move faster by diagonal movement than you could by counting in cardinal directions.

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<sup>75</sup> Barrick, *The Operational Wargame Series*.

<sup>76</sup> Cris Carnes, *Fluvius Bellum*, Board Game (unpublished, n.d.).

<sup>77</sup> Ibid.

<sup>78</sup> Ibid.

The *Band of Brothers: Screaming Eagles* game gave great insights into time and representing the fluid back and forth nature of combat.<sup>79</sup> *Band of Brothers* used two rules that gave initiative power, allowed for the opposing force (OPFOR) to take immediate action against the friendly force, and addressed the capabilities of command and control. It presented a system that was not overly complicated and fit closely to the Army's action, reaction, counter action model.<sup>80</sup> The series clearly laid out conditions that enabled the OPFOR to take opportunity fire against identified targets. This system was easy to follow and made sense. *Band of Brothers* also limited the number of units the player could activate at one time.<sup>81</sup> This forced the player to consider the sequence of deployment and action in a dynamic environment.

The system laid out clear requirements for opportunity fire that were easy to follow and allowed real time reactions to events.<sup>82</sup> The command reach system of limiting activated units before allowing the OPFOR to begin activation forced the player to think through sequence of deployment and events. This also replicated in an elegant way the deployment of units into the area of operations. The player with initiative may move or deploy first but cannot carry out all of their tasks before meeting friction or reactions from the enemy.

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<sup>79</sup> Jim Krohn, *Band of Brothers: Screaming Eagles*, Board Game (Virginia Beach, VA: Worthington Games, Worthington Publishing, LLC, 2011).

<sup>80</sup> HQDA, FM 6-0, 9-36; Krohn, *Band of Brothers*.

<sup>81</sup> Krohn, *Band of Brothers*.

<sup>82</sup> Ibid.



Lastly in the area of game mechanics and focus, the biggest impact on game mechanics was from *Verdun 1916: Steel Inferno*.<sup>83</sup> *Verdun* takes place near the city of its namesake during the German offensive in 1916. This was one of the most influential times periods in artillery and the game replicates that aspect. The players must organize their offensives in conjunction with different sized artillery barrages.<sup>84</sup>

The focus of *Verdun* is the artillery, although artillery units are not on the map but on cards in the players' hands. The maneuver forces become fatigued and destroyed based on the number of hits that the player scores.<sup>85</sup> These hits are achieved by rolling a five (5) or six (6) on a six-sided die (d6) in amounts between six (6) and 12 dice.<sup>86</sup> Each time a player rolls a six (6) the player may roll that die again and score more hits. Each infantry unit takes three (3) hits to destroy, but for each three (3) sixes (6s) the player rolls, that many friendly troops are hit as well.<sup>87</sup> Choosing when to play the largest barrage cards and how to mitigate the risk to friendly forces in *Verdun* replicated similar choices FSCOORDs currently face when massing artillery batteries and battalions.

### Summary

These games and doctrinal resources started the process of making *Counter Fire!*. Army Doctrine laid out the essential aspects of the battle that the FSCOORD influenced

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<sup>83</sup> Pun fully intended. Do the crater analysis.

<sup>84</sup> Vejedovsky, *Verdun 1916*.

<sup>85</sup> Ibid.

<sup>86</sup> Ibid.

<sup>87</sup> Ibid.

through the artillery battalion and staff. Survival, movement, positioning, massing fires, and ammunition resupply are essential to the artillery battalion's operations. All of these elements feed the requirements set forth by the Brigade Commander as Fire Support Tasks and are translated into field artillery tasks (FATs) by the FSCOORD. The literature and games helped identify different ways to replicate parts of the challenge that is tactical fire direction. The games taught useful mechanics to model aspects of the problem and how the artillery participates in the battle. From these key resources, the beginnings of what the FSCOORD controlled and useful mechanics for an artillery wargame were derived.

## CHAPTER 3

### RESEARCH METHODOLOGY

#### Introduction

How to model the direct support cannon battalion operations to train the artillery battalion staff?

The first step of picking this problem apart is to find the most important aspects of the field artillery battalion's operations. Next these operations must be modeled in a competitive wargame. Once the key tasks and models of those tasks are identified the design must remain concentrated on the artillery and not the infantry or armor forces. This means that the maneuver forces must be modeled to stay true to a battle but not become the focus. How could a game do that? Once the means of artillery operations are identified, how they can be separated from the maneuver forces, and useful game models be applied? These research topics are combined into the question: what tasks and staff functions are the most important to focus on? Finally, the game must be assembled and answer the question of what tasks an artillery game must include.

This chapter will cover how the research methodology addressed the research questions. The methodology used was wargaming design, easily compared to a qualitative grounded method. The aspects of the problem are identified through experience and historical examples. Through these experiences the problem is identified and framed for research. Initial research from doctrine, experience, historical examples, and other games formed the initial coding. The research then used two sub-steps of collecting data and analyzing data for further study. Final coding and rules were refined through play tests and comparing game mechanics to key aspects of U.S. Army doctrine.

## Defense of Wargaming

Humans have tried learning how the world works through the scientific method of observation, replication, and experimentation. Learning has evolved from simple observation, listening to stories, reading, and theoretical math into a scientific method that tests reality through the engagement we call experimentation. Wargame design and the act of wargaming is an adaptation of experimentation to the topic of warfare. Wargaming does this through engaging the audience, forcing designers to study the problem, making a model that closely represents the interaction of aspects of war, and compares how these individual parts interact to develop students, players, or participants.

The more a student is engaged, the greater potential is unlocked for learning. Reading, listening, writing, and reflecting all contribute to a student's visualization of a lesson. A wargame can create experience-based memories to increase the quality of lessons learned and recall.<sup>88</sup> If "wargame" is removed from this topic, the process mirrors drivers' education. Driving is a key life skill that society has recognized cannot only be learned from a book. In the United States you have to pass a practical driving test. This prompts many parents to get behind the wheel with their teenagers to teach parallel parking and merging onto the highway. As parents were scared by their teens, the commercial sector saw the demand for driving simulators and now these are prevalent teaching aids.<sup>89</sup> Simulators exist to teach more thoroughly than reading and listening.

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<sup>88</sup> Koster, *A Theory of Fun for Game Design*, 36.

<sup>89</sup> R. Wade Allen, George D. Park, and Marcia L. Cook, "The Effect of Driving Simulator Fidelity on Training Effectiveness," (Driving Simulator Conference-North America 2007, The University of Iowa, Iowa City, IA, September 12-14, 2007), 1-13.

Games are effectively manual simulators that create experience and engage the senses to enhance learning.

Short of concrete experience, wargaming is a good alternative that is proven to be useful. As the brain is engaged and entertained in a game, the body releases similar chemicals to those of stimulating music, drug reactions, and sexual stimulation.<sup>90</sup> This brain activity creates a more suitable condition for learning and retaining knowledge. Games can keep the student involved and therefore learning. The goal of any training should be to keep the audience involved, engaged, and learning. Therefore, wargaming is a better alternative to reading or listening because the brain itself reacts more dramatically when playing a game or having fun. If the student can have fun while being taught the brain is more likely to retain the information and yearn for more information.<sup>91</sup>

Prior to World War II the German Army wargamed its new equipment, theories, and battle plans to create an effective fighting force. As German military leaders analyzed the plan and forces needed to invade Poland and France, they identified that second wave and reserve forces needed to increase their proficiency and training.<sup>92</sup> To increase their proficiency, the German General Staff sent inspectors to those commands to supervise exercises and conduct wargames.<sup>93</sup> This effort to train through games and exercises then

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<sup>90</sup> Koster, *A Theory of Fun for Game Design*, 40.

<sup>91</sup> *Ibid.*, 42.

<sup>92</sup> S. J. Lewis, "Reflections on German Military Reform," *Military Review* 68, no. 8 (August 1988): 63, [https://cgsc.blackboard.com/bbcswebdav/pid-1253923-dt-content-rid-22105572\\_1/institution/CGSC/AY21-22/RES\\_Core/H100\\_Students/H113RB-CPY.pdf](https://cgsc.blackboard.com/bbcswebdav/pid-1253923-dt-content-rid-22105572_1/institution/CGSC/AY21-22/RES_Core/H100_Students/H113RB-CPY.pdf).

<sup>93</sup> *Ibid.*

paid off through the enormously successful campaigns in Poland and France. These exercises allowed leaders to refine data and intuition into understanding of possibilities and how to react to them.<sup>94</sup> This artificial experience allowed German Military leaders to anticipate French and Polish actions and enabled decision making in the early phases of the war. While reading and debating theories can improve the student, interaction through gaming is even more effective.

The U.S. Army recognizes the value of artificial and created experiences in a number of places. First is the emphasis of rehearsals in the troop leading procedures.<sup>95</sup> The Army formally defines the rehearsal's purpose as practice to build understanding of complicated actions before execution.<sup>96</sup> Leaders at the lowest levels are encouraged in ADP 5-0 to conduct rehearsals before each operation.<sup>97</sup> This shows that the Army as an organization recognizes the importance of creating artificial experience for each of its soldiers before entering combat.

The U.S. Army teaches this concept at the Maneuver Captain's Career Course and reinforces the importance of creating artificial experience in the Command and General Staff Officer Course (CGSOC). During the leadership lessons in CGSOC the students

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<sup>94</sup> McConnell, Richard, Jacob A. Mong, and Dawn Ptascheck. "Seeing Through the Fog: Developing Fog of War Resistant Visualization," *Military Review* 101, no. 1 (January-February 2021): 61.

<sup>95</sup> HQDA, ADP 5-0, 1-7.

<sup>96</sup> Ibid., 1-6.

<sup>97</sup> Ibid.

learn about Experimental Learning Theory.<sup>98</sup> This theory presented by Dr. D. A. Kolb in 1984 and mapped by Dr. S. A. Boylan in 2017, emphasizes the importance of not just talking about how to improve leaders but making meaning from targeted experiences through analysis and reflection.<sup>99</sup> Wargaming and wargame design supports these efforts by forcing leaders to not just analyze the needs of the player or leader to be developed, but the problem that the player faces. Better understanding of both the subject and problem can increase the meaning and lessons learned from the game. This enables the designer and player to visualize what could happen in real life.

Understanding the conditions of a problem is essential to framing and solving it. The Army recognizes this importance by including problem framing and understanding in the first steps of Army Design Methodology and the Military Decision Making Process.<sup>100</sup> In fact understanding the elements of a problem, how they interact, deriving meaning from these interactions, and determining the best actions from them is the point of Army planning as well as the purpose of analytical wargames.<sup>101</sup> Koster agrees with the comparison explaining that humans have used games to teach essential skills since they were hunter/gathers with hide-and-go seek.<sup>102</sup> So, wargaming is an important

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<sup>98</sup> Lewis, “Reflections on German Military Reform,” 63.

<sup>99</sup> Ibid., 64.

<sup>100</sup> HQDA, ADP 5-0, 2-17.

<sup>101</sup> HQDA, ADP 5-0, 2-3; Jeff Appleget, Robert Burks, and Fred Cameron, *The Craft of Wargaming: A Detailed Planning Guide for Defense Planners and Analysts* (Annapolis, MD: Naval Institute Press, 2020), 40, 63.

<sup>102</sup> Koster, *A Theory of Fun for Game Design*, 48.

process because wargames help teach designers and players the importance of the parts of a problem and different aspects of the problem.

Understanding the interaction of parts is the true importance of building a game and executing a plan of action. Wargame Design is not just modeling parts of problems with singularly great mechanics.<sup>103</sup> A great wargame enables visualization of the problem and interactions on the battlefield through the interaction of mechanics. This requires a game designer to study and test the interactions of the mechanics and the aspects of the problem he or she is simulating.<sup>104</sup> The game is then molded to the purpose of the sponsor or designer.<sup>105</sup> The designer can use real data to find mechanics and their relation to enable the visualization of their real application.<sup>106</sup> As a game designer creates the wargame, the designer develops a deep understanding of not just parts of a problem but the complex system of interactions on the battlefield. If done well, the wargame enhances the ability of the designer, development team, and players to visualize the potential events on a battlefield.

Through visualization before execution wargame design has practical benefits. The designer must use the data collected and model it to present a simulation that replicates reality. Dr. Richard McConnell and his research team described playing a game

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<sup>103</sup> Peter Perla, *The Art of Wargaming: A Guide for Professionals and Hobbyists* (Norfolk, VA: United States Naval Institute Press, 2011), 173.

<sup>104</sup> Koster, *A Theory of Fun for Game Design*, 54.

<sup>105</sup> Developement, Concepts and Doctrine Center, Ministry of Defence, Shrivenham, *Wargaming Handbook* (Swindon: United Kingdom Ministry of Defence, 2017), 7-6; Appleget, Burks and Cameron, *The Craft of Wargaming*, 63.

<sup>106</sup> Perla, *The Art of Wargaming*, 159.



as learning through experimentation.<sup>107</sup> However, this experimentation also extends to the designer and play testers. The designer or design team create, test, and evaluate the game's ability to achieve its purpose. Through these tests the design team can make changes to better understand how to represent game topic and therefore better understand the topic. Through imitation of reality the design team can better understand the game and predict its patterns.

The most important of these effects is to anticipate exceptional information. Exceptional information is the unexpected appearance of a danger or opportunity that forces a commander to change his or her course of action or make a decision.<sup>108</sup> This ability to recognize exceptional information and make a decision can only come from practice, and one way of doing is that is through wargaming.<sup>109</sup> The designers and testers are the first beneficiaries of the game's ability to create this skill. Game design is therefore valuable to the education of the design team as well as the player.

The design process requires repetitions of the game and deliberate analysis of its functions. Game design and wargaming require the players and designers to practice

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<sup>107</sup> McConnell, Richard, Mark Gerges, John Dalbey, Typhanie Dial, George Hodge, Marty Leners, Joel Miller, Jacob Mong, and Patrick Schoof, "The Effect of Simple Role-Playing Games on the Wargaming Step of the Military Decision Making Process (MDMP): A Mixed Methods Approach," *Developments in Business Simulation and Experimental Learning* 45 (2018): 329.

<sup>108</sup> Jason R. Wolfe, "Exceptional Information: Recognizing Threats and Exploiting Opportunities," (Master's Thesis, U.S Army Command and General Staff College, 2017).

<sup>109</sup> McConnell, "Connecting the Dots."

making decisions.<sup>110</sup> The artificial experience the game creates gives the designer and player the chance to deliberately study and practice the thinking and information required to make decisions.<sup>111</sup> This can directly influence future decision making based on games played.<sup>112</sup> Therefore wargaming and wargame design provide direct benefits to the warfighter practicing them.

The Army prefers live wargaming through field training exercises and units maneuvering in large numbers on real terrain.<sup>113</sup> The Army also favors training and learning through competition.<sup>114</sup> Soldiers at all levels compete against live thinking adversaries in CTC rotations. Wargaming at home station increases the frequency of this competitive training. Manual wargaming presents an opportunity at a much lower cost, to increase the frequency of competitive training that enables better recognition of exceptional information and effective decision making.

Wargaming and Wargame Design are legitimate fields of study. Wargame design encourages the research and education about the problem to be gamed. Wargame design tests ways to simulate problems enabling learning. Wargaming enables the players, testers, and designers to make effective tools of visualization and recognition of exceptional information. The act of wargaming allows game designers and the players to

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<sup>110</sup> Perla, *The Art of Wargaming*, 215.

<sup>111</sup> McConnell, “Connecting the Dots.”2020.

<sup>112</sup> McConnell et al., “The Effect of Simple Role-Playing Games on the Wargaming Step of the Military Decision Making Process (MDMP),” 329.

<sup>113</sup> Murray, “Armored Warfare,” 6.

<sup>114</sup> Ibid.

combine data and intuition to visualize possibilities.<sup>115</sup> Through these actions researchers do what wargaming is supposed to do: teach us to know ourselves and our environment.<sup>116</sup> This paper and the *Counter Fire!* game studies tactical fire direction and attempts to make a tool to teach it. The Army recognizes tactical fire direction as an essential skill for artillery leaders.<sup>117</sup> This fulfills Koster's direction that academics and professionals should make games that teach and study important skills.<sup>118</sup>

### Method

This thesis uses a qualitative method to build the wargame. Identifying the important aspects of artillery battalion operations is inherently subjective. While ATP 3-09.23 lists many aspects of the cannon battalion operations, including all of them would make for a complicated game with aspects that could not be researched and modeled in the time associated with the project.<sup>119</sup> Therefore, lessons learned from the Center for Army Lessons Learned (CALL), Combined Training Centers (CTCs), national strategy, modernization efforts, common themes from doctrine, and personal experience narrowed the scope of the project. Concrete experiences from historical examples, deployments as a M777A2 battery commander, seventeen CTC rotations and previous wargaming informed the decisions on what mechanics were possible. Comparative analysis with the

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<sup>115</sup> McConnell, Mong, and Ptascheck, "Seeing Through the Fog," 60.

<sup>116</sup> Koster, *A Theory of Fun for Game Design*, 55.

<sup>117</sup> HQDA, ADP 3-09.23, 2-4.

<sup>118</sup> Koster, *A Theory of Fun for Game Design*, 176.

<sup>119</sup> HQDA, ADP 3-09.23, 1-2.

game's purpose determined what mechanics were useful. While qualitative studies determined the aspects to include and how to shape the game, quantitative data was a key contributor to building the statistics behind the game. Technical manuals, timetables, ranges, payloads, and probability tables were combined to create and analyze the mechanics of the game.

The incorporation of qualified study with testing and quantifiable data are keys to grounded studies.<sup>120</sup> While Tie describes grounded theory in reference to medical studies. Purposive sampling leads to the researcher creating initial codes. Relations between the initial codes and testing data creates intermediate codes. Further testing and research lead to advanced codes. Continued testing research, and constant comparison to the initial purpose leads to final coding and a new theory. Grounded theory techniques in making medical codes are similar to building a realistic wargame.<sup>121</sup> This was the most appropriate way to conduct the study given the data needed to build a useful model. The process of re-evaluating the code as it is developed and influenced with more data, mimics the process of building a wargame quite closely. Confirming this assessment was the game design process that Appleget, Burks, and Cameron describe in designing an analytical wargame. They describe the second two steps, design and develop, as recurring

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<sup>120</sup> Ylona Chun Tie, Melanie Birks, and Karen Francis, "Grounded Theory Research: A Design Framework for Novice Researchers," *SAGE Open Medicine* 7 (2019): 1-8, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6318722>.

<sup>121</sup> Ibid.

each time a designer meets with a client or tests the game.<sup>122</sup> These observations subjectively influence the game development for the purpose of the sponsor or designer.

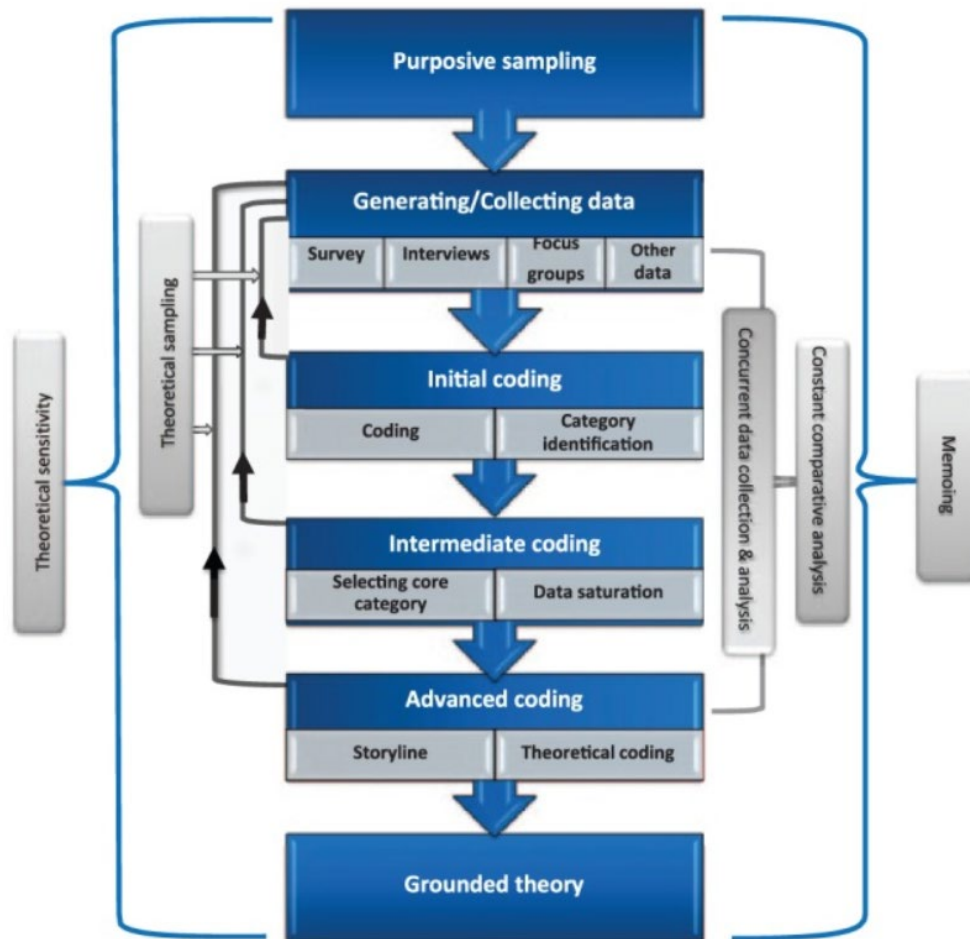


Figure 1. Grounded Theory Research

Source: Ylona Chun Tie, Melanie Birks, and Karen Francis, "Grounded Theory Research: A Design Framework for Novice Researchers," *SAGE Open Medicine* 7 (2019): 1-8, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6318722/>.

<sup>122</sup> Appleget, Burks, and Cameron, *The Craft of Wargaming*, 63.

The key portions of the above figure of grounded theory that parallel wargame design are Purposive sampling, Generating and Collecting data; initial, intermediate, and advanced coding; constant comparative analysis, and memoing. The following discussion and Figure 2 spells out the methods used to develop *Counter Fire!*.

The steps used to develop *Counter Fire!* were adapted from Jim Dunnigan's ten steps of wargame design.<sup>123</sup> These steps consisted of developing a purpose for the game, drafting an initial concept, research, rules and mechanic creation, playtesting, memoing and playtest analysis, rules adjustment, and constant comparison with research questions and the purpose. Purpose guided the research questions for the game and thesis. The purpose and questions then influenced where and what initial data was collected through reading army doctrine, historical case studies, personal experience, and playing other games. After these research steps patterns and repeating themes are revealed and these relationships reflect in the game mechanics. These mechanics were compiled into the game rules and then tested by playing and examination with play testers and the thesis committee. After each playtest the notes were compiled and used to analyze the influence of future research and rules creation. When the rules worked together to answer the research questions and purpose of the study the game was complete.

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<sup>123</sup> Appleget, Burks, and Cameron, *The Craft of Wargaming*, 42.

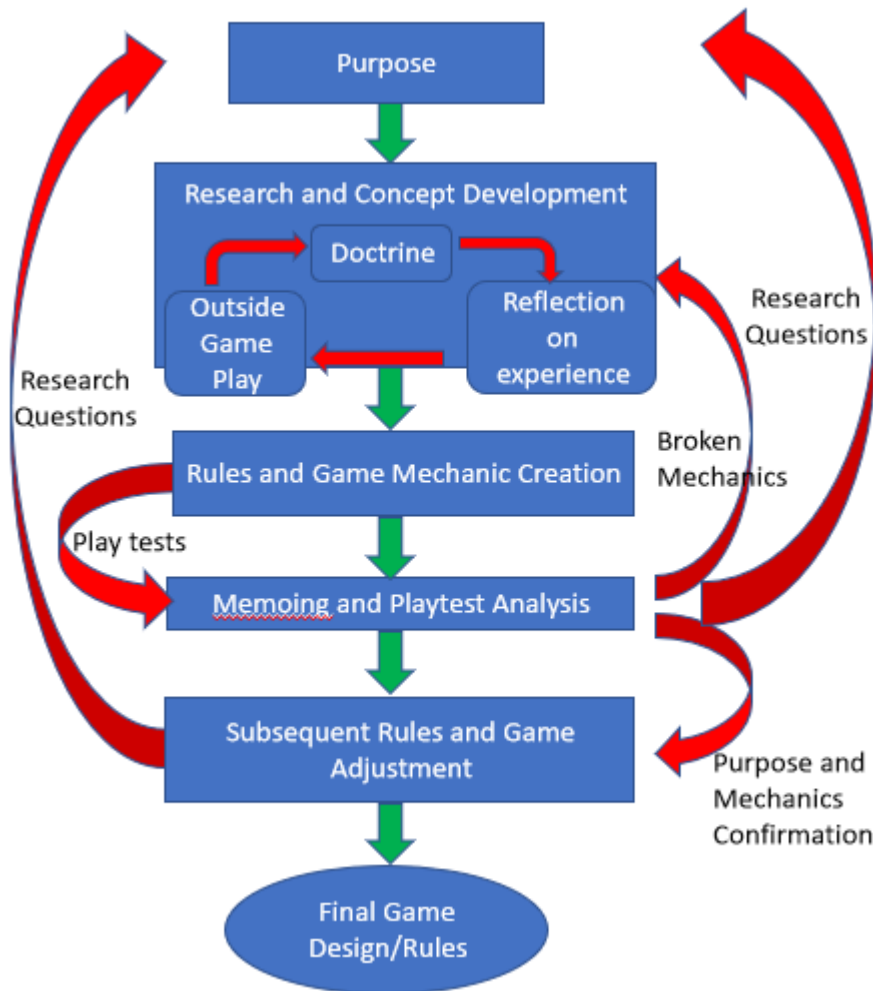


Figure 2. Game Design Methodology Influenced by Grounded Theory

Source: Created by author.

The purpose of *Counter Fire!* is to train the artillery battalion staff on visualization of the artillery battalion's actions and key tasks that they will execute in the fight. This core concept serves as the basis for all other decisions and actions during the game's design. The research questions developed support this purpose by keeping the design focused on the purpose and prevented the game and research from detouring on to other topics. The importance can be seen in Figure 2. After each playtest and after

adjusting rules and game components the notes and changes were compared to the research questions to ensure the game stayed grounded in the original purpose.

The purpose drove the initial research. Initially in grounded theory research a researcher would conduct theoretical sampling and decide what areas need exploring.<sup>124</sup> This is how the research questions were developed. Searching current games for an existing tool and comparing the existing games to doctrine and experience. These research questions and purpose reflect the first step of creating an objective for the game as described by Appleget, et al.<sup>125</sup> These influences lead to the first step of Dunnigan's wargame design: research.<sup>126</sup> So, while Appleget and Dunnigan may disagree on what starts wargame design, the grounded theory methodology clarifies the need to start with a purpose before beginning initial research and sampling.

As Tie states, purposive sampling is determining a sample set that is centered around the research questions.<sup>127</sup> This thought lead the research process to start with Army doctrine, personal experiences, and previously created games. This initial collection of data and information led to collecting data based on what the artillery battalion commander controlled, how to include the maneuver branches and units without

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<sup>124</sup> Helen Noble and Gary Mitchell, "Research Made Simple: What is Grounded Theory?" *Evidence Based Nursing* 19, no. 2 (February 2016): 34, <https://ebn.bmj.com/content/19/2/34>.

<sup>125</sup> Appleget, Burks and Cameron, *The Craft of Wargaming*, 43.

<sup>126</sup> *Ibid.*, 42.

<sup>127</sup> Tie, Birks, and Francis, "Grounded Theory Research."



them being the focus, and key staff functions that need to be trained. These questions also served as the topics for initial coding.

The initial, intermediate, and advanced coding iterations took place during the rules creation, memoing, analysis, adjustment and finalization steps. The initial code is the potential game mechanics that combine data to form draft rules. Potential mechanics are the models of the doctrinal and technical that have been compared to experience or historical examples. The mechanics are then combined to create rules to examine the relationships between the mechanics. The game rules attempt the interaction of mechanics that represent groups of data to create a playable game. The initial rules and prototype come together to form a testable theory.

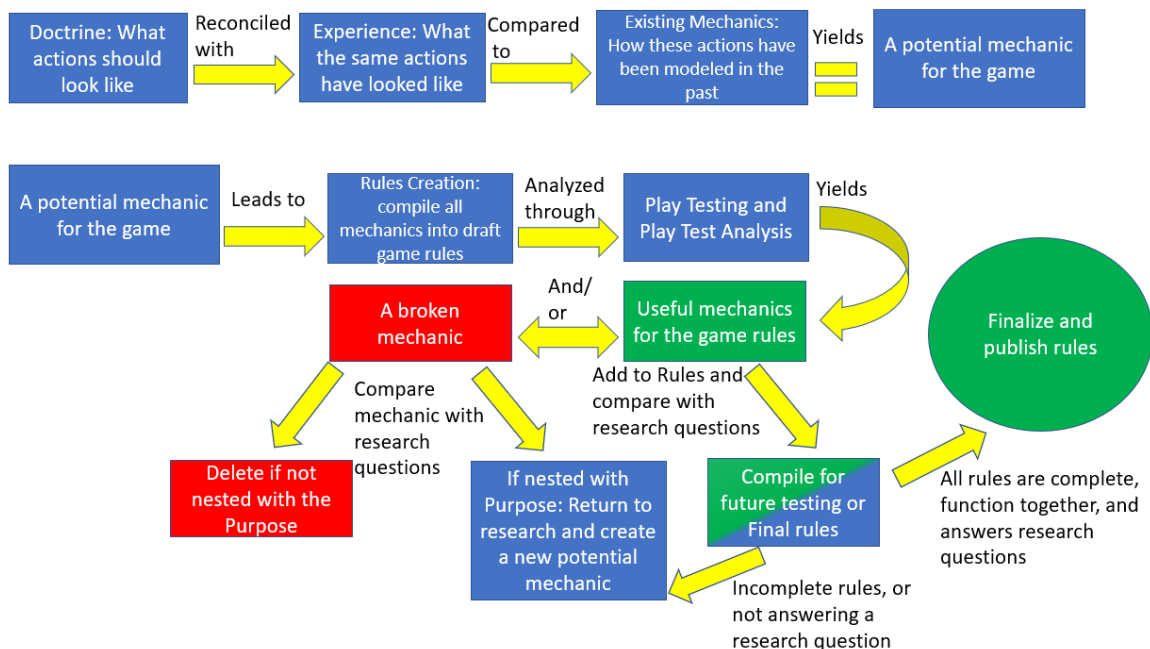


Figure 3. A Breakdown of Research, Rules Creation, and Testing

Source: Created by author.

The game rules were then tested with players and the thesis committee to see if the rules worked as a whole and to analyze the interactions between mechanics. These playtests yielded memorandums for each test and gave sustains and improves. The sustains were aspects identified to keep in the game while improves were broken mechanics, or poor interactions between the mechanics that warranted more research and recreation of the rules. When the completed rules created a playable game that answered the research questions the game was finalized and published.

Through a combination of grounded theory and previous wargame design methodology a playable wargame was created. It is grounded in the original purpose, from collected and coded data that yielded rules and mechanics for a playable artillery wargame. *Counter Fire!* has mechanics that reflect Army doctrine, training, and battlefield experience that could be used to train key artillery battalion staff officers and leaders to make decisions and visualize artillery operations.

### Data Collection

As stated in the wargame methodology, the data collection for *Counter Fire!* consisted of pulling information from Army doctrine, reflecting on personal and historical lessons, and considering mechanics from other games. These actions identified training topics and personnel that needed to be included in the game, the importance of artillery actions on the battlefield, and how these actions could be modeled to coincide with Army doctrine.

The first step of generating and collecting data was a review of Army artillery doctrine. Army doctrine is the guidelines that the Army uses to tell units how they should fight. These are the tactics, techniques, and procedures (TTPs) that units should use to

fight the enemy. Other than TTPs, research also evaluated key tasks and the standards for those tasks to inform modeling actions. The initial research established what the Army tells the cannon artillery battalion to do, and how those tasks are done to standard. This forms the basis for realism and helped define the scope of the game.

The second aspect of data collection was to research trends from the CTCs, historical examples, and analyze personal experience. Reading and reflecting on lessons learned from the CTCs gives examples of how actions such as fire missions, battery and battalion movements, plans, and resupply are executed in the composite artillery battalion. Historical examples and experience provide data on what the battalion can reasonably accomplish on the battlefield. Comparing past operations with doctrine shaped what games and game mechanics were studied to create game mechanics that may be useful.

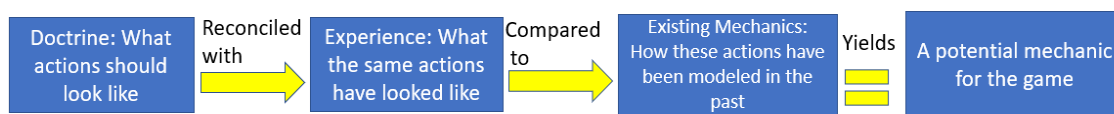


Figure 4. Research to Produce Potential Game Mechanics

*Source:* Created by author.

The game must then be prototyped and played. This included playing other wargames, reading manuals on game mechanics, and play testing the game itself. Determining other wargames to play and study was a uniquely challenging aspect of the research process. There are a variety of ways that games included artillery and artillery effects on the battlefield. From the combat tables of *Kriegsspiel* and *Land Power* to the

exploding dice barrages of *Verdun 1916: The Steel Inferno*, games have used different techniques to simulate artillery fires on a battlefield.<sup>128</sup> Many different games that included artillery were tested and these games influenced the mechanics used to model artillery effects and requirements in *Counter Fire!*. When previously existing mechanics did not exist or fit with the purpose or other rules, new ones were created.

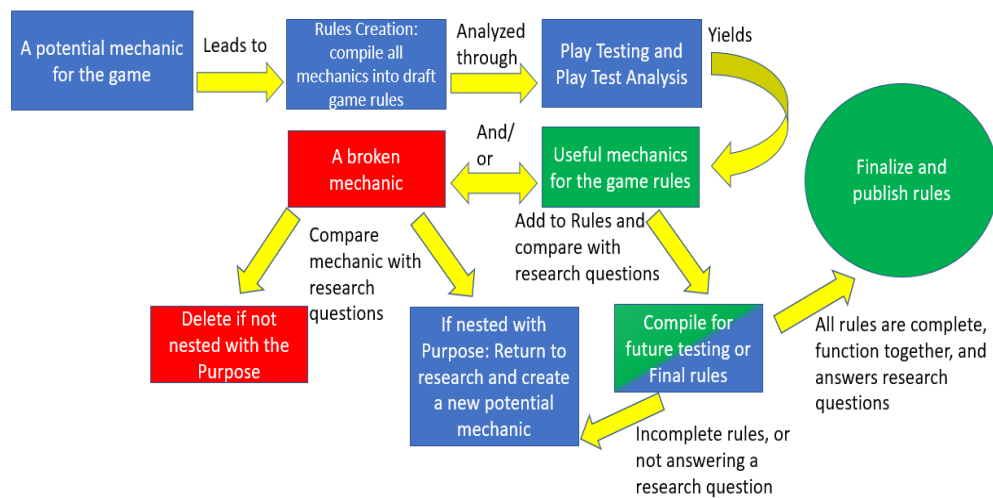


Figure 5. Testing Mechanics and Rules Creation

Source: Created by author.

Testing the game itself was the most time consuming and challenging aspect of the research process. This included setting up the game for groups of players and receiving feedback on how best to make the game understandable and playable. Testers would suggest edits to game that led to different needs for data grounded in capabilities

<sup>128</sup> George Leopold von Reisswitz, *Kriegsspiel*, Board Game (Prussia: Independent, 1812); Vejedovsky, *Verdun 1916*; Patrick Schoof, *Land Power: GAAT*, Board Game (Ft. Leavenworth, KS: Self Published, 2018).

in the Army. This feedback then informed further research, sampling and grouping data, and the creation of potential rules/mechanics. The feedback was essential for making the game work and function. This was a similar practice to the memorandum, intermediate and advanced coding process that Tie described and contributed to making the new theory or original wargame.<sup>129</sup> To document this, memorandums from playtests are included in the appendixes of this study.

The final challenge of the research was to keep the game distributable to many players. This is where the guidance of my committee and department was the most important. The advisors were quick to recommend sources and contacts that could provide unclassified, unlimited distribution sources. The Army tests and has data on aspects from munitions effectiveness and ranges, to radar capabilities that could make a game more accurate. However, these resources are limited to a controlled distribution or classified. This game is neither classified nor limited for distribution. Including this data would defeat the purpose of the game to reach as many audiences for training as possible. My thesis committee of dedicated professionals were essential to this aspect.

The data was then compiled to make a prototype game and set of rules. After making the prototype, players tested the game. After recording playtest results in memorandums, the memorandums were analyzed for how the mechanics worked, if they supported the purpose of the game, and/or needed updates. If the game was not complete at the end of the playtest then the process started over with the purpose, continued research, or rules editing. These paths created single and double feedback loops that

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<sup>129</sup> Tie, Birks, and Francis, “Grounded Theory Research.”

allowed a game that supported the developed purpose, was based in doctrine and practical experience, and that could be played smoothly.

### Data Analysis

Analysis of data will be conducted after each play test. A list of results and critiques from each playtest was recorded and compared to the decisions that the artillery battalion commander could control and the tactics that the artillery needs to encourage. This was done similarly to how the army evaluates courses of action. The play testers evaluated each playtest for the encouragement of doctrinal foundations, realism, and ease of play. The critiques from each playtest were then taken back to research and adjusted for future playtests.

Through playtests and research there were three key staff functions and sections emerged that need to be the focus of a game for training the artillery battalion staff. The core of the artillery battalion operations centered around the intelligence, operations, and sustainment sections of the artillery battalion. By focusing on these functions, the entire staff can increase their understanding and visualization through the game. However, to simulate these key staff functions the game mechanics needed to function harmoniously.

The key groups of game mechanics in *Counter Fire!* are set-up, turns, interruptions, maps, and terrain, drawing cards, dice rolls, tables of key data, and quick access to rules. Data fell into these groups and was compared to the key staff functions. The comparisons yielded potential mechanics that combined into draft rules. These draft rules represented the intermediate and advanced coding.<sup>130</sup> Playtesting the rules sets with

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<sup>130</sup> Tie, Birks, and Francis, “Grounded Theory Research.”

these mechanics allowed the study of relationships between the mechanics. Analysis of the playtests showed how mechanics could be adjusted to most accurately represent the artillery actions on the battlefield and encourage lessons from doctrine.

The data analysis and data collection are deeply intertwined in wargame design and grounded theory. After each code is created the relationships between that code and other codes from the data are analyzed and this yields more data.<sup>131</sup> It is a constant comparative analysis of data that enables it to be collected and analyzed at the same time.<sup>132</sup> This constant analysis is made possible in this study through the research questions and purpose. As mechanics, rules, relationships, and other data are collected and analyzed they are combined to create updates to the game. When the data answers the research questions and fulfills the purpose in a complete and playable competitive wargame the cycle is then complete with a new game.

### Ethical Considerations

The biggest ethical consideration was maintaining classification. The purpose of *Counter Fire!* is a game that can be used to train artillery battalion staffs. If the classification level grew from unclassified and unlimited distribution, then the audience would shrink. One of the national security strategy goals, and that of the Maneuver and Fires Centers of Excellence is to increase human capability.<sup>133</sup> However, to make this

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<sup>131</sup> Noble and Mitchell, “Research Made Simple,” 2.

<sup>132</sup> Tie, Birks, and Francis, “Grounded Theory Research.”

<sup>133</sup> U.S. President, *Interim National Security Strategic Guidance*, 21; Army Futures Command (AFC), AFC Pamphlet 71-20-1, *Army Futures Command Concept of Maneuver in Multi-Domain Operations 2028* (Austin, TX: Army Futures Command, July

happen at the tactical level, the classification level could not raise to any restriction. This limit ensured that leaders and soldiers in the staff could participate in the game at any time. Ensuring that the classification level stayed unclassified enabled the game to stay out of secret rooms and buildings and could enter into the command posts and barracks around the military.

Play-testing of the various editions of the wargame required the use of human play-testers and incorporated their feedback. However, since the focus of the interaction with play-testers was the wargame under development and not them personally, this study was not human subjects research and therefore did not require human subjects approval.

### Summary

The design of this wargame used a grounded qualitative research study methodology. Data came from academic sources, Army doctrine, military journals, previously published and unpublished wargames, and game testers. An iterative analysis processed the data into a game that highlights key challenges faced by a field artillery cannon battalion. This data was continuously analyzed and compared to the purpose until a game that was playable and emphasized the chosen lessons learned emerged.

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7, 2020), 7, <https://api.army.mil/e2/c/downloads/2021/01/20/2fbeccee/20200707-afc-71-20-1-maneuver-in-mdo-final-v16-dec-20.pdf>.



## CHAPTER 4

### ANALYSIS

#### Aspects of the Battle Artillery Commanders Control through the Artillery Battalion

The first question that the research answered was the aspects of the battle that the artillery battalion commander controlled and influenced. The battalion commander is responsible for everything the battalion does or fails to do.<sup>134</sup> As *Counter Fire!* is focused on the actions of the battalion, the responsibilities of the artillery battalion commander must be established first. These responsibilities need to then be narrowed down to the artillery battalion and brigade staff roles that directly affect the battle. The artillery battalion commander's actions are the starting place for designing a game focused on tactical fire direction.

The artillery battalion commander, also referred to as the Fire Support Coordinator (FSCOORD), has a dual role in the United States Army as a member of the Brigade Commander's staff and the commander of the field artillery battalion.<sup>135</sup> As such, the commander must suggest actions, priorities of support, and executing command and control of the artillery battalion in accordance with brigade commander's orders.<sup>136</sup> The FSCOORD is suggested to be in the brigade command post and delegate control of the field artillery battalion to the executive officer (XO) or operations officer at the

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<sup>134</sup> HQDA, ADP 3-09.23, 1-5.

<sup>135</sup> Ibid.

<sup>136</sup> Ibid.

artillery battalion command post.<sup>137</sup> The delegation of responsibilities means the artillery battalion staff must act with the same competence of the FSCOORD in the FSCOORD's absence.<sup>138</sup> Therefore, the commander and entire artillery battalion must rely heavily on the competency of the staff and execute mission command to effectively operate.

Army Doctrine clearly defines the roles and responsibilities of the FSCOORD and the artillery battalion staff. Through doctrine, aspects of the battle that must be included in a wargame for training the staff and leaders become clear. Movement and positioning of the firing units to enable their engagement of targets is an essential aspect of tactical fire direction.<sup>139</sup> The staff must plan fire orders to control the rates of fire of the batteries and also the resupply triggers for the ammunition.<sup>140</sup> The FSCOORD also controls the radar target acquisition operations to include positioning and cueing (when the radar should be actively sensing for the incoming rounds).<sup>141</sup> The FSCOORD and his intelligence officer must also inform the brigade commander on the actions of the enemy artillery and predict enemy artillery employment.<sup>142</sup> With these key aspects identified data could then be grouped around them to be compared to game mechanics.

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<sup>137</sup> HQDA, ADP 3-09.23, 1-5.

<sup>138</sup> HQDA, ADP 6-0, 2-15.

<sup>139</sup> HQDA, ATP 3-09.23, 5-2.

<sup>140</sup> Ibid., 5-2, 3-8.

<sup>141</sup> Ibid., 4-5.

<sup>142</sup> Ibid., 3-6.

These groups, or codes, are movement and positioning of the artillery battalion, resupply, radar cueing, and delivery of effects on the enemy. Doctrine and practical examples from history and past operations show that these groups stand out as essentials for training artillery battalion staff.

### Movement and Positioning of the Artillery Battalion

The movement of firing batteries on the battlefield is the first and most basic function of the artillery battalion. If the firing batteries' howitzers are not in place ready to fire and in the correct range from the target, it does not matter the skill of the sections or supplies on hand; the batteries will not be able to provide fire support.<sup>143</sup> Every aspect of moving the batteries must be considered from timing, to distance of travel, targets supported before and after the move, and especially risk to the batteries.<sup>144</sup> These are crucial to the battle and are therefore required to be included in the field artillery tactical and technical rehearsals.<sup>145</sup> Movement of the batteries cannot be removed from a wargame with the purpose of training artillery leaders at the battalion level.

Lessons learned from the Joint Readiness Training Center and National Training Center concur with the importance of battery movement.<sup>146</sup> In *Ten Fundamental Brigade Combat Team Skills Required to Win the First Fight* from August of 2017, LTC Shine and his team recounted lessons learned on digital fires and proactive counterfire. When

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<sup>143</sup> HQDA, ATP 3-09.23, 5-2.

<sup>144</sup> Ibid., 3-8, 5-2.

<sup>145</sup> Ibid.

<sup>146</sup> NTC, *Mastering the Fundamentals*, 135.

discussing digital fires, the team concluded that placement of the batteries and their movement to the correct position was essential for digital fire mission execution.<sup>147</sup> As the team examined surviving and executing counterfire operations, again the timing of the battery moves with fire mission demands was essential.<sup>148</sup> From the summer of 2020 to the spring of 2021, only two batteries were able to successfully time survivability moves with fire missions during offensive or defensive operations at JRTC. Poor positioning and lack of survivability movements resulted in the batteries being destroyed by a combination of direct and indirect fire in seven of eight rotations from 2020-2021.<sup>149</sup> The combination of these events and published lessons learned shows the need for movement focused training to grow throughout the field artillery.

#### Resupply of the Artillery Battalion

Along with planning the movement and positioning of the batteries, the battalion staff must plan to properly supply the batteries. The primary aspect of resupply is ammunition. The FSCOORD is directly responsible for the ammunition resupply of the

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<sup>147</sup> Jonathan A. Shine, Ashton J. Read, Reginald D. White, Brian Bucholz, and John Furr, “Digital Fires in Decisive Action,” in Newsletter No. 17-19, *Ten Fundamental BCT Skills Required to Win the First Fight* (Fort Leavenworth, KS: Center for Army Lessons Learned, August 2017), 50.

<sup>148</sup> Jonathan A. Shine, Reginald D. White, Michael W. Miller, and Ferman C. Barnes, “Proactive Counterfire at the National Training Center,” in Newsletter No. 17-19, *Ten Fundamental BCT Skills Required to Win the First Fight* (Fort Leavenworth, KS: Center for Army Lessons Learned, August 2017), 58.

<sup>149</sup> Author’s observations at Fort Polk, LA JRTC rotations from July 2020-June 2021. In each rotation the battery was positioned in a static location for ease of control and did not move. These static locations were identified and destroyed by squad sized OPFOR units using direct fire and, in some cases, with combined arms maneuver.

artillery battalion. The battalion S4 and Forward Support Company (FSC) Commander assist in the planning and execution of sustainment operations.<sup>150</sup> Just as the tactical and technical fires rehearsal cannot be effective without sustainment planning neither can a wargame focused on training the staff and artillery leaders.<sup>151</sup> If the artillery battalion correctly plans ammunition resupply the staff can include other classes to be moved with it.<sup>152</sup> Thus, if the staff can plan for ammunition resupply it can effectively plan for all other supplies. For these reasons ammunition resupply is an essential aspect of the battle that the battalion commander controls, therefore it must be considered an efficient training product. However, artillery sustainment is not as simple as one may think.

Ammunition resupply in the composite battalion poses a unique challenge. The composite field artillery battalion includes both semi-fixed 105mm ammunition and separate loading 155mm ammunition.<sup>153</sup> Different caliber howitzers existing in the same battalion means that half of the artillery ammunition comes in self-contained packages.<sup>154</sup> While, the larger 155mm ammunition's shell, fuze, and propellant, and primers are all packaged separately. The different packaging of rounds complicates ammunition lot management and transportation.<sup>155</sup> The commander must plan for the extra space of the

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<sup>150</sup> HQDA, ATP 3-09.23, 1-5, 1-9.

<sup>151</sup> Ibid.

<sup>152</sup> Ibid., 5-2.

<sup>153</sup> HQDA, ADP 3-09.23, B-2.

<sup>154</sup> HQDA, TC 3-09.81, 3-2.

<sup>155</sup> HQDA, ATP 3-09.23, B-2.

155mm ammunition due to the propellants being packaged separately than the projectiles and weight increase from 35lbs standard per round of 105mm to 95lbs standard of the 155mm ammunition.<sup>156</sup> *Counter Fire!* must address the issue specifically in order to train the staff and enable visualization of battlefield operations.

Many arguments can be made for the inclusion of more classes of supply to be directly involved in the model. *Race to the Rhine*, certainly included at least food, fuel, and ammunition in its operational simulation of WWII.<sup>157</sup> Modern artillery battalions cannot operate without all of these supplies either. However, including these aspects in detail would detract from the purpose of training tactical fire direction and multiple staff sections. If replacements, new end items, food, and water, building materials, small arms ammunition, repair parts and all necessary supplies were included the focus would shift from tactical fire direction to sustainment. The greater details of sustainment deserve their own game just as sustainment has a dedicated rehearsal in the Army operation process.<sup>158</sup>

The simulated time frame of the game limits the impact of other classes of supply as well. Before a major battle, the artillery battalion has the haul capacity to carry 150 105mm rounds or 95 155mm rounds, with three days of supply of food and water.<sup>159</sup>

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<sup>156</sup> HQDA, TC 3-09.81, 3-3.

<sup>157</sup> Andruszkiewicz and Gumienny, 1944.

<sup>158</sup> Headquarters, Department of the Army (HQDA), Army Doctrine Publication 4-0, *Sustainment* (Washington, DC: Army Publishing Directorate, July 2019), 3-11, [https://armypubs.army.mil/ProductMaps/PubForm/Details.aspx?PUB\\_ID=1007565](https://armypubs.army.mil/ProductMaps/PubForm/Details.aspx?PUB_ID=1007565).

<sup>159</sup> AM General, “OEM Certified Remanufactured HMMWV 1097A2R,” (AM General, South Bend, IN, December 2019), <https://www.amgeneral.com/wp->

Also, the brigade would not have the ability to replace end items during a 48-hour fight, as prepositioned stocks are meant for units coming into theater not replacement of battle damaged equipment.<sup>160</sup> If the batteries moved damaged vehicles or howitzers back to the battalion maintenance collection point, the staff would need to account for transit time, towing or hauling time and resources, maintenance hours to repair the damage, and time to move the equipment back to the battery.<sup>161</sup> Again, all of these maintenance and transportation activities would need to be accomplished in the span of less than 48 hours in this game, forcing the players' focus of moving and shooting the howitzers to calculating maintenance timeframes. The game still meets the purpose of planning tactical fire direction by removing these planning factors, and simply removing damaged

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content/uploads/2019/12/M1097A2R.pdf; Oshkosh Corporation Company, "FMTV Cargo 4x4/6x6," Oshkosh Defense, accessed April 25, 2022, <https://oshkoshdefense.com/vehicles/medium-tactical-vehicles/fmtv/fmtv-cargo-4x4-6x6/>. Data based on the payloads and towing capacity of HMMWV or MTV variants for each howitzer, and 350lbs of gear per soldier. The soldier's gear would include three days' worth of food and water as well as comfort items and basic soldier equipment. The soldiers' load means that the artillery batteries can haul enough equipment to sustain their soldiers for potentially three days or more without deliberate resupply of these items.

<sup>160</sup> Headquarters, Department of the Army (HQDA), Army Techniques Publication (ATP) 3-35.1, *Army Prepositioned Operations* (Washington, DC: Army Publishing Directorate, April 2022), 1-4, [https://armypubs.army.mil/epubs/DR\\_pubs/DR\\_a/ARN35183-ATP\\_3-35.1-000-WEB-1.pdf](https://armypubs.army.mil/epubs/DR_pubs/DR_a/ARN35183-ATP_3-35.1-000-WEB-1.pdf); Air Land Sea Application Center (ALSAC), Army Techniques Publication (ATP) 3-52.2, *Multi-Service Tactics Techniques and Procedures for The Theater Air-Ground System* (Washington, DC: Army Publishing Directorate, June 2014), [cgsc.blackboard.com/bbcswebdav/courses/CGSS\\_RES\\_ELECTIVE\\_A530/Course%20Lessons/Session%202%20TAGS%20Theater%20Air%20Ground%20System/TAGS%20Manual%20ATP%203-52.2.pdf](https://cgsc.blackboard.com/bbcswebdav/courses/CGSS_RES_ELECTIVE_A530/Course%20Lessons/Session%202%20TAGS%20Theater%20Air%20Ground%20System/TAGS%20Manual%20ATP%203-52.2.pdf).

<sup>161</sup> Headquarters, Department of the Army (HQDA), Field Manual (FM) 4-0, *Sustainment Operations* (Washington, DC: Army Publishing Directorate, July 2019), 2-55, [https://cgsc.blackboard.com/bbcswebdav/pid-1259953-dt-content-rid-17384918\\_1/library/Library%20Content/Master%20Library/FM\\_and\\_FMIs/FM\\_4-0\\_31Jul2019.pdf](https://cgsc.blackboard.com/bbcswebdav/pid-1259953-dt-content-rid-17384918_1/library/Library%20Content/Master%20Library/FM_and_FMIs/FM_4-0_31Jul2019.pdf).

equipment from the game. The staff may still recognize the importance of such sustainment by losing the assets for the rest of the game. Therefore, by concentrating on ammunition resupply the game maintains focus on its purpose while other factors can still be visualized and emphasized in after action reviews.

### Radar Cueing

Of high importance to the brigade commander and artillery commander alike is the emplacement and cueing schedule of the artillery battalion's organic fire finding radars. The FSCOORD is responsible for the cueing schedule in conjunction with the intelligence collection plan and targeting priorities.<sup>162</sup> The plan for the organic radars is essential to the brigade commander's survivability plans for the brigade formations.<sup>163</sup> These also enable effective counterfire operations for targeting the enemy artillery assets.<sup>164</sup> These organic radar enable the brigade commander to cross cue other assets and use redundant observation to confirm targeting data, execute the intelligence collection plan and prosecute the HPTL. Given the importance to the brigade operations and the control by the FSCOORD, *Counter Fire!* must include the organic radar for counter artillery operations.

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<sup>162</sup> HQDA, ATP 3-09.23, 4-5.

<sup>163</sup> Ibid.

<sup>164</sup> Ibid.



## Delivery

The final aspect that must be included in an artillery wargame that the battalion commander controls or influences is delivery. Tactical fire direction boils down to the ability to engage targets.<sup>165</sup> The FSCOORD's primary role is to integrate and deliver fires to enable the joint or maneuver commander's plan.<sup>166</sup> The delivery of munitions on targets cannot be removed from the game and still support these operations. While observation is delegated out to maneuver units through control of detection assets and the task organization of observers, howitzers remain controlled by the FSCOORD. The FSCOORD influences the battle through the staff and subordinate commanders controlling these howitzers. To that end, a game that trains the staff and leaders in the execution of artillery operations must therefore simulate the delivery of munitions on targets.

## Summary

From studying doctrine, specifically ATP 3-09.23, the role of the artillery battalion is clear. The key aspects that must be included in a game for training the artillery battalion staff can be identified and coded for modeling in a game. Movement and positioning, resupply, radar cueing, and delivery are essential functions that must be included in order to train a battalion staff. Before examining the staff that must be trained, an answer to the second research question of modeling maneuver units and the

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<sup>165</sup> HQDA, ATP 3-09.23, 5-2.

<sup>166</sup> Ibid., 1-2.

maneuver actions without those units becoming the focus of the game must be found. Otherwise, *Counter Fire!* would be another maneuver wargame.

#### How to Model Maneuver Units without Them Being the Focus

The Maneuver unit is still the decisive unit on the battlefield. In fact, the field artillery branch exists to enable decisive maneuver and to achieve the commander's intent.<sup>167</sup> Priority of fires is specifically weighted to enable the main effort or decisive operation, but fire support is not decisive alone.<sup>168</sup> For these reasons a game that includes the artillery must include the maneuver. This section answers the second research question of how to model these units without the maneuver units becoming the focus of the game.

#### Observation

In *Counter Fire!*, the infantry companies and platoons exist in theory but the player only partially interacts with them. Forward observers working in maneuver units are the primary observers that exist in a field artillery battalion.<sup>169</sup> However, these soldiers are employed inside maneuver companies or troops.<sup>170</sup> Therefore including observation and success in maneuver objectives inherently includes the maneuver companies and troops.

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<sup>167</sup> HQDA, ADP 3-90, 3-8.

<sup>168</sup> Ibid.

<sup>169</sup> Ibid., 4-1.

<sup>170</sup> Ibid.

The challenge is then how to model these units without them becoming the focus of the game. As observation is emphasized so the focus shifts out of the artillery battalion and onto the maneuver units forward observers work in. The FSCOORD may be responsible for training them but, the maneuver leadership normally controls them in a battle.<sup>171</sup> So, in *Counter Fire!* the maneuver operations have FAT values that represent the observers on the battlefield.

The FAT cards primarily represent the observers distributed on the battlefield and their ability to pass targets back to the firing units. Artillery forward observers may be organic and trained in the field artillery battalion, but scouts are the most common observers on the battlefield. Scouts exist in each infantry battalion and comprise the whole of a reconnaissance squadron.<sup>172</sup> The maneuver brigade and battalion commanders may task the scouts as the commanders see fit and should weight them, similarly to fire support assets, to the main effort or decisive operation.<sup>173</sup> As such, the first shaping operation of the game reflects the reconnaissance and counter reconnaissance fights and has a value of three (3) FAT cards for each player to draw. The three (3) FAT cards represent when the reconnaissance and sensor assets are the majority of forces operating and the main efforts of the combatants. The two following operations have values of two (2) FAT cards. These two (2) FAT cards reflect two (2) battalion's forward observer teams and the infantry battalion's ability to observe and call for fire organically. The

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<sup>171</sup> HQDA, ATP 3-09.23, 4-2.

<sup>172</sup> Ibid.

<sup>173</sup> HQDA, ADP 3-09, 3-2.

decisive operation has a base value of three (3) FAT cards. The three (3) FAT cards represent the brigade commander dedicating the bulk of the available observation assets to the operation.

### Land Management

The next way that maneuver units are involved in the game is forcing the players to make land management decisions. The artillery battalion staff normally creates Position Areas for Artillery (PAAs) in the Field Artillery Support Plan (FASP) and artillery battalion operations order.<sup>174</sup> These areas should be away from other units' command posts so as not to create larger targets and not to attract counterfires onto friendly command posts. Therefore, training land management around other units and identifying usable terrain is essential.

The maneuver and support battalion CPs are therefore included to emphasize the land management training objective. Each unit in the brigade has a command element represented in the game and the firing batteries and radar are not allowed to position themselves near other command posts. While not the most difficult part of the game, avoiding other friendly forces the player to adapt to other units on the battlefield that occupy terrain advantageous for the batteries, but is unavailable.

### Operation Based Scoring

The last way that *Counter Fire!* simulates the importance and actions of maneuver units on the battlefield is scoring by operation system. Each successfully completed FAT

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<sup>174</sup> HQDA, ATP 3-09.23, A-6.

earns the player points. But points scored in shaping operations simply shape future operations. Having the highest score in a shaping operation nets the player an advantage in later operations in the form of more FAT cards. The player wins the game by scoring the most points during the decisive operation. Afterall, the decisive operation accomplishes the mission.<sup>175</sup> Therefore winning the Decisive Operation (DO) is essential and players fight to gain advantages in the DO through the Shaping Operations (SOs). The players can choose to weight other operations at different times, but they only win if they score the most points during the DO.

### Summary

In *Counter Fire!*, the players take on the inherently supportive role of the FSCOORD. The FSCOORD is not the maneuver brigade or battalion commander. The FSCOORD does not dictate how the attack is orchestrated or the form of maneuver used. The FSCOORD does however directly affect the amount of support that is delivered upon request and shapes the fight for the battalions based on the brigade commander's guidance. *Counter Fire!* replicates supporting the maneuver units by forcing the player to manage terrain, shape future success in shaping operations, and win through survival and the decisive operation. Now that maneuver units can be modeled without becoming the focus of the game, the design process can concentrate on answering what staff functions need to be included and modeled for training.

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<sup>175</sup> HQDA, ADP 3-90, Glossary-5.

### Important Staff Functions to Include in a Training Wargame

The third research question answered was: What are the most important staff functions to include in an artillery centric wargame? As previously, discussed the artillery battalion commander is encouraged to spend much of the time away from the artillery battalion. The FSCOORD's division of time between the artillery battalion and brigade command post means that much of the battalion's success is dependent on the artillery battalion staff. The commander must train the staff to act independently. Therefore, the commander must concentrate on training the key battalion staff officers. These officers are the intelligence officer (S2), the sustainment officer (S4), the operations officer (S3), and the Fire Direction Officer (FDO).

#### S2 and Intelligence

The core of understanding a mission starts with the intelligence section of a staff. The intelligence section leads the entire staff through the intelligence preparation of the battlefield (IPB) at echelon.<sup>176</sup> The entire staff to include the intelligence section must then understand all aspects of IPB. Therefore, IPB is essential to include in a training game for the training of the entire staff, especially the S2.

Key elements of IPB that apply across warfighting functions and the staff sections should be prioritized in training. Terrain analysis, the first step of IPB, is an essential aspect of defining the operational environment. Terrain is one of the essential elements of

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<sup>176</sup> Headquarters, Department of the Army (HQDA), Field Manual 3-90-1, with Change 2, *Offense and Defense* (Washington, DC: Army Publishing Directorate, April 2015), 1-3, [https://armypubs.army.mil/epubs/DR\\_pubs/DR\\_a/NOCASE-FM\\_3-90-1-002-WEB-0.pdf](https://armypubs.army.mil/epubs/DR_pubs/DR_a/NOCASE-FM_3-90-1-002-WEB-0.pdf).

mission variables and one all staffs must understand.<sup>177</sup> Terrain analysis affects all of the warfighting functions as terrain dictates where the batteries can be emplaced, trafficable areas, ability to conceal units, and many other impacts on operations.

Enemy abilities and course of action is another aspect that must be included. To continue to keep the focus on the artillery and synchronize the fires warfighting function with all other warfighting functions, the intelligence section must anticipate the enemy artillery's actions.<sup>178</sup> The S2's responsibility to mimic an adversary means that a game training the staff must include an adversary. An independently thinking adversary that has an understanding of the problem and can take informed actions is the best to compete against. Being a player in the wargame trains the intelligence officer, non-commissioned officer or soldier in acting as an adversary in COA analysis.

Through acting as an adversary, the intelligence section or other staff leader can better understand the resources and capabilities needed to accomplish a mission. Understanding the resources of the mission forms the basis of targeting in development of high value target and high payoff target lists.<sup>179</sup> These two lists are the key output of

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<sup>177</sup> Headquarters, Department of the Army (HQDA), Army Techniques Publication (ATP) 2-01.3, *Intelligence Preparation of the Battlefield with Basic Enclosure 1* (Washington, DC: Army Publishing Directorate, January 2021), 1-2, [https://armypubs.army.mil/epubs/DR\\_pubs/DR\\_a/ARN31379-ATP\\_2-01.3-001-WEB-4.pdf](https://armypubs.army.mil/epubs/DR_pubs/DR_a/ARN31379-ATP_2-01.3-001-WEB-4.pdf).

<sup>178</sup> Ibid., 1-4.

<sup>179</sup> Headquarters, Department of the Army (HQDA), Army Techniques Publication (ATP) 3-60 (Field Manual 3-60), *Targeting* (Washington, DC: Army Publishing Directorate, May 2015), 2-2, [https://armypubs.army.mil/ProductMaps/PubForm/Details.aspx?PUB\\_ID=105207](https://armypubs.army.mil/ProductMaps/PubForm/Details.aspx?PUB_ID=105207).

deciding what targets to deliver effects on.<sup>180</sup> As the FASP is the plan of how an artillery battalion will deliver these effects, high payoff targets must be included in the game to train the intelligence section and staff.

#### S4 and Sustainment

No military unit can survive let alone fight without receiving the correct supplies. Therefore, training and including aspects of sustainment are as important to a wargame as they are to war. Unique to a composite artillery battalion is the variations in ammunition types versus a battalion made of purely the same howitzers.<sup>181</sup> Challenges stem from the difference in 155mm artillery ammunition in the U.S. Army being separate loading and 105mm artillery ammunition being semi-fixed. The mixture of size and type of ammunition presents planning challenges to the staff when attempting to keep the unit shooting.

Including ammunition resupply in a game is a simple and useful tool to train in resupply operations of all classes for the sustainment leadership. Ammunition resupply is normally conducted as a part of a refuel, rearm, resupply, and survey mission.<sup>182</sup> Ammunition should be the primary focus of sustainment training as ammunition is the greatest single pacer for a battle. Fuel, water, food, and other classes of supply can easily be measured in days of supply. The batteries have water trailers that hold hundreds of gallons. Meals ready to eat can be carried in personal equipment. The trucks of a

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<sup>180</sup> HQDA, ATP 3-60, 2-2.

<sup>181</sup> HQDA, ADP 3-09.23, B-1.

<sup>182</sup> Ibid., 7-1.



composite battalion have large fuel tanks and carry extra cans that can help fuel last for days.<sup>183</sup> Ammunition is expended in high volume, weighs hundreds of pounds, and is measured in the number of missions the stock could support. Controlled supply rate and haul capacity are the limiting factors of ammunition longevity.<sup>184</sup> The ability to move multiple classes of supply together means that if a battalion can consistently keep the firing batteries supplied with ammunition, then the battalion could reasonably expect to sustain the batteries with other supplies as well. Ammunition is therefore the key supply aspect to train in a wargame, as ammunition resupply operations would include other essential supplies.

Because of these unique assets the ammunition must be included independently to enable the S4 to visualize the challenges of sustaining the artillery battalion. While the Army allocates a field artillery officer to fulfill the role of S4 in the artillery battalion, not every artillery battalion has the same equipment. The FSCOORD in each battalion must therefore train the S4 to operate in that specific battalion. Neglecting training the S4 can limit the battalion's effectiveness.

### S3/FDO and the Control of Forces

The operations section or operations officer (S3) of an artillery battalion controls the most aspects that need to be included in a training wargame. The operations section is responsible for coordinating all aspects of the operation.<sup>185</sup> Of special significance for the

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<sup>183</sup> HQDA, ADP 3-09.23, 7-2 – 7-3.

<sup>184</sup> Ibid.

<sup>185</sup> HQDA, FM 6-0, 2-9.

artillery battalion is tactical fire direction, technical fire direction, positioning batteries around the battlefield, and survivability of the battalion as a whole. Training an artillery staff must include these essential functions from the S3.

Coordination of movement of the batteries is one of the simplest functions of the operations section. However simple does not mean easy. The S3 must time movement of the batteries to ensure that the proper number of howitzers are in place and ready to fire at the proper times and that the batteries move often enough to avoid counterfire.<sup>186</sup> While moving batteries is simple, executing simple tasks in a contested environment is difficult. Training and repetition in planning is needed to synchronize these tasks. In fact, planning for simple tasks to take longer than normal due to friction could be beneficial.

The most important aspect of the operations section of the artillery battalion is tactical fire direction. The operations officer and battalion FDC control what firing missions each firing batteries receives.<sup>187</sup> The controlled units includes both organic and reinforcing batteries.<sup>188</sup> The task organization of supporting artillery assets means that the fire direction officer (FDO) may be responsible for firing units belonging to multiple battalions. A task to control battery level units from other organizations would normally be reserved for a field grade officer, but the FDO is a junior captain. The FDO directly controls the delivery assets organic to the entire brigade, the brigade commander's

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<sup>186</sup> HQDA, ATP 3-09.23, 6-4, 5-10.

<sup>187</sup> Ibid., 1-14.

<sup>188</sup> Ibid.

primary asset to weigh the main effort.<sup>189</sup> Due to the FDO's importance to the brigade, a game training the artillery battalion staff must include the FDO's tactical fire direction duties.

All members of the staff fulfill important roles and serve to keep the battalion fighting. But the S2, S4, FDO, and S3 are essential to training an effective staff and artillery battalion. These leaders fulfill the most critical roles for the artillery battalion. To make a game that can be used for training these roles a game must focus on the actions these leaders advise the commander on. They are the key advisors that shape the commander's understanding and visualization of the battle.

### Summary

By comparing the aspects of the battle, the artillery battalion commander controls and preventing the maneuver forces from becoming the focus of the game, key staff functions and leaders became apparent. Trends between the controllable aspects of the battle and essential elements of the maneuver branch's actions emerge. The battalion needs ammunition to fire in support of maneuver, confirming the essential role of the S4 and ammunition management. The importance of the artillery battalion's movement to be IPRTF in support of maneuver objectives emphasizes the importance of the S3's control of units and their need for training prior to battle. The task organization of the observers to maneuver units creates an opportunity to emphasize the importance of observers without making them controllable units. The focus then shifts to the mechanics that can be used to train staff members in tasks delegated by the commander.

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<sup>189</sup> HQDA, FM 3-09, 1-8.

### Useful Game Mechanics

Analyzing initial codes, playtesting, and memoing revealed useful mechanics for training artillery leaders and answered the final research question. Analyzing the initial codes and relations between the codes led to the inclusion of seven (7) core game mechanics that enabled the practical application of tactical fire direction. Tactical fire direction is the key actions that must be included in an artillery centric wargame. Looking at similarities and the importance of each staff section's actions revealed key mechanics of set-up, turns, interruption, maps, card draws, dice rolls, table references, and quick access rules as the game mechanics that support the purpose of the game.

### Setup

Getting the game started is a unique challenge for a training game that is not limited to a specific scenario or terrain. Most games have specified locations that do not move. *Verdun*'s bases and victory points are always in the same place.<sup>190</sup> If you play *Battle for Moscow* or *Hold Fast Russia*, your supply comes from the same location every game.<sup>191</sup> Many games even have you start in the same locations. These mechanics are not useful for a game that needs to be as adaptable as the unique maps that staffs may operate with.

To make the setup of the game reasonable and useful for training, maneuver objectives must exist. So how then do objectives appear on the map if they are not

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<sup>190</sup> Vejedovsky, *Verdun 1916*.

<sup>191</sup> Frank Chadwick, *Battle for Moscow*, Board Game (Chicago, IL: Diverse Talents, Incorporated, 1986); Grant Wylie and Mike Wylie, *Holdfast: Russia 1941-42*, Board Game (Virginia Beach, VA: Worthington Publishing, LLC, 2014).

dictated to the players? The artillery staff must understand the maneuver units' objectives and operations. So, artillery staff must be trained to visualize maneuver objectives. The maneuver commander designates the shaping and decisive operations and gives the subordinate units objectives to achieve for each operation.<sup>192</sup> To mimic options in the operational framework, players designate the shaping and decisive operations together.

The players designating the shaping and decisive operations' locations benefits professional development and forces conversations about understanding higher and adjacent unit missions.<sup>193</sup> The field artillery commander must understand and support the maneuver units no-matter the mission.<sup>194</sup> The need for shared understanding emphasizes that all leaders in the battalion understand forms of maneuver, and maneuver tasks so that the artillery battalion can know how to shape the battle for the supported unit.

There are a few ways players can choose where the objectives will be. A simple way is to conduct terrain analysis, assemble the Modified Combined Obstacle Overlay (MCOO) and designate agreed upon key terrain as the locations of the shaping and decisive operation. Key terrain is terrain that must be acted upon during the operation. These terrain features give controlling units marked advantages.<sup>195</sup> A second method is to visit the local Mission Command Training Center (MCTC) and receive one of the pre-made mission orders for the area, use the dictated form of maneuver, and the associated

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<sup>192</sup> HQDA, ADP 3-0, 2-1.

<sup>193</sup> Ibid., 3-12.

<sup>194</sup> HQDA, ATP 3-09.23, 1-5.

<sup>195</sup> HQDA, FM 1-02.1, 1-59.

locations of shaping and decisive operations. Incorporating existing orders allows the game to fit into other staff training, enables *Counter Fire!*'s use with an actual mission order, and will mitigate any potential arguments about the location of the shaping and decisive operations.

As players designate the objective locations, the players need to choose if the Red or Blue player will be on offense or defense. The attacker or defender is not designated specifically in the rules to allow the simulation an offensive or defensive fight for both the Red and Blue teams. Leaders must understand the appropriate actions in both the offense and defense, so both are included in the game to enable training.<sup>196</sup>

The choice of offense or defense will determine what player takes the first turn. The offensive player taking the first turn nests with the Army's theory that the unit on offense has the initiative in combat.<sup>197</sup> Secondly, the offensive player going first supports the action-reaction-counter action cycle described for Course of Action (COA) analysis.<sup>198</sup> The defending player going second and forcing the defender to react to the attacking player's actions trains leaders in the orderly execution of COA analysis.

After objectives are placed and sides taken, players begin placing units on the board. There are two types of units that the players will see on the board. Those that the players control and those that the players do not control. The players will control only units that the artillery battalion commander controls. The units that the player does not

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<sup>196</sup> HQDA, ADP 3-90, 3-1, 4-1; HQDA, ATP 3-09.23, 6-14.

<sup>197</sup> HQDA, ADP 3-90, 4-16.

<sup>198</sup> HQDA, ADP 6-0, 9-26.

control will be placed first. *Counter Fire!* includes the brigade support battalion, maneuver command posts, and the engineer command posts. As the locations of each of these units do not have a direct effect on each other the uncontrolled units of both players may be placed at the same time, but each unit has specific rules.

The infantry battalion command posts must be placed with-in six to eight kilometers of SO2, SO3 and the DO. The reason for this placement guidance is twofold. Firstly, these command posts should be placed outside of mortar but not necessarily outside of artillery range of each objective. The placement guidance enables the command posts to execute their warfighting function without excessive survivability moves or hardening.<sup>199</sup> Secondly, the most common communications system infantry units have is an FM radio. The range on most FM radios does not reach beyond 9 km without retransmission operations.<sup>200</sup> Now, each of these battalions have retransmission sections and many company formations have access to adapters that allow them to make retransmission stations.<sup>201</sup> However, the maneuver units are not controlled units and the artillery commander or staff does not have direct influence on the employment of the infantry communications systems. Maneuver units have FM radios high in their signal plan, but the unit's retransmission capabilities could be tasked out, or not fully mission

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<sup>199</sup> HQDA, FM 3-90-1, 6-19.

<sup>200</sup> Headquarters, Department of the Army (HQDA), Technical Manual (TM) 11-5820-890-10-8, *Operator's Manual SINCGARS Ground ICOM Combat Net Radios* (Washington, DC: Department of the Army, December 1998), 2-16, <https://www.liberatedmanuals.com/TM-11-5820-890-10-8.pdf>.

<sup>201</sup> Ibid., 4-28.

capable. Therefore, these command posts will be placed where the units could reasonably be expected to function in most circumstances without augmentation or special training.

The second uncontrolled unit type placed during set-up is the Brigade Support Battalion (BSB). The BSB is the unit that controls the logistics and sustainment for the entire brigade to include the artillery battalion and is therefore crucial to the artillery's resupply.<sup>202</sup> Planning for resupply of ammunition is crucial to the field artillery support plan.<sup>203</sup> The BSB takes up a large area of the battlefield and is doctrinally placed within 30 kilometers of the forward line of own troops.<sup>204</sup> The size and importance of the BSB means that the BSB must be on the map. The BSB holds much of the ammunition the field artillery battalion shoots in the battle and poses an obstacle to howitzer emplacement in the brigade's area of operation.

The BSB will be placed in unrestrictive or restrictive terrain and at a junction of main supply or auxiliary supply routes. The BSB's location is also to be out of the initial range of the opposing player's artillery. The doctrinal guidance for emplacing the brigade support area dictates similar placement of a BSB. The BSB should be in the maneuver brigades' area of operations but outside of enemy artillery range if possible.<sup>205</sup> Placing

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<sup>202</sup> HQDA, ATP 3-09.23, 1-3.

<sup>203</sup> Ibid.

<sup>204</sup> HQDA, FM 4-0, 5-15; While the FM 4-0 does not specifically describe the size of a Brigade Support Area (BSA), the Division Support Area (DSA) is described as 10km<sup>2</sup>. It is therefore reasonable to assume the BSB will take up at a 4km<sup>2</sup> area. Especially considering that the BSB will need to manage space and storage of the entire brigades' ammunition resupply with the associated net explosive weight.

<sup>205</sup> HQDA, ADP 3-0, 4-4.



the BSB near supply routes and roads is also a reasonable expectation as these units have large amounts of vehicles moving in and out of the area. The artillery staff should plan on the BSB being placed in a location with terrain and infrastructure that supports the doctrinal guidance if possible.

The Brigade Engineer Battalion (BEB) headquarters and brigade or regimental headquarters units will be placed in the same manner with similar guidelines as the brigade support area. The headquarters are to be placed on similar unrestrictive terrain with at least one road. However, these command posts are placed between the BSB and the objectives for the shaping operations. The purpose of emplacing the BEB and brigade headquarters is introducing an element of terrain management. The artillery staff should not plan on emplacing firing units or radars near these locations.<sup>206</sup> The BEB is comprised of engineering equipment that is often on high pay off target lists or protected unit lists.<sup>207</sup> The artillery battalion commander would not want to expose the firing batteries or radar to fires directed at the BEB nor would the BEB or brigade CP soldiers appreciate being exposed by the firing or radar units. Artillery leaders must train to position firing batteries and radar away from other units.

The only exception to placing artillery units next to other unit's headquarters is the ability of the FSC to emplace next to the BSB. The FSCs supply functions are subordinate actions of the BSB. Supply doctrine even recommends placing the FSC at the

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<sup>206</sup> HQDA, ATP 3-09.23, 4-6.

<sup>207</sup> Headquarters, Department of the Army (HQDA), Army Doctrine Publication (ADP) 3-37, *Protection* (Washington, DC: Army Publishing Directorate, July 2019), 3-6, [https://cgsc.blackboard.com/bbcswebdav/pid-1324917-dt-content-rid-16628176\\_1/library/Library%20Content/Master%20Library/ADP/ADP\\_3-37\\_31JUL19.pdf](https://cgsc.blackboard.com/bbcswebdav/pid-1324917-dt-content-rid-16628176_1/library/Library%20Content/Master%20Library/ADP/ADP_3-37_31JUL19.pdf).

BSB to assist in supply coordination to supported battalions.<sup>208</sup> The FSC's ability to emplace next to the BSB is to simulate more efficient battalion trains operations. Other units may not be placed or emplaced within a four-by-four-kilometer area of the BSB, or any kilometer adjacent to the regimental, maneuver battalion, or brigade headquarters (this restriction includes diagonally adjacent grid squares).

After all uncontrolled units are set on the map, the defensive player may place firing batteries, radar, and FSC onto the map. The defensive player may place firing batteries anywhere between the objectives and the friendly BSB. The defensive player's batteries may be IPRTF and will not lose action points for the initial emplacement. The defending player's batteries are emplaced in order to simulate that the units have completed some preparations for the defense.

The offensive player's firing batteries will start at the BSB, not IPRTF, and ready to move. The offensive player's starting positions simulate the units attacking into the area. The artillery battalion commander must plan to move batteries into position to support the attack and the batteries may not start where they can range planned and dynamic targets.<sup>209</sup> The NTC and JRTC rotations start similarly to *Counter Fire!*. Rotational units are required to fight into the training area.<sup>210</sup> The first decision facing the

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<sup>208</sup> HQDA, FM 4-0, 6-10.

<sup>209</sup> HQDA, FM 3-90-1, 3-15, 3-22; Headquarters, Department of the Army (HQDA), Army Techniques Publication (ATP) 3-09.90, *Division Artillery Operations and Fire Support for the Division* (Washington, DC: Army Publishing Directorate, October 2017), 2-3, [https://armypubs.army.mil/epubs/DR\\_pubs/DR\\_a/pdf/web/ARN5999\\_ATP%203-09x90%20FINAL%20WEB%201.pdf](https://armypubs.army.mil/epubs/DR_pubs/DR_a/pdf/web/ARN5999_ATP%203-09x90%20FINAL%20WEB%201.pdf).

<sup>210</sup> Author's experience at the Joint Multinational Readiness Training Center (JMRC) in 2014, NTC 2016 and 2017, and JRTC 2019-2021. All rotations at the CTCs

artillery battalion is how and when to get the batteries into the area of operations to support the reconnaissance operations and initial attacks.<sup>211</sup>

The next step of set up is to fill in the ammunition trackers of the player cards. These trackers represent the haul capacity available to the firing units, forward support companies, and brigade support battalions. The player can fill these with any combination of rounds but only up to the max capacity of each unit. The designation of ammunition at the start of the game enables the planning of hauling ammunition, combat loads, and echeloned supply operations.<sup>212</sup> Each slot on the battery and FSC trackers will be filled with an H, D, R, S, I, or a dash. The “H” represents a high explosive round. The “D” represents a dual purpose improved conventional munition round. The “R” represents a high explosive rocket assisted projectile. The “S” and “I” represent smoke and illumination rounds respectively. The dash is used after the letter label on the FSC ammunition tracker to represent the extra space that is needed for the 155mm ammunition.

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normally start with a fight into the box through a Joint Forcible Entry (JFE) exercise or movement to contact. The unit is required to immediately take tactical action upon leaving the barracks area used for staging and planning.

<sup>211</sup> HQDA, ATP 3-09.90, 3-6.

<sup>212</sup> HQDA, FM 4-0, 5-18; FM 4-0 discusses echeloned sustainment in multiple locations below the division level. The key missing information from doctrine was the description of combat loads for 155mm and 105mm towed systems. The FM gives specific loadouts for the self-propelled and rocket systems. These operations and similar load outs are still executed in the composite artillery battalion through not mentioned specifically in the FM 4-0.

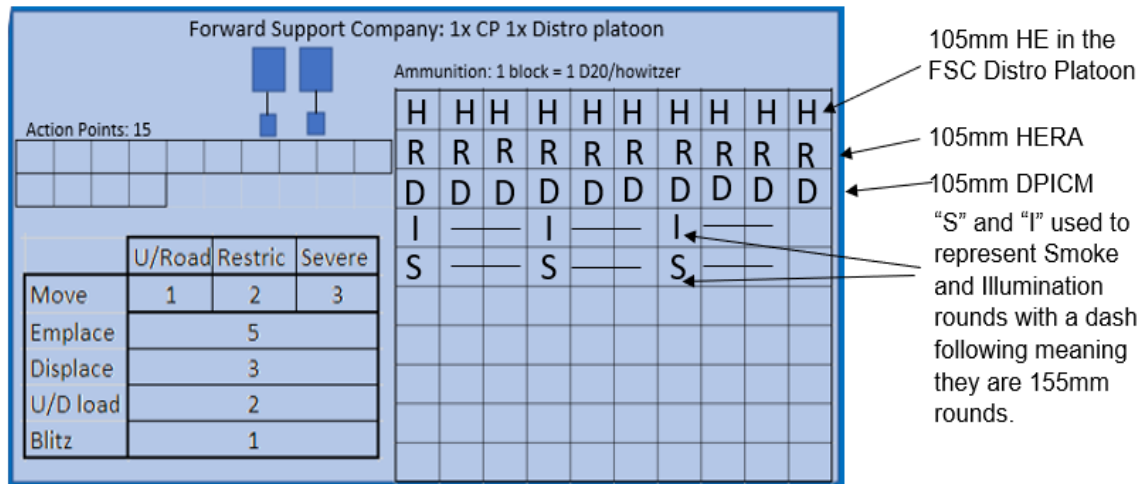


Figure 6. Example of Ammunition Labeled on the FSC Ammunition Tracker


Source: Created by author.

The last step of set up is to divide up the FAT cards between the objectives. Shaping Operation One (SO1) cards and Decisive Operation (DO) cards should first be separated into two piles. The SO1 cards have more reconnaissance and scout targets and have a red and white hashed top above the target picture. These cards simulate the counter reconnaissance fight. Reconnaissance organizations would first encounter other reconnaissance assets or a disruption force at the start of the battle.<sup>213</sup> Many HPTs may be drawn from the SO1 deck of cards as well, as HPTs are what enemy focused reconnaissance is supposed to find.<sup>214</sup>

<sup>213</sup> HQDA, ADP 3-09.23, 6-17.

<sup>214</sup> Headquarters, Department of the Army (HQDA), Field Manual (FM) 3-55, *Information Collection* (Washington, DC: Army Publishing Directorate, May 2013), 1-5, [https://cgsc.blackboard.com/bbcswebdav/pid-1324861-dt-content-rid-10783172\\_1/library/Library%20Content/Master%20Library/FM\\_and\\_FMIs/FM\\_3-55\\_3May2013.pdf](https://cgsc.blackboard.com/bbcswebdav/pid-1324861-dt-content-rid-10783172_1/library/Library%20Content/Master%20Library/FM_and_FMIs/FM_3-55_3May2013.pdf).

Shaping Operation 1



<u>105mm:</u> DPICM +2	<u>Hits Needed:</u> <input style="width: 30px; height: 20px; border: 1px solid black;" type="text"/>
<u>155mm:</u> HE +1 DPICM +2	<input style="width: 30px; height: 20px; border: 1px solid black;" type="text"/>

Decay: 8

Cavalry section

Figure 7. Example SO1 FAT Card

*Source:* Created by author.

The DO FAT cards are also separated out and generally reflect more complex and harder to hit targets. The more difficult to hit units simulate targets that are in prepared defensive positions. These harder units require firing units to often expend smoke and lethal munitions at the same target to simulate the artillery's participation in breaching drills. For the defensive player the smoke requirement represents the complexity of firing smoke and suppression to disrupt and suppress units attacking through complex obstacles and captured positions. During the DO, more HPT cards will appear. The higher inclusion of HPTs shows that detection of these assets may take more time and encourages the use of more assets in the decisive operation over shaping operations.

The level of protection “Dug-in” requires the firing unit to expend smoke in order to engage with lethal rounds to score hits.

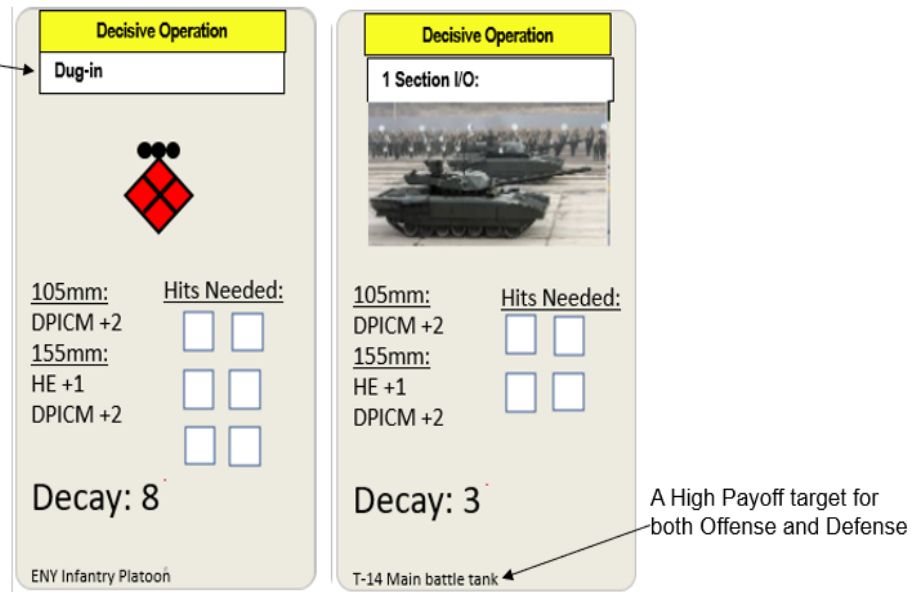


Figure 8. Example DO Cards

Source: Created by author.

After the SO1 and DO cards are divided and placed on the corresponding objective markers take the rest of the cards, shuffle them and divide them between the Shaping Operation Two (SO2) and Shaping Operation Three (SO3). These cards also have HPTs included to model that HPTs could be discovered at any time. Fewer HPTs exist in the SO2 and SO3 decks to encourage the players to use more assets to support the DO as that operation directly accomplishes the mission.<sup>215</sup> As the last of the cards are divided up and placed on the map and all units are present in their starting positions the game is ready to start.

<sup>215</sup> HQDA, ADP 3-0, 3-4.

Starting a game must support the purpose of the game as well. Each aspect of setting up *Counter Fire!* supports training objectives directed at staff positions and leaders. The S2 and intelligence collection is supported with the distribution of cards and assessment of the opposing player's starting locations. The S4 and sustainment functions are supported with the placement of the BSBs and starting ammunition load outs. The location and flow of firing batteries into the AO support training the battalion FDO and S3 with tactical fire direction. All staff sections train on the effects of terrain by executing IPB on a 1:50,000 map and labeling terrain. The game begins training key staff functions during setup.

#### Turns/Time

After Set-up, the next key mechanic and model is that of turns and the representation of time. Time is finite, unknown, always decreasing, and never in large enough supply. Therefore, time is the most important resource in the battle. Because time is so fleeting on the battlefield, time is an essential element that must be established in a model of tactical fire direction.

Time is modeled in game turns that represent the passing of three hours. The basis for the time frame is that of the radar cueing schedule. Three hour segments were a common time frame for the radars to cycle on and off at JRTC.<sup>216</sup> Each radar would radiate for established time before transferring the responsibility to an alternate radar or

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<sup>216</sup> Author's observations at Fort Polk, LA, JRTC rotations from July 2019 through June 2020 as a Fire Support OCT. The Q50s and Q53 radars were controlled by the FSCOORD and told when to be radiating. The Cuing schedule was normally dictated in three hour blocks centered around predicted battles or times of higher rates incoming fire according to S2 analysis.

shutting down for a period to avoid exposure.<sup>217</sup> Three-hour time blocks divided between the two AN/TPQ-53s in a battalion allowed the crews time to rest or move to a new location and emplace their equipment before radiating again.<sup>218</sup> The second thought process that influenced the decision for a replicating a three hour window was that of conducting a refuel, re-arm, resupply, and survey point (R3SP) with a battery and distribution platoon.<sup>219</sup> A sensible planning factor is that R3SP should be able to be conducted in three hours.<sup>220</sup> The battery should then be able to move, resupply, and move again in three (3) hours.

The second factor affecting the representation of time was: how often other decisions should be made, such as moving the batteries between firing points. Common commander's guidance to the firing batteries on movement at the Joint Readiness Training Center (JRTC) was every three fire missions or 12 hours.<sup>221</sup> Survival movement guidance is often broken or ignored, but also gave an easily divisible time for turns. If the

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<sup>217</sup> HQDA, ATP 3-09.23, 4-7.

<sup>218</sup> Author's observations at Fort Polk, LA, JRTC from July 2018 through June 2019 as a Fire Support OCT.

<sup>219</sup> HQDA, ATP 3-09.23, B-3. The ATP here references that the S3 needs to plan for time and movement that rearm, refit, refuel, survey, and positioning (R3SP) operations will take. Though the doctrine does not designate how long R3SP will take as the time required depends on the amounts of supplies to be transferred.

<sup>220</sup> Author's experience as a M777A2 Battery commander from 2018-2019 at Fort Hood, TX, in 3rd Cavalry Regiment.

<sup>221</sup> Author's observations at Fort Polk, LA, JRTC from July 2020 through July 2021 as a Battery OCT. Displacement criteria was a common part of the FASP and commander's guidance to the firing batteries. The guidance on when to move the batteries is in accordance with ATP 3-09.23's emphasis on supplementary and alternate positions mitigating the threat of counterfire on the battery. HQDA, ATP 3-09.23, 6-4.



batteries are planned to move every 12 hours, then decision points would likely exist at least twice to move the battery early.

The controlled unit movement rates are influenced by the time replication. The battlefield calculus from the infantry doctrine tends to limit the rate of advance and supports slow movement rates. When looking into planning factors for how fast infantry units move in a tactical environment commanders must consider that the troops will move very slowly through rough terrain, especially when transporting their equipment on foot.<sup>222</sup> The infantry battalions are weighed down and moving very slowly cross country as they conduct the shaping and decisive operations.<sup>223</sup> Therefore, the artillery must remain flexible and not pass forward of the infantry to support the infantry operation.<sup>224</sup> The battalion commander wanting, to keep two thirds of the howitzer range in front of the supported unit may need to execute a series of smaller quick moves and therefore have the option to move the batteries once every three hours.<sup>225</sup> Considering that the battalion commander would not want all the of the batteries moving at the same time in order to support the maneuver units, three (3) hours becomes an even more logical. Simulating three (3) hours per turn allows the player to plan the batteries' moves on different turns.

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<sup>222</sup> Headquarters, Department of the Army (HQDA), Army Techniques Publication (ATP) 3-21.20, *The Infantry Battalion* (Washington, DC: Army Publishing Directorate, December 2017), B-22, [https://armypubs.army.mil/epubs/DR\\_pubs/DR\\_a/pdf/web/ARN6672\\_ATP%203-21x20%20FINAL%20WEB.pdf](https://armypubs.army.mil/epubs/DR_pubs/DR_a/pdf/web/ARN6672_ATP%203-21x20%20FINAL%20WEB.pdf).

<sup>223</sup> Ibid., C-24.

<sup>224</sup> Ibid.

<sup>225</sup> HQDA, ATP 3-09.23, 6-4.

With the time frame for each turn established at three hours, the next problem is the actions batteries and radars take and how best to model them in the three (3) hour time block. The first step of the process was to list out the actions that the individual batteries make. Secondly find time stamps or standards for how long these actions should take. These times then make a sensible base for how long each action takes. Then adapt a model that allows the player to make the appropriate actions in a turn that could be expected of the units. An action point system with different amounts of points per turn, best replicated the flexibility needed to perform different actions in the turn.

Action points are a value assigned to the unit that represent the amount of time and effort used to execute any given action in a turn. Action points are assigned to each unit to represent the number of actions that could be accomplished in a three (3) hour turn.<sup>226</sup> The action point mechanic allows the players to plan and prioritize actions for each unit to accomplish. Action points force the player to determine the sequence and most important tasks to accomplish each turn. A single pool of points is used for all tasks by the unit because this allows the unit to conduct a variety of tasks but not every possible task in the same turn. If a player tried to conduct all the desired actions, the unit would run out of action points for the turn. One of the inspirations for the action point system was *Verdun 1916: Steel Inferno*. In *Verdun* the player could trade victory points

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<sup>226</sup> See Appendix B.

for reinforcements and other actions.<sup>227</sup> The sending of victory points forced the player to decide what actions were important enough to risk victory on.<sup>228</sup>

Firing battery actions were the first topic to model. Most actions that a battery can execute have standards in TC 3-09.8.<sup>229</sup> The TC 3-09.8 is the publication is used by artillery units across the Army for training standards on tasks from the section to battery level.<sup>230</sup> Emplacement, displacement, fire mission times, and many others are listed with tasks, conditions, and standards for training.

However, while *Counter Fire!* may be used for training, the game simulates combat not training standards. To replicate time taken, effort expended, and friction on the battlefield a scaled cost for different types of emplacements was used. Deliberate emplacements take more time and effort, faster emplacements are cheaper.<sup>231</sup> However, each of emplacement besides deliberate comes with tradeoffs. When howitzer batteries conduct hasty and emergency emplacements the batteries may not go through the entire process of spacing out the guns.<sup>232</sup> In some cases, the batteries use alternate less accurate

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<sup>227</sup> Vejedovsky, *Verdun 1916*.

<sup>228</sup> Ibid.

<sup>229</sup> HQDA, TC 3-09.8, 1-1.

<sup>230</sup> Ibid.

<sup>231</sup> See Appendix B.

<sup>232</sup> Headquarters, Department of the Army (HQDA), Army Techniques Publication (ATP) 3-09.5, *The Field Artillery Cannon Battery* (Washington, DC: Army Publishing Directorate, May 2016), 3-8, [https://armypubs.army.mil/epubs/DR\\_pubs/DR\\_a/pdf/web/atp3\\_09x50.pdf](https://armypubs.army.mil/epubs/DR_pubs/DR_a/pdf/web/atp3_09x50.pdf).

methods of lay.<sup>233</sup> In a hurry, the sections may not emplace all of the alternate aiming references or have 6400 mil (360 degrees) firing capability.<sup>234</sup> To improve these emplacements the battery leadership must coordinate the platoons to go back and execute work the platoons skipped or execute emplacement tasks again in different locations.<sup>235</sup> The transition between emplacements takes significant amounts of effort and roughly the same time to improve as if the platoon emplaced deliberately the first time. These considerations forced the incorporation of negative modifiers for emergency emplacements and restriction of platoon positioning for emergency and hasty emplacements.<sup>236</sup>

After the firing batteries are emplaced, the batteries can then process fire missions rapidly. However, the effort used to execute a fire mission means that the units cannot be doing other actions.<sup>237</sup> After the fire mission, fire direction centers (FDCs), platoon sergeants, section chiefs, and gunnery sergeants need to update ammunition records and howitzer maintenance data.<sup>238</sup> These actions also take small amounts of time that detract from other tasks. These supporting actions mean that while the battery may shoot a mission quickly the battery must carry out supporting tasks requiring time and effort

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<sup>233</sup> HQDA, ATP 3-09.23, 5-18, 6-14; HQDA, ATP 3-09.5, 3-8.

<sup>234</sup> HQDA, TC 3-09.81, 14-2; HQDA, ATP 3-09.5, 3-8.

<sup>235</sup> HQDA, ATP 3-09.5, 3-8.

<sup>236</sup> See Appendix B.

<sup>237</sup> HQDA, ATP 3-09.5, 5-2.

<sup>238</sup> Ibid., 1-4.

immediately after the fire mission. Including even a small action point cost for each fire mission forces decisions about how to prioritize efforts for other actions including saving effort for counterfire missions on the opponent's turn.

The artillery battalion commander controls emplacement and fire mission times through training planning and setting conditions.<sup>239</sup> However, lessons and observations from CTCs continue to point out that units struggle to meet task standards in combat simulations.<sup>240</sup> Staffs must therefore anticipate actions to take longer in combat than normally expected. Incorporating friction into each action enabled the model to be flexible instead of sticking to exact doctrinal time standards, while still being useful for training the staff.

The most basic challenge facing a firing battalion is moving the batteries and radar around the battlefield.<sup>241</sup> Movements have to be planned and executed in a reasonable time. Moving the batteries is the first challenge that the battalion commander and staff face when establishing firing capability on the battlefield and must be modeled in the game. To replicate the effort and time of moving the batteries, moving a unit one (1) kilometer on the map also costs action points. Moving along the road or across unrestrictive terrain requires one (1) point while moving cross country through restrictive

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<sup>239</sup> HQDA, ATP 3-09.23, 1-5.

<sup>240</sup> David Armando Zelaya, "Failure and the After Action Review," in Newsletter No. 17-02, *Decisive Action Training Environment at the JRTC*, vol. 14, *Company Level Combined Arms Maneuver: Lessons and Best Practices* (Fort Leavenworth, KS: Center for Army Lessons Learned, December 2016), 59-61.

<sup>241</sup> HQDA, ATP 3-09.23, 3-8.

terrain costs two (2) points.<sup>242</sup> The higher action point cost represents the slower speeds that are required for cross country movement. The S3 must consider the time required to not just to emplace and fire the howitzers but to move to the firing point.<sup>243</sup> However, not everything goes according to plan and the staff must be prepared for the enemy to have a vote or friction to arise.

Many games such as *Root* control actions per turn by setting parameters and allowing the player to execute as many actions as the parameters allow.<sup>244</sup> However these mechanics warp the model of time. The purpose of the game is to train staffs and analyzing that with the need to prioritize actions to fit into a limited time frame. The action point system combined with turns better replicates the time and effort available for the commander and staff to make decisions and batteries to carry out their warfighting functions.

### Interruptions

The old adage of plans not lasting past the first contact still remains true in warfare today. Not only is the ability to interrupt an opponent realistic, but fun in games as well. Even in the descriptions of Course of Action (COA) analysis, often referred to by Army units as “wargaming,” Army doctrine says there should be an action-reaction-counteraction rhythm between the opposing sides.<sup>245</sup> The player or team with the

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<sup>242</sup> See Appendix B.

<sup>243</sup> HQDA, ATP 3-09.23., 3-3.

<sup>244</sup> Wehrle, *Root*.

<sup>245</sup> HQDA, ADP 6-0, 9-26.

initiative should take the action, the opponent a reaction, and the first player then acts again for a counteraction.<sup>246</sup> The defending unit acting between attacking unit actions in COA analysis, shows that the Army values wargaming methods that employ back and forth aspects. The Army realizes that there is an inherent back and forth aspect of warfare that must be replicated in training.

The most important interruption to include in the game is counterfire operations. The FSCoord must plan for these operations at the division level and below.<sup>247</sup> Counterfire is important to include in a training game so that players can visualize how opposing artillery units will contest the friendly operations and minimize risk to the force.<sup>248</sup> Counterfire mechanics in the game force the players to identify threats and opportunities when firing at FAT cards, HPTs, or the opponent's units. Forcing these decisions in the game play exposes the importance of visualization of exceptional information.<sup>249</sup> The artillery unit must plan both how executing counterfire missions will affect the mission and how to survive these operations from the enemy.

Execution of counterfire against an enemy is often a key step of prosecuting the high payoff target list.<sup>250</sup> To prosecute these HPTs, artillery and radar must be positioned aggressively to target the enemy cannon or rocket systems that often out range U.S. Army

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<sup>246</sup> HQDA, ADP 6-0, 9-26.

<sup>247</sup> HQDA, ATP 3-09.23, 1-2.

<sup>248</sup> Ibid., 9-27.

<sup>249</sup> McConnell, Mong, and Ptascheck, "Seeing Through the Fog," 60.

<sup>250</sup> HQDA, FM 3-90, 1-48.

artillery assets.<sup>251</sup> The S2 and S3 must work together to both predict where the enemy artillery will position and where the batteries need to be to return fire.<sup>252</sup> *Band of Brothers* series of board games captured the need to consider interrupting and suppressing fires and influenced the counterfire mechanics of the game.<sup>253</sup>

Interruption of operations by the opposing player was essential to include because artillery units are inherently vulnerable to counterfire immediately after firing. Not only is interruption an essential aspect of real artillery combat, but it encourages interaction between the players. Reciprocation of fires on an enemy after fire missions encourages an action-reaction-counteraction cycle and that engages the player and replicates the COA analysis. The enemy must be able to react to friendly actions, just like on the battlefield.

To simulate counterfire operations in the game two mechanics are used. First friendly radar units can identify enemy firing units after the first mission that a unit fires. Secondly, after two missions that utilize impacting rounds (HE, RAP) from the same location, the firing units are exposed and the opposing player may execute a fire mission against the exposed unit if able.<sup>254</sup> These two triggers allow for the opposing players to interrupt their counterpart's actions. The counterfire mechanic forces the decisions of when the batteries should move, when the batteries should shoot, and what the batteries

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<sup>251</sup> AFC, AFC Pamphlet 71-20-6.

<sup>252</sup> HQDA, FM 3-90, 3-19.

<sup>253</sup> Krohn, *Band of Brothers*.

<sup>254</sup> See Appendix B.



should shoot at. Just as the artillery battalion leaders must balance the risk versus reward dilemma in real life the players must face the same dilemma in the game.

However enemy artillery units and counterfire are not the only aspects of the battle that interrupt actions on the battlefield. An opposing force could use Special Purpose Forces (SPF), unmanned aerial vehicles (UAVs), or a variety of other resources to target friendly artillery.<sup>255</sup> The integration of these assets with an Integrated Fires Command (IFC) presents a particularly dangerous ability for enemy forces to disrupt friendly actions.<sup>256</sup> Different mechanics than just fire missions must be in the game to model these other threats.

### Vulnerability and Reference Tables

Integrated and varied threats led to important aspects of friction on the battlefield that are not directly controlled by an IFC or FSCOORD. For integrating uncontrolled threats, results tables play an integral role. Wargames such as *Land Power* and *Battle for Moscow* determined combat results with a Combat Results Table (CRT).<sup>257</sup> While *Counter Fire!* uses a die roll and target number to determine combat results, the CRTs presented a different mechanic that could be used to describe other threats to the batteries.

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<sup>255</sup> HQDA, ATP 3-09.23, 6-7; Headquarters, Department of the Army (HQDA), Field Manual (FM) 7-100-1, *OPFOR: Opposing Force Operations* (Washington, DC: Army Publishing Directorate, December 2004), 13-14, [https://armypubs.army.mil/epubs/DR\\_pubs/DR\\_a/pdf/web/fm7\\_100x1.pdf](https://armypubs.army.mil/epubs/DR_pubs/DR_a/pdf/web/fm7_100x1.pdf).

<sup>256</sup> HQDA, FM 7-00.1, 13-14.

<sup>257</sup> Schoof, *Land Power*; Chadwick, *Battle for Moscow*.

A separate table is used in *Counter Fire!* to create a random occurrence of different threats or issues that the firing batteries could face. The vulnerability table added the additional threats of the maneuver forces and uncontrolled friction back into the artillery operations. The vulnerability mechanic allowed more threats to be present, yet uncontrolled by a player.<sup>258</sup> These uncontrolled threats kept the game centered on the artillery. Maneuver forces present and threats are triggered by the artillery unit's choices.

Table 1. *Counter Fire!* Vulnerability Table

1	The unit is attacked by a small special purpose or disruption force. The unit loses one (1) howitzer.
2	The firing point turns into a mud pit due to movement on the same ground over and over. All actions take double action points until the unit moves again.
3	The unit suffers jamming effects and cannot fire this turn.
4	The unit is detected because of their static electronic signature and the unit is exposed to the opponent.
5	Enemy aerial reconnaissance is spotted in the battery's area the battery immediately executes a blitz.
6	Soldiers fall asleep at the howitzers and the battery loses 10 action points for this turn.

*Source:* Created by author.

Events triggered on the vulnerability table are triggered based on the action or lack of action by the player. Adding a measure of increasing vulnerability based on units' movement, hardening, and camouflaging actions can serve to replicate risk accepted by the battery and battalion commanders.<sup>259</sup> Measuring the risk, mitigating risk, and

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<sup>258</sup> See Appendix B.

<sup>259</sup> HQDA, ATP 3-09.23, A-3; Headquarters, Department of the Army (HQDA), Army Techniques Publication (ATP) 5-19, *Risk Management* (Washington, DC: Army Publishing Directorate, November 2021), 2-1, [https://armypubs.army.mil/epubs/DR\\_pubs/DR\\_a/ARN34181-ATP\\_5-19-000-WEB-1.pdf](https://armypubs.army.mil/epubs/DR_pubs/DR_a/ARN34181-ATP_5-19-000-WEB-1.pdf).

accepting certain levels of risk is the FSCOORD's responsibility.<sup>260</sup> So the tracking of actions that addresses the vulnerability to attacks, detection, or complacency is essential for training.

The challenge then becomes setting a threshold to trigger the events. The counter of eight (8) points was set as the trigger for initiating an immediate event. Each turn a vulnerable battery accrues three (3) points and this penalty could increase based on the proximity to active objectives.<sup>261</sup> The number also increases based on the number of fire missions the battery conducts.<sup>262</sup> Vulnerability could then be decreased or reset to zero (0) when the unit moves. These actions give meaning to not just the choice to conduct actions but also the choice to be stagnant.

In combat the FSCOORD must balance the ability to provide continuous fires with that of survivability moves.<sup>263</sup> The vulnerability dilemma not only adds a challenge to keep the brain engaged but replicate the hazards the units may face in battle. Considering vulnerability has the potential to improve not just how an artillery leader visualizes the risks on the field but takes into account all analysis and suggestions from across the staff to balance sustainment, fires, and survivability.

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<sup>260</sup> HQDA, ATP 5-19, 2-1.

<sup>261</sup> See Appendix B.

<sup>262</sup> Ibid.

<sup>263</sup> HQDA, FM 3-09, 1-52; HQDA, ATP 3-09.23, 3-9.

## Maps/Terrain

A possibility when making a war game is to focus only on the systems in play and abstract the terrain and relative distances. However, just as stated in FM 3-96 consideration of the terrain is critical to any military operation and this includes the direct support artillery battalion.<sup>264</sup> Proper analysis of the terrain and terrain's effects on the battery are essential to artillery battalion and therefore must be used in training the staff and leaders.

The importance of terrain analysis eliminates many different techniques used for maps in many games. One of the most common techniques in wargaming to force terrain management is a point-to-point map. Games such as *Friedrich*, *Race to the Rhine*, and *Napoleon 1807* use point-to-point maps to show avenues of approach, restrictive and unrestrictive terrain, and key terrain that influence what the players can and cannot do.<sup>265</sup> Point-to-point maps are not appropriate for training professional artillerymen. Military professionals need to analyze terrain for themselves. Staff officers can then use their knowledge of capabilities to visualize, describe, and recommend suitable, feasible, and acceptable options to the commander. A point-to-point map does too much of the analysis that staff and leaders are expected to do themselves and is therefore inappropriate for training.

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<sup>264</sup> Headquarters, Department of the Army (HQDA), Field Manual (FM) 3-96, *Brigade Combat Team* (Washington, DC: Army Publishing Directorate, January 2021), 2-3, [https://armypubs.army.mil/epubs/DR\\_pubs/DR\\_a/ARN31505-FM\\_3-96-000-WEB-1.pdf](https://armypubs.army.mil/epubs/DR_pubs/DR_a/ARN31505-FM_3-96-000-WEB-1.pdf).

<sup>265</sup> Denis Sauvage, *Napoleon 1807*, Board Game (Aubenas, FR: Shakos, 2020); Richard Sivel, *Friedrich*, Board Game (Berlin, DE: Histogame, 2004); Andruszkiewicz and Gumienny, *1944*.

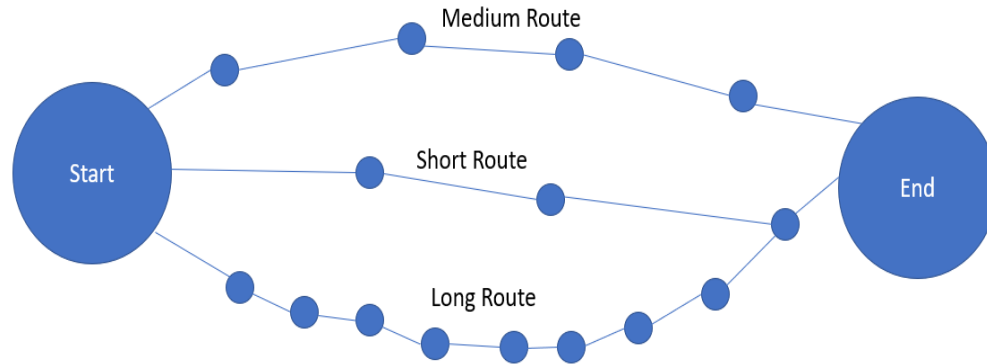


Figure 9. Example Simple Point-to-Point Map

*Source:* Created by author.

The next step up in complexity from a point-to-point map is a sector map. These maps can be found in mostly strategic and operational wargames while only occasionally at the tactical level. These maps generally have varied geometric shapes (similar to the battle dress uniform patterns) super imposed over a map. These maps are a more realistic than point to point maps and generally require the player to do more analysis about where pieces can go from sector to sector and what sectors can affect other sectors. As stated before, sectors remove much of the analysis that the staff or leader needs to do. The different sizes of sectors can represent severely restrictive, restrictive, and unrestrictive terrain based on the sector's size and shape. Indeed, some lessons can easily be taught based on stopping and thinking about why sectors are sized and shaped a particular way. But again, dictating the sectors on a map does the staff's work for them. Sectors also complicate range analysis for where the batteries should be emplaced to hit targets. Afterall, the terrain under a ballistic trajectory has little effect on the round in flight

unless intervening crests are not accounted for.<sup>266</sup> For these reasons a sector map is inappropriate for an artillery wargame.

Given sectors and point to point maps are eliminated from consideration, one could consider going to a fully scaled system on a tabletop. However, scale modeling is simply too resource intensive to be practical. Many wargames such as the original *Kriegsspiel* use an abstract map with scaled unit markers and rulers for rates of march and capabilities.<sup>267</sup> Specific maps, scaled terrain, and scaled pieces are difficult and expensive to produce in mass quantities. While these types of terrain models do force creative and critical thought, true to scale and size figurines are just not practical.

Hexagonal maps (referred to from here on as hex maps) are a viable choice that many wargames use. The game *Band of Brothers* uses a hex map to great effect and a multitude of other titles do as well.<sup>268</sup> Hexes are user friendly and simple as they are closer to a circle. The six sides of a hex make movement and range measurement in multiple directions easy. Hex maps' pattern and level of detail also allows for specific rules for terrain that dominates a hex or borders the hexes. The game *Land Power* at the Command and General Staff College uses hexes to great effect, assigning values 1-3 on each hex to quickly assess the speed units can move through each hex.<sup>269</sup> The hex maps' adaptability and allows for more free thought, analysis, and ease of play. *Band of*

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<sup>266</sup> HQDA, TC 3-09.81, 15-34.

<sup>267</sup> Reisswitz, *Kriegsspiel*.

<sup>268</sup> Krohn, *Band of Brothers*.

<sup>269</sup> Schoof, *Land Power*.

Brothers used hexes to determine the contents of each 10m of terrain. Many other games used them to denote whole kilometers or tens of kilometers worth of terrain and used the edges for obstacles such as rivers in the case of *Hold Fast: Russia* and *Battle for Moscow*.<sup>270</sup> However, *Counter Fire!* will not use a hex map.

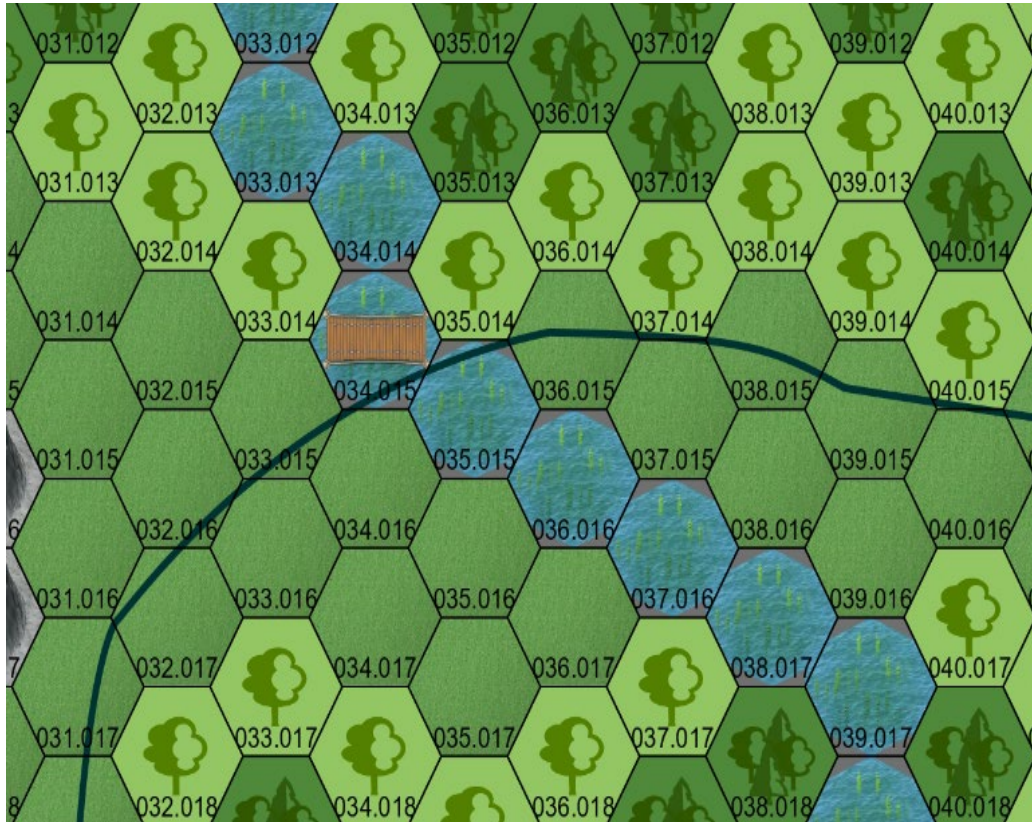


Figure 10. Example Hexagonal Map

*Source:* Created by author using Worldographer/Hexographer2, v1.38, accessed January 20, 2022, [www.hexographer.com](http://www.hexographer.com).

<sup>270</sup> Wylie and Wylie, *Holdfast*; Chadwick, *Battle for Moscow*.

The purpose of *Counter Fire!* is to train the artillery staff and leaders how to move howitzers into the right area, at the right time, to shoot the right targets in order to shape the battlefield for the maneuver commander. Therefore, the best map to use for the game is a simple 1:50,000 grid map. The 1:50,000 scale is the standard used for military maps at NTC and JRTC. The military grid reference system 1984 (MGRS '84) is the standard that military maps are made of and easily accessed in the Advanced Field Artillery Target Data System (AFATDS). Using 1:50,000 scale maps lowers the barrier to entry to the game for units across the Army. Army staffs can use their traditional planning systems, resources, and products to analyze the terrain in the game just as the staff would in a real battle.

The game rules mitigate the downsides to using a 1:50,000 grid as opposed to a hex map. For determining range, a string with the max ranges of munitions is provided to each player.<sup>271</sup> Range strings are common tools used by staffs to measure ranges of munitions and weapons systems.<sup>272</sup> If the target is out of range on the string, the target would be out of range in real life. Players must classify each grid square as unrestricted, restricted, or severely restricted. Players classifying terrain by grid square allows for conversations between the staff as to what the staff could reasonably expect in each kilometer of terrain and mitigates one steep hill or cliff from designating an entire grid square as severely restrictive terrain. Players can make irregular (non-cardinal direction)

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<sup>271</sup> HQDA, ATP 3-09.5, 1-7; See Appendix A.

<sup>272</sup> Author's experience as a Fire Support Officer in various Army units from 2011-2018.



travel along roads for the same cost as cross country on unrestrictive terrain.<sup>273</sup> Range, terrain classification, and travel could be easier on a hex map; however, units use 1:50,000 scale maps for real operations.

Moving diagonally is a hotly contested issue with games on a grid and a reason why so many gamers prefer hex maps to grid maps. Allowing diagonal movement at 1.5 times the cost or simply along a road at normal cost alleviates this irregularity. Allowing movement along a road at all times also institutes some realism on severely restricted terrain.<sup>274</sup> Allowing road movement through severely restrictive terrain enables the batteries to traverse along a road is on steep or densely forested mountain side for example.

Terrain must be included in the game for vulnerability aspects as well. While units can dig themselves fighting positions in almost any terrain, camouflage is only available where there is enough vegetation or irregular terrain to use.<sup>275</sup> Only allowing camouflaging actions in restrictive terrain forces the artillery to consider the benefits of placing the artillery batteries in tree lines, low vegetation, or undulating terrain.<sup>276</sup> Camouflage is a key aspect of the batteries' ability to survive that can be lost on leaders that have only experienced static fire base and forward operating base operations in the

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<sup>273</sup> See Appendix B.

<sup>274</sup> See Appendix B.

<sup>275</sup> Ibid.

<sup>276</sup> HQDA, ATP 3-09.23, 6-10.

past 20 years of conflict. With the map established the determination ammunition mechanics and abilities can be assessed.

### Ammunition

Ammunition is one of the most crucial aspects of the battle that the artillery battalion staff and commander have control over. The commander chooses the method of distribution based on input from the staff and mission variables.<sup>277</sup> Ammunition is the most difficult class of supply to plan for because the consumption is not easily predicted, can often exceed the planned amount, and must compete with other classes of supply for space on distribution platforms.<sup>278</sup>

Commander's visualization and staff prediction of the ammunition consumption during the battle is essential for the artillery battalion to succeed. Maneuver commanders request certain effects on targets. The artillery staff and commander must plan how to get the correct ammunition to create the effects and how to distribute ammunition to the firing batteries.<sup>279</sup> Without the right ammunition at the firing batteries the battalion will fail to support the maneuver objectives.

Therefore, game mechanics must allow for a multitude of different ways to get ammunition to the firing batteries. Action point systems allow for the player to choose the order of actions and allow for adaptable planning and execution. There are three major techniques for moving supplies across the brigade to the batteries. Through put

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<sup>277</sup> HQDA, FM 4-0, 5-17.

<sup>278</sup> HQDA, ATP 3-09.23, 7-1.

<sup>279</sup> Ibid., 5-1.

resupply is the movement of ammunition straight from the BSB to the batteries.<sup>280</sup>

Battalion trains, the battalion FSC delivers ammunitions and supplies to the batteries.

Troop/Company/battery trains is where the batteries send resupply trucks back to the FSC to retrieve ammunition.<sup>281</sup> The two key techniques that the artillery battalion can control and choose are battalion and company trains. Therefore, these must be possible in the wargame.

Throughput operations are not possible because this is not a decision made by the artillery battalion.<sup>282</sup> The brigade support battalion executing throughput operations is the decision of the brigade commander. The brigade commander could be persuaded to conduct throughput operations for battalions in the fight, but the brigade commander is not likely to choose this option. The artillery ammunition is very important but, the artillery FSC and batteries are often much closer to the BSA than the maneuver forces.<sup>283</sup> The proximity of the firing units to the BSA means that the artillery units should be able to move their own ammunition more easily than the infantry or armor. The artillery battalion also has more vehicles than the light infantry. While throughput resupply is a possibility, artillery units should not count on this technique being available during a fight.

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<sup>280</sup> HQDA, FM 4-0, 6-10.

<sup>281</sup> HQDA, FM 4-0, 5-14.

<sup>282</sup> Ibid., 6-10.

<sup>283</sup> Ibid., 5-15.

Battalion and battery trains can be controlled and triggered by the artillery battalion. The distribution platoon is responsible for distributing all classes of supply in the battalion.<sup>284</sup> The distribution platoon, as a part of the FSC, has the bulk of the flat racks (large removeable truck beds that cargo of all types can be secured to and transferred from truck to ground to truck) that can be used for the transportation of ammunition. Transporting ammunition is a critical factor the commander uses to decide what resupply technique the battalion will use. If the staff cannot visualize how much the distribution platoon can move and the time required to move the supplies, howitzers will not be able to deliver effects on the target.<sup>285</sup> To train and facilitate visualization of the battle the distribution platoon must be represented.

Replication of the types of distribution can be accomplished with the action point system and breaking down the FSC into a headquarters and distribution platoon. The distribution platoon's movement across the battlefield is essential for the battalion to track and trigger. The effort placed into the distribution platoon is still a part of what the FSC does and therefore must come out of the same pool of action points. Given that the platoon and FSC has more people by MTOE than the firing batteries and therefore needs a similar amount of action points. The FSC also needs to be able to execute complimentary actions for resupply. Therefore, the FSC and distribution platoon also execute the

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<sup>284</sup> HQDA, ATP 3-09.23, 7-2.

<sup>285</sup> Ibid., 7-8.

movement, emplacement, and upload/download actions.<sup>286</sup> The distribution platoon has to perform these actions to replicate their roles in R3SP.<sup>287</sup>

With the need for and basic actions of the FSC and distribution platoon established, the ammunition needed to be replicated. Unit basic loads (UBLs) are the totals of ammunition that the batteries are expected to carry when starting a battle.<sup>288</sup> To establish the UBL and ammunition, the maximum payload of the family of medium tactical vehicles (FMTVs) and the high mobility multiple wheeled vehicles (HMMWVs) had to be modeled. The weight and cubic space of the ammunition needed to be compared and replicated.

Artillery ammunition in the United States Army falls into two categories: semi-fixed ammunition and separate loading ammunition.<sup>289</sup> The M119A3 105mm howitzers, fire semi-fixed ammunition. Rounds are packaged in pairs inside a single wooden crate. In the crate, each round is housed inside a cardboard cylinder with the brass canister and propellant. When looking at how the rounds are transported in the howitzer sections however, the cardboard cylinders are removed from the crate and stacked in the back of the trucks. The wooden crate is used for building and fortification material. With the packaging removed the planning weight is 35lbs per round carried in the HMMWVs. Breaking down the rounds packaging also saves cubic space in the back of the

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<sup>286</sup> See Appendix B.

<sup>287</sup> HQDA, ATP 3-09.23, B-3.

<sup>288</sup> HQDA, ATP 3-09.23, 7-3.

<sup>289</sup> Ibid., B-2.

HMMWVs as the rounds can be stored vertically with ratchet straps in between groups of them. The HMMWV payload equals: 4,400lbs which means that including planning factors for the seven-soldier crew each needing 350lbs of planned weight, the howitzer section can carry up to 104 complete rounds of 105mm ammunition and still have weight remaining for the basic issue items and other supply classes without damaging the HMMWV.<sup>290</sup>

The 155mm rounds take up roughly three times as much space as the 105mm rounds. The 155mm ammunition uses a separate loading concept and packages the rounds differently. The shells are packaged separately than the propellants. The propellants are packaged in metal tubes on wooden pallets and the shells are packaged in sets of eight on specially made metal pallets with bolts securing the round to the pallet where the fuze screws in. The extra packaging and size mean that the completed rounds not only weigh near three times as much, at 95-110lbs but also use more cubic space on the flat racks and trucks.<sup>291</sup> While initially sounding complicated, this means that 155mm rounds can be replicated simply by taking three times as much space on the ammunition trackers as the 105mm variants.

The ammunition storage model must be realistic enough to be useful without being cumbersome. *Race to the Rhine* and *Terraforming Mars* used block counters and spreadsheets to track supplies by quantity, type, and value.<sup>292</sup> Both of these games used

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<sup>290</sup> AM General, “OEM Certified Remanufactured HMMWV 1097A2R.”

<sup>291</sup> HQDA, FM 4-0, 5-4.

<sup>292</sup> Andruszkiewicz and Gumienny, 1944; Jacob Fryxelius, *Terraforming Mars*, Board Game (Vellinge, SE: Fryxgames, 2016).

small tokens in slots on a grid tracker. Through the use of tokens on tracking grids visualization of capacity, value, and type of resource was easy. *Counter Fire!* uses a similar concept with tracking the type of ammunition on a grid tracker.

Simple representation of tally marks or actual ammunition numbers was not practical in a wargame. As stated earlier the individual howitzer sections can each hold near 100 rounds. Fire missions are counted in the number of rounds per group of howitzers (battalion, battery, or platoon).<sup>293</sup> If the game used numbers or tallies the training would quickly turn into less of a decision-making game and more akin to math homework. While the math can be educational and have training benefit, numbers and tallies do not assist with visualization. Using a physical and visual system that can replicate the rounds available utilizes more senses and creates a training tool that allows leaders to literally see and feel the ammunition status without needing a calculator.

The second problem was creating a system easily useable to represent fire orders and numbers of rounds at the same time. The relationship between fire orders and ammunition is essential to developing a staff. Telling a commander that a certain number of rounds on hand has little meaning. Defining on-hand ammunition by fire orders increases shared understanding of the capabilities of the unit. Describing the unit has 15 battery six (6) rounds, or that the batteries have enough ammunition to neutralize 10 tanks or destroy 12 infantry platoons better describes the capabilities of the unit. These measurements give the staff and leadership more understanding of what can actually be

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<sup>293</sup> HQDA, TC 3-09.81, 5-9.

fired or effects available with the available ammunition. Now if ammunition is described in fire orders, how can ammunition be represented on a finite tracker?

*Counter Fire!* defines the ammunition at the batteries as each block equals firing one (1) complete round per howitzer that is currently available to the battery.<sup>294</sup> This definition creates an easy transaction for spending ammunition and simulates the loss of ammunition at the firing unit as howitzer sections are destroyed.

Now there are some flaws with this ammunition model. Firstly, if ammunition equates to number of rounds per howitzer at the firing battery there will be an inequality when transferring ammunition from the FSC to the battery. After all, the strength of the firing platoon does not directly affect the strength of the distribution platoon. Some may say that this inequality breaks the system. Indeed, the inequality in the model means that each round carried by the distribution platoon is worth only as much as the strength of the battery the distribution platoon is supplying. How can a flawed system work and assist in training and visualization?

There are actually two aspects of resupply friction that the inefficiency accounts for. Batteries cannot always haul every piece of the artillery round that is brought by the distribution platoon. Afterall, there are differences in the haul capacity between firing units and forward support companies.<sup>295</sup> The differences in packaging of rounds also means that some inefficiencies exist in the real system. A surplus of one piece of a complete round has to be carried by either the FSC or battery and then grouped with a

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<sup>294</sup> See Appendix B.

<sup>295</sup> HQDA, FM 4-0, 5-4.



complete round at a later time. With that in mind, perfectly efficient systems of an ammunition marker truly representing 10 rounds makes ammunition tracking too easy, unrealistic, and causes issues with how rounds are fired for each mission.<sup>296</sup> To ease the friction between mechanics the value of each ammunition block or slot, the unit ammunition trackers had to have a fluid value to better train the staff and leadership.

The final answer on ammunition is that ammunition is tracked as marking squares on a grid for each type of ammunition. Each battery and forward support company has a tracker that represents how much ammunition each unit can carry and when the battery fires that ammunition the player can roll one (1) d20 for each howitzer available.<sup>297</sup> Having each ammunition block represent one (1) round per howitzer enables a useable relation between the mechanics of hauling the ammunition and expending the ammunition.

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<sup>296</sup> Playtest notes dated 26 January 2022.

<sup>297</sup> See Appendix B.

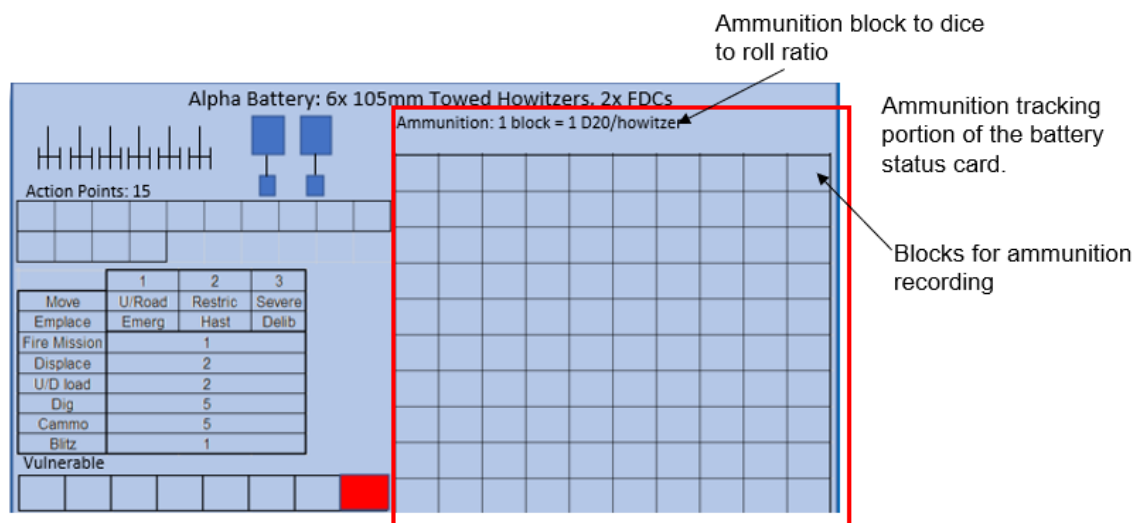


Figure 11. Highlight of the Ammunition Tracker for Each Battery

Source: Created by author.

### Cards, Dice, and Targets

The relationship between observing targets and delivering artillery rounds on those targets requires the synchronization of observers, staff decisions, battery emplacements, ammunition resupply, technical fire direction, and ballistics. In order to replicate these relationships, the players will need to draw FAT cards, spend action points, and roll dice to adjudicate the results. The Field Artillery Task (FAT) cards add randomness to the targets acquired to replicate the uncontrolled effectiveness of the maneuver elements. Dice rolls for the effectiveness of rounds fired simulate the inherent randomness of indirect fire rounds landing.<sup>298</sup> Different target sizes and degrees of

<sup>298</sup> HQDA, TC 3-09.81, 11-2. As this paper does not delve into the intricacies of technical fire direction this randomness will not be explained in detail. Suffice to say that all indirect fire rounds can be fired accurately and precisely to a point. Outside of the five requirements for accurate predictive fire are position constraints. These are small

protection influence how effective artillery can be. These elements were all included in the FAT card, and dice roll mechanics.

As previously stated, the FSCOORD does not control the maneuver elements and observation tasks are delegated to observers that are then task organized (controlled) by infantry or armor commanders.<sup>299</sup> So, while the choice to fire at a target resides with the FSCOORD, the FSCOORD does not control the targets observed or requested to be fired.<sup>300</sup> To represent this dilemma, field artillery targets and field artillery tasks were combined into the FAT cards. The FAT cards are then divided up between the battalion sized operations.

During each active operation, the players can draw a number of FAT cards. These cards represent the targets passed to the fires cell in the brigade and the fire direction center at the battalion. Normally the brigade fires cell would filter out any targets deemed insignificant.<sup>301</sup> However, including these targets gives the players practice making decisions on what targets to engage, just as the FSCOORD or FDO might. The FSCOORD would control target discrimination through forming the high payoff target list (HPTL) and target selection standards for the brigade commander.<sup>302</sup> The game creates a feedback system that disincentivizes engaging targets that are not High Pay off

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variances between each round from a number of factors that are difficult to quantify or control. These cause dispersion and inconsistency round to round.

<sup>299</sup> HQDA, ATP 3-09.23, 4-2.

<sup>300</sup> Ibid., 3-9.

<sup>301</sup> Ibid., A-2.

<sup>302</sup> HQDA, FM 3-96, 4-40.

Targets (HPTs). The lowest HPT is worth twice the victory points of any non-HPT.<sup>303</sup>

Each time a player engages non-HPTs, that player exposes the batteries to counterfire and wastes valuable rounds that could be used for HPTs.<sup>304</sup>

The significance of the wasted rounds can be linked back to the to hit statistics. Army artillery doctrine emphasizes the importance of massing firing batteries and effects.<sup>305</sup> When a player does not mass the batteries, fires the incorrect ammunition, or engages FAT cards that are not HPTs, the player wastes rounds. If a player engages a BMP in the open, the player must roll 54 d20s to have a 51% chance of achieving effects. Firing 54 rounds would be a battery nine (9) round mission for the Blue team, or a battery seven (7) round mission with the Red team (a Red team battery nine 9 rounds would actually be a 56 round mission at full strength but the success percentage change is minute). That is one tenth of the battalion's ammunition for only a 50% chance of success. If the player is not aggressive and fires less than that, the risk becomes much greater than the potential reward. If the player fires more than that, the player is spending one (1) of 10 missions of that size that the battalion has on hand for a single point for that objective. Determining how much ammunition to spend for each target is the same dilemma that commanders face in the real battle. What targets should be engaged, when, and with what resources.

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<sup>303</sup> See Appendix B.

<sup>304</sup> Playtest memorandum dated 20 January 2022.

<sup>305</sup> HQDA, FM 6-0, 9-9; HQDA, ADP 3-09.23, 5-5.

The dice probabilities continue to degrade as the players lose howitzers to counterfire or vulnerability events. Decreasing the value of each ammunition block then forces the players to make decisions on what targets are essential to fire at what times. While possibly decreasing the number of actions or fun per turn, this decision replicates the real consequences of firing too often, in small numbers, or at non-high payoff targets. Doctrine encourages prosecuting HPTs, with massed effects, at times when the commander can balance the risk with rewards.<sup>306</sup>

Conversely, massing fires with multiple batteries with the correct rounds is encouraged through bonuses to hitting the targets. The player adds one (1) to each die if two batteries fire at the same FAT card, and plus two (2) to each die if all three batteries fire at the same FAT.<sup>307</sup> Adding a bonus for massing batteries encourages massing in the form of firing multiple batteries at the same target.<sup>308</sup> The bonus for firing multiple batteries is added to other bonuses for the more effective 155mm high explosive ammunition and the Dual-Purpose Improved Conventional Munitions (DPICM). Stacking bonuses means that if the player can use the entire battalion with DPICM, each battery could have a bonus of up to four (4) added to each of the player's die rolls. Stacking bonuses gives the player benefits to matching ammunition to the appropriate target and massing batteries at the same time. As the player chooses the amount of ammunition to

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<sup>306</sup> HQDA, FM 3-09, 1-10; HQDA, ATP 5-19, 4-10; HQDA, ATP 3-09.23, 5-5.

<sup>307</sup> See Appendix B.

<sup>308</sup> Play test memorandum dated 17 January 2022.

fire, the player must remember that the twenty-sided die has only a 5% chance of hitting most targets.

The choice of using a twenty-sided die (d20) also encourages massing batteries and firing large numbers of rounds. Using the d20 for each artillery round fired means that each round normally has a chance to hit a target.<sup>309</sup> While rolling 12-16 dice may be effective to hit small targets, the player will need to fire in much higher volume to hit larger targets. The use of six-sided dice (d6) was tested early in the game, but these caused unbalanced results and conflicted with the ammunition system.<sup>310</sup> The d6 tripled the chance to hit over the d20. Each d6 gives a 17% chance to achieve a six (6), which was used for each hit at the time of testing. For d6 to be used for fire mission adjudication the ammunition trackers had to be adjusted each time a howitzer was destroyed, and hit chances increased exponentially for weaponeering and massing. The odds quickly became that the players would hit most targets firing small amounts of rounds. For example, if the player spent one ammunition slot to roll one d6 per three howitzers the player gained a plus two (+2) to hit with DPICM the odds to succeed for one (1) hit would be 32% as opposed to a 21% for the d20 model. The addition of the modifiers and lower numbers to succeed with a d6 model enabled higher hit rates per die. The ease of hitting targets with a d6 eliminated the importance of player decisions on how much

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<sup>309</sup> Appendix B. Technically if a player chose to shoot high explosive rounds at a Tank FAT card from only the 105mm batteries there would not be a mathematic possibility of hitting the target. A 21 would be possible but a 22 is needed for each hit. The numerical difficulty forces the player to mass a 105mm battery with a 155mm battery or fire DPICM.

<sup>310</sup> Playtest memorandum dated 17 January 2022; Playtest memorandum dated 26 January 2022.

ammunition to spend and what targets to engage. The d6 degraded the purpose of the game that is centered around training tactical fire direction and integrating key staff functions.

The player's choices on engagement of FAT cards combine to produce very low odds of success if the player does not properly mass and weaponeer each target. The difficulty to hit each target is set by the target's difficulty to affect with an artillery round. Infantry targets in the open are the easiest to hit, and only need a 19 total to hit (number on the d20 plus modifiers). Vehicles and artillery pieces are harder to affect with blasts and shrapnel and need a 20 on the d20 to affect. Tanks are specifically designed to withstand blasts and shrapnel so therefore need a 22 to hit. Requiring a 22 to hit tanks means the player must mass the 155mm battery with at least one other battery or fire DPICM with any battery. The player could do both to increase the odds per round. However, the player must still fire large amounts of rounds to affect the tanks. In fact, weaponeering and massing is the only way to significantly increase the odds of achieving effects on larger targets.

The number of hits, or successes, needed to achieve effects on the FAT cards is determined by the size. The FAT cards list whether the target is a team, squad, section, or platoon. Each of these correspond to an echelon of size for a military formation. Fire teams are small teams of four or less people. Squads consist of two (2) teams. Sections are formations usually used in reconnaissance that consist of two to three teams. Each of these smaller echelons make up platoons. Platoons generally have between three (3) and

four (4) squads, or at least two (2) sections.<sup>311</sup> An exception to the section description is the artillery sections. Each of these consists of two (2) teams, and centers around one (1) howitzer or the fire direction center. These sections perform special tasks but are the same size as infantry squads.

To succeed at each FAT the player must achieve (1) hit against a team, two (2) hits against a reconnaissance or mechanized section, three (3) hits against a squad, four (4) hits against tank sections and six (6) hits against any platoon.<sup>312</sup> The amount of hits required to achieve affects against each card means that to greatly increase odds against the FAT cards the player must maximize all available bonuses. Table 2 below illustrates the difficulty of achieving these effects without bonuses.

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<sup>311</sup> HQDA, FM 1-02.1, 1-42, 1-78, 1-88; These are paraphrases from Operational Terms the largest reference of official definitions from Army doctrine. Understanding the echelons of the units is essential to the understanding of their size. The size of each target was limited at the platoon level because if a platoon size element could be significantly affected then a company size would be affected by as well. After all, if a company has an entire platoon suppressed the suppression could significantly affect the company's maneuver. Also, additional observation would need to occur to properly identify elements larger than a platoon.

<sup>312</sup> See Appendix B; see Appendix D Printable Game Parts for visual examples.



Table 2. Odds to Achieve a 19 or 20 on a d20

# of d20	19+				20			
	1hit	2hits	3hits	6 hits	1hit	2hits	3hits	6 hits
6	47%	11%	2.00%	0.00%	26%	3%	0.20%	0.00%
8	57%	19%	4.00%	0.00%	34%	6%	0.60%	0.00%
12	72%	34%	11.00%	0.05%	46%	12%	2%	0.00%
18	85%	55%	27.00%	0.60%	60%	23%	6%	0.00%
19	86%	58%	29.00%	0.90%	62%	25%	7%	0.00%
24	92%	71%	44.00%	3%	71%	34%	12%	0.00%
34	97%	87%	67.00%	12%	83%	51%	24%	1%
36	98%	89%	71.00%	14%	84%	54%	27%	1.00%
54	99.60%	98%	92.00%	46%	92%	76%	51%	5.00%
64	100%	99.9	96.00%	63%	96%	84%	63%	10.00%

*Source:* Created by author. Odds generated using Omni Calculator, accessed April 29, 2022, <https://www.omnicalculator.com/statistics/dice>.

NOTE: Percentages rounded to the nearest whole number except when used to show changes or possibilities below 1%.

These odds mean that players must fire large quantities of ammunition to achieve the effects needed on larger targets. Only by combining batteries and weaponeering do the entry arguments for the table shift significantly. When the player is rolling 36 d20, with bonuses of 3 or more the player has a 67% chance of achieving three hits against tanks. Only when rolling 64 d20s with the same modifiers does the player have a 63% chance of achieving six (6) hits.

As the player considers the requirements to achieve affects against each target, the player must also consider how long the target is valid for. Each FAT card has a decay value at the bottom of the card. The decay value represents the amount the action points the player can spend before the target is no longer valid. The target decay forces the player to decide what actions to prioritize in the turn. If the player chooses to prioritize actions other than firing, the targets may decay before the player can engage the target. If a player engages non-high payoff targets first, the HPTs may decay before the player

engages them. The decay value applies to the total action points spent in the turn, not just for single units. Using the total action points spent forces the players to plan what batteries are prioritized for firing, when the batteries are moving, and what targets to prioritize. Decay forces the player to conduct tactical fire direction for the batteries as an FDO would do on the battlefield.<sup>313</sup>

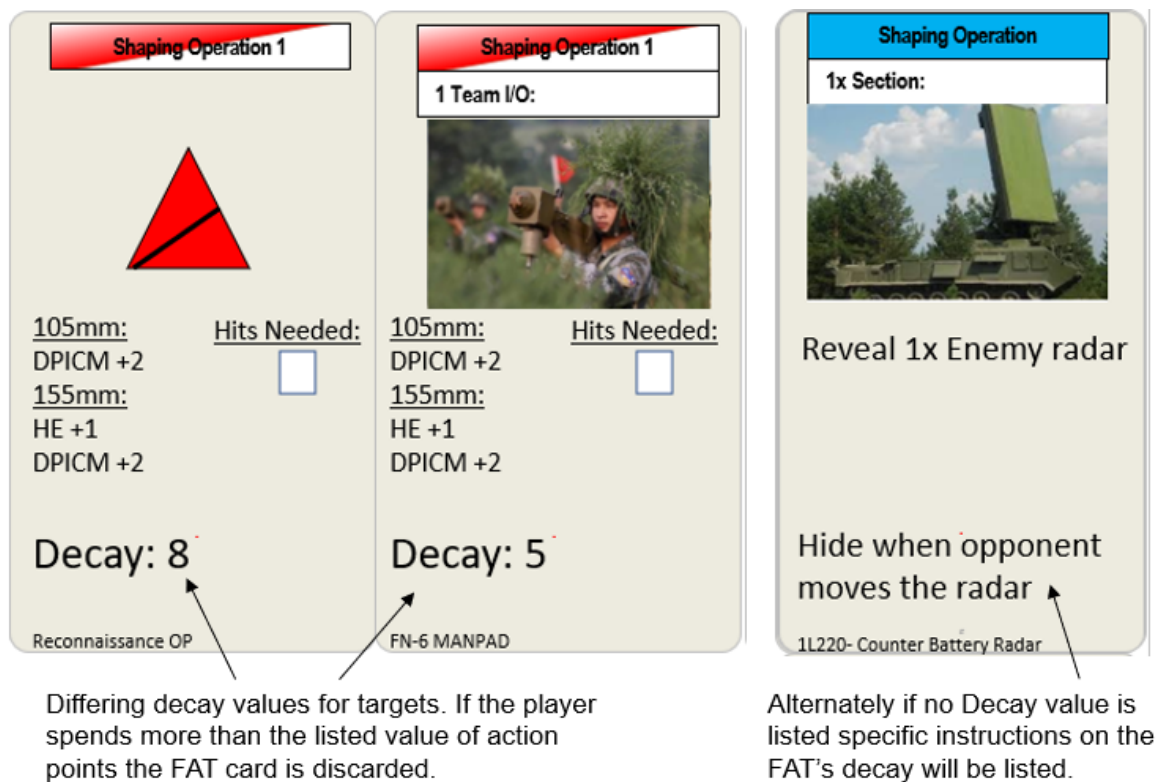


Figure 12. Example FAT Cards with Decay Instructions

Source: Created by author.

<sup>313</sup> HQDA, ATP 3-09.23, 1-14.

The final ways that the FSCOORD could affect the engagements is by requesting support from the next higher units. To simulate higher units' support of brigades, each player has three requests for support each game. These requests reflect each side's ability to integrate with the higher echelons. Enemy Integrated Fires Commands (IFCs) tend to be more centralized and integrated with Special Purpose Forces (SPF).<sup>314</sup> The U.S. Army tends to be more decentralized but excels at dynamic targeting.<sup>315</sup> Both U.S. and opposing forces have long range assets that can be called for devastating effects on HPTs. Each side receives slightly different, one-time use, requests to get support from higher units to reflect differences between friendly and opposing forces.<sup>316</sup>

The FSCOORD and staff must be able to recognize enemy equipment and capabilities to see opportunities. The FAT cards offer an opportunity to encourage recognition of the friendly and enemy equipment. Some units put images of enemy equipment, and visual replications of CTC equipment, over toilets and sinks.<sup>317</sup> The Army requires observes to pass equipment recognition tests as a part of artillery skills proficiency tests as well.<sup>318</sup> The FAT cards in the same way have images and pictures that members of the staff can use to remember and recognize equipment and icons.

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<sup>314</sup> HQDA, FM 7-00.1, 13-14.

<sup>315</sup> HQDA, ATP 3-60, 1-5.

<sup>316</sup> See Appendix B.

<sup>317</sup> The author placed many of these pictures around the offices and so did many units in the 3rd Cavalry Regiment in 2016 and 2017 in preparation for an NTC rotation. The Field Artillery Squadron even used a phone application that assists with identifying foreign equipment.

<sup>318</sup> HQDA, TC 3-09.8, 1-6.

Doctrine is clear. The artillery and maneuver leaders need to shape battles for the maneuver units to win. Army leaders need to mass effects in accordance with the main effort to achieve a decisive advantage. The game of *Counter Fire!* replicates tactical fire direction by forcing the player to choose when, why, and how the artillery will be used to shape each of the maneuver unit's operations. The mechanics of dice rolls for determining effects and cards to determine the targets force the player into the same decisions that the FSCOORD and artillery battalion staff could face in a battle.

### Rules Access and Situational Awareness

The difficulty of training with games is often not the lessons of the game, but the understanding and appreciation of the rules. *Root* combined using player boards as tracking the status of the factions with quick access to key rules.<sup>319</sup> The key from *Root* was not just the unique way *Root* approached asymmetrical warfare, but the reference cards for each faction.<sup>320</sup> The reference cards kept the rules at hand and told the player the steps to execute the actions each faction could take. An adaptation of these reference cards is used in *Counter Fire!* to assist players in knowing the actions available and to help players visualize the benefits of tracking battle damage to both the friendly and enemy units.

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<sup>319</sup> Wehrle, *Root*. The player boards in *Root* have slots for the player to track resources and the rules that each faction uses to carry out actions. The rules completely change based on what faction the player chooses. The different rules add a level of asymmetry that is entertaining to play but can also be confusing for new players. The quick access and simple strategy described on the boards is essential to play and allows players to change factions quickly each time they play.

<sup>320</sup> Ibid.



## BLUE PLAYER CARD 2

Turn Sequence: Draw FAT Cards, Increase Vulnerability, Recover Action points, Activate Units

**Forward Support Company: 1x CP 1x Distro platoon**

Ammunition: 1 block = 1 D20/howitzer

Action Points: 15

	U/Road	Restric	Severe
Move	1	2	3
Emplace	5		
Displace	3		
U/D load	2		
Blitz	1		

**AN/TPQ-53 1**

Action Points: 10

	U/Road	Restric	Severe
Move	1	2	3
Emplace	3		
Displace	2		
U/D load	2		
Dig	5		
Cammo	5		
Blitz	1		

Radar Cue  
On Pass

Vulnerable			

**AN/TPQ-53 2**

Action Points: 10

	U/Road	Restric	Severe
Move	1	2	3
Emplace	3		
Displace	2		
U/D load	2		
Dig	5		
Cammo	5		
Blitz	1		

Radar Cue  
On Pass

Vulnerable			

**Higher Unit Support and TTP advantages**

- Dynamic Targeting: If an enemy firing unit moves with-in 8kms of an objective expose it and immediately engage if able.
- DIV HPTs spotted: When you identify 2 or more Enemy Batteries roll 12 D20 against each with a +2 modifier. Do not expend ammunition when doing so.
- Final Protective Fires: Engage one target up to 3 times. Each time you achieve affects against the FAT score it again.

Each of these advantages may be utilized 1 time per game.

**Radar Cue/Radiation:**  
 If a Radar is IPRTD and radiating reveal any Enemy battery that fires on its first fire mission. You may begin counterfire after its fire mission is complete but before the opposing player takes another action of any type.  
  
 To observe the round the radar must have line of sight to the halfway point of a straight line between the firing battery and the objective it is supporting.

**Vulnerability:**  
 +3/turn for each IPRTD Radar  
 +3 if w/in 5 kms of an objective  
 -1 for Digging  
 -1 for Cammo  
 Reset to 0 when the section moves.  
 The FSC will not accrue vulnerability. However it can be observed when certain FAT cards are drawn.  
**Cache:**  
 Ammunition may be downloaded in the field.  
 Complete one download action then place a white block in the place it was dropped and note the ammo on a note card.

**Resupplying:**  
 155mm ammunition is listed as 3 blocks for the FSC these equate to 1 block on the Charlie battery Ammo Tracker (non-interchangeable with 105mm). If the battery has all its howitzers it may send an ammunition section to resupply. Up/Down load must be conducted twice per resupply. This can be split between 2 collocated units.

Figure 14. Example Player Card 2

Source: Created by author.

The player cards with rules printed on them allow the players to see the majority of the rules in both text and graphic form. If the player wonders when to roll on the vulnerability table this trigger is indicated by a red block on the vulnerability tracker. If the player wonders what objective is next, the player can reference the objective tracker. Same with ammunition at the batteries, in the FSC, and cached. These cards allow the player to track rules and status of units.

## Objective Tracker

Turn Sequence: Draw FAT Cards, Increase Vulnerability, Recover Action points, Activate Units

Turns														Score: Blue/Red	
SO1															
SO2															
SO3															
DO															

	Blue	Red		Blue	Red
105mm			155mm		
HE			HE		
HERA			HERA		
DPICM			DPICM		
Illumination			Illumination		
Smoke			Smoke		

High Payoff Targets	Off	Deff
Tanks	4pts	4pts
ADA/RADAR	3pts	3pts
CPs	3pts	2pts
Artillery	2pts	2pts
Engineers	2pts	3pts
All Others	1pt	1pt

**FATs and Scoring:**  
Each accomplished FAT card will be scored according to the HPTL to the left. Keep score by objective to the right of the turn tracker above. The player who has the most points in the objective when it ends wins the objective. For each objective the player wins he/she can draw one more FAT card for subsequent objectives. Win the game by winning the DO and having the most surviving howitzers when it ends.

**Default FAT Cards per player for each objective:**  
SO1 = 3  
SO2 = 2  
SO3 = 2  
DO = 3

FAT1

FAT2

FAT3

FAT4

Figure 15. Objective Tracker

*Source:* Created by author.

The artillery battalion staff must track the effectiveness of their fires, anticipate enemy actions, and stay aware of friendly unit status.<sup>321</sup> The player cards replicate unit status trackers and emphasize the importance of trackers to the staff. The players must update these cards to understand the ammunition, howitzers, and radar currently available, and the achieved effects on targets. The players keep track of all these aspects by updating the player cards and objective tracker. These trackers give immediate

<sup>321</sup> HQDA, ATP 3-09.23, 5-12.

feedback to the players on how effective each player has been and helps replicate the assessments in a targeting cycle.

The assess step of the targeting cycle requires the S-2 and S-3 to make recommendations to the FSCOORD on the current effectiveness of operations and the next steps that should be taken.<sup>322</sup> A player can make these same assessments by seeing the board and updating the cards. These actions closely replicate the same actions the player would take in a command post. The situational awareness generated by updating the player cards gives the player a repetition at updating running estimates that feed the same decisions as the FSCOORD's in a battle.

A rule book and key design notes are essential to any wargame. The rule book gives the player, facilitator, or researcher a place to reference for detailed information. But, having goals, rules, turn sequence, and key elements directly in-front of the player at all times enables understanding of the most useful aspects. Making rules easier to access serves two purposes. The first is to force the players to practice actions they should take in the command post, and secondly to alleviate as much frustration as possible. People learn best when they are having fun after all.<sup>323</sup>

### Summary

The key players of the artillery battalion staff do not inherently have the ability to visualize a battlefield. The staff must be trained to effectively execute their jobs. The S-3 needs practice to understand the orders to write. The S-2 must be able to visualize the

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<sup>322</sup> HQDA, ATP 3-09.23, 1-7 – 1-9.

<sup>323</sup> Koster, *A Theory of Fun for Game Design*, 42.



friendly and enemy artillery actions to advise the FSCOORD. The Fire direction officer needs to practice tactical fire direction before the battle in order to execute tactical fire direction effectively when under real fire. The mechanics discussed in this chapter effectively model the aspects of the battle that the FSCOORD controls and staff functions that are essential to training the supporting staff. The decisions of the commander and staff are the key artillery actions that must be included in the game. Army doctrine defines these as the supporting tasks to tactical fire direction. Tactical fire direction is modeled in mechanics that fit together into a playable game that encourages the player to act in ways encouraged by doctrine. Moreover, *Counter Fire!* is not restricted by a specific scenario but is adaptable to any situation the players can create on a 1:50,000 map.

## CHAPTER 5

### CONCLUSIONS AND RECOMMENDATIONS

*Counter Fire!* is a working tool that can be used to train artillery staffs in their responsibilities and visualize the battle from the artillery battalion's perspective. *Counter Fire!* does this by simulating tactical fire direction in a competitive environment where the players must make decisions of the FSCOORD and supporting staff. An artillery battalion staff can play *Counter Fire!* and apply critical thought to learn lessons about the practical application of artillery before going to a battle, and with less expense than a field exercise or CTC rotation. The rules target the key staff members and FSCOORD responsibilities to enable the visualization of the roles each play in the battle. The design of *Counter Fire!* answers the research questions posed in this paper in a practical way that staffs around the Army can use. However, *Counter Fire!* does not cover every aspect of an artillery battle and gets some things wrong. More research could expand improve the training and more accurately replicate the artillery actions in a battle.

Future research, design, or development of *Counter Fire!* and this thesis center around updating the artillery pieces, adjusting the card deck and Red team for orders of battle, and testing the game's ability to actually train players. The limitations of the IBCT and composite battery are well known to the U.S. Army and the Army is looking to replace and update the howitzers. Changing the card composition to reflect an enemy and U.S. Army order of battle and separating the card decks could make the game more flexible and accurately reflect a particular battle. With the addition of these updates the Army could produce multiple game sets, distribute to artillery staffs and schools, and execute a study to test *Counter Fire!*'s training effectiveness.

The U.S. Army is currently going through an era of modernization. From fielding the extended range cannon artillery system to new anti-tank rounds; the employment of artillery on the modern battlefield is changing rapidly.<sup>324</sup> The current game is centered around systems that may be phased out in the near future and researchers in the coming years are encouraged to update the rules and systems to reflect these changes.<sup>325</sup>

Other aspects of the battle that the artillery commander controls or influences could be added as well. *Counter Fire!* glossed over communications and made the assumption that all systems in the artillery battalion functioned. Future research could expand on different communications platforms and the systems' influences on tactical fire direction and positioning. Including communications systems could make the game truer to reality and expand on communications employment in the artillery battalions. Including communications equipment could incorporate training the S6 section and integrate command and control in a more detailed way.

The training level of the batteries could also be researched and adapted for the game just as other equipment could be. The TC 3-09.8 may dictate the training standards and goals each battalion must achieve, but execution of time standards in an austere environment presents unforeseen challenges that may hinder units. Incorporation of real training statistics could encourage more realistic modeling of what the battalion can achieve. However, these standards and the status of units training in aggregate is

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<sup>324</sup> Jen Judson, "US Army Nears Choosing First Battalion for Extended-Range Cannon," *Defense News*, March 17, 2021, <https://www.defensenews.com/digital-show-dailies/global-force-symposium/2021/03/18/us-army-nears-choosing-first-battalion-for-extended-range-cannon/>.

<sup>325</sup> AFC, AFC Pamphlet 71-20-6.

classified or restricted from distribution. More research on the details of actual units and their equipment has a great potential to add to the study and game at the cost of dissemination.

The current game only uses one deck of cards that are all centered on OPFOR systems and both players draw from the same decks. Future development could lead to an expansion or design change that allows players to have different objectives at different times with unique card decks for each. Creating separate decks could allow for players to simulate different forms of maneuver and defense and allow for the decks to be tailored to the assets at each objective. Changing the composition of the decks and tailoring them to units would take focused research on different unit compositions of friendly and hostile countries, and more control by the player of the maneuver forces.

The best way to improve this project would be to conduct a human subjects research study on if the game is effective at training a staff. This study would ideally include the Fires Center of Excellence at Fort Sill, OK and many units around the U.S. military. A human subjects research study could include fielding the game to units and test how the staffs improve their understanding of the battle before a CTC rotation. The other test could be on students at the Field Artillery Captains Career Course and Basic Officers' Leader Course and see how the students' understanding of artillery operations and staff functions improve. These junior officers often start on the staff in artillery units and could start training in the school before arriving.

Just as no game is correct in all aspects of reality neither is *Counter Fire!*. The game is useful to the staff as is but could improve greatly with continued effort. As the U.S. moves into an interwar period, with the conclusion of the Afghanistan and Iraq

conflicts, the Army must continue to look for ways to improve soldiers, leaders, and equipment. As the Army changes, the game can be adapted with new capabilities, additional card sets, and future human subjects research to improve the game's usefulness.

The Ukrainian Army is learning the importance of tactical fire direction through necessity. As Ukrainian and Russian forces clash artillery fires dominate the battlefield. The forces fire massive barrages back and forth, rounds, and howitzers are expended. The United States and its allies are replacing the howitzers and ammo with new equipment and ammunition.<sup>326</sup> While Ukrainian leaders receive hands on training from its supporters, Ukrainian soldiers must often learn in the battle. The artillery lessons that Ukraine is learning are essential to its survival. If the United States wants to continue to learn essential artillery employment lessons, it can use *Counter Fire!* to simulate the artillery battle without the loss of life Ukraine must currently pay.

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<sup>326</sup> Emma Graham-Harrison and Kateryna Semchuk, "Trial by Fire: Ukraine War Becomes Grueling Artillery Duel," *The Guardian*, May 13, 2022, [www.theguardian.com/world/2022/may/13/gas-masks-medics-ukraine-choking-troops-sloviansk](https://www.theguardian.com/world/2022/may/13/gas-masks-medics-ukraine-choking-troops-sloviansk).

## APPENDIX A

### PARTS LIST

- 1x 1:50,000 terrain map
- 2x 6-sided dice (d6)
- 14x 20-sided dice (d20)
- 2x Green permanent markers
- 1x Clear eraser alcohol pen
- 2x large acetate overlays
- 2x String, 25  $\frac{1}{2}$  inch with measurements at 11  $\frac{1}{2}$  inch, 15  $\frac{7}{16}$  inch, 19  $\frac{1}{8}$  inch, 22  $\frac{1}{8}$  inch, and 23  $\frac{6}{8}$  inch
- 14x 25mmx25mmx12.5mm wood blocks (blue)
- 13x 25mmx25mmx12.5mm wood blocks (red)
- Paper labels for units
  - 3x enemy battery (A, B, C)
  - 1x enemy artillery battalion
  - 3x enemy infantry motorized battalion detachment (1, 2, 3)
  - 1x enemy reconnaissance squadron detachment (4)
  - 1x enemy engineer battalion detachment (5)
  - 1x enemy forward support company
  - 1x enemy brigade support battalion (6)
  - 1x enemy fire finding radar (1)
  - 3x friendly battery (A, B, C)

- 1x friendly artillery battalion
- 3x friendly enemy infantry motorized battalion detachment (1, 2, 3)
- 1x friendly reconnaissance squadron detachment (4)
- 1x friendly engineer battalion detachment (5)
- 1x friendly forward support company
- 1x friendly brigade support battalion (6)
- 2x friendly fire finding radar (1,2)
- 18x 7mm plastic cubes (blue)
- 18x 7mm plastic cubes (red)
- 20x 7mm plastic cubes (black)
- 16x 7mm plastic cubes (white)
- 1x deck of *Counter Fire!* FAT cards (3 1/2 x 2 1/8 inch card stock)
  - 14x Decisive Operation Dug-in Infantry Platoon cards
  - 10x Decisive Operation T-14 section cards
  - 3x Decisive Operation Infantry Battalion CP cards
  - 2x Decisive Operation FSC CP cards
  - 6x Shaping Operation BMP section cards
  - 6x Shaping Operation BMP platoon cards
  - 2x Shaping Operation Radar cards
  - 1x Shaping Operation Dogear card
  - 10x Shaping Operation Dug-in Infantry platoon cards
  - 8x Shaping Operation Suspected Infantry platoon cards
  - 4x Shaping Operation BMP-3 platoon cards

- 4x Shaping Operation BMP-3 section cards
- 2x Shaping Operation Towed Howitzer platoon cards
- 3x Shaping Operation FN-6 MANPAD cards
- 2x Shaping Operation RPG-12 AT cards
- 1x Shaping Operation 1 T-14 card
- 3x Shaping Operation 1 Forward Observer OP cards
- 6x Shaping Operation 1 Cavalry Observer OP cards
- 9x Shaping Operation 1 Cavalry Section cards
- 1x Shaping Operation 1 Engineer Breaching Vehicle card
- 2x Shaping Operation 1 Panzerfaust 3 cards
- 3x Shaping Operation 1 BMP3 section cards
- 5x Shaping Operation 1 tracked engineer section cards
- 5x Shaping Operation 1 suspected tracked engineer section cards
- 2x Shaping Operation 1 FN-6 MANPAD cards
- 1x Shaping Operation 1 SA-22 ADA card
- 3x Objective markers for SO2, SO3, and DO (card stock, laminated)
- 3x Red Player Cards (8 ½ x 11 inch card stock, laminated)
  - Red Player Card 1
  - Red Player Card 2
  - Red Player Card 3
- 1x Objective Player Card (8 ½ x 11 inch card stock, laminated)
- 3x Blue Player Cards (8 ½ x 11 inch card stock, laminated)
  - Blue Player Card 1



- Blue Player Card 2
- Blue Player Card 3

## APPENDIX B

### GAME RULES FOR *COUNTER FIRE!*

**Intro:** This game is designed to be played by 2 or more players representing the Blue and Red field artillery battalion commander and the artillery battalion staff. The players will conduct terrain analysis and develop a Modified/Combined obstacle overlay, deploy the artillery battalion, conduct tactical fire direction, and shape the battle for the maneuver units to win at their objectives and the battle.

The players will not control the maneuver units. You are not the infantry, armor, or cavalry commander. You are the artillery battalion commander and the staff. The artillery battalion commander does not dictate where and when the maneuver units go or attack. Now, the artillery will not win a battle on their own, but they do shape the battlefield to enable success for the maneuver elements. To model this problem firing units will support the shaping and decisive operations by resolving target or field artillery task cards. This allows the player to concentrate on accomplishing tasks and shaping the objectives of a battle, while not focusing on the actions of the maneuver force. The maneuver objectives are still how the battle is won, but this model will emphasize the importance of the artillery properly shaping the fight for the maneuver force.

**Map:** This game is designed to be played on a 1:50,000 map. The unit markers take up roughly one grid square. The range strings and measurements match unclassified open-source ranges for the munitions. Other map scales may still be used, but different range strings are needed for these scales.

**Unit markers:** Each unit is represented by a small red or blue block with the doctrinal unit symbol from FM1-02.2 Military Symbols. The color corresponds to each

team/player. One player or team will control the red units the other will control the blue units. Each firing battery has two small blocks of matching color with the larger wooden marker. The smaller blocks represent the firing platoons. There is one small block of matching color with the Forward Support Company (FSC), the smaller block represents the distribution platoon. There are also unit markers for the Brigade Support Battalion (BSB), the maneuver battalion headquarters, brigade and regimental headquarters, Field artillery headquarters, and radars. The game comes with a small reserve of small white blocks. The small white blocks represent ammunition caches should the players choose to cache ammunition around the battlefield.

**The turn sequence:**

1. Draw objective FAT/observation cards. Place target cards on the objective tracking board.
2. Increase vulnerability status of all in place artillery by three (3) points.
3. Select status of in-place radars: ON or PASSIVE (reveal location of active radar if both sides have radar in-place)
4. Recover action points.
5. Activate units.

Players spend action points of each unit until they are all spent, or player declares their turn is done. As units are activated, they may conduct a number of actions (refer to unit status card). Units that fire will mark off the number of rounds fired on their unit status card then react to counterfire if applicable. Non-firing units can be engaged using events from Field Artillery Task (FAT) Cards drawn at the beginning of the turn. They may also be activated in any order with the firing units.

As units take actions and resolve FAT cards the players will score points towards winning the objective and game. Scoring is tallied according to the HPTL on the Objective tracker. The HPTs are worth the listed values, all other tasks are worth one (1) victory point.

After all units are activated or players state they are done with the turn, players will clear the turn doing the following:

1. Score points based on completed FAT cards and HPTs engaged. On the Score tab for each objective.
2. Advance the operation if conditions are met and check for victory conditions.
3. Clear destroyed unit markers.

**How to win:** Score the most victory points in the decisive operation and survive to the end of the game. If you lose all your howitzers before the end of the game, you lose. If you or the opposing player does not win the DO, you both lose. If you win in total points and your opponent wins the decisive operation your opponent wins.

**Setup:** Layout a map (preferably 1:50K with 1in squares). As a group conduct terrain analysis and label each grid square as non-restrictive (no marking), restrictive (single slash through the grid square), and severely restrictive (cross slash through the grid square). This will determine the status of terrain per square for movement and emplacements. At this time the Attacking player chooses the location of objectives. Shaping operation two (2) (SO2), shaping operation three (3) (SO3), and the decisive operation (DO) will be 3x3 square locations. While Shaping operation one (SO1) is active a firing unit that can range SO2, SO3, or the DO can range the targets drawn.

Players will then designate the locations of the BSB, BEB, BDE Main CP, and four (4) maneuver battalion (BN) CPs. These must be in restrictive or non-restrictive terrain. The BSB and BEB will be a 4x4 square kilometer space, the CPs will be one square kilometer, with the exception of the brigade and regimental headquarters they will be 2x2km areas. These will not move during the game and the batteries and radars may not occupy in any square adjacent to them.

**Activation:**

A unit is activated at the start of the of the round by the controlling player spending at least 1 action point from the unit's pool. Actions and their cost are listed on the unit status card. Pay close attention to what the unit can do as not every unit can do the same actions and similar actions may have different costs i.e., emplacing a battery vs emplacing a radar.

**Movement:**

A unit may spend all or none of their action points on movement. Movement across unrestrictive terrain spends one (1) point, restrictive terrain costs two (2) points to enter or move across, and severely restrictive terrain cannot be moved across, entered, or emplaced in. The exceptions to this rule are movement on improved or unimproved roads. These cost only one (1) point to traverse and can be taken through severely restrictive terrain (you can drive up the mountain if there is a road on it, but you cannot go cross country or expect to emplace on a cliff.)

Units that have been detected before a move become hidden again when they begin movement after a displacement and reset their vulnerability to zero (0).

**Emplacement:** Emplacement is when the unit changes from moving to conducting the unit's warfighting function. Emplacement could be setting up the command post for headquarters units, establishing the combat trains command post, establishing an observation area for the radar, or a firing point for the artillery batteries.

There are 3 types of emplacements that batteries can do:

**Deliberate:** The battery takes time to deliberately establish a firing position. This means the platoons are spreading out, conducting advanced party procedures, and establishing firing capability in the most accurate way possible. A deliberate emplacement allows a battery to immediately begin position improvement actions such as digging in and camouflaging. There is no accuracy penalty for conducting deliberate emplacements. Firing units that conduct a deliberate emplacement can place their firing platoons up to 2kms away from their CP/FDCs.

**Hasty:** Hasty emplacements cost fewer action points and get the units emplaced faster. The unit speeds up the process by choosing fast over efficient methods to establish capabilities. Units hastily emplaced are ready to conduct their warfighting functions but cannot spread out, or immediately begin camouflaging or digging-in. Units may spend action 2 action points to increase their emplacement quality, and half as much as listed to displace. They take no penalty to capabilities or accuracy for a hasty emplacement. They cannot spread out their unit and platoon markers are placed on top of the battery marker to show this.

**Emergency:** Units conducting an emergency emplacement are rushing to emplace immediately with little preparation. Firing units that conduct an emergency emplacement take a penalty of -1 to all die rolls to hit, as they have sacrificed accuracy

for speed. Units may spend 2 action points to increase their emplacement quality and half as much as listed to displace.

**Emplacement modifiers:** Units can conduct certain actions only after emplacing. These are digging-in, camouflaging their position, and shooting. Each firing unit can shoot after conducting any type of emplacement. Each time they do they expend one round slot per howitzer per fire mission and spend one action point. Digging-in can be conducted by units that have reached a deliberate emplacement. Units that can dig-in have this action listed on their status card. This decreases their vulnerability score by 1. Deliberately emplaced units that are in or boarder restrictive terrain may camouflage their units. Camouflage decreases the unit's vulnerability by one (1). Camouflaging and digging-in bonuses can be stacked together.

**Vulnerability:** As units conduct operations in the same place, they become vulnerable to complacency, identification, ambush, and attacks. At the start of each turn each firing battery that is emplaced accrues three (3) vulnerability points. The unit will also accrue an extra three vulnerability points if they emplace within eight kilometers (8km) of an active objective or closer to the enemy BSA than the active objectives. When the individual battery's vulnerability score reaches eight (8) they must roll on the vulnerability table to receive negative effects from static operations. This only applies to the firing batteries and radar units.

**Vulnerability management:** There are three actions that a unit can take to reduce the vulnerability of the battery. The first two are spending action points to dig-in at their position and the second is using vegetation to camouflage the battery. Each of these actions decrease the vulnerability of the battery by 1 point each. The third action the

battery can take to decrease vulnerability is movement. If the battery displaces and moves the vulnerability score for that battery resets to zero (0). Vulnerability is tracked in the vulnerability section on the unit status cards with a tally. If a unit rolls on the vulnerability table their vulnerability is reset to five (5).

**Increasing vulnerability:** Vulnerability increases with each turn that passes and the artillery is emplaced at a location. Fire-missions will also increase vulnerability. Each fire mission will increase the unit vulnerability by one (1) point.

**Vulnerability results:** When a unit's vulnerability score reaches (8) the player immediately rolls a d6 for that unit and executes the corresponding result on the vulnerability table:

**1:** The unit is attacked by a small special purpose or disruption force. The unit loses one (1) howitzer.

**2:** The firing point turns into a mud pit due to movement on the same ground over and over. All actions take double action points until the unit moves again.

**3:** The unit suffers jamming effects and cannot fire this turn.

**4:** The unit is detected because of their static electronic signature and the unit is exposed to the opponent.

**5:** Enemy aerial reconnaissance is spotted in the battery's area the battery immediately executes a blitz.

**6:** Soldiers fall asleep at the howitzers and the battery loses 10 action points for this turn.



The vulnerability score for that unit resets to zero only if the unit moves. Otherwise, the player will roll on the vulnerability table each time the unit accrues another vulnerability point. The player rolls for each gaining event, not for each point over eight (8) gained.

**Displacement:** Units may leave an emplaced location by spending the required action points and beginning their movement from where the CP/FDC is located.

**Firing:** Batteries that are emplaced can shoot at observed targets on FAT cards or located units. This expends 1 action point per battery firing. The player determines how many rounds and howitzers he/she will fire at the target. Each ammunition block on the player unit card represents one complete round of ammunition per fully mission capable howitzer in that battery. For each howitzer fired, the player will roll one D20. Infantry units in the open are hit on a 19. Vehicles and dug-in infantry units are hit on a 20 and tanks are hit on a 22 (this is achieved by shooting DPICM which gives a plus two (+2) to rolls on the die). A bonus of +1 to each die roll is added for each battery above one (1). For example, firing two batteries add a plus one (+1) and firing three batteries adds a plus two (+2). Massing bonuses are stacked with weaponeering bonuses to create a potential bonus of plus four (+4). After firing the mission increase the firing unit's vulnerability by one (1) point.

**Counterfire:** When a cued radar is able to detect a firing unit or when a firing unit makes two (2) fire missions from the same location that unit is revealed to the opposing player. See **Cueing** for rules on radar detection. The detection rule without active radar replicates the ability to do crater analysis. The unit is discovered after the second fire mission and can be fired upon. The battery stays exposed until the battery

displaces and moves. Each time a player executes counterfire, the player expends the required ammunition and action points the same as any other fire mission.

**Blitz:** A unit receiving fire from the opponent can stop the opponent after the first fire mission by executing a blitz. A blitz is an emergency movement of only essential equipment and personnel to a new location. As such, if a player chooses to blitz the unit may displace for one (1) action point and move directly to a grid with restrictive or severely restrictive terrain (spending the required action points to move to that terrain). The unit must move even if emplaced. If the unit cannot reach restrictive terrain, the unit must move to the extent of the remainder of the unit's action points and continue movement next turn. When a battery blitzes, place a black marker on the battery's original location. Subordinate platoons of that battery take a minus one (-1) to all rolls to hit until that battery returns to the marker and executes and upload action (recovering the equipment).

**Cuing:** Radar units can cue on or off for no action points. Radars cannot be cued on while they are moving. They must have conducted an emplacement to cue on and if not announced is assumed off when they displace. When a Radar is cued on, the radar can identify any unit firing on the first fire mission as long as the radar has unobstructed observation of the unit firing or to the halfway point (or earlier) of a straight line between the firing unit and the target. A passive or radiating radar can identify the location of another cued radar that the firsts radar has line of sight to. An emplaced radar has the detection ability as long as it is emplaced. No radar can detect other radars or rounds while moving or radars that are not radiating.

**Loading/Offloading:** The forward support company, distro platoon, and firing batteries may conduct loading/offloading operations for ammunition and equipment. This is the action that moves ammunition and equipment between units, or between a unit and a cache. Each unit may expend two (2) points to conduct the action, or one unit may expend double the points to conduct the action. All units may conduct load/offload to recover lost equipment from a blitz for two (2) action points.

**Distribution operations:** The FSC has the ammunition in their initial tracker automatically on the distribution platoon. Their haul capacity does not increase but the unit can split its haul capacity between the FSC and the distribution platoon. If the batteries are at full strength, the batteries may send an ammunition section separate from the platoons to pick up ammo. The ammunition section's action points still come out of the battery pool. Use an extra same colored small block for the ammunition section marker. The ammunition section haul capacity is the battery ammo tracker minus three slots per howitzer.

**Ammunition:** The batteries and FSC start with a full load of ammunition. The ammunition the batteries are holding can be of any composition selected during set-up. There are a few types of ammunition and abilities of each: (Suggested set up is that the batteries will have 1/3 of their ammunition is HE, 1/3 HERA, 1/6 DPICM, and 1/6 smoke and illumination).

**HE:** High explosive munitions are the basic artillery round. HE may destroy, neutralize, or suppress targets through explosive force and shrapnel. HE is designed for effects against infantry and light skinned vehicles. 105mm HE can range up to 14km; 155mm HE can range 24Km. These are marked with an "H" on ammo trackers.

**HERA:** High Explosive Rocket Assisted. The HERA round is similar to the HE. I HERA counts the same as an HE round for effects but has an expanded range. The 105mm HERA ranges up to 19km; 155mm HERA ranges up to 30km. These rounds are marked with an “R” on ammunition trackers.

**DPICM:** Dual Purpose Improved Conventional Munitions are air bursting rounds that spread bomblets over a beaten zone. These rounds are designed to disable and destroy lightly armored and armored vehicles. DPICM gives a plus two to all rolls to hit. 105mm DPICM can range up to 14km; 155mm DPICM can range 28km. **Firing DPICM DOES count as a fire mission for RADAR acquisition NOT crater analysis.**

**Illumination:** Illumination rounds are long burning flares that ejects from the shell to illuminate the area and assist with identifying targets. These rounds can range as far as their HE counterparts. If a target is suspected (dashed outline or stated on the FAT card) you must expend an illumination round to identify the target before firing lethal munitions. **This DOES count as a fire mission for RADAR acquisition, NOT crater analysis.**

**Smoke:** These are rounds that spread smoke on the battlefield to obscure observation and screen movements. These rounds can range the same as their HE and illumination counterparts. Some cards require this to expended with HE or DPICM to simulate breaching drills. Firing smoke **DOES count as a fire mission for RADAR acquisition, NOT crater analysis.**

Ammunition is tracked in the firing batteries by block counters on their unit status card. Each block a player expend allows the player to roll one (1) d20 per fully mission capable howitzer. Each slot replicates one (1) complete round from each surviving

section. When howitzers are destroyed each ammunition slot is worth that many less rounds/d20s as well. This simulates the loss of the ammunition hauling truck in the section as well as the howitzer.

The FSC is slightly different. The FSC ammunition blocks also count for a complete round for each howitzer they are resupplying. However, each 155mm round that the FSC carries counts for three (3) of the ammunition tracking blocks. The difference in 105 and 155mm ammunition tracking is to account for the difference in round packaging and the separate loading ammunition taking extra space.

For the FSC to resupply they must return to the BSA. There may be the equivalent of one (1) FSC load of ammunition ready at the BSA. This can also be designated during set up.

The BSA can be resupplied one (1) time during the game. The resupply may only arrive at the BSA after SO1 is complete. The BSA cannot ever hold more ammunition than one (1) full load of the FSC.

**Objectives and Turns:** There are four objectives that constitute the game. Shaping operations 1-3 (SO1, SO2, SO3) and the decisive operation (DO). SO1 lasts six (6) turns. SO2 and SO3 last seven (7) turns. The DO lasts six (6) turns. However, the entire game will only last for no greater than of 16 turns and no less than 10 turns. The players may arrange the active turns of the operations in any order they wish, so long as the combined total number of turns is no greater than 16. This means that there must be times that multiple objectives are active at the same time. This allows the players to set up objectives to simulate sequential and simultaneous attacks and simulate many different forms of maneuver.

The objective tracker is labeled for the turn number across the top and the objectives along the left edge. To indicate what turns each objective will be active highlight the turn blocks in that objective's row. The turns for the objectives all be adjacent to each other. In other words, once an objective is activated the objective will inactive and reactivate later. For example, to simulate a frontal attack SO1 could be active for turns 1-6, SO2 and SO3 active for turns 7-11 and the Decisive operation active for turns 8-13. This would end the game on turn 13 rather than 16. For a penetration, SO1 could be active for turns 1-6, SO2 6-12, SO3 active for turns 10-16 and the DO active for turns 12-16. The attacking player will choose the location and duration of the objectives.

**Observation, FATs:** Observers while being organic to the field artillery battalion are incorporated into the objective model. The players will draw cards based on the objective number. Three (3) are drawn for SO1. Two (2) are drawn for each of the other active objectives. The more objectives that the player wins the more cards that the player can draw later for effectively supporting the objectives. For each objective that the player wins, they may draw one additional card for later objectives

Three (3) FAT cards are drawn for SO1, two (2) FAT cards each for SO2 and SO3, and three (3) for the DO. Players will hold on to completed FAT cards and segregate them by objective for scoring. The player with the most victory points when the objective closes wins that objective. Wining the objective gives you the ability to draw one (1) extra FAT card for the other objectives currently active. This bonus stacks with other objectives won. So, if a player wins SO1 and SO2 the player may draw an additional two (2) cards for the decisive operation and SO3 if these objectives are still active.

**FAT Cards:** The Field artillery tasks “FATs” are those tasks that the maneuver commander needs the artillery battalion to accomplish to ensure success of the brigade. The bulk of the tasks can be translated into destroying, neutralizing or suppressing different types of enemy units, or targets. To replicate this the targets the players will “shoot” at are on FAT cards. These cards have the symbol for the target, the required amount of hits, the target number to beat on the dice, the bonuses to the dice rolled for 155mm and DPICM, and the decay time for the target. If the player rolls the required amount of hits before spending the amount of action points listed as the decay value, the player achieves the FAT and holds on to the card for scoring.

**Target Decay:** Each card has a decay value at the bottom of the card. If the player spends more action points than is on the card, the target decays and the FAT is discarded. Place all discarded FATs in a pile near the objective tracker. When the objective ends add the discarded FATs into the other objective piles evenly and shuffle the piles independently of each other.

**Special abilities:** The Red and Blue players each have three (3) special abilities that can be used once per game.

**Blue:**

**Dynamic Targeting:** If any enemy firing unit moves within or emplaces within eight (8) kilometers of an objective expose the enemy unit and immediately engage if possible. The number of howitzers, ammunition expenditure, and counterfire trigger as normal.

**Division HPTS:** When you identify two (2) enemy batteries roll to attack them with six (6) 155mm howitzers with DPICM without expending ammunition.

The player may roll these six (6) dice twice per battery identified.

**Final Protective Fires:** Engage one (1) target up to three (3) times. Counterfire may still be triggered, and ammunition is expended as normal.

**Red:**

**Special Purpose Forces coordination:** When you identify an enemy battery, that enemy battery with a small red block. The next time the enemy battery moves announce an ambush. Roll one (1) D6 and divide the number by two (2) (rounded up). Destroy that many howitzers. This does not count for the objective score.

**Integrated Fires Command:** When you can identify three (3) or more HPTs, engage them with 12 D20s with a plus two (+2) modifier. Do not expend the ammunition.

**Drone Reconnaissance:** Choose one (1): Either search an active objective deck and draw an HPT or expose one 1 enemy unit. You may engage that target immediately as normal.

**Example Turn:**

The defending side has two 105mm batteries in place and one radar turned on. The defender is playing Red.

The Blue player is the attacker.

The attacking side is entering the battlefield on turn one (1). Only SO1 is active.

First, the player draws three FAT cards from the SO1 pile. They are a cavalry OP, a suspected armored CAV squad, and a friendly screening card.



The Blue player moves the 155mm Charlie battery into position one kilometer out of the BSA's range and conducts a hasty emplacement for a total of 3 action points. The player then uses the range cord to ensure that he/she can range into the SO1 area. The range is inside the 155mm HE/Illum/SMK range. The decay time on the suspected armored reconnaissance squad is four (4) so the FAT is still active. The player spends one (1) action point to fire on the Armored reconnaissance FAT card. The player has spent three (3) action points prior and, on the fourth (4), point the target would decay, but since he/she is engaging the target, the engagement continues. The player spends one (1) block of illumination ammunition to confirm the target and then spends six (6) DPICM rounds (one (1) block of ammunition equaling 1 (one) D20 per howitzer). The Blue player fires the illumination round and then exposes the battery to the enemy because the Red player's radar is turned on.

Blue player chooses to continue the fire mission and fires six (6) DPICM rounds on the Armored reconnaissance element. The player rolls a 12, 20, 19, 20, 20, and 18. These values are modified by a plus two (+2) for firing DPICM equaling three (3) 22s, one (1) 21, one (1) 20, and a 14. The blue player needed three (3) 22s to achieve effects on the FAT card and they score four (4) victory points in SO1. The card is held by the Blue player with any other SO1 FATs the Blue player successfully completes.

Now, since the Red player's radar was on, he/she chooses to trigger counterfire on the Blue player's 155mm battery (Charlie). The Red player measures the distance to the Charlie battery using the range string and sees that only one (1) battery can range the target and only with RAP/DPICM. The Red player chooses to fire three (3) ammunition blocks with a Red battery of eight (8) guns. This means the Red player may roll 24 D20s,

in an attempt to achieve 18s on the die (18 plus two (2) for DPICM is 20). All of Charlie battery's howitzers and FDCs are exposed to the counterfire mission because the Blue player chose to only conduct a hasty emplacement. The Red player rolls five (5) hits. These destroy four (4) of the Blue player's 155mm howitzers and one (1) of the FDCs Charlie battery. This fire mission expends one (1) action point from the Red player's battery. The Red player will not get that action point back at the beginning of their turn, the first turn only.

In order to prevent further counterfire missions, the Blue player decides to conduct a blitz from Charlie battery's current location. The Blue player leaves one black block in place to replicate the equipment left behind and moves Charlie battery directly to the nearest restrictive terrain six kilometers (6km) away. This expends one (1) action point to execute the blitz and six (6) additional points to move. The Blue player has expended a total of 11 action points. With Charlie battery's remaining four (4) points the Blue player moves Charlie four kilometers (4km) closer to Charlie's original position, but cannot reach or pick up the equipment yet.

The Blue player has expended 15 action points with Charlie battery, so the other two (2) FAT cards have expired, and the FAT cards are discarded. The Blue player may now activate all other friendly units and spend action points in any order until all units are out of action points or are positioned as desired. When no unit has action points remaining, or the player is satisfied with the placement of the controlled units, the turn passes turn to the Red player.

The Blue player moves Alpha battery six kilometers (6km) away from the BSA and conducts a deliberate emplacement. The player spreads the two platoons out into

restrictive terrain. These actions spend eight (8) action points. Leaving seven (7) action points remaining. The Blue player spends five (5) more to camouflage the battery. Alpha battery has spent 13 action points and Alpha battery's vulnerability is negative one (-1). Blue player then moves Bravo battery four kilometers (4km) from the BSA and deliberately emplaces them spreading the firing platoons out two kilometers (2km) from the battery CP. Bravo battery then camouflages the position for another five (5) action points. Bravo battery has spent 11 action points and has a vulnerability score of negative one (-1). Four (4) action points remain that the player could spend later for counterfire.

Blue player conducts similar actions with bravo Battery but moves Bravo one (1) kilometer farther and not into restrictive terrain. Since the player did not move Bravo into restrictive terrain, the battery could not conduct the camouflage action. The player then chose to dig-in the battery for the same result. Bravo battery is down to three (3) action points and a vulnerability score of negative one (-1).

Blue player then moves the two friendly radars six kilometers (6km) from the BSA and emplaces each, with only one (1) cued on. The radars have less than five (5) action points left per radar and are unable to dig or camouflage.

The FSC is the last unit available for the Blue player to activate. The Blue player emplaces the FSC at the BSA to keep the FSC away from the enemy fires and close for up and downloads of ammunition. The emplacement takes two (2) action points from the FSC. As the FSC has not taken any hits the blue player sends the distribution platoon out to Bravo battery for six (6) points and drops 10 ammunition blocks worth of DPICM at Bravo's location for another two (2) points before moving the distribution platoon again toward Alpha battery with its remaining five (5) points.

Now, the Blue player passes the turn to the Red player. The Blue player has not spent all the action points with each battery. But each unit is in a position where the player wanted or could get units to, and the player has saved action points for possible counterfire missions during the Red player's turn.

## APPENDIX C

### PLAY TEST MEMORANDUMS



DEPARTMENT OF THE ARMY  
U.S. ARMY COMMAND AND GENERAL STAFF COLLEGE  
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ATZL-JSG

17 January 2022

#### MEMORANDUM FOR RECORD

SUBJECT: Playtest Notes for Counterfire

1. MAJ DeJarnett, Samuel H. (the thesis author) and MAJ Harden, James (play tester) ran through four turns of *Counter Fire*, and observed the following notes on the game. These notes are evaluations of the game mechanics and how the current research and is modeled not an evaluation or study of the players.
2. The following notes were sustains for the game.
  - a. Howitzers and equipment should not be reconstituted in the game time frame of 48 hours it would be unrealistic to replace major end items during the course of the battle.
  - b. Practical application of the current dice rolling statistics worked out well. Firing battery missions had a roughly 50% hit rate when firing at single hit targets with a five (5) or six (6) to hit on targets that needed one to two hits.
  - c. Action point system accurately replicated what a battery could accomplish the three (3) hour replicated timeframe of each turn. While neither play often spent the entire battery's points they limited what each battery could do especially when forced actions took points.
  - d. Vulnerability system forced the players to make choices on when they would stay in a location, if they could afford to fire a target, would they run the risk of leaving batteries in place ready to fire vs exposing the battery to the negative effects.
3. The following notes were for improving the game.
  - a. The crater analysis system of identifying a batter after three shots from one location became irrelevant. The vulnerability tracker forced the batteries to move so often that they were rarely in a place long enough for three fire missions.
  - b. The difficulty cutoff to hit each howitzer needed to be listed on the player/unit boards. This is a simple update that keeps in line with the current hit system. This addition makes an easy reference for calculating high payoff target hits without looking for a card or into the rules.
  - c. There was a gap in not allowing platoons to move independently of the battery

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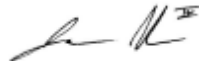
SUBJECT: Playtest Notes for Counterfire

headquarters. Platoons can and should be allowed to operate semi-independently as that is a decision that the battalion commander, and Fire Direction Officer could implement. This could lead to a proximity factor from the battery HQ and allow vulnerability to be tracked by platoon.

3. The point of contact for this memorandum is CPT DeJarnett, Samuel H. Sr. at (706) 969-0391 or samuel.h.dejarnett.mil@mail.mil.



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20 January 2022

MEMORANDUM FOR RECORD

SUBJECT: Playtest Notes for Counterfire

1. MAJ DeJarnett (the thesis author), Mr. Mike Dunn (play tester and advisor) and CPT Shawn Blaydes (play tester) ran through four turns of *Counter Fire*, and observed the following notes on the game.
2. The following notes were sustains for the game.
  - a. Vulnerability system continued to encourage movement. The count of adding three points at the start of each turn for emplaced batteries encouraged moving the batteries at least every two turns. In real time this would simulate each battery moving every nine hours.
  - b. High payoff target (HPT) lists (HPTLs) and scoring based on these targets led to realistic decisions on what to shoot and what not to shoot. When the players chose to shoot at non-high payoff targets, this exposed the batteries to enemy counter fire and ran down their ammunition supply robbing them of the chance to shoot more HPTs later in the game.
  - c. The lack of regenerating units accurately modeled the loss of combat power in a 48-72hr battle. In the first four turns the players lost twelve howitzers. Red team lost eight and Blue team lost four. The teams each lost one radar that could not be replaced. These major end items could not realistically be replaced in 24-48 hours.
  - d. Massing of rounds and firing units was highly encouraged through a combination of the counterfire and hits system. Requiring multiple hits for section and platoon targets, requiring hits on fives and sixes of the six sided die, and allowing counter fire after the second volley from each battery, combined to force the decision to mass firing units and numbers of rounds on each target.
  - e. The action point system and no formal limit to howitzer movement forward allowed the teams to execute artillery [ground] raids. This allowed the firing units to surge forward to prosecute HPTs or prepare to shoot fire missions against deeply placed radars, firing units, command posts, or support elements.
  - f. Each counter of ammo replicating 10 artillery rounds forced decisions on ammunition resupply and its triggers. In this game each team initiated resupply after the first few fire-missions keeping the firing batteries supplied while quickly emptying the forward support

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SUBJECT: Playtest Notes for Counterfire

companies. This forced the teams to discuss when to pull more ammunition out of the brigade support battalion (BSB), if they should cache ammunition, and where the field artillery should emplace their forward support company.


3. The following notes were improves and suggestions for future coding and research.


a. The mechanic of trading victory points for more abilities or asset coverage was proposed when radars and howitzers were removed from the battlefield. This trade mechanic was also proposed for enabling through-put operations from the BSB.

b. The free movement of the batteries close to the objectives on the board also made the players and author consider a space or land management mechanic. The mechanic proposed was designating a space commensurate with the command post or company space that the firing batteries and radar could not occupy.

2. The point of contact for this memorandum is MAJ DeJarnett, Samuel H. Sr. at (706) 969-0391 or samuel.h.dejarnett.mil@mail.mil.

  
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ATZL-JSG

26 January 2022

MEMORANDUM FOR RECORD

SUBJECT: Playtest Notes for *Counter Fire*

1. MAJ DeJarnett (the thesis author), Dr. James Sterrett (thesis chairman), Dr. Richard McConnell (First Reader), Mr. Russell Conrad (Second Reader), and Mr. Tom Chychota (third reader) ran through two turns of *Counter Fire*, and observed the following notes on the game. These notes are evaluations of the game mechanics and how the current research and is modeled not an evaluation or study of the players.
  2. The following notes were sustains for the game.
    - a. Using a military map enabled visualization of the terrain. Using this familiar tool fit with doctrinal terrain analysis and enabled useful representation of units moving and their effects on emplacement decisions.
    - b. Use of the range string allowed for useful visualization of where batteries needed to be to range targets and deliver effects. This combined with the military map gave the player a visualization of the realistic requirements of positioning, weapons capabilities, and risk of counterfire.
    - c. Action point system accurately replicated what a battery could accomplish the three (3) hour replicated timeframe of each turn. While neither player side often spent the entire battery's points they limited what each battery could do especially when forced actions took points.
    - d. Vulnerability system forced the players to make choices on when they would stay in a location, if they could afford to fire at a target, and would they run the risk of leaving batteries in place ready to fire vs exposing the battery to the negative effects.
  3. The following notes were for improving the game.
    - a. There was a significant disconnect between fire mission resolution and ammunition consumption. Ammunition and fire missions are irrevocably linked. The game did not currently use a standard fire order. This combined with each ammunition block representing 10 rounds combined for a confusing relationship between the number of guns shooting and the number of complete rounds expended. The committee submitted that there is no logical reason that you would shoot 10 complete rounds from six operational howitzers. There would be a fire order defined by the number of howitzers and it would

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SUBJECT: Playtest Notes for Counterfire

normally be lower than 10 per howitzer for many of the targets encountered.

b. The vulnerability system while encouraging movement and position improvement needed to be adjusted for the amount of actions taken in a position. Firing howitzers often should increase their exposure and risk of detection. This could be represented by increasing the threshold of the vulnerability table, and the unit accruing vulnerability with each fire mission.

c. Vocabulary used in the rules needs to be edited to better reflect doctrinal artillery speak. As the purpose of the game is to educate and train artillerymen, the verbiage used must do so as well. Complete rounds in resupply, platoon/battery/battalion rounds for fire missions, and possibly going back to destroy, neutralize, and suppress for the effects on targets. It was a good improvement to include a High Payoff Target list for scoring but more corrections are needed across the rules.

3. The point of contact for this memorandum is CPT DeJarnett, Samuel H. Sr. at (706) 969-0391 or samuel.h.dejarnett.mil@mail.mil.



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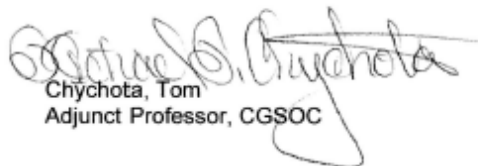
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Conrad, Russell  
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ATZL-LSG

28 January 2022

MEMORANDUM FOR RECORD

SUBJECT: Playtest Notes for Counterfire

1. MAJ DeJarnett (the thesis author), MAJ Curtis Floyd (play tester) and CPT Eric Thompson (play tester) ran through six turns of *Counter Fire*. These spanned Shaping operations one, two, and three. The players and author observed the following notes on the game.
  - a. The vulnerability system continued to encourage movement particularly after a battery shot for two turns (first on emplacement then following a shot on the second turn). The players also noted that vulnerability should expand to the radar systems. There was very little encouragement to move the radar as they could be emplaced well outside of the range of opposing howitzers. This would force more thought about where the radars were emplaced and synchronizing the cueing schedule with their movements and operations.
  - b. Changing the combat system from rolling D6s for to D20s forced the players to consider what they needed for standard fire orders and attack guidance matrixes. Initially this seems slightly confusing to non-artillerymen players but as more combat occurred and more targets were missed with 1-2 battery round missions. The players and author talked more about the mechanic and the chances of low round missions having little effect, a training and development conversation often needed for junior artillerymen as well.
  - c. Tailored powers to the Blue and Red players added elements of shaping the battle beyond just delivery. These cards and specifically the ability to stack single game use powers together allowed the players the options of when and how Artillery battalion commanders should request and employ assistance from echelons above brigade.
3. The following notes were improves and suggestions for future coding and research.
  - a. Using the ammunition blocks to represent each howitzer firing one complete round per mission did simplify the fire mission process and visualization, however in this play test there were no movements to resupply the batteries with ammunition as the deflation of each block meant that there was always enough ammo for the howitzers in the battery to shoot. While simple this aspect of the game may need to be combined with the loss of ammunition blocks with the howitzers. It is possible that full game progression may solve

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SUBJECT: Playtest Notes for Counterfire

this issue as well. More playtesting is needed to explore other aspects of this system.

b. The free movement of the batteries close to the objectives on the board also made the players and author consider a space or land management mechanic. The mechanic proposed was designating a space commensurate with the command post or company space that the firing batteries and radar could not occupy.

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16 February 2022

MEMORANDUM FOR RECORD

SUBJECT: Playtest Notes for *Counter Fire*

1. MAJ Samuel DeJarnett (thesis author), Dr. James Sterrett (thesis chairman), MAJ Shawn Blaydes, MAJ Dan Warner, and MAJ (RLC) Ben Millan played three turns of *Counter Fire* on 16FEB22 and contributed the following observations.
  - a. Player team cards enabled understanding of the actions that the units could take and facilitated a quick understanding of the capabilities and status of each unit.
  - b. Action point system was easy to employ and enabled visualization of the actions that units take and time it takes to complete these actions.
  - c. Concentrating on the artillery units allowed for the maneuver officer to better visualize the actions that the artillery battalion took to provide fires. This game could possibly be used to evaluate or formulate the field artillery support plan, parallel to the maneuver plan.
  - d. The range measurement string was very useful in determining the capabilities of the howitzers and rounds.
  - e. Ammunition consumption was largely ignored until it became a problem. This seemed to emphasize that if ammunition is fired liberally and not planned for, the units will run out and then have to scramble to get more. But, the units will not have as much as they could as they are losing howitzers and therefore haul capacity.
  - f. The game was engaging and fun. This is important as it keeps the players engaged and connects entertainment to learning. The engaging and fun nature of the game encourages play and repetition. This repetition then increases the opportunity for learning and proficiency.
3. The following notes were for improving the game.
  - a. More information is needed on the player cards. Turn orders and general goals of the game on the player cards will assist new players with what they need to do. This may also include the purposes and capabilities of the ammunition. This allows for a better quick reference and ease of play.

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SUBJECT: Playtest Notes for Counterfire

b. The vulnerability system while encouraging movement and position improvement needed to be adjusted for the number of actions taken in a position. Firing howitzers often should increase their exposure and risk of detection. This could be represented by increasing the threshold of the vulnerability table, and the unit accruing vulnerability with each fire mission. The ability to allow vulnerability into negative numbers encourages players to begin position improvement immediately. This more accurately reflects actions on the battlefield and immediate position improvement.

c. Interaction between the player sides was low. Beyond counter fire mechanics there was little that one player did that directly affected the other player actions. The game may benefit from an interactive system where players interrupt each other's turn more often.


d. The maneuver battalion command posts needed to mean more. When the objectives were aligned in a sequential pattern it was confusing why they were active all at the same time. It did not make sense that the inactive objectives had command posts near them that were active.

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16 February 2022

MEMORANDUM FOR RECORD

SUBJECT: Playtest Notes for *Counter Fire*

1. MAJ DeJarnett (the thesis author), and MAJ Stephen DeGracia (Playtester) played *Counter Fire* on 10MAR22 and contributed the following observations.
  - a. The High Payoff Target List (HPTL) and points associated with each facilitated prosecution of those targets. This emphasized the importance of the HPTL and encouraged the players to think about each fire mission the player executed and if it was worth exposing the firing batteries.
  - b. The counterfire mechanics were fair and accurately emphasized the challenges of aggressive positioning, shaping an objective, and preserving the howitzer batteries. One of the platoons was destroyed in the first two turns after firing at non-HPTL targets.
  - c. The movement and fire mission mechanics worked well together and created decisions on how to get howitzers in position to support maneuver while having to move around the battle field. This was evident even without dictating position areas. The presence of other unit headquarters added a land management element that replicated concerns well.
  - d. The range measurement string was very useful in determining the capabilities of the howitzers and rounds.
  - e. Ammunition consumption became evident when howitzers were destroyed and players rolled fewer dice. The loss of dice when firing after losing howitzers was a clear signal that the player could not hold as much ammunition after losing howitzers. This mechanic emphasized the importance of supplying the firing batteries often.
3. The following notes were for improving the game.
  - a. Event cards for the identification of uncontrolled units is essential. Those were not printed for this test and that greatly detracted from the purpose of those units being on the map and the HPTL.
  - b. Difficulties for hitting targets needed to be added to the player cards or Field Artillery

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SUBJECT: Playtest Notes for *Counter Fire*

Task (FAT) cards. This would increase the situational awareness of the player and assist with deciding what ammunition to shoot.











3. The point of contact for this memorandum is CPT DeJarnett, Samuel H. Sr. at (706) 969-0391 or samuel.h.dejarnett.mil@mail.mil.

  
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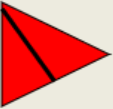









  
Steven DeGracia  
MAJ, FA


















# APPENDIX D PRINTABLE GAME PARTS











<p><b>Shaping Operation 1</b></p> <p>1 section I/O:</p>  <p>105mm: <u>          </u> Hits Needed: <u>          </u>  DPICM +2 <input type="checkbox"/> <input type="checkbox"/>  155mm: <u>          </u>  HE +1 <input type="checkbox"/>  DPICM +2 <input type="checkbox"/></p> <p>Decay: 5</p> <p>BMP-3 infantry fighting vehicle</p>	<p><b>Shaping Operation 1</b></p> <p>1 Platoon I/O:</p>  <p>105mm: <u>          </u> Hits Needed: <u>          </u>  DPICM +2 <input type="checkbox"/>  155mm: <u>          </u>  HE +1 <input type="checkbox"/>  DPICM +2 <input type="checkbox"/></p> <p>Reveal an opposing artillery platoon. Hide upon movement</p> <p>D-30 towed howitzer</p>	<p><b>Shaping Operation 1</b></p> <p>1 section I/O:</p>  <p>105mm: <u>          </u> Hits Needed: <u>          </u>  DPICM +2 <input type="checkbox"/>  155mm: <u>          </u>  HE +1 <input type="checkbox"/>  DPICM +2 <input type="checkbox"/></p> <p>Decay: 4</p> <p>SA-22 ADA missile and radar</p>	<p><b>Shaping Operation 1</b></p> <p>1 team I/O:</p>  <p>105mm: <u>          </u> Hits Needed: <u>          </u>  DPICM +2 <input type="checkbox"/>  155mm: <u>          </u>  HE +1 <input type="checkbox"/>  DPICM +2 <input type="checkbox"/></p> <p>Decay: 5</p> <p>Panzerfaust 3</p>	<p><b>Shaping Operation 1</b></p> <p>1 Section I/O:</p>  <p>105mm: <u>          </u> Hits Needed: <u>          </u>  DPICM +2 <input type="checkbox"/>  155mm: <u>          </u>  HE +1 <input type="checkbox"/>  DPICM +2 <input type="checkbox"/></p> <p>Decay: 8</p> <p>Cavalry section</p>
<p><b>Shaping Operation 1</b></p> <p>1 Platoon I/O:</p>  <p>105mm: <u>          </u> Hits Needed: <u>          </u>  DPICM +2 <input type="checkbox"/> <input type="checkbox"/>  155mm: <u>          </u>  HE +1 <input type="checkbox"/>  DPICM +2 <input type="checkbox"/></p> <p>Decay: 3</p> <p>T-14 Main battle tank</p>	<p><b>Shaping Operation 1</b></p> <p>1 section I/O:</p>  <p>105mm: <u>          </u> Hits Needed: <u>          </u>  DPICM +2 <input type="checkbox"/>  155mm: <u>          </u>  HE +1 <input type="checkbox"/>  DPICM +2 <input type="checkbox"/></p> <p>Decay: 8</p> <p>Artillery forward observer OP</p>	<p><b>Shaping Operation 1</b></p> <p>1 section I/O:</p>  <p>105mm: <u>          </u> Hits Needed: <u>          </u>  DPICM +2 <input type="checkbox"/>  155mm: <u>          </u>  HE +1 <input type="checkbox"/>  DPICM +2 <input type="checkbox"/></p> <p>Decay: 8</p> <p>Reconnaissance OP</p>	<p><b>Shaping Operation 1</b></p> <p>1 Team I/O:</p>  <p>105mm: <u>          </u> Hits Needed: <u>          </u>  DPICM +2 <input type="checkbox"/>  155mm: <u>          </u>  HE +1 <input type="checkbox"/>  DPICM +2 <input type="checkbox"/></p> <p>Decay: 5</p> <p>FN-6 MANPAD</p>	<p><b>Shaping Operation 1</b></p> <p>1 Section I/O:</p>  <p>105mm: <u>          </u> Hits Needed: <u>          </u>  DPICM +2 <input type="checkbox"/>  155mm: <u>          </u>  HE +1 <input type="checkbox"/>  DPICM +2 <input type="checkbox"/></p> <p>Decay: 7</p> <p>GSL-133 Engineer breaching vehicle</p>

<b>Shaping Operation 1</b> 1 section I/O  105mm: <u>          </u> Hits Needed: <input type="checkbox"/> <input type="checkbox"/> DPICM +2 155mm: <u>          </u> HE +1 DPICM +2 Decay: 5 BMP-3 infantry fighting vehicle	<b>Shaping Operation 1</b>  105mm: <u>          </u> Hits Needed: <input type="checkbox"/> <input type="checkbox"/> DPICM +2 155mm: <u>          </u> HE +1 DPICM +2 Decay: 8 Cavalry section	<b>Shaping Operation 1</b>  105mm: <u>          </u> Hits Needed: <input type="checkbox"/> <input type="checkbox"/> DPICM +2 155mm: <u>          </u> HE +1 DPICM +2 Decay: 8 Cavalry section	<b>Shaping Operation 1</b> 1 team I/O:  105mm: <u>          </u> Hits Needed: <input type="checkbox"/> DPICM +2 155mm: <u>          </u> HE +1 DPICM +2 Decay: 5 Panzerfaust 3	<b>Shaping Operation 1</b>  105mm: <u>          </u> Hits Needed: <input type="checkbox"/> <input type="checkbox"/> DPICM +2 155mm: <u>          </u> HE +1 DPICM +2 Decay: 8 Cavalry section
<b>Shaping Operation 1</b> 1 section I/O  105mm: <u>          </u> Hits Needed: <input type="checkbox"/> <input type="checkbox"/> DPICM +2 155mm: <u>          </u> HE +1 DPICM +2 Decay: 5 BMP-3 infantry fighting vehicle	<b>Shaping Operation 1</b>  105mm: <u>          </u> Hits Needed: <input type="checkbox"/> DPICM +2 155mm: <u>          </u> HE +1 DPICM +2 Decay: 8 Artillery forward observer OP	<b>Shaping Operation 1</b>  105mm: <u>          </u> Hits Needed: <input type="checkbox"/> DPICM +2 155mm: <u>          </u> HE +1 DPICM +2 Decay: 8 Reconnaissance OP	<b>Shaping Operation 1</b> 1 Team I/O:  105mm: <u>          </u> Hits Needed: <input type="checkbox"/> DPICM +2 155mm: <u>          </u> HE +1 DPICM +2 Decay: 5 FN-6 MANPAD	<b>Shaping Operation 1</b> 1 Platoon I/O:  105mm: <u>          </u> Hits Needed: <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> DPICM +2 155mm: <u>          </u> HE +1 DPICM +2 Decay: 3 T-14 Main battle tank











<b>Shaping Operation 1</b>  <u>105mm:</u> DPICM +2 <u>155mm:</u> HE +1 DPICM +2  <u>Hits Needed:</u> <input type="checkbox"/>  <b>Decay: 8</b> Reconnaissance OP	<b>Shaping Operation 1</b>  <u>105mm:</u> DPICM +2 <u>155mm:</u> HE +1 DPICM +2  <u>Hits Needed:</u> <input type="checkbox"/> <input type="checkbox"/>  <b>Decay: 8</b> Cavalry section	<b>Shaping Operation 1</b>  <u>105mm:</u> DPICM +2 <u>155mm:</u> HE +1 DPICM +2  <u>Hits Needed:</u> <input type="checkbox"/> <input type="checkbox"/>  <b>Decay: 8</b> Cavalry section	<b>Shaping Operation 1</b>  <u>105mm:</u> DPICM +2 <u>155mm:</u> HE +1 DPICM +2  <u>Hits Needed:</u> <input type="checkbox"/>  <b>Decay: 8</b> Reconnaissance OP	<b>Shaping Operation 1</b>  <u>105mm:</u> DPICM +2 <u>155mm:</u> HE +1 DPICM +2  <u>Hits Needed:</u> <input type="checkbox"/> <input type="checkbox"/>  <b>Decay: 8</b> Cavalry section
<b>Shaping Operation 1</b>  <u>105mm:</u> DPICM +2 <u>155mm:</u> HE +1 DPICM +2  <u>Hits Needed:</u> <input type="checkbox"/>  <b>Decay: 8</b> Reconnaissance OP	<b>Shaping Operation 1</b>  <u>105mm:</u> DPICM +2 <u>155mm:</u> HE +1 DPICM +2  <u>Hits Needed:</u> <input type="checkbox"/>  <b>Decay: 8</b> Artillery forward observer OP	<b>Shaping Operation 1</b>  <u>105mm:</u> DPICM +2 <u>155mm:</u> HE +1 DPICM +2  <u>Hits Needed:</u> <input type="checkbox"/>  <b>Decay: 8</b> Reconnaissance OP	<b>Shaping Operation 1</b>  <u>105mm:</u> DPICM +2 <u>155mm:</u> HE +1 DPICM +2  <u>Hits Needed:</u> <input type="checkbox"/> <input type="checkbox"/>  <b>Decay: 8</b> Cavalry section	<b>Shaping Operation 1</b>  <u>105mm:</u> DPICM +2 <u>155mm:</u> HE +1 DPICM +2  <u>Hits Needed:</u> <input type="checkbox"/> <input type="checkbox"/>  <b>Decay: 8</b> Cavalry section








<b>Shaping Operation 1</b>  <u>105mm:</u> DPICM +2 <u>155mm:</u> HE +1 DPICM +2  <u>Hits Needed:</u> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Decay: 5 Reconnaissance OP	<b>Shaping Operation 1</b>  <u>105mm:</u> DPICM +2 <u>155mm:</u> HE +1 DPICM +2  <u>Hits Needed:</u> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Decay: 5 Cavalry section	<b>Shaping Operation 1</b>  <u>105mm:</u> DPICM +2 <u>155mm:</u> HE +1 DPICM +2  <u>Hits Needed:</u> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Decay: 5 Cavalry section	<b>Shaping Operation 1</b>  <u>105mm:</u> DPICM +2 <u>155mm:</u> HE +1 DPICM +2  <u>Hits Needed:</u> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Decay: 5 Reconnaissance OP	<b>Shaping Operation 1</b>  <u>105mm:</u> DPICM +2 <u>155mm:</u> HE +1 DPICM +2  <u>Hits Needed:</u> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Decay: 5 Cavalry section
<b>Shaping Operation 1</b>  <u>105mm:</u> DPICM +2 <u>155mm:</u> HE +1 DPICM +2  <u>Hits Needed:</u> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Decay: 5 Reconnaissance OP	<b>Shaping Operation 1</b>  <u>105mm:</u> DPICM +2 <u>155mm:</u> HE +1 DPICM +2  <u>Hits Needed:</u> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Decay: 5 Artillery forward observer OP	<b>Shaping Operation 1</b>  <u>105mm:</u> DPICM +2 <u>155mm:</u> HE +1 DPICM +2  <u>Hits Needed:</u> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Decay: 5 Reconnaissance OP	<b>Shaping Operation 1</b>  <u>105mm:</u> DPICM +2 <u>155mm:</u> HE +1 DPICM +2  <u>Hits Needed:</u> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Decay: 5 Cavalry section	<b>Shaping Operation 1</b>  <u>105mm:</u> DPICM +2 <u>155mm:</u> HE +1 DPICM +2  <u>Hits Needed:</u> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Decay: 5 Cavalry section

<b>Shaping Operation</b> 1 squad I/O 	<b>Shaping Operation</b> 1 Squad I/O: 	<b>Shaping Operation</b> 1 squad I/O 	<b>Shaping Operation</b> 1 squad I/O 	<b>Shaping Operation</b> 1 squad I/O 
105mm: Hits Needed: DPICM +2 <input type="checkbox"/> <input type="checkbox"/> 155mm: <input type="checkbox"/> <input type="checkbox"/> HE +1 <input type="checkbox"/> DPICM +2 <input type="checkbox"/>	105mm: Hits Needed: DPICM +2 <input type="checkbox"/> <input type="checkbox"/> 155mm: <input type="checkbox"/> <input type="checkbox"/> HE +1 <input type="checkbox"/> DPICM +2 <input type="checkbox"/>	105mm: Hits Needed: DPICM +2 <input type="checkbox"/> <input type="checkbox"/> 155mm: <input type="checkbox"/> <input type="checkbox"/> HE +1 <input type="checkbox"/> DPICM +2 <input type="checkbox"/>	105mm: Hits Needed: DPICM +2 <input type="checkbox"/> <input type="checkbox"/> 155mm: <input type="checkbox"/> <input type="checkbox"/> HE +1 <input type="checkbox"/> DPICM +2 <input type="checkbox"/>	105mm: Hits Needed: DPICM +2 <input type="checkbox"/> <input type="checkbox"/> 155mm: <input type="checkbox"/> <input type="checkbox"/> HE +1 <input type="checkbox"/> DPICM +2 <input type="checkbox"/>
Decay: 5	Decay: 5	Decay: 5	Decay: 5	Decay: 5
BMP-3 Amphibious IFV	BMP-2 Amphibious IFV	BMP-3 Amphibious IFV	BMP-3 Amphibious IFV	BMP-3 Amphibious IFV











<div>Shaping Operation</div> <div>Dug-in</div>  <div> <u>105mm:</u>            DPICM +2  <u>155mm:</u>            HE +1            DPICM +2         </div> <div> <u>Hits Needed:</u>  <input type="checkbox"/> <input type="checkbox"/>  <input type="checkbox"/> <input type="checkbox"/>  <input type="checkbox"/> <input type="checkbox"/> </div> <div>Decay: 8</div>	<div>Shaping Operation</div> <div>Dug-in</div>  <div> <u>105mm:</u>            DPICM +2  <u>155mm:</u>            HE +1            DPICM +2         </div> <div> <u>Hits Needed:</u>  <input type="checkbox"/> <input type="checkbox"/>  <input type="checkbox"/> <input type="checkbox"/>  <input type="checkbox"/> <input type="checkbox"/> </div> <div>Decay: 8</div>	<div>Shaping Operation</div> <div>Dug-in</div>  <div> <u>105mm:</u>            DPICM +2  <u>155mm:</u>            HE +1            DPICM +2         </div> <div> <u>Hits Needed:</u>  <input type="checkbox"/> <input type="checkbox"/>  <input type="checkbox"/> <input type="checkbox"/>  <input type="checkbox"/> <input type="checkbox"/> </div> <div>Decay: 8</div>	<div>Shaping Operation</div> <div>Dug-in</div>  <div> <u>105mm:</u>            DPICM +2  <u>155mm:</u>            HE +1            DPICM +2         </div> <div> <u>Hits Needed:</u>  <input type="checkbox"/> <input type="checkbox"/>  <input type="checkbox"/> <input type="checkbox"/>  <input type="checkbox"/> <input type="checkbox"/> </div> <div>Decay: 8</div>	<div>Shaping Operation</div> <div>Dug-in</div>  <div> <u>105mm:</u>            DPICM +2  <u>155mm:</u>            HE +1            DPICM +2         </div> <div> <u>Hits Needed:</u>  <input type="checkbox"/> <input type="checkbox"/>  <input type="checkbox"/> <input type="checkbox"/>  <input type="checkbox"/> <input type="checkbox"/> </div> <div>Decay: 8</div>
<div>Shaping Operation</div> <div>Suspected</div>  <div> <u>105mm:</u>            DPICM +2  <u>155mm:</u>            HE +1            DPICM +2         </div> <div> <u>Hits Needed:</u>  <input type="checkbox"/> <input type="checkbox"/>  <input type="checkbox"/> <input type="checkbox"/>  <input type="checkbox"/> <input type="checkbox"/> </div> <div>Decay: 8</div>	<div>Shaping Operation</div> <div>Suspected</div>  <div> <u>105mm:</u>            DPICM +2  <u>155mm:</u>            HE +1            DPICM +2         </div> <div> <u>Hits Needed:</u>  <input type="checkbox"/> <input type="checkbox"/>  <input type="checkbox"/> <input type="checkbox"/>  <input type="checkbox"/> <input type="checkbox"/> </div> <div>Decay: 8</div>	<div>Shaping Operation</div> <div>Suspected</div>  <div> <u>105mm:</u>            DPICM +2  <u>155mm:</u>            HE +1            DPICM +2         </div> <div> <u>Hits Needed:</u>  <input type="checkbox"/> <input type="checkbox"/>  <input type="checkbox"/> <input type="checkbox"/>  <input type="checkbox"/> <input type="checkbox"/> </div> <div>Decay: 8</div>	<div>Shaping Operation</div> <div>Suspected</div>  <div> <u>105mm:</u>            DPICM +2  <u>155mm:</u>            HE +1            DPICM +2         </div> <div> <u>Hits Needed:</u>  <input type="checkbox"/> <input type="checkbox"/>  <input type="checkbox"/> <input type="checkbox"/>  <input type="checkbox"/> <input type="checkbox"/> </div> <div>Decay: 8</div>	<div>Shaping Operation</div> <div>Suspected</div>  <div> <u>105mm:</u>            DPICM +2  <u>155mm:</u>            HE +1            DPICM +2         </div> <div> <u>Hits Needed:</u>  <input type="checkbox"/> <input type="checkbox"/>  <input type="checkbox"/> <input type="checkbox"/>  <input type="checkbox"/> <input type="checkbox"/> </div> <div>Decay: 8</div>




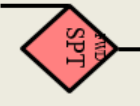
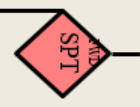







<b>Shaping Operation</b> 1 squad I/O 	<b>Shaping Operation</b> 1 Squad I/O: 	<b>Shaping Operation</b> 1 squad I/O 	<b>Shaping Operation</b> 1 squad I/O 	<b>Shaping Operation</b> 1 squad I/O 
105mm: DPICM +2 155mm: HE +1 DPICM +2 Hits Needed: <input type="checkbox"/> <input type="checkbox"/> Decay: 5	105mm: DPICM +2 155mm: HE +1 DPICM +2 Hits Needed: <input type="checkbox"/> <input type="checkbox"/> Decay: 5	105mm: DPICM +2 155mm: HE +1 DPICM +2 Hits Needed: <input type="checkbox"/> <input type="checkbox"/> Decay: 5	105mm: DPICM +2 155mm: HE +1 DPICM +2 Hits Needed: <input type="checkbox"/> <input type="checkbox"/> Decay: 5	105mm: DPICM +2 155mm: HE +1 DPICM +2 Hits Needed: <input type="checkbox"/> <input type="checkbox"/> Decay: 5
<b>Shaping Operation</b> 1 Squad I/O: 	<b>Shaping Operation</b> 1 Squad I/O: 	<b>Shaping Operation</b> 1 Squad I/O: 	<b>Shaping Operation</b> 1 Squad I/O: 	<b>Shaping Operation</b> 1 Squad I/O: 
105mm: DPICM +2 155mm: HE +1 DPICM +2 Hits Needed: <input type="checkbox"/> <input type="checkbox"/> Decay: 5	105mm: DPICM +2 155mm: HE +1 DPICM +2 Hits Needed: <input type="checkbox"/> <input type="checkbox"/> Decay: 5	105mm: DPICM +2 155mm: HE +1 DPICM +2 Hits Needed: <input type="checkbox"/> <input type="checkbox"/> Decay: 5	105mm: DPICM +2 155mm: HE +1 DPICM +2 Hits Needed: <input type="checkbox"/> <input type="checkbox"/> Decay: 5	105mm: DPICM +2 155mm: HE +1 DPICM +2 Hits Needed: <input type="checkbox"/> <input type="checkbox"/> Decay: 5

<div>Shaping Operation</div> <div>Dug-in</div>  <div> 105mm: Hits Needed: <input type="checkbox"/> <input type="checkbox"/>  DPICM +2 <input type="checkbox"/> <input type="checkbox"/>  155mm: <input type="checkbox"/> <input type="checkbox"/>  HE +1 <input type="checkbox"/> <input type="checkbox"/>  DPICM +2 <input type="checkbox"/> <input type="checkbox"/> </div> <div>Decay: 8</div>	<div>Shaping Operation</div> <div>Dug-in</div>  <div> 105mm: Hits Needed: <input type="checkbox"/> <input type="checkbox"/>  DPICM +2 <input type="checkbox"/> <input type="checkbox"/>  155mm: <input type="checkbox"/> <input type="checkbox"/>  HE +1 <input type="checkbox"/> <input type="checkbox"/>  DPICM +2 <input type="checkbox"/> <input type="checkbox"/> </div> <div>Decay: 8</div>	<div>Shaping Operation</div> <div>Dug-in</div>  <div> 105mm: Hits Needed: <input type="checkbox"/> <input type="checkbox"/>  DPICM +2 <input type="checkbox"/> <input type="checkbox"/>  155mm: <input type="checkbox"/> <input type="checkbox"/>  HE +1 <input type="checkbox"/> <input type="checkbox"/>  DPICM +2 <input type="checkbox"/> <input type="checkbox"/> </div> <div>Decay: 8</div>	<div>Shaping Operation</div> <div>Dug-in</div>  <div> 105mm: Hits Needed: <input type="checkbox"/> <input type="checkbox"/>  DPICM +2 <input type="checkbox"/> <input type="checkbox"/>  155mm: <input type="checkbox"/> <input type="checkbox"/>  HE +1 <input type="checkbox"/> <input type="checkbox"/>  DPICM +2 <input type="checkbox"/> <input type="checkbox"/> </div> <div>Decay: 8</div>	<div>Shaping Operation</div> <div>Dug-in</div>  <div> 105mm: Hits Needed: <input type="checkbox"/> <input type="checkbox"/>  DPICM +2 <input type="checkbox"/> <input type="checkbox"/>  155mm: <input type="checkbox"/> <input type="checkbox"/>  HE +1 <input type="checkbox"/> <input type="checkbox"/>  DPICM +2 <input type="checkbox"/> <input type="checkbox"/> </div> <div>Decay: 8</div>
<div>Shaping Operation</div> <div>Suspected</div>  <div> 105mm: Hits Needed: <input type="checkbox"/> <input type="checkbox"/>  DPICM +2 <input type="checkbox"/> <input type="checkbox"/>  155mm: <input type="checkbox"/> <input type="checkbox"/>  HE +1 <input type="checkbox"/> <input type="checkbox"/>  DPICM +2 <input type="checkbox"/> <input type="checkbox"/> </div> <div>Decay: 8</div>	<div>Shaping Operation</div> <div>Suspected</div>  <div> 105mm: Hits Needed: <input type="checkbox"/> <input type="checkbox"/>  DPICM +2 <input type="checkbox"/> <input type="checkbox"/>  155mm: <input type="checkbox"/> <input type="checkbox"/>  HE +1 <input type="checkbox"/> <input type="checkbox"/>  DPICM +2 <input type="checkbox"/> <input type="checkbox"/> </div> <div>Decay: 8</div>	<div>Shaping Operation</div> <div>Suspected</div>  <div> 105mm: Hits Needed: <input type="checkbox"/> <input type="checkbox"/>  DPICM +2 <input type="checkbox"/> <input type="checkbox"/>  155mm: <input type="checkbox"/> <input type="checkbox"/>  HE +1 <input type="checkbox"/> <input type="checkbox"/>  DPICM +2 <input type="checkbox"/> <input type="checkbox"/> </div> <div>Decay: 8</div>	<div>Shaping Operation</div> <div>In the Open</div>  <div> 105mm: Hits Needed: <input type="checkbox"/> <input type="checkbox"/>  DPICM +2 <input type="checkbox"/> <input type="checkbox"/>  155mm: <input type="checkbox"/> <input type="checkbox"/>  HE +1 <input type="checkbox"/> <input type="checkbox"/>  DPICM +2 <input type="checkbox"/> <input type="checkbox"/> </div> <div>Decay: 8</div>	<div>Shaping Operation</div> <div>In the Open</div>  <div> 105mm: Hits Needed: <input type="checkbox"/> <input type="checkbox"/>  DPICM +2 <input type="checkbox"/> <input type="checkbox"/>  155mm: <input type="checkbox"/> <input type="checkbox"/>  HE +1 <input type="checkbox"/> <input type="checkbox"/>  DPICM +2 <input type="checkbox"/> <input type="checkbox"/> </div> <div>Decay: 8</div>



<div>Shaping Operation</div> <div>1x Section:</div> 	<div>Shaping Operation</div> <div>1x Platoon</div> 	<div>Shaping Operation</div> <div>1x Platoon</div> 	<div>Shaping Operation</div> <div>1x Section</div> 	<div>Shaping Operation</div> <div>1x Section:</div> 
<div>Reveal 1x Enemy radar</div>	<div>Reveal 1x Enemy firing platoon (155mm platoon if possible)</div>	<div>Reveal 1x Enemy firing platoon (105mm platoon if possible)</div>	<div> <div>105mm: DPICM +2</div> <div> <div>Hits Needed:</div> <div> <input type="checkbox"/> </div> </div> <div> <div>155mm: HE +1</div> <div>DPICM +2</div> </div> </div>	<div>Reveal 1x Enemy radar</div>
<div>Hide when opponent moves the radar</div>	<div>Hide when opponent moves the platoon</div>	<div>Hide when opponent moves the platoon</div>	<div>Decay: 4</div>	<div>Hide when opponent moves the radar</div>
<div>11220- Counter Battery Radar</div> <div>Shaping Operation</div> <div>In the Open</div> 	<div>Shaping Operation</div> <div>In the Open</div> 	<div>Shaping Operation</div> <div>In the Open</div> 	<div>Shaping Operation</div> <div>In the Open</div> 	<div>Shaping Operation</div> <div>In the Open</div> 
<div> <div>105mm: DPICM +2</div> <div> <div>Hits Needed:</div> <div> <input type="checkbox"/> </div> </div> <div> <div>155mm: HE +1</div> <div>DPICM +2</div> </div> </div> <div>Decay: 5</div> <div>FN-6 MANPAD</div>	<div> <div>105mm: DPICM +2</div> <div> <div>Hits Needed:</div> <div> <input type="checkbox"/> </div> </div> <div> <div>155mm: HE +1</div> <div>DPICM +2</div> </div> </div> <div>Decay: 5</div> <div>FN-6 MANPAD</div>	<div> <div>105mm: DPICM +2</div> <div> <div>Hits Needed:</div> <div> <input type="checkbox"/> </div> </div> <div> <div>155mm: HE +1</div> <div>DPICM +2</div> </div> </div> <div>Decay: 5</div> <div>FN-6 MANPAD</div>	<div> <div>105mm: DPICM +2</div> <div> <div>Hits Needed:</div> <div> <input type="checkbox"/> </div> </div> <div> <div>155mm: HE +1</div> <div>DPICM +2</div> </div> </div> <div>Decay: 5</div> <div>RPGa-32</div>	<div> <div>105mm: DPICM +2</div> <div> <div>Hits Needed:</div> <div> <input type="checkbox"/> </div> </div> <div> <div>155mm: HE +1</div> <div>DPICM +2</div> </div> </div> <div>Decay: 5</div> <div>RPGa-32</div>

<b>Shaping Operation</b> 1x Section I/O:  <u>105mm:</u> DPICM +2 <u>155mm:</u> HE +1 DPICM +2  <u>Hits Needed:</u> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>  Decay: 6	<b>Shaping Operation</b> 1x Section I/O:  <u>105mm:</u> DPICM +2 <u>155mm:</u> HE +1 DPICM +2  <u>Hits Needed:</u> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>  Decay: 6	<b>Shaping Operation</b> 1 Section I/O:  <u>105mm:</u> DPICM +2 <u>155mm:</u> HE +1 DPICM +2  <u>Hits Needed:</u> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>  Decay: 6	<b>Shaping Operation</b> 1 Section I/O:  Expose the enemy Forward Support Company.  Hide again when the FSC moves.	<b>Shaping Operation</b> 1 Section I/O:  Expose the enemy Forward Support Company.  Hide again when the FSC moves.
<b>Shaping Operation</b> Dug-in  <u>105mm:</u> DPICM +2 <u>155mm:</u> HE +1 DPICM +2  <u>Hits Needed:</u> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>  Decay: 8	<b>Shaping Operation</b> Dug-in  <u>105mm:</u> DPICM +2 <u>155mm:</u> HE +1 DPICM +2  <u>Hits Needed:</u> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>  Decay: 8	<b>Shaping Operation</b> Dug-in  <u>105mm:</u> DPICM +2 <u>155mm:</u> HE +1 DPICM +2  <u>Hits Needed:</u> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>  Decay: 8	<b>Shaping Operation</b> Dug-in  <u>105mm:</u> DPICM +2 <u>155mm:</u> HE +1 DPICM +2  <u>Hits Needed:</u> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>  Decay: 8	<b>Shaping Operation</b> Dug-in  <u>105mm:</u> DPICM +2 <u>155mm:</u> HE +1 DPICM +2  <u>Hits Needed:</u> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>  Decay: 8











ENV Infantry Platoon











ENV Infantry Platoon

ENV Infantry Platoon

ENV Infantry Platoon

ENV Infantry Platoon

<p><b>Decisive Operation</b></p> <p>1x Section I/O:</p>  <p>105mm: DPICM +2 155mm: HE +1 DPICM +2</p> <p>Hits Needed: <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p>Decay: 3</p> <p>T-14 Main battle tank</p>	<p><b>Decisive Operation</b></p> <p>1x Section I/O:</p>  <p>105mm: DPICM +2 155mm: HE +1 DPICM +2</p> <p>Hits Needed: <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p>Decay: 3</p> <p>T-14 Main battle tank</p>	<p><b>Decisive Operation</b></p> <p>1 Section I/O:</p>  <p>105mm: DPICM +2 155mm: HE +1 DPICM +2</p> <p>Hits Needed: <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p>Decay: 3</p> <p>T-14 Main battle tank</p>	<p><b>Decisive Operation</b></p> <p>1 Section I/O:</p>  <p>105mm: DPICM +2 155mm: HE +1 DPICM +2</p> <p>Hits Needed: <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p>Decay: 3</p> <p>T-14 Main battle tank</p>	<p><b>Decisive Operation</b></p> <p>1 Section I/O:</p>  <p>105mm: DPICM +2 155mm: HE +1 DPICM +2</p> <p>Hits Needed: <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p>Decay: 3</p> <p>T-14 Main battle tank</p>
<p><b>Decisive Operation</b></p> <p>Dug-in</p>  <p>105mm: DPICM +2 155mm: HE +1 DPICM +2</p> <p>Hits Needed: <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p>Decay: 8</p> <p>ENV Infantry Platoon</p>	<p><b>Decisive Operation</b></p> <p>Dug-in</p>  <p>105mm: DPICM +2 155mm: HE +1 DPICM +2</p> <p>Hits Needed: <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p>Decay: 8</p> <p>ENV Infantry Platoon</p>	<p><b>Decisive Operation</b></p> <p>Dug-in</p>  <p>105mm: DPICM +2 155mm: HE +1 DPICM +2</p> <p>Hits Needed: <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p>Decay: 8</p> <p>ENV Infantry Platoon</p>	<p><b>Decisive Operation</b></p> <p>Dug-in</p>  <p>105mm: DPICM +2 155mm: HE +1 DPICM +2</p> <p>Hits Needed: <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p>Decay: 8</p> <p>ENV Infantry Platoon</p>	<p><b>Decisive Operation</b></p> <p>Dug-in</p>  <p>105mm: DPICM +2 155mm: HE +1 DPICM +2</p> <p>Hits Needed: <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p>Decay: 8</p> <p>ENV Infantry Platoon</p>

<div>Decisive Operation</div> <div>1x Section I/O:</div> 	<div>105mm: DPICM +2</div> <div>155mm: HE +1</div> <div>DPICM +2</div> <div>Hits Needed: <div><div></div><div></div><div></div><div></div></div></div> <div>Decay: 3</div>	<div>Decisive Operation</div> <div>1x Section I/O:</div> 	<div>105mm: DPICM +2</div> <div>155mm: HE +1</div> <div>DPICM +2</div> <div>Hits Needed: <div><div></div><div></div><div></div><div></div></div></div> <div>Decay: 3</div>	<div>Decisive Operation</div> <div>1 Section I/O:</div> 	<div>105mm: DPICM +2</div> <div>155mm: HE +1</div> <div>DPICM +2</div> <div>Hits Needed: <div><div></div><div></div><div></div><div></div></div></div> <div>Decay: 3</div>	<div>Decisive Operation</div> <div>1 Section I/O:</div> 	<div>105mm: DPICM +2</div> <div>155mm: HE +1</div> <div>DPICM +2</div> <div>Hits Needed: <div><div></div><div></div><div></div><div></div></div></div> <div>Decay: 3</div>	<div>Decisive Operation</div> <div>1 Section I/O:</div> 	<div>105mm: DPICM +2</div> <div>155mm: HE +1</div> <div>DPICM +2</div> <div>Hits Needed: <div><div></div><div></div><div></div><div></div></div></div> <div>Decay: 3</div>
<div>Decisive Operation</div> <div>Dug-in</div> 	<div>105mm: DPICM +2</div> <div>155mm: HE +1</div> <div>DPICM +2</div> <div>Hits Needed: <div><div></div><div></div><div></div><div></div></div></div> <div>Decay: 8</div>	<div>Decisive Operation</div> <div>Dug-in</div> 	<div>105mm: DPICM +2</div> <div>155mm: HE +1</div> <div>DPICM +2</div> <div>Hits Needed: <div><div></div><div></div><div></div><div></div></div></div> <div>Decay: 8</div>	<div>Decisive Operation</div> <div>Dug-in</div> 	<div>105mm: DPICM +2</div> <div>155mm: HE +1</div> <div>DPICM +2</div> <div>Hits Needed: <div><div></div><div></div><div></div><div></div></div></div> <div>Decay: 8</div>	<div>Decisive Operation</div> <div>Dug-in</div> 	<div>105mm: DPICM +2</div> <div>155mm: HE +1</div> <div>DPICM +2</div> <div>Hits Needed: <div><div></div><div></div><div></div><div></div></div></div> <div>Decay: 8</div>	<div>Decisive Operation</div> <div>Dug-in</div> 	<div>105mm: DPICM +2</div> <div>155mm: HE +1</div> <div>DPICM +2</div> <div>Hits Needed: <div><div></div><div></div><div></div><div></div></div></div> <div>Decay: 8</div>





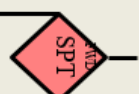





ENV Infantry Platoon

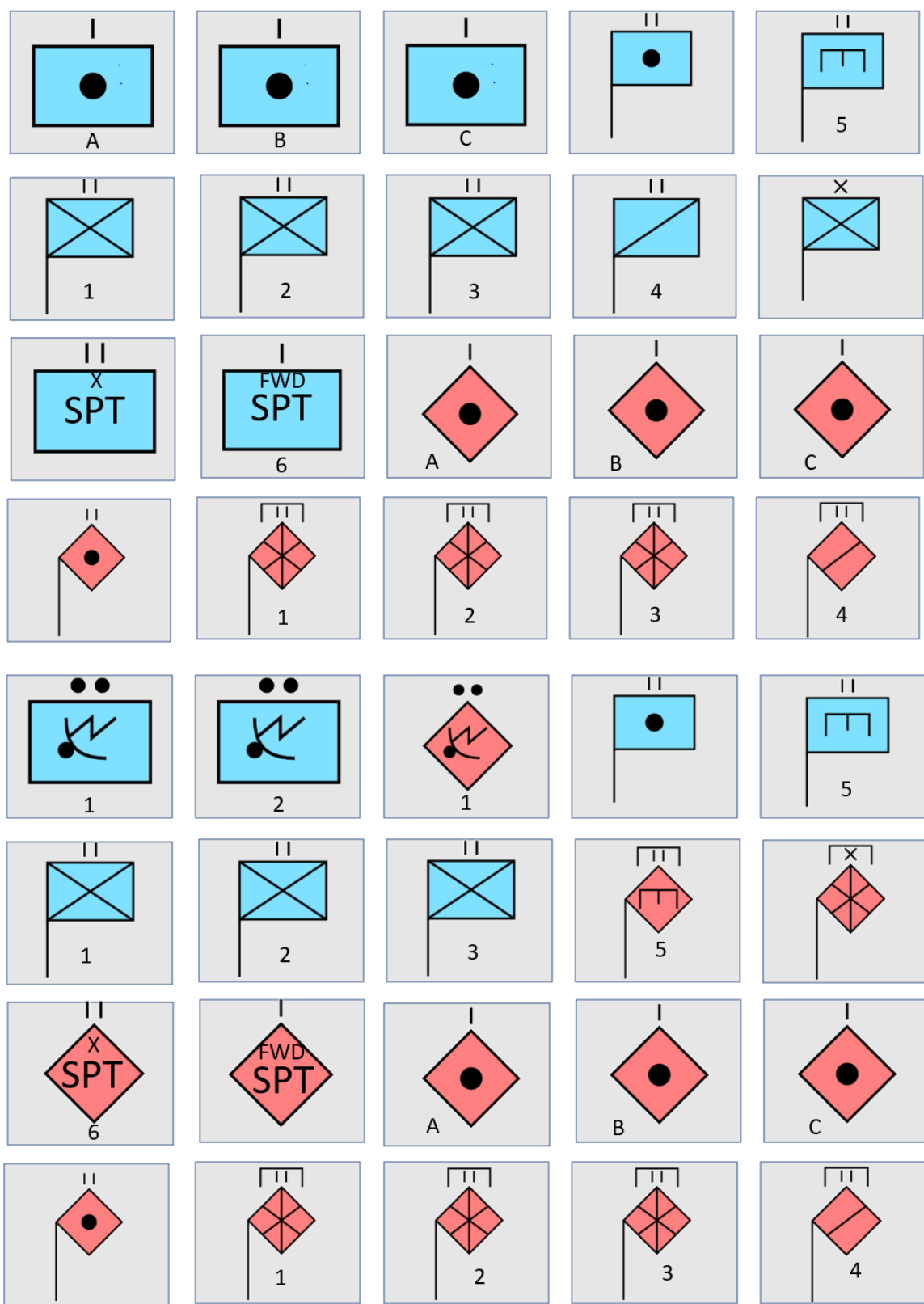
ENV Infantry Platoon

ENV Infantry Platoon

ENV Infantry Platoon

ENV Infantry Platoon

<p><b>Decisive Operation</b></p> <p>1x Section I/O:</p>  <p>105mm: DPICM +2 155mm: HE +1 DPICM +2</p> <p>Hits Needed: 4 squares</p> <p>Decay: 6</p> <p>Infantry Battalion Headquarters</p>	<p><b>Decisive Operation</b></p> <p>1x Section I/O:</p>  <p>105mm: DPICM +2 155mm: HE +1 DPICM +2</p> <p>Hits Needed: 4 squares</p> <p>Decay: 6</p> <p>Infantry Battalion Headquarters</p>	<p><b>Decisive Operation</b></p> <p>1 Section I/O:</p>  <p>105mm: DPICM +2 155mm: HE +1 DPICM +2</p> <p>Hits Needed: 4 squares</p> <p>Decay: 6</p> <p>Infantry Battalion Headquarters</p>	<p><b>Decisive Operation</b></p> <p>1 Section I/O:</p>  <p>Expose the enemy Forward Support Company.</p> <p>Hide again when the FSC moves.</p> <p>Forward Support Company HQ</p>	<p><b>Decisive Operation</b></p> <p>1 Section I/O:</p>  <p>Expose the enemy Forward Support Company.</p> <p>Hide again when the FSC moves.</p> <p>Forward Support Company HQ</p>
<p><b>Decisive Operation</b></p> <p>Dug-in</p>  <p>105mm: DPICM +2 155mm: HE +1 DPICM +2</p> <p>Hits Needed: 4 squares</p> <p>Decay: 8</p> <p>ENV Infantry Platoon</p>	<p><b>Decisive Operation</b></p> <p>Dug-in</p>  <p>105mm: DPICM +2 155mm: HE +1 DPICM +2</p> <p>Hits Needed: 4 squares</p> <p>Decay: 8</p> <p>ENV Infantry Platoon</p>	<p><b>Decisive Operation</b></p> <p>Dug-in</p>  <p>105mm: DPICM +2 155mm: HE +1 DPICM +2</p> <p>Hits Needed: 4 squares</p> <p>Decay: 8</p> <p>ENV Infantry Platoon</p>	<p><b>Decisive Operation</b></p> <p>Dug-in</p>  <p>105mm: DPICM +2 155mm: HE +1 DPICM +2</p> <p>Hits Needed: 4 squares</p> <p>Decay: 8</p> <p>ENV Infantry Platoon</p>	<p><b>Decisive Operation</b></p> <p>Dug-in</p>  <p>105mm: DPICM +2 155mm: HE +1 DPICM +2</p> <p>Hits Needed: 4 squares</p> <p>Decay: 8</p> <p>ENV Infantry Platoon</p>



# BLUE PLAYER CARD 1

Turn Sequence: Draw FAT Cards, Increase Vulnerability, Recover Action points, Activate Units

Alpha Battery: 6x 105mm Towed Howitzers, 2x FDCs

Ammunition: 1 block = 1 D20/howitzer

HHHHHHHHHH

Action Points: 15

Move	1	2	3
U/Road	Restric	Hast	Severe
Emplace	Emerg		Delib
Fire Mission	1		
Displace	2		
U/D load	2		
Dig	5		
Cammo	5		
Blitz	1		

Vulnerable

Charlie Battery: 6x 155mm Howitzers, 2x FDCs

Ammunition: 1 block = 1 D20/howitzer

HHHHHHHHHH

Action Points: 15

Move	1	2	3
U/Road	Restric	Hast	Severe
Emplace	Emerg		Delib
Fire Mission	1		
Displace	2		
U/D load	2		
Dig	5		
Cammo	5		
Blitz	1		

Vulnerable

Bravo Battery: 6x 105mm Towed Howitzers, 2x FDCs

Ammunition: 1 block = 1 D20/howitzer

HHHHHHHHHH

Action Points: 15

Move	1	2	3
U/Road	Restric	Hast	Severe
Emplace	Emerg		Delib
Fire Mission	1		
Displace	2		
U/D load	2		
Dig	5		
Cammo	5		
Blitz	1		

Vulnerable

**Fire Missions:**

1 Action Point per fire mission  
1 D20/Howitzer/Ammo Block

**Hit:**

Infantry i/o 19

Tanks 22

All others TGTs 20

Smoke and illum always hit

**Modifiers:**

DPICM= +2

155mm HE= +1

Mass= +1 for each additional

battery fired for that FAT

Dug In= Must shoot smoke first

and -1

Suspected= must shoot illum first

and -1

Suspected= must shoot illum first

and -1

Suspected= must shoot illum first

and -1

Suspected= must shoot illum first

and -1

Suspected= must shoot illum first

and -1

Suspected= must shoot illum first

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Suspected= must shoot illum first

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and -1

Suspected= must shoot illum first

and -1

Suspected= must shoot illum first

and -1

Suspected= must shoot illum first

and -1

Suspected= must shoot illum first

**Vulnerability:**

+3/turn for each IPRTF Battery  
+1 each fire mission  
+3 if w/in 5 kms of an objective

-1 for Digging

-1 for Cammo

Reset to 0 when the battery

moves

**Emplacements:**

Batteries/RADAR may not be

emplaced in any square

adjacent to or diagonal from a

CP. Batteries/RADAR may not

emplace with-in 2 km of the BSB

(the FSC may). To camouflage

the battery/RADAR bust it must

be in restrictive terrain.

**Resupplying:**

155mm ammunition  
is listed as 3 blocks for  
the FSC these equate

to 1 block on the

Charlie battery Ammo

Tracker (non-

interchangeable with

105mm). If the

battery has all its

howitzers it may send

an ammunition

section to resupply.

Up/Down load must

be conducted twice

per resupply. This can

be split between 2

collocated units.



**Turn Sequence: Draw FAT Cards, Increase Vulnerability, Recover Action points, Activate Units**

Ammunition: 1 block = 1 D20/howitzer

[illegible]A full-page sheet of graph paper with a light blue background and a dark gray grid. The grid consists of 20 columns and 20 rows of squares. There are small tabs at the top center and bottom center of the page.

**Action Points: 10**

Radiating	
On	Pass


**Action Points: 10**

Radiating	
On	Pass


1. **Dynamic Targeting:** If an enemy firing unit moves within 8kms of an objective expose it and immediately engage if able.

- Each of these advantages may be utilized 1 time per game.

If a Radar is IPRTD and radiating reveal any Enemy battery that fires on its first fire mission. You may begin counterfire after its first mission is complete but before the opposing player takes another action of any type.

cards are drawn.

Ammunition may be downloaded in the field. Complete one download action then place a white block in the place it was dropped and note the ammo on a note card.

155mm ammunition is listed as 3 blocks for the FSC these equate to 1 block on the Charlie battery Ammo Tracker (non-interchangeable with 105mm). If the battery has all its howitzers it may send an ammunition section to resupply. Up/Down load must be conducted twice per resupply. This can be split between 2 collected units.

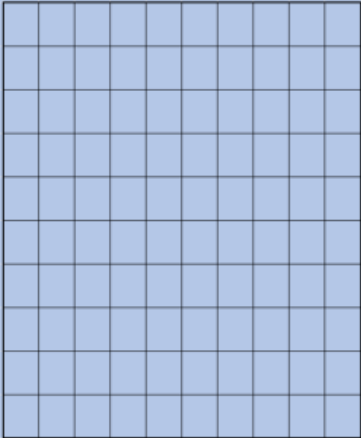


# BLUE PLAYER AMMO CACHE

Turn Sequence: Draw FAT Cards, Increase Vulnerability, Recover Action points, Activate Units

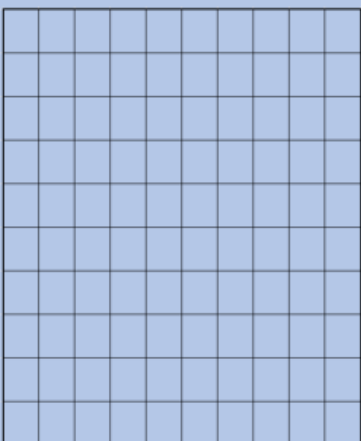
Cache 1

Ammunition: 1 block = 1x105mm round/ 3 blocks = 1x155mm round



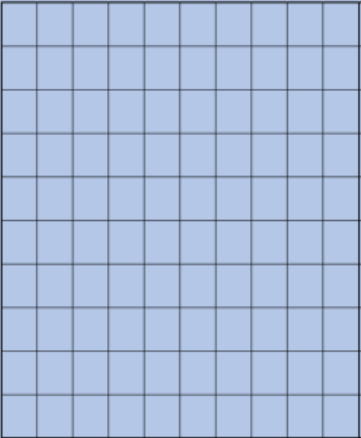
Cache 2

Ammunition: 1 block = 1x105mm round/ 3 blocks = 1x155mm round



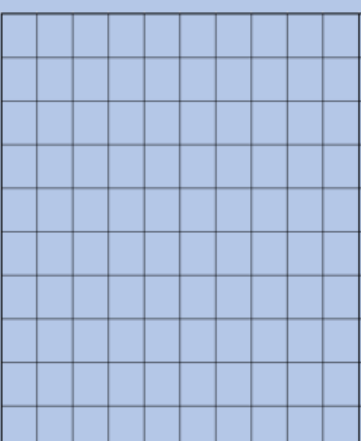
Cache 3

Ammunition: 1 block = 1x105mm round/ 3 blocks = 1x155mm round



Cache 4

Ammunition: 1 block = 1x105mm round/ 3 blocks = 1x155mm round



# RED PLAYER CARD 1

Turn Sequence: Draw FAT Cards, Increase Vulnerability, Recover Action points, Activate Units

Alpha Battery: 8x 105mm Towed Howitzers, 2x FDCs

Ammunition: 1 block = 1 D20/howitzer

Action Points: 15

Move	1	2	3
U/Road	Restric	Severe	
Emplace	Emerg	Hast	Deib
Fire Mission	1		
Displace	2		
U/D load	2		
Dig	5		
Cammo	5		
Blitz	1		

Vulnerable

Bravo Battery: 8x 105mm Towed Howitzers, 2x FDCs

Ammunition: 1 block = 1 D20/howitzer

Action Points: 15

Move	1	2	3
U/Road	Restric	Severe	
Emplace	Emerg	Hast	Deib
Fire Mission	1		
Displace	2		
U/D load	2		
Dig	5		
Cammo	5		
Blitz	1		

Vulnerable

Charlie Battery: 8x 155mm Howitzers, 2x FDCs

Ammunition: 1 block = 1 D20/howitzer

Action Points: 15

Move	1	2	3
U/Road	Restric	Severe	
Emplace	Emerg	Hast	Deib
Fire Mission	1		
Displace	2		
U/D load	2		
Dig	5		
Cammo	5		
Blitz	1		

Vulnerable

## Fire Missions:

1 Action Point per fire mission  
1 D20/Howitzer/Ammo Block  
Hit:

Infantry / 0 19  
Tanks 22

All others TGTs 20

Smoke and illum always hit

## Modifiers:

DPICM=+2

155mm HE=+1

Mase=+1 for each additional

battery fired for that FAT

Dig in= Must shoot smoke first

and -1

Suspected= must shoot illum first

Add 1 Vulnerability/fire mission

## Vulnerability:

+3/turn for each IPRTF Battery  
+1 each fire mission  
+3 if w/in 5 kms of an objective

-1 for Digging  
-1 for Cammo  
Reset to 0 when the battery

moves  
Emplacements:

Batteries/RADAR may not be  
emplaced in any square  
adjacent to or diagonal from a

CP. Batteries/RADAR may not  
emplace with-in 2 km of the BSB  
(the FSC may). To camouflage

the battery/RADAR bust it must  
be in restrictive terrain.

## Resupplying:

155mm ammunition  
is listed as 3 blocks for  
the FSC these equate  
to 1 block on the

Charlie battery Ammo  
Tracker (non-  
interchangeable with

105mm). If the  
battery has all its  
howitzers it may send

an ammunition  
section to resupply.  
Up/Down load must

be conducted twice  
per resupply. This can  
be split between 2  
collocated units.

**Turn Sequence:** Draw FAT Cards, Increase Vulnerability, Recover Action points, Activate Units

Ammunition: 1 block = 1 D20/howitzer


[illegible][illegible]

Radiating	
On	Pass

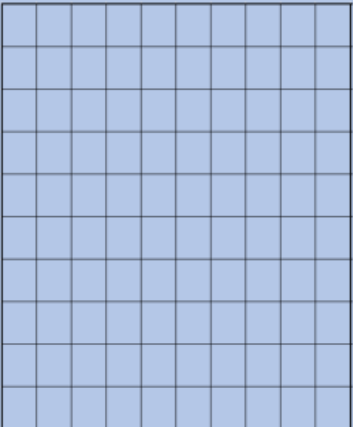
Frequency	Percentage
Daily	~1%
Several times a week	~1%
Once a week	~1%
A few times a month	~1%
Once a month	~1%
A few times a year	~1%
Never	~96%

# RED PLAYER AMMO CACHE

Turn Sequence: Draw FAT Cards, Increase Vulnerability, Recover Action points, Activate Units

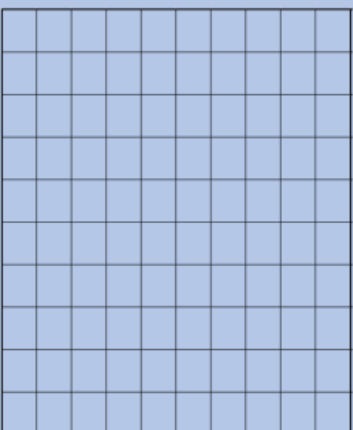
Cache 1

Ammunition: 1 block = 1x105mm round/ 3 blocks = 1x155mm round



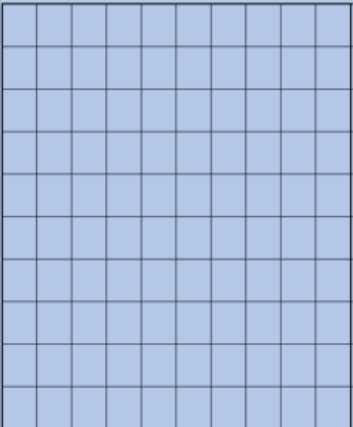
Cache 2

Ammunition: 1 block = 1x105mm round/ 3 blocks = 1x155mm round



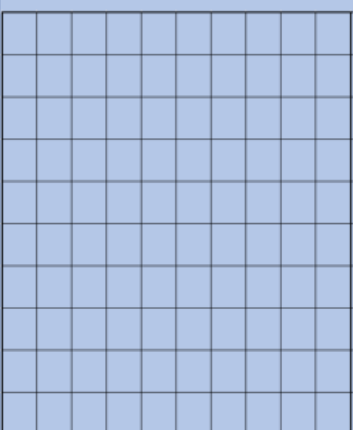
Cache 3

Ammunition: 1 block = 1x105mm round/ 3 blocks = 1x155mm round



Cache 4

Ammunition: 1 block = 1x105mm round/ 3 blocks = 1x155mm round



# Objective Tracker

Turn Sequence: Draw FAT Cards, Increase Vulnerability, Recover Action points, Activate Units

Turns										Score: Blue/Red	
SO1											
SO2											
SO3											
DO											

BSA for Blue and Red:

105mm	Blue	Red	155mm	Blue	Red
HE			HE		
HERA			HERA		
DPICM			DPICM		
Illumination			Illumination		
Smoke			Smoke		

High Payoff Targets	Off	Deff
Tanks	4pts	4pts
ADA/RADAR	3pts	3pts
Cps	3pts	2pts
Artillery	2pts	2pts
Engineers	2pts	3pts
All Others	1pt	1pt

FATs and Scoring:

Each accomplished FAT card will be scored according to the HPTL to the left. Keep score by objective to the right of the turn tracker above. The player who has the most points in the objective when it ends wins the objective. For each objective the player wins he/she can draw one more FAT card for subsequent objectives. Win the game by winning the DO and having the most surviving howitzers when it ends.

Default FAT Cards per player for each objective:

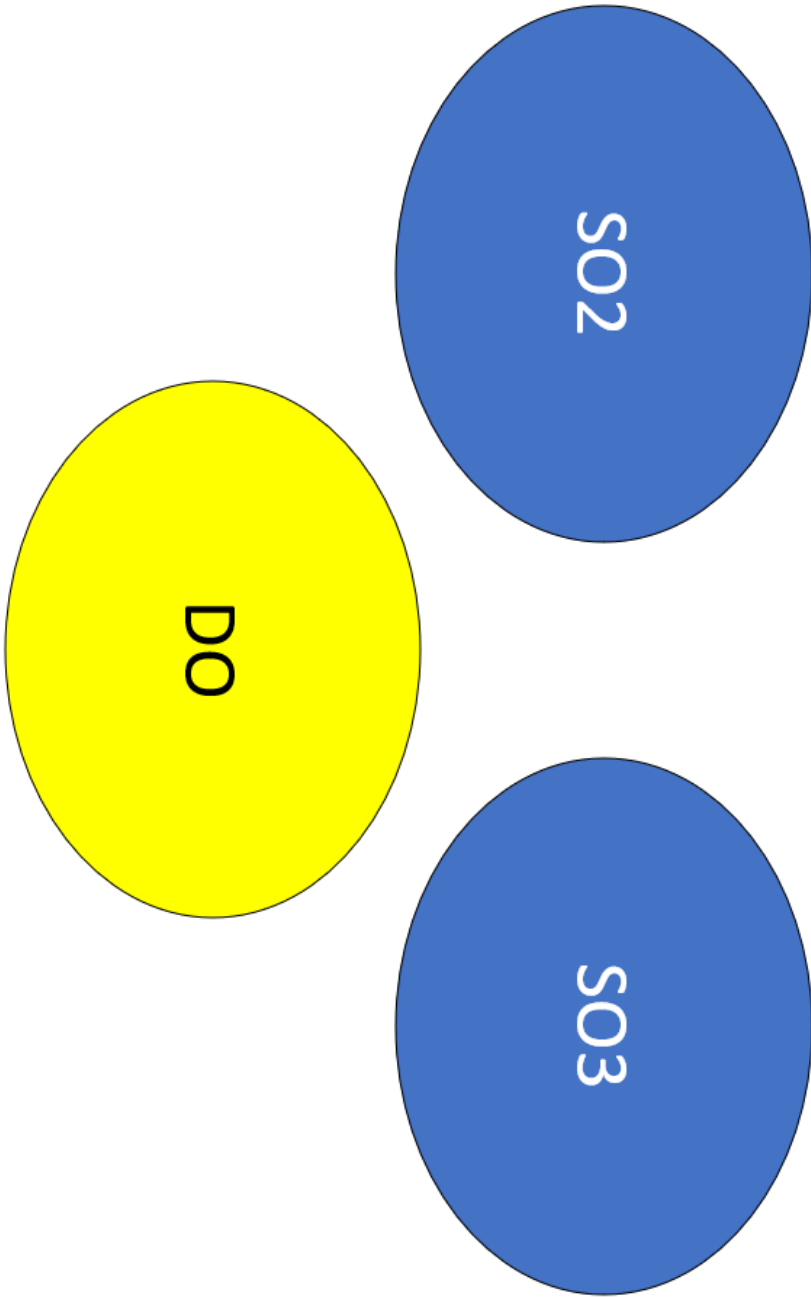
SO1 = 3  
SO2 = 2  
SO3 = 2  
DO = 3

FAT1

FAT2

FAT3

FAT4



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