



## **FIRES UNDER FIRE: LIGHT MORTARS IN THE CANADIAN INFANTRY**

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### **JCSP 50**

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# FIRES UNDER FIRE: LIGHT MORTARS IN THE CANADIAN INFANTRY

## AIM

1. The aim of this service paper is to highlight a critical capability gap in the Royal Canadian Infantry Corps (RCIC): the light mortar. A reflection evaluating Canadian indirect fire capabilities against potential peer adversaries will illuminate the problem. Within Pan-Domain Operations, the CAF is called to action:

Building capability depth in this environment by identifying and mitigating vulnerabilities – personnel, equipment, technology, or otherwise – has become an increasingly complex endeavor for which Target Systems Analysis-like thinking will be required.<sup>1</sup>

The lack of depth and scalability in indirect fire support is one such vulnerability. Integral light mortars in the infantry is a needed mitigation. It is recommended that the RCIC and the Canadian Army (CA) re-instate the light mortar as a standard platoon and company weapon system. Further study should evaluate the limited use of medium mortars that currently only reside in light and select infantry reserve battalions within the RCIC.

## INTRODUCTION

2. The US Field Manual 7-90 *Tactical Employment of Mortars* states that “Simplicity, ruggedness, maneuverability and effectiveness are the principle characteristics of mortars.”<sup>2</sup> The 60mm light mortar was a standard weapon within the RCIC until it was phased out by the C16, Automatic Grenade Launcher (AGL) Close Area Suppression Weapon (CASW) in the 2008-2010 timeframe. The argument for the change was that the CASW was a superior weapon that met the same requirement as the 60mm mortar, which was at the end of its life cycle.<sup>3</sup> The replacement was highly debated at the time.<sup>4</sup> The C19 is now fully integrated into regular force infantry battalions. After more than a decade of use, it is universally understood in the CA that due to its lack of mobility, simplicity, and reliability in an indirect role it is not in fact a replacement capability.<sup>5</sup> The United States (US) Army has a similar story, 50 years earlier in history. The 60mm mortar was taken out of the rifle company order of battle (ORBAT) in 1957,<sup>6</sup> to be replaced with the 81mm medium mortar due to a desire for heavier firepower capability.<sup>7</sup> In

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<sup>1</sup> *Pan-Domain Force Employment Concept: Prevailing in a Dangerous World*, Canadian Armed Forces, 33.

<sup>2</sup> United States. Dept. of the Army, *Tactical Employment of Mortars*, Vol. 7-90 (Washington: Headquarters, Dept. of the Army, 1992), 1-5.

<sup>3</sup> David Pugliese, "Does it make Sense to Get Rid of the 60mm Mortar?" *Ottawa Citizen* Jul 4, 2008. <https://ottawacitizen.com/news/national/defence-watch/does-it-make-sense-to-get-rid-of-the-60mm-mortar>.

<sup>4</sup> David Pugliese, "Does it make Sense to Get Rid of the 60mm Mortar?" *Ottawa Citizen* Jul 4, 2008. <https://ottawacitizen.com/news/national/defence-watch/does-it-make-sense-to-get-rid-of-the-60mm-mortar>.

<sup>5</sup> Dunning, M.R. *Rethinking the Canadian Army Anti-Armour Procurement Strategy* (Toronto, Ont.: Canadian Forces College, [2016]). <https://www.cfc.forces.gc.ca/259/290/318/192/dunning.pdf>

<sup>6</sup> Ney, Virgil. *Evolution of the US Army Infantry Mortar Squad: The Argonne to Pleiku*, (1966). <https://apps.dtic.mil/sti/pdfs/AD0645160.pdf>

Vietnam, soldiers found the weight of the 81mm to be burdensome, affecting mobility, and that the M-79 grenade launcher was not an adequate light capability replacement for the 60mm.<sup>8</sup>

3. Currently in the RCIC, mechanized infantry battalions have no integral mortar capability, and the regular force light battalions employ the 81mm within the battalion combat support company. Any meaningful understanding of indirect fire support for a mechanized battalion must therefore come from artillery- a limited brigade resource. Our airborne and mountain forces, designed and trained to work in austerity and independently are reliant on either the 81mm support from their battalions, artillery, or air for supporting fires. This lack of layered indirect fire capability is highly problematic against a peer enemy. This service paper will review light mortar origins, fighting in a degraded environment, counter-battery, a note on deep or dispersed operations and air parity to illuminate. Additionally, it will demonstrate how light mortar capabilities resident in the infantry would allow us to better equip partnered forces for combat.

## DISCUSSION

### Origins

4. A brief look at the early development of the modern light mortar is worthwhile, as many of the considerations that led to its integration within the infantry are very relevant in the modern operating environment. The birth of the light mortar in its current form can be traced back to the trenches of World War 1 (WWI). During a Canadian trench raid on the Douvre River 16-17 November, 1915, Rawling describes how artillery was utilized to strike the front lines, wire obstacles and communications trenches, whilst the newly integrated 4 inch trench mortar worked with machine guns to target a German machine gun emplacement.<sup>9</sup> Throughout the course of the trench warfighting, there was a general shift towards smaller, lighter, more portable mortars to support soldier mobility.<sup>10</sup> Sir Wilfred Stokes designed the British Stokes Mortar in 1915,<sup>11</sup> which was a three-inch light mortar.<sup>12</sup> This design built upon the 18<sup>th</sup> century system developed by Dutch Baron Menno van Coehoorn in the 18<sup>th</sup> century.<sup>13</sup> In the words of Virgil Ney, “The Stokes was the answer in World War I to the infantrymans prayer for organic support fire as he went over the top of his trenches into the enemy fire.”<sup>14</sup> In the defensive, mortar fire was synchronized with machine guns and wire obstacle emplacements.<sup>15</sup> The importance of maneuverability of suppression weapons in trench warfare was learned in blood. These lessons are important to reflect on. The war in Ukraine has demonstrated that trench warfare must be considered. Our soldiers would, at this time, be reliant on brigade level artillery fires, or the more

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<sup>8</sup> Ney, Virgil. *Evolution of the US Army Infantry Mortar Squad: The Argonne to Pleiku*, 1966).  
<https://apps.dtic.mil/sti/pdfs/AD0645160.pdf>

<sup>9</sup> Bill Rawling, *Surviving Trench Warfare: Technology and the Canadian Corps, 1914-1918* (Toronto: University of Toronto Press, 1992), 48.

<sup>10</sup> Ney, *Evolution of the Us Army Infantry Mortar Squad: The Argonne to Pleiku*

<sup>11</sup> John Norris and Robert Calow, *Infantry Mortars of World War II*, Vol. 54 (Oxford: Osprey, 2002), 3.

<sup>12</sup> Ney, *Evolution of the Us Army Infantry Mortar Squad: The Argonne to Pleiku*

<sup>13</sup> Norris, *Infantry Mortars of World War II*, 3

<sup>14</sup> Ney, Virgil. *Evolution of the US Army Infantry Mortar Squad: The Argonne to Pleiku*, 1966).  
<https://apps.dtic.mil/sti/pdfs/AD0645160.pdf>

static, targetable, C16 to provide similar suppressive effects that the light and medium mortars provided to the British and others in WWI.

5. The Stokes mortar is what World War II (WWII) mortar systems were based off of.<sup>16</sup> During WWII, most infantry platoons held at least one, and up to three light mortars.<sup>17</sup> John Norris remarks: “For instant fire support the mortar was unsurpassed on the battlefields of World War II, and for that fact the infantry and lightly armed airborne units were glad for the support...”<sup>18</sup> US Airborne troops used a 60mm M2 which could be deployed in a “leg bag” with the soldier during an air insertion.<sup>19</sup> As such, soldiers operating behind enemy lines, outside of the reach of friendly artillery, and in a contested airspace would be capable of providing their own integral indirect fire support. Manoeuvre down to the platoon level was enabled by integral direct and indirect fires. By centralizing our limited medium mortar capability, and stripping our light mortar completely, we have tied our ability to provide fire support to tactical units to battalion or brigade assets, or with an assumption of air support. By this metric the infantry is less capable of independent small, dispersed manoeuvre and direct action than it was over eighty years ago. This is not a technical systems integration problem, but a capability gap.

## Degraded Environment

6. Pan-Domain Operations states the following:

Capabilities that provide us a competitive advantage will also inherently be the focus of our adversaries’ efforts to deny their use to us. The CAF must be prepared to operate in a highly contested, degraded, and operationally limited environment and possess the means to rapidly rebuild or replace this advantage.<sup>20</sup>

This is not just a question of technology. The emphasis on evolving integrated systems of the future is necessarily balanced with the need for combat elements to develop the capabilities and abilities operate analog and independently of electronic systems - more than ever in history since the advent of radio communications.

7. For the infantry, operating in a contested environment in part means having the ability to integrate fires and manoeuvre with limited, or a complete lack of communications. To overcome this, recent years have seen large scale manoeuvre in a training environment completed without radio communications up to the Battlegroup level. Units relied upon detailed control measures, standard operating procedures, flag indications by vehicle crews, and the use of “back deck” face-to-face direction vice lengthy radio orders to achieve a measure of success. At the headquarters level, work has been done to reinvigorate long-shelved runner systems, developing dispatch rider capability to ensure orders and analysis can be filtered down in a communications degraded environment. What has not been resolved is fires. We are completely reliant on radio communications or pre-planned fire missions to achieve indirect fire support for front-line

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<sup>16</sup> Norris, *Infantry Mortars of World War II*, 3

<sup>17</sup> *Ibid*, 8.

<sup>18</sup> *Ibid*, 4.

<sup>19</sup> *Ibid*, 14.

<sup>20</sup> *Pan-Domain Force Employment Concept: Prevailing in a Dangerous World*, 33

soldiers. This is an unacceptable vulnerability. We require responsive fires not dependant on what we know to be a tenuous radio communications or data link. Within the enhanced Forward Presence Battlegroup in Latvia, the use of a multinational regiment (-) of artillery with incompatible national communications systems further increases this vulnerability.

### **Counter-Battery Considerations**

8. Our potential adversaries have developed and modernizing counter-battery capabilities. A recent study on drone and artillery activity in the war in Ukraine noted that Russian counter-battery sensors can locate firers in a minimum of 8 seconds.<sup>21</sup> The associated deduction is that fire missions should only last 2-3 minutes in order to minimize the risk of counter-battery fire.<sup>22</sup> In a 2023 Forbes article, Hambling points to the Russian military journal ‘Arsenal of the Fatherland’ that claims the Russian forces now possess new technology: Ukrainian artillery positions can be triangulated 4-6 kilometers behind the frontline using a smartphone app on four phones.<sup>23</sup> In high counter-battery threat areas, rapid movement or “shoot-and-scoot” tactics are utilized.<sup>24</sup> However, shoot-and-scoot tactics are further challenged by the integration of drone technology. In addition to noting drone ability to visually detect artillery signatures,<sup>25</sup> Oprean discussed how western counter-battery sensors can cue and vector drones onto moving, “scooting” artillery to confirm their locations improve results of counterbattery fire.<sup>26</sup> It should be assumed that this capability will be further promulgated in future conflicts against a peer threat.

9. Each use of artillery opens it up as a target. Even if assuming clear communications that would enable artillery support, a contested environment demands a scalable response. A well-organized ground defence has a detailed fire support matrix that outlines which weapon system will engage what type and size of threat in each killzone. The level of engagement is directly proportional to the threat. In this way, an undisciplined machine-gunner will not unmask for an enemy recce-in-force and give away the location of a key position. In this vein, we must re-evaluate our limitations in scalability in indirect fires. Light mortars, and indeed an effective use of medium mortars, would afford the infantry effective, layered and responsive protective fires without unnecessarily exposing a brigade artillery asset. Similarly, during offensive operations, tactical commanders could make use of integral mortar fires for smaller engagements without requiring approval and coordination from either battalion (in light battalions utilizing 81mm) or the brigade for use of artillery, which could in-turn make those assets targeted by counter-battery.

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<sup>21</sup> Laurean-Georgel Oprean, "Artillery and Drone Action Issues in the War in Ukraine," *Scientific Bulletin* 28, no. 1 (2023), 75.

<sup>22</sup> Laurean-Georgel Oprean, "Artillery and Drone Action Issues in the War in Ukraine," *Scientific Bulletin* 28, no. 1 (2023), 75.

<sup>23</sup> David Hambling, "Russians Claim to Develop Smartphone App to Locate Ukrainian Artillery," Jan 26, 2023, .

<sup>24</sup> "How Ukraine is Fighting Back Against Russian Artillery: The Economist Explains." *The Economist (Online)* (2022), 1. <https://www.economist.com/the-economist-explains/2022/06/02/how-ukraine-is-fighting-back-against-russian-artillery>

<sup>25</sup> "How Ukraine is Fighting Back Against Russian Artillery: The Economist Explains." *The Economist (Online)* (2022), 1.

<sup>26</sup> Oprean, "Artillery and Drone Action Issues in the War in Ukraine," 74-75

## Air Parity

10. In recent conflicts in Afghanistan, Iraq and Syria, direct artillery support to small units was regularly readily available and could be used with relative impunity. Air supremacy ensured that soldiers conducting operations in austerity, outside of the range of artillery, could receive support from a host of unchallenged Allied air platforms. Conflict against our peer adversaries will not be so welcoming. Michael Stefanovic et al have described the current air situation in the war in Ukraine as a “stalemate” as a result of surface-to-air missile systems, and the limited use of fighters in the defensive.<sup>27</sup> They draw out the deduction that “In an era of aerial stalemate, the United States and its allies cannot assume the same extraordinary overmatch they enjoyed in recent wars.”<sup>28</sup> Further, they highlight that future conflict may see the resurgence of a defensive air posture in which Allies will only achieve episodic air superiority in support of joint operational efforts.<sup>29</sup> In the analysis of a potential conflict with China in the East China Sea Lazidis echoes this perspective:

The [anti-access area denial] A2/AD forces China employs will present a significant problem for gaining and maintaining air superiority. As such, deciding on and establishing the level of air control required to accomplish follow-on objectives will be one of the first priorities for commanders in a Western Pacific campaign.<sup>30</sup>

Lazidis emphasizes the probability of a defend and disrupt task at the onset of hostilities stating, “surviving at the strategic level by disputing air control and achieving air parity should be the primary objective.”<sup>31</sup> We must consider the impact of fighting under air parity. There will necessarily be a reduced level of responsiveness of air support to ground force operations, particularly at the low tactical level. Our furthest forward and dispersed combat elements must possess an integral indirect fire capability.

## Partner Training

11. As a partnering force in future conflicts, the ability to train militia, poorly equipped, or inexperienced infantry soldiers on the light mortar would be greatly beneficial. There are many conceivable tactical scenarios where a light mortar would be the only available indirect fire support available to partnered forces. Even if allied artillery or air assets were in range to support, issues of communications, IFF, ROE, and priority could have a major effect on the level of support given to independently operating partnered elements. In the war against ISIL Peshmerga forces utilized US 60mm mortars as a primary infantry fighting weapon, which

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<sup>27</sup> Michael Stefanovic *et al.*, "The Somme in the Sky: Lessons from the Russo-Ukrainian Air War," *War on the Rocks* (9 Feb, 2023). <https://warontherocks.com/2023/02/the-somme-in-the-sky-lessons-from-the-russo-ukrainian-air-war/>.

<sup>28</sup> *Ibid.*

<sup>29</sup> *Ibid.*

<sup>30</sup> Christopher Lazidis et al., *Air Parity: Re-Discovering Contested Air Operations--Studies of World War II Battle of Britain, Siege of Malta, and Falklands War, Objectives at Outbreak of China Conflict in East Or South China Seas* (Pacific Grove, California: Smashwords, 2019), 25.

<sup>31</sup> *Ibid.*, 229.

proved very important in some regions due to a lack of mechanized forces and artillery support.<sup>32</sup> In a more immediate example, Canadians are currently training Ukrainian infantry units under Operation UNIFIER. In the Russian-Ukrainian war, light mortars have proved their importance. Many operations in Ukraine take place at the company level and below; mortars provide essential flexibility and fire support to the commanders of these units.<sup>33</sup> For example, the importance of light mortars was emphasized in the successful platoon defence of the Bakhmut Siniat ALC asphalt mixing plant taking place from 5-8 October 2022.<sup>34</sup> Light mortar weapons and ammunition have flooded into Ukraine from across the globe.<sup>35</sup> Ukraine now produces the KBA-118 (60mm) and M-60A.<sup>36</sup> Canada would be better positioned to support Ukrainian soldiers in preparing for combat if we possessed a light mortar capability.

## Personnel

12. Incorporating an additional weapons capability begs the question of personnel requirements. Adding the light mortar to the infantry would not require the addition of any personnel in mechanized, light regular or reserve forces.

## CONCLUSION

13. Dead assumptions from recent wars plague the RCIC. The Canadian Army's lack of depth in indirect fire capability is highly problematic against a peer enemy with credible counter-battery capability, in a degraded environment, or one in which we do not benefit from air supremacy, or superiority. We cannot ensure rapid and continuous fire support in a degraded environment at the tactical level. Pan-Domain Operations demands technological advancement and integration as well as resilience when degraded. In a *Journal of the Royal United Service Institution* published in 1922, the author Major Stoehr assesses that, with regard to the light mortar, "there is no type of warfare for which it is not useful."<sup>37</sup> A hundred years later this assessment holds new weight. The simplicity, mobility, and responsiveness of the light mortar that led to its integration into the infantry in the first place remain. The light mortar would ensure our infantry soldiers can provide immediate, sustained fires on tactical objectives with no communications requirements, and under conditions of unfavorable air control. It would decrease reliance on brigade artillery, which must be used judiciously in a war with a credible counter-battery capability.

## RECOMMENDATIONS

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<sup>32</sup> Mark Cancian and Matthew Cancian, "A Visit to the Frontlines of the Battle Against Isil," *War on the Rocks* (Apr 13, 2016). <https://warontherocks.com/2016/04/a-visit-to-the-frontlines-of-the-battle-against-isil/>.

<sup>33</sup> "The Witch of Ukraine Reveals how 'Teeny-Weeny' American Weapons are Beating Russians." Feb 23, 2023, .

<sup>34</sup> "The Witch of Ukraine Reveals how 'Teeny-Weeny' American Weapons are Beating Russians." Feb 23, 2023, .

<sup>35</sup> "The Witch of Ukraine Reveals how 'Teeny-Weeny' American Weapons are Beating Russians." Feb 23, 2023, .

<sup>36</sup> "The Witch of Ukraine Reveals how 'Teeny-Weeny' American Weapons are Beating Russians." Feb 23, 2023, .

<sup>37</sup> Stoehr, Major C.F, "Tank Or Light Mortar as a Weapon of Infantry," *Journal of the Royal United Service Institution* 67 (1922), 739.



14. It is recommended that the light mortar be re-adopted as platoon and company weapon into the mechanized, light regular and reserve infantry battalions in the RCIC. This will ensure we have a scalable, responsive indirect fire capability in all land operations, against any adversary, under any conditions.

15. Since the decommissioning of the Canadian 60mm mortar, other nations have used modern technology to improve the light mortar. For example, in 2014, Norway infantry and SOF adopted a lightweight variant utilized by both Czech Republic and Poland.<sup>38</sup> The German RSG60 offers another lightweight option, that is built with a steel tube with carbon fibre overwrap, and a carbon fiber composite base.<sup>39</sup> Notably, it can be converted from the standard infantry version weighting 15.8 kg to a commando variant weighing 6.8 kg without the requirement for any tools.<sup>40</sup> These developments should be considered further in future study.

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<sup>38</sup> "New Lightweight COMMANDO Mortar for SOF and Infantry." *Military Technology* 38, no. 6 (2014).

<sup>39</sup> "Two in One Rheinmetalls New 60mm Mortar for Infantry and Special Forces." *MENA Report*, 2019. <https://www.proquest.com/wire-feeds/germany-two-one-rheinmetalls-new-60mm-mortar/docview/2274563236/se-2?accountid=9867>

<sup>40</sup> "Two in One: Rheinmetalls New 60mm Mortar for Infantry and Special Forces." *MENA Report*, 2019. [https://www.rheinmetall.com/en/media/news-watch/news/2019/2019-08-13\\_two-in-one-rheinmetall's-new-60mm-mortar-for-infantry-and-special-forces](https://www.rheinmetall.com/en/media/news-watch/news/2019/2019-08-13_two-in-one-rheinmetall's-new-60mm-mortar-for-infantry-and-special-forces)

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