9.

Cycling in Wartime

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Some historians think that the "quaint" bicycle has no place in modern warfare.[1] This paper will show the opposite. I will not present a chronological history of bikes in wartime. Rather, I will cover the bicycle's advantages for military operations followed by its employment for various tasks. Then, I will examine the adoption by militaries and other armed groups. Finally, current uses of military bikes will be discussed.

In modern warfare, no single weapon or arm of service can be dominant in all situations. "Ways of warfare," tactics, weather, logistics, geography, communications, and equipment all have an impact. Let's take two examples from World War II. In 1940, French and British tanks outnumbered their German opponents, but the panzer-led Wehrmacht threw its British opponent off the continent and captured the French capital.[2] Another example is the American M4 medium tank, the Sherman. In the European theater it was outclassed by German Panther and Tiger tanks.[3] But in the Pacific the Sherman easily defeated its Japanese opponents.[4] I will show that bicycles should not be discounted because they seem to be yesterday's technology. They have played and continue to play useful roles in modern warfare.

Figure 1. Dismounted cyclist aiming rifle from the cover of Moss, James Alfred. Military Cycling in the Rocky Mountains, New York: American Sports Publishing Company, 1897.

Advantages and Disadvantages

Successful modern warfare relies on combined arms: "the full integration and application of two or more arms or elements of one Service into an operation."[5] Bikes have been and continue to be employed in helping militaries succeed in their tasks. In this section I will be comparing horse-mounted formations with bikes since that was the initial measurement when they appeared in the 1890s. Many points continue to be valid with motorized operations.

The greatest advantage of military bicycling is its stealth aspect. It makes little noise, has great maneuverability, and is difficult to detect.[6] Following closely on stealth is the bicycle's logistical profile. Compared with horses, bikes have a low impact. Horses consume huge amounts of fodder and require trained men (veterinarians, animal hygienists and farriers) to service their needs. They take up large amounts of space in strategic transport. Moreover, horses often die in large numbers with replacement a major challenge. In World War One, "the British Army lost 15% of its horses every year. Surprisingly, just a quarter of horse deaths were caused by enemy action. The biggest killer was 'debility' – a condition caused by exposure to the elements, hunger, and illness."[7]

Bikes, on the other hand, use far fewer support resources. "By the end of the Great War, the ubiquitous bicycle was in use in all the armies serving on the Western Front, proving itself to be a cheap, light-weight, adaptable alternative to the horse requiring little fodder or maintenance, and able to operate under varying weather conditions."[8] Bikes took up less space than horses in long-distance transport.[9] Supply of components was handled by the normal logistical system. Repair and maintenance could usually be done by the cyclists themselves or by a larger repair unit, e.g., in World War I the British Army had its Ordnance Corps armorers repair bikes alongside rifles.[10] Additional training was minimal. Cyclists had mastered the vehicle in civilian life and had basic military training from their arm of service.[11] **[Figure 1]** Specialized training was straightforward and easy to learn. Replacement of bikes was far simpler than fostering and training a horse. However, they were not a complete substitute for horse cavalry; they could not execute a charge.[12]

They had good tactical mobility over decent roads and trails.[13] A soldier-cyclist could do 10 miles per hour and travel 100 miles in a day. They could be pushed over difficult ground and could ford small streams. Bikes were a perfect stealth vehicle. They were quiet, raised little dust, and could be hidden quickly.[14] Unlike horses, cycles could be left when their riders dismounted.[15] But they did have disadvantages. They were bad in mountains, swamps, dense vegetation, or sand. They were useless in snow; many armies converted cyclists to cross-country skiers in winter.[16]

Figure 2. A squad of soldiers mounted on "Paratrooper" Montague mountain bikes.

Figure 3. A woman conserves gas and rubber by carrying her shopping on a bike.

Finally, their pneumatic tubes could be punctured.[17]

Table I: Bicycles Confiscations or Restrictions During Conflicts

Time Period	Country	Action
1919-1921	Ireland	British deny mobility to IRA[103]
1937	China	Japanese occupiers confiscate journalist's bike[104]
1941	Channel Islands	Under Article 63 of the Hague Convention[105]
1943-1945	Nazi-occupied Europe	Germans deny mobility to resistance[106]
1952-1960	Kenya	British deny mobility to Mau Mau insurgents[107]

Military Employment

Mounted infantry was the main combat role for bicycle troops. **[Figure 2]** Unlike horse cavalry, they could fight dismounted and did not need soldiers to hold their mounts. Their missions were rapid movement (compared with dismounted infantry), reconnaissance/scouting, screening, rear area security and patrols, rapid reinforcement, and communication with their parent unit.[18] They could deploy with light crew-served weapons. With the development of lightweight anti-tank weapons, such as the World War II German panzerfaust, a courageous bicyclist could become an effective tank killer.[19] Currently, Ukraine is deploying e-bike anti-tank teams.[20] Finally, an imaginative use was the British Royal Air Force's resorting to bicycles in World War II as a way to teach formation flying.[21]

Bikes also had non-combat roles, both in military and civilian spheres. They were used for basic transportation, especially when gas was rationed.[22] **[Figure 3]** This was especially true in World War II.[23] Air forces relied on bikes for personnel to travel on their huge bases.[24] The inhabitants of occupied countries had to resort to bicycles for their transport needs. As the war turned against the Axis, German occupiers, especially in Holland confiscated civilian bikes for their own use.[25] In response, Dutch resistance leaders urged Amsterdamers to toss their bicycles into the city's numerous canals to deny them to the Germans.[26]

Military bike messengers were frequently employed. They were quicker than runners, had better cross-country capabilities, and presented a smaller target than their horse-mounted counterparts.[27] And they were much quieter than motorcycle couriers.

The bicycle's stealthiness seemed tailor-made for large-scale protests, insurgencies, and espionage.[28] In World War II Netherlands, guerrillas used bicycles in "liquidating" collaborators and German soldiers. Young women would lure their targets into secluded areas, shoot them, and then male comrades would dispose of the bodies in cargo bikes.[29] A recent widespread bicycle use by guerrillas was in Sri Lanka's Civil War of 1983-2009.[30]

Figure 4. In World War II, sailors bicycled over to the women-only Arlington Farms apartment complex for dates.

Insurgent bike couriers, sometimes part of elaborate communications networks, were also used.[31] The most prominent bike courier was Italian champion road cyclist Gino Bartali. During World War II he used his long training rides as a cover to deliver messages to the Italian Resistance and forged documents that enabled Jews to escape the Holocaust.[32]

As noted above, authorities quickly recognized the utility of bicycles and often confiscated or otherwise restricted them. [For selected examples, see **Table I**]. In the 1989 Chinese protests "bicycles and tricycles kept the Tiananmen Square occupation going" in a variety of ways: temporary shelter, logistics, medical care, communications, and intelligence sharing. In quelling the demonstrations, the Chinese Army had its tanks crush the bicycles as an object lesson.[33]

The most successful cyclist-spy was Belgian Georges Delfanne who worked for the German military. During the 1930s, he posed as a traveling salesman, pedaling to Belgian military bases selling ink blotters. He quickly came to understand the Belgium forces' Order of Battle. Delfanne also sketched fortifications. His detailed drawings of the key fort of Eban-Emael on the Albert Canal enabled the Germans to drop glider borne infantry on it. This attack shattered the Belgian defensive line.[34]

A final use is the bicycle as a terrorist weapon.[35] Terrorists have put bombs in baskets and saddlebags. The development of pliable, compact explosives has enabled bikes to be innocuously placed in locations that could produce serious casualties and damage[36] **[Table II]**. A heavily publicized incident was the 1965 Viet Cong bombing of the My Canh Restaurant in Saigon (Ho Chi Minh City) that resulted in over 120 casualties from several nations.[37]

Civilian Employment

The World Wars saw bicycles as an important element in wartime countries' basic transportation needs.[38] Petroleum and rubber rationing along with stresses to public transportation made cycling the only alternative for distance traveling in cities and towns.[39] **[Figure 4]** In Germany, the growing scarcity of bikes had the Nazi government encourage citizens to donate their bikes to war workers.[40]

The United States saw a struggle within the federal bureaucracy. Some,

such as Rationing Czar Leon Henderson, championed the Victory Bike, a new cargo bike design. **[Figure 5]** Other bureaucrats argued that scarce production facilities should be used on more critical needs. Overall, wartime bicycle production in the U.S. plummeted.[41]

Mail and telegraph couriers, often women and children, were relied on in both World Wars.[42] **[Figure 6]** The most famous messenger was fourteen-year-old Charity Brick, winner of the George Medal (the second highest British civilian medal). Claiming to be sixteen, she joined the British Air Raid Precautions Service (ARPS) as a dispatch rider. In the course of a 1940 air raid, she helped her father put out an incendiary bomb and then delivered messages to the ARPS Headquarters.[43]

Integrating Bikes Into Military Operations

The 1880s and 1890s saw much exploration by militaries into the effective use of bicycles. In Great Britain and the United States, members of the militia were the early experimenters, probably because they were not as restricted by their military hierarchies.[44] Soon military periodicals began printing articles about the potential of cycling in wartime.[45] **[Figure 7]** In the main, regular officers convinced their superiors of the bicycle's value. By the start of the Great War in 1914, many militaries had integrated bikes into their structures **[Table III]**.

The biggest outlier was the United States Army. It showed little interest despite its National Guard units' bicycle experiments[46]; the lobbying efforts of the renowned Civil War Veteran and bicycle manufacturer Colonel Albert Pope; and multiple demonstrations by soldiers of the 25th Infantry Regiment during the 1890s.[47] This situation was due to several factors:

- Proponents were mainly junior officers, such as Lieutenants Henry H. Whitney.[48] R.G. Hill,[49] James A. Moss[50], and Captain Howard Alden Giddings,[51]

- The highest-ranking patron of these officers was Commanding General Nelson Miles who had an ignominious end of tenure due to his handling of the Spanish American War and opposition to Army reorganization.[52]

- The post-Spanish American War Army was stretched by new overseas responsibilities and a broad reorganization of its workings.[53]

- Unlike Europe, which had a network of paved and gravel roads, the rural roads of the United States were in a deplorable state[54] and did not fit into mobilization plans.[55]

Table II: Selected Bicycle Bomb Terrorist Incidents

Time Period	Country	Details
1939-1994	United Kingdom	IRA initiated.
1965	Vietnam	Restaurant bombed
1989	Germany	Banker killed
1993-2009	Sri Lanka	Tamil Tiger bombings
2001	Spainn	ETA assassination
2003	Palestine	Hamas initiated.
2006-2009	Iraq	Civilians targeted
2009	Russia	Police and bystanders
2003-2006	Afghanistans	Civilians
2008-2012	India	Series of blasts

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As bureaucracies are wont to do, armies also produced manuals to train their new forces.[56] They covered tactics, logistics, training, commands, drills, formations **[Figure 8]**, riot duty, ceremonies, inspections, maintenance, signaling, bugle calls, etc.[57] According to cycling historian Jim Fitzpatrick, the official manuals did not address a key issue: "…no thoughtful analysis of the possible role of the bicycle in future warfare; what was fundamentally different about it, how it might alter combat, tactics, strategy, or intelligence gathering. They seemed to treat the cyclists, for the most part as wheeled pedestrians or cavalry substitutes."[58]

Bicycles Ruled Essential; Price Ceiling Fixed

By the Associated Press

Price Administrator Leon Henderson officially classified bicycles yesterday as "essential for civilian transportation," and requested manufacturers not to increase prices on present models above levels prevailing January 15.

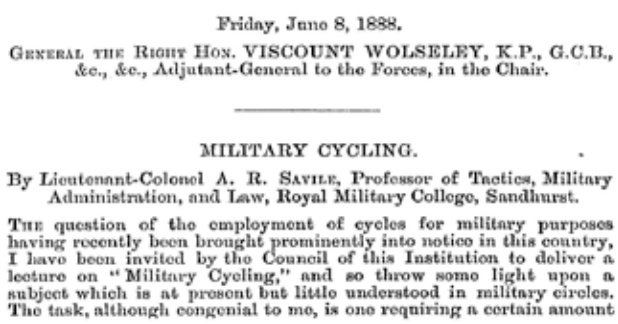
Henderson suggested that the producers, about to bring out a war-inspired "Victory" bicycle, submit proposed prices on the model to his office for approval.

Under the industry's present plan, there will be but one "Victory" model for men and women. It will use a minimum of critical materials such as steel and chrominum and will have smaller sized tires.

Henderson said "substantial in-

Figure 5. Headline in February 27, 1942, Washington Post (page 26) signals the start of a bureaucratic war over wartime bike production.

Figure 6. A female courier delivers dispatches to the B-25 production line at the North American Aviation's Inglewood, California, aircraft plant.



Friday, June 8, 1888.

GENERAL THE RIGHT HON. VISCOUNT WOLSELEY, K.P., G.C.B., &c., &c., Adjutant-General to the Forces, in the Chair.

MILITARY CYCLING.

By Lieutenant-Colonel A. R. SAVILE, Professor of Tactics, Military Administration, and Law, Royal Military College, Sandhurst.

THE question of the employment of cycles for military purposes having recently been brought prominently into notice in this country, I have been invited by the Council of this Institution to deliver a lecture on "Military Cycling," and so throw some light upon a subject which is at present but little understood in military circles. The task, although congenial to me, is one requiring a certain amount

Figure 7. Army Lieutenant Henry H. Whitney favorably reviewed the adoption of bikes by world's militaries in the Army's premier professional publication, the Journal of the Military Service Institution of the United States (vol. 17, no. 78, 1895, pp. 542-563).

A perennial problem for military forces in the pre-mobile radio era was the lack of rapid communication between lower and higher echelons. Foot infantry, cavalry, and mounted infantry all had difficulty in reporting to the chain of command.[59]

The type of military bicycle was a key consideration. In the 1870s, the popularity of the "high wheel" bike or "ordinary," with well-heeled civilians led soldiers to experiment with this new invention. However, the ordinary's height made it an easy target. Its inability to move at speed on poor roads was a key factor against it.[60] The introduction of the "safety" cycle in 1885 provided a design that could be developed into a practical vehicle for the military.[61] The safety's utility was further enhanced by the introduction of folding bicycles in the last half of the 1890s.[62] **[Figure 9]**

As an example of the ubiquity of British military bicycling in the years leading to World War I, popular culture featured fiction involving German infantry mounted on folding cycles invading Britain.[63]

The two World Wars saw significant military and civilian use of bikes. During the Great War the most comprehensive use of bikes in a combined arms team was the Canadian Independent Force which combined armored cars, motorcyclists, bicyclists, and truck-borne trench mortar, machine gun, and engineer sections. This unit did yeoman service in pursuing the Germans in the Hundred Days Campaign.[64] This practice was carried over into World War II by the German army.[65]

There were three campaigns in the Twentieth Century where bikes played pivotal roles. The first was the 1917 employment of bike-mounted infantry in the amphibious seizure of Saaremaa Island[66] in the Baltic Sea.[67] One commentator states that this operation played a major role in accelerating the Russian Revolution.[68] The second was Japan's "bicycle blitzkrieg" that enabled the Imperial Army to seize the Malay Peninsula and Singapore.[69] Finally, North Vietnam employed carrier bikes as a key component in supplying its forces during the Second Indochina War.[70]

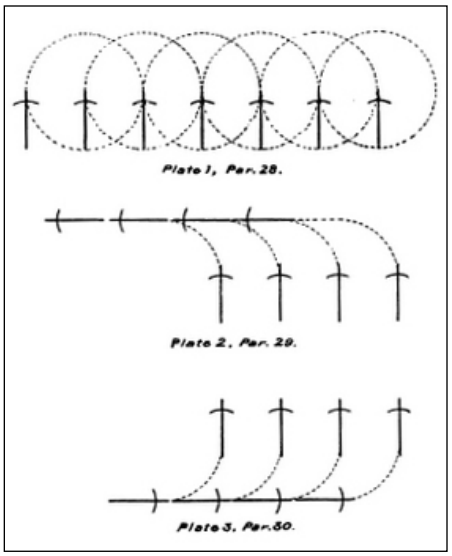


Figure 8. Bike formation diagrams from Cycle-Infantry Drill Regulations written by Civil War veteran and head of the Washington, D.C. militia General Albert Ordway. He teamed with fellow Civil War veteran and bike manufacturer Albert Pope to publish the manual (Boston: Pope Manufacturing Co., 1892).

Militaries also use bikes for non-lethal purposes. Bicycles are employed for the rehabilitation of wounded veterans.[71] Bicycle racing has been used for public awareness and recruiting. Service branches, such as the French Army[72] and the Royal Navy Royal Marines Cycling Association[73] have sponsored amateur and professional bike racing teams. The International Military Sports Council (the "world [sic] leading military sports organization enhancing mutual respect, solidarity and promoting Peace through its various activities"[74]) includes cycling competitions.[75] The U.S. Air Force has promoted bicycling as an easy way for Airmen and their families to keep fit.[76]

Current Developments

The trend in the Twentieth Century was mechanization of military operations.[77] Over time many countries disbanded their bike units.[78] Currently Finland is the only Western country that utilizes bikes in large units.[79] However, bikes continue to show their utility in

TABLE III: Adoption of Bicycles by European Armies

Time Period	Country	Comments
1870	Italy	Bersaglieri & line infantry
1869-1891	Austria-Hungary	From trial classes to full adoption
1885	*Debut of Safety Bike*	
1887	France	
1888	Great Britain	Volunteer units
189?	Netherlands	Militia units
1890	Belgium	
1890	Spain	Bike section in a regiment
1891	Russia	
1892	Switzerland	Establishment of bike school
1894	Bavaria	
1894-1895	Germany	

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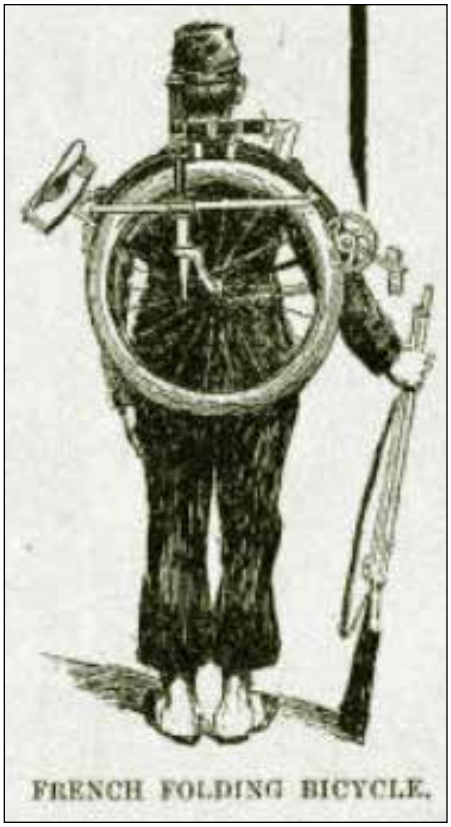

Figure 9. French Army folding bike as appeared in Howard Giddings' "The Bicycle in the Army," Harper's Weekly, vol. 40, no. 2051, April 11, 1896, p. 364.

"low-intensive operations," such as the Tamil Tiger insurgency in Sri Lanka.

The American military establishment, usually the Defense Advance Projects Research Agency (DARPA), has sporadically examined the possible employment of bicycles. In 1962 it received a "Preliminary Proposal for Very Light Weight, Off Road Ground Vehicle Concepts and a Program of Prototype Developments" from the Cornell Aeronautical Laboratory that it declined to fund.[80] The Battelle Memorial Institute had more luck in getting a DARPA contract in 1965. Author R.S. Kohn did not come out pro or con for bikes but listed their advantages and disadvantages.[81]

The next in-depth American study was then-Major Stephen T. Tate's 1989 master's thesis at the U.S. Army's Command and General Staff College (CGSC). He came out solidly for military cycling: "… the American military since 1898 has virtually ignored the military possibilities of the bicycle. Whether out of arrogance in the belief that it was not technical enough, or simply because we were used to dealing with unlimited resources, we have historically failed to take advantage of the unique capabilities of the bicycle. With the design of the present light infantry division [sic] we are in a mission imposed [sic] resource constrained environment. Yet, light infantry forces need additional mobility. The bicycle can provide that additional mobility.[82]"

Figure 10. U.S. Marine stands in front of a Light Armored Vehicle with his Montague "Paratrooper" mountain bike.

Tate based part of this conclusion on a detailed study of Swiss Army bicycle regiments.[83] Ironically in 2003, the Swiss Army disbanded those regiments, though some specialist units still use cycles.[84]

In 1997 DARPA gave the Montague Corporation, a high-end mountain bike company, a two-year contract to develop an electric bike.[85] The U.S. Marine Corps participated in trials of these bikes together with Marine Light Armored Vehicles for scouting.[86] **[Figure 10]** While its initial e-bike didn't work out, Montague did develop a rugged, air-droppable folding bicycle, the Paratrooper, that (according to author Jim Fitzpatrick) set the standard for late twentieth century military bikes.[87] **[Figure 11]** It continues to supply its Paratrooper model to U.S. forces.[88] Montague has continued to develop e-bikes and is currently marketing its M-E1 electric commuter bike on its https://militarybikes.com/ web page.[89]

The conflicts in Iraq and Afghanistan saw Western militaries deploy "ultra-light vehicles" (UTV)[90] that have a "maximum combined vehicle weight of 4,500 pounds in combat configuration and internally transportable by a CH-47 helicopter.[91] Thus, bikes are included in this category. Outside of an article on Dutch units employing bikes for scouting and "showing the flag" in Tarin Kowi District of Uruzgan Province in southern Afghanistan,[92] there has been scant detailed mention or analysis ofbikes in these conflicts.

In 2015 the RAND Corporation, in response to a request from the Army's Asymmetric Warfare Group, issued "Assessing Conventional Army Demands and Requirements for Ultra-Light Tactical Mobility."[93] Relying heavily on Tate's research,[94] it concludes that: "Bicycles have repeatedly proven their military value and should be taken more seriously as an option for enhancing the mobility of light infantry with low cost and the minimal training required for their safe operation."[95]

Moreover, the advent of e-bikes has opened up more possibilities for integrating bikes back into military inven-

Figure 11. Montague Corporation web page for its "Paratrooper" mountain bike.

tories. Norwegian border troops patrol the Russian border on electric mounts.[96] The Ukrainians have utilized Delfast e-bikes in anti-tank operations against the Russians.[97] The need for reliable charging plus the extra weight and complexity may limit the utility of electric bicycles;[98] linking an e-bike with a mechanized vehicle may overcome this limitation. The Australian Army is teaming Stealth B-52 e-bikes with its Boxer combat vehicles (similar to the LAV/Stryker/Mowag Piranha 8x8).[99] In its submission for the U.S. Army's Infantry Squad Vehicle Program, Polaris Ground and Defense proposed putting a mount on its DAGOR vehicle for the Sur-Ron High Performance Electric Bike (Polaris lost the competition).[100] In addition to the Australians, special forces of several nations are testing e-bikes.[101]

Finally, South Korea (Republic of Korea or ROK) is the first nation to have bicycle infrastructure as a strategic asset. It has established a 1,500-kilometer-long network of recreational pedestrian/bicycle trails that crisscross the country. The trails are well supported with amenities such as covered benches, bathrooms, and campsites. The government encourages its citizens to use the trails with a series of incentives. The result is a physically fit population. The trails have national security aspects. They can be used for evacuations, bicycle infantry operations, and re-supply. In the event of an invasion by North Korea:

The ROK, by the simple act of building recreational trails and tangibly rewarding citizens who use them, has begun to ready generations of robust, skilled defenders, a uniquely surprising strategy of defense and a transport system nigh invulnerable to interdiction.[102]

In summary, the world's militaries continue to find advantageous uses for bicycles in activities related to warfare. Future military use of bicycles in these activities will be decided by the imaginations of each army's leaders. ●

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Conference Flash Back • ICHC 2009

Photos by Greg Siple

The ICHC returned to the United States in 2009 for the 20th annual edition of the gathering. The last conference held in the US was in Davis, California, in 2005. The 2009 venue was in Freehold, New Jersey, which was the home of the David Metz Bicycle Museum and it had been the home of Arthur Zimmerman, the first world Bicycle Racing Champion. The group photo was shot on the steps of the Freehold Carnegie Library that was built in 1913.