

# The Red Ball Express

## Past Lessons for Future Wars

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If the adage that militaries prepare for the next war by studying the last war holds true, the U.S. Army should tread carefully in its preparation for future sustainment operations. After all, the Army has not sustained a large-scale combat operation (LSCO) since Operation Iraqi Freedom in the early 2000s, and that was neither against a near-peer threat nor in a denied theater. Instead of focusing on the last fight, the more pertinent

historical example for sustainers comes from the European theater of operations (ETO) during the Second World War. In preparation for future operations, the Army needs to examine the valuable sustainment lessons of the Red Ball Express. At each phase of its development, the Red Ball Express revealed the importance of enablers, the value of improvisation, and the challenges inherent in relying on existing infrastructure during a LSCO.



## From Operation Bolero to the Red Ball Express

Unlike other operations during World War II, Allied planners were not rushed to prepare for the invasion of occupied France. Operation Overlord, the invasion of Normandy in June 1944, began two years earlier with the buildup of U.S. troops and supplies in the United Kingdom. Known as Operation Bolero, Allied leaders hoped to amass more than a million soldiers in 1942 capable of invading the European continent by 1943.<sup>1</sup> In January 1942, American military cargo started flowing into the United Kingdom by sea and air. Shipments increased in the second half of 1943, and by early 1944, the United States was sending more than a million tons of supplies per month to the British Isles in preparation for a cross-channel invasion.

In preparation for the sustainment effort ahead, officers of the two-year-old Transportation Corps planned a major exercise to work through the challenges associated with moving massive amounts of supply from English ports to French depots.<sup>2</sup> The exercise sought to simulate the terminal and distribution operations planned for France across a 480-kilometer stretch of the United Kingdom.<sup>3</sup> Scheduled to last several weeks, the exercise was ultimately scrapped because of a lack of personnel, equipment, and time. The cancellation meant sustainment units would not get a final large-scale rehearsal before arriving on French soil.

Following the successful D-Day invasion in early June, sustainment operations were soon slowed by poor weather conditions and determined German defenders. Just weeks after landing, severe storms hit the Normandy coast, wrecking one of the Allied mulberries and forcing a four-day closure of sections of the beach.<sup>4</sup> Capturing the coastal city of Cherbourg was an important Allied objective after D-Day, but entrenched German forces held for over three weeks and destroyed most of the port infrastructure before surrendering. With severe damage to Cherbourg's valuable harbor, sustainers had little option but to send supplies over the French beaches.

Soldiers from the 4185th Quartermaster Service Company (*left to right*), Pvt. Harold Hendricks, Staff Sgt. Carl Haines, Sgt. Theodore Cwright, Pvt. Lawrence Buckhalter, Pfc. Horace Deahl, and Pvt. David N. Hatcher, load trucks with rations bound for frontline troops September 1944 in Liege, Belgium. (Photo courtesy of the U.S. Army)

After establishing a lodgment in France, Allied forces initiated a series of offensive operations in July designed to break out of Normandy. Operation Goodwood, a British and Canadian thrust, contained Nazi defenders and allowed U.S. units as part of Operation Cobra to break through German lines. In early August, German forces counterattacked near Mortain, France. Adolf Hitler's gamble failed and resulted in the German Seventh Army's entrapment near Falaise. As enemy positions across France collapsed, Allied forces rushed to exploit the disintegrating German lines.

The short lines of communication from the Normandy coast to the front line had been manageable at first, but the offensive success of the Allied breakout created immediate sustainment challenges. As lines stretched, logistics suffered from poor movement control and a lack of storage depots for the rapidly accumulating supplies arriving en masse.<sup>5</sup> Without these, the distribution of supplies became haphazard. Not designed to handle heavy equipment and military vehicles, the French road network was quickly overwhelmed by Allied traffic. Despite their preparation, U.S. Army planners failed to properly account for the numerous enablers such as military police (MP), engineers, and movement control teams, all of which were required to sustain the blistering operational tempo in France.<sup>6</sup> If mission-essential supplies failed to reach the front, the Allied offensive across France would be forced to culminate while German defenders were still retreating.

### Creating the Red Ball Express

The breakout from Normandy in late July and early August 1944 exceeded Allied expectations. The offensive was so successful that Allied Army groups were over two hundred days ahead of what planners had estimated.<sup>7</sup> This success strained sustainment operations, which had to deliver food, ammunition, and fuel along an

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ever-lengthening supply line. Just keeping troops fed became a full-time effort. For instance, a single division in 1944 required thirty-five tons of field rations per day.<sup>8</sup> Ammunition and fuel were also critical to sustaining the breakout. On 5 August, seventy-two thousand tons of ammunition were ordered south of the Normandy beaches.<sup>9</sup> A week later, the petroleum, oil, and lubricants (POL) required by Third Army doubled from three hundred thousand gallons to six hundred thousand gallons per day.<sup>10</sup>

During the First World War, when armies had limited motorized capabilities, railroads were the primary mode for transporting supplies on the European continent. But American forces could not rely on trains in 1944 because Allied air forces had systematically targeted bridges and rail networks to prevent German reinforcements from reaching Normandy on D-Day. At the time, large-scale aerial supply was considered impractical, although crucial supplies like food and POL were airlifted throughout the European campaign with varying degrees of success.<sup>11</sup> Supply via barge was another option, but this was only

An American truck convoy halts at a makeshift service station 7 September 1944 for servicing and a change of drivers near Saint Denis, France. (Photo courtesy of the U.S. Army)

possible in secured areas of operation with waterways and required the use of heavy machinery such as cranes.

In preparation for their forthcoming offensives, the U.S. First Army and Third Army both sought supply depots near La Loupe, a town southwest of Paris.<sup>12</sup> In late August, the communications zone logistics officer requested one hundred thousand tons of supplies be transported from Normandy to the triangular area between the French towns of Chartres, La Loupe, and Dreux by 1 September.<sup>13</sup> There was optimism that a rail line from Laval to Paris could be repaired and used for this massive undertaking.<sup>14</sup> However, understaffed engineer units had not been given enough time to restore the track, so trains were only capable of hauling eighteen thousand to twenty-five thousand tons under that timeline.<sup>15</sup> The inability to use rail lines meant logistics planners had to find

another way to move the remaining seventy-five thousand to eighty-two thousand tons of equipment and supplies.<sup>16</sup>

With limited time and few options, planners turned to motor transportation. The Motor Transport Division operated a mixture of 2.5-ton cargo trucks, 5-ton cargo trucks, and 10-ton semitrailers.<sup>17</sup> These were primarily made by General Motors Company, Dodge, and Ford.<sup>18</sup> Logisticians had been advocating for the design of a system around semitrailers as their heavy load capac-

American soldiers in the ETO.<sup>22</sup> These soldiers would fill the ranks of the Red Ball Express.

The name “Red Ball Express” was not a new term in the transportation world, as it originated from railroad slang for “express freight.”<sup>23</sup> In France in 1944, the Army appropriated a red ball classification symbol that was placed on cargo, vehicles, road signs, and uniform patches. Since D-Day, logistic units and their enablers had been plagued by a shortage of soldiers because the deployment

“ Unlike combat units, rear echelon units were often disproportionately African American, as exemplified by the Motor Transport Service, which was composed of approximately 73 percent African American soldiers in the European theater of operations. ”

ity and the ease by which trailers could be transferred between tractors made them ideal for operations in the ETO. Officers estimated maximum efficiency could be achieved with a ratio of three semitrailers per one tractor-trailer.<sup>19</sup> However, mass production and deployment of the larger trailers was not possible until later in the war, so the 2.5-ton cargo truck, known as the “deuce and a half,” became the workhorse of the Red Ball Express. With supply needs increasing at the front, Red Ball operations commenced on 25 August 1944.

### Life on the Red Ball Express

At the beginning of World War II, the Army, like much of the United States, was racially segregated. Targeted recruitment of Black Americans increased as the nation encountered the heavy demands of a truly global war. By the summer of 1944, nearly seven hundred thousand Black soldiers were serving in the U.S. Army.<sup>20</sup> Yet, Black soldiers were generally relegated to noncombat units regardless of their desire to serve at the front. For example, out of the 29,714 soldiers who landed at Omaha Beach on D-Day, only five hundred were African American.<sup>21</sup> Unlike combat units, rear echelon units were often disproportionately African American, as exemplified by the Motor Transport Service, which was composed of approximately 73 percent African

of combat troops took precedence over service troops.<sup>24</sup> Desperate to fill billets for two-person driving teams, the Army sought volunteers from combat and noncombat units already on French soil. Experience behind the wheel was preferred but not deemed essential.

Even before arriving in France, Allied planners recognized that many French roads were not wide enough to support two-way traffic when using large military vehicles. To overcome this problem, Red Ball planners created a closed loop system of one-way travel. Officially, the Red Ball Express route started at Saint-Lô, but drivers were often forced to pick up materials as far north as the harbor at Cherbourg. When Red Ball operations began, convoys delivered supplies to U.S. Army depots located between the French cities of Dreux, Chartres, and La Loupe. A convoy support center was established near the town of Alençon because it was the midpoint on the route, and the area could be accessed by both outbound and inbound traffic.<sup>25</sup> At Alençon, drivers could refuel, rest, and conduct unscheduled maintenance.

The Red Ball Express route was a one-way highway that was only open to its drivers. To prevent confusion, all vehicles on the route had to be clearly marked with Red Ball discs on the front and rear.<sup>26</sup> For efficiency, convoys were organized with a minimum of twenty vehicles and separated at fifty-five meter intervals unless operating in congested areas. Although drivers rarely adhered to

the rule, the speed limit was set at twenty-five miles per hour.<sup>27</sup> Convoy commanders were officers and were generally positioned in the trail, while a noncommissioned officer led the convoy from the head.<sup>28</sup>

Convoys on the Red Ball Express were not permitted to stop except for a ten-minute break that occurred ten minutes before each hour.<sup>29</sup> Driving teams were expected to be back on the road at the hour mark. After six hours of consecutive driving, soldiers were authorized a thirty-minute break for food, but these stops did not occur in urban areas. To meet the massive supply demands of the front, Red Ball operations were to run nonstop. Drive teams would often skip their breaks to save time and were known to switch drivers without stopping their vehicles. When operating at night, low-beam headlights were permitted west of the light line but not allowed near combat zones to avoid targeting by German artillery or aircraft.

Five days after Red Ball's inception, 132 companies composed of nearly 6,000 vehicles delivered 12,300 tons of supply in one day.<sup>30</sup> This feat represented Red Ball's single-day record for tonnage delivered. In spite of this accomplishment, Red Ball was unable to meet its target of 82,000 tons by 1 September.<sup>31</sup> However, Allied planners extended the Red Ball mission after rail operations also failed to deliver the quota. By 5 September, the Red Ball Express had exceeded its original goal by delivering 89,000 tons to the La Loupe, Dreux, and Chartres triangle.<sup>32</sup> With few other options available in France, sustainers were forced to extend Red Ball operations through the fall.

## Running on Fumes

During the offensive across France, sustainment units were challenged to keep pace with the demanding operational tempo. Tremendous amounts of POL were needed to sustain U.S. mechanized units. By the end of August, the U.S. Armies in northern France were consuming eight hundred thousand gallons of gasoline per day.<sup>33</sup> Early plans relied on the construction of three pipelines out of Normandy to support frontline forces, but this effort proved unfeasible. By August, work on the three-pipeline system was cancelled and service units focused instead on the construction of one primary pipeline.<sup>34</sup>

With vehicles in constant need of petroleum at the front, the Red Ball Express began delivering Motor Transport 80 octane (MT 80) and Aviation 100 octane (AV 100). When fuel tankers were unavailable, POL products were transported in fifty-five gallon drums,

which weighed nearly one hundred pounds empty.<sup>35</sup> Petroleum was often distributed in the five-gallon gas can known among soldiers as the "jerrican."

Adopted from a German design, one jerrican weighed ten pounds empty and forty pounds full.<sup>36</sup> In 1944, fifty cans could fit in a one-ton trailer, 250 in a five-ton cargo space, and five hundred fit in a ten-ton semitrailer.<sup>37</sup> The United States had twelve million jerricans before D-Day, but because fuel depots were high-value targets for the Germans and because jerricans were often inappropriately discarded by soldiers, sustainers expected to lose eight hundred thousand of them per month starting in August and September. By October, Quartermaster units were short 3.5 million jerricans, forcing the War Department to seek production at home and abroad.<sup>38</sup>

With POL at a premium, Red Ball convoys were under standing orders to depart with full fuel tanks and transport enough gasoline for an entire round trip.<sup>39</sup> To build fuel stores in forward areas, five additional jerricans were added to each logistics package and included on all Red Ball vehicles. No other supply class was given similar priority. From June to December 1944, Motor Transport Services hauled 423,000 tons of POL, much of which was stored in five-gallon jerricans.<sup>40</sup>

## The Red Ball Goes East

Liberated by the Allies in late August 1944, Paris became a hub for Allied sustainment. Returning Paris to Allied control provided an immeasurable morale boost to the war effort, but the French capital was also a major burden because its sizable population now relied on the military logistics network for basic supplies. As frontline soldiers marched on, the Red Ball Express altered its supply route extending its lines east of the French capital on 10 September. Red Ball's expansion was significant for the sustainment effort as average round trips reached nearly one thousand kilometers.<sup>41</sup>

As the lines of communication stretched, sustainment leaders sought ways to improve efficiency and reduce the burden on both Red Ball operators and vehicles. Unlike northwest France, Allied bombers spared the rail network east of Paris. By late September, sustainers had established terminals and transfer points near Vincennes and Fontenay-sous-Bois.<sup>42</sup> At these transfer points located at the outskirts of Paris, Red Ball trucks would drop their cargo, and under U.S. military supervision, French workers loaded the supplies onto trains for further movement.

Supporting the U.S. First Army in the north and Third Army in the south, Red Ball officially extended its route well beyond Paris to Hirson and Sommesous. Unofficially, drivers pushed their movements even further east to the cities of Verdun and Metz.<sup>43</sup> Convoys struggled with the new round trip that was now over 1,600 kilometers.<sup>44</sup> An uncharacteristically rainy autumn made shallow creeks nearly impassible, bloated rivers washed out bridges, and flooded fields could no longer be used for resupply. Difficult weather conditions added to the growing list of Red Ball problems.

## Red Ball Challenges

The extension of the Red Ball Express toward the German border stretched an already shaky system. During the first phase of the Red Ball Express, drivers operated from the advanced section of the communications zone into field armies' rear areas.<sup>45</sup> However, as the front continued to move further east, the second phase required passage through multiple sections of the communications zone to reach these areas. Communication failures and poor unity of effort hampered distribution

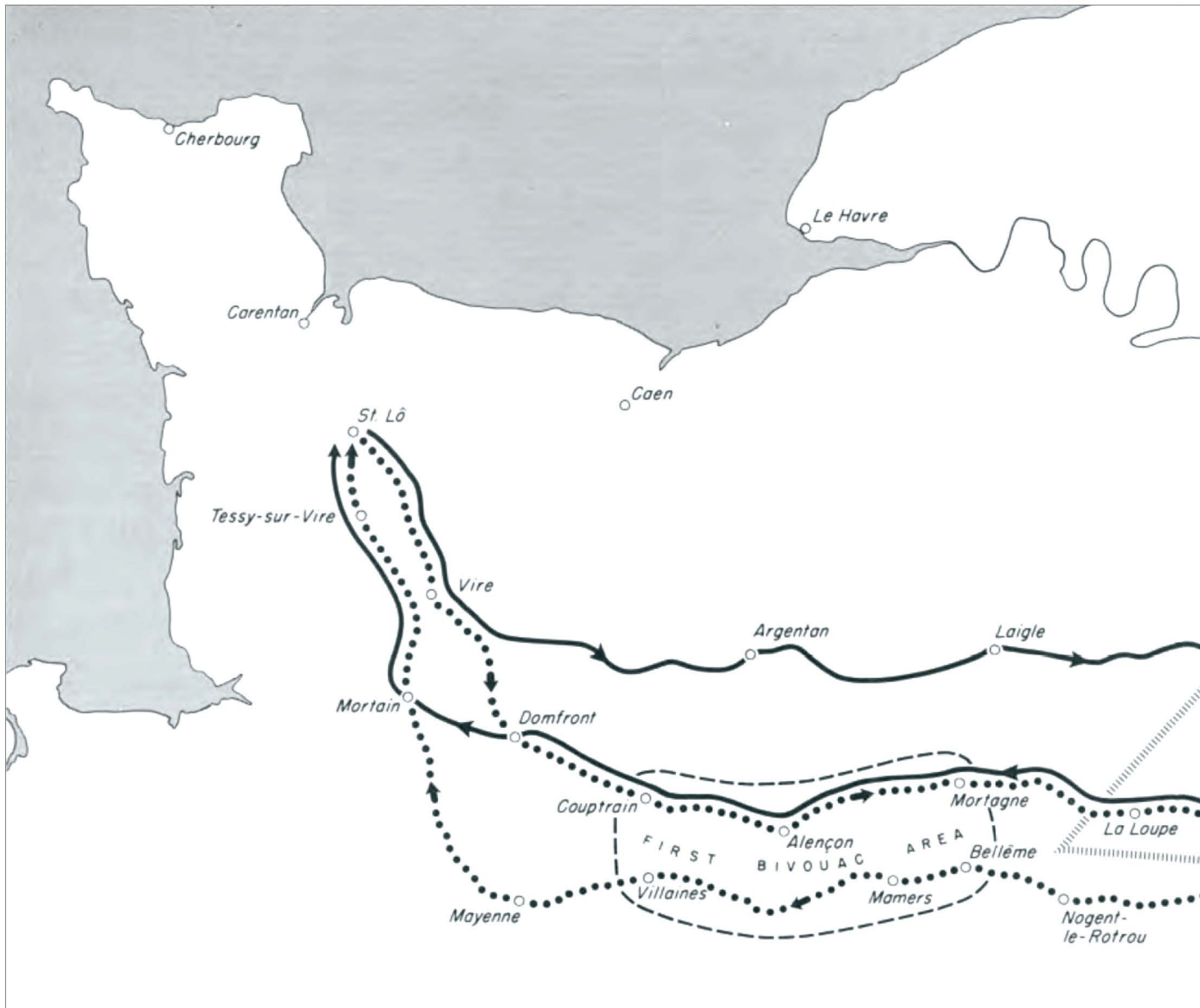
and overall efficiency. These challenges required sustainers to improvise and adapt to meet demands at the front. One after action report declared that "orthodox supply procedures had been abandoned."<sup>46</sup>

A lack of enablers (a challenge from Red Ball's inception) continued to plague Red Ball operations as Allied progress extended the lines of communication. For example, engineer units in France were in such high demand that they were often shuttled between First Army and Third Army.<sup>47</sup> The situation became so grave that the War Department deployed inexperienced stateside units to Europe to complete engineer training in rear areas.<sup>48</sup> The dearth of engineers slowed construction on France's rail network, which in turn added to the heavy load already shouldered by the motor transport service.

Like the engineers, MP units were also challenged to meet the demands of the Red Ball Express because

Soldiers load trucks with combat rations in preparation for a convoy to the front line 21 December 1944 in the European theater of operations. (Photo courtesy of the U.S. Army)

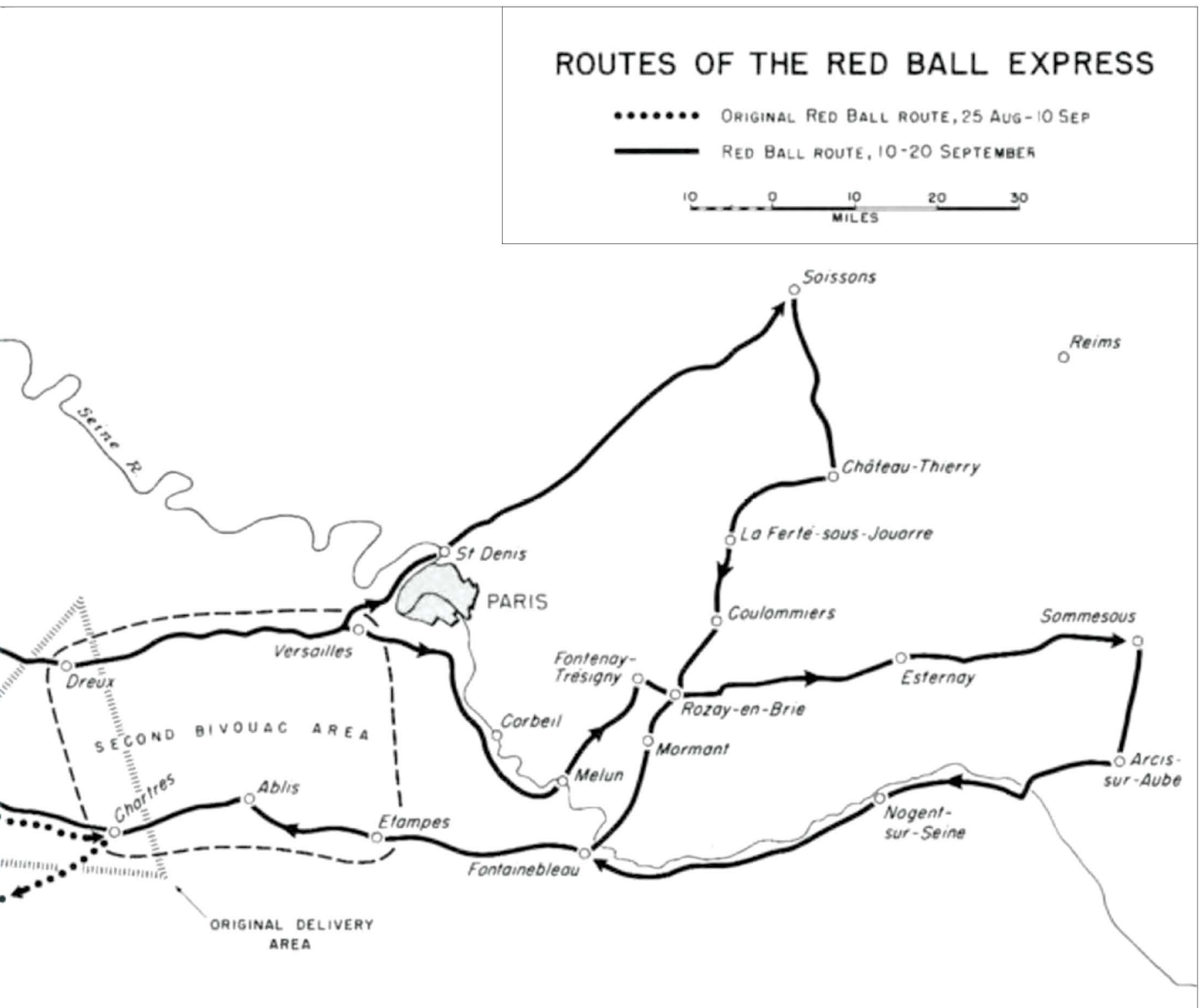




of personnel shortages. According to Red Ball plans, MPs were supposed to be stationed in urban areas controlling traffic and checking cargo. Mandatory traffic control points were to be no further than eighty kilometers apart and continuously staffed.<sup>49</sup> MPs were also responsible for patrolling the Red Ball highways, ensuring American drivers were adhering to Army protocol, and preventing unauthorized vehicles from using the route. Ultimately, the MPs were stretched too thin. The U.S. First Army, Third Army, and the Ninth Air Force added to the confusion and congestion by using the restricted Red Ball routes without requesting permission. The lack of an adequate MP presence

also led to the pilfering of U.S. supplies, much of which ended up on the French black market.

The loading and unloading process was another problem for sustainers. Early on, sustainers in the ETO had organized convoys into groups of forty vehicles. However, a lack of personnel and material handling equipment made loading and unloading so many vehicles far too time consuming.<sup>50</sup> Even after reducing the size of convoys to twenty vehicles, it could take from twelve to forty hours to load all of the cargo.<sup>51</sup> Communications breakdowns frequently resulted in drivers getting lost or unloading at the wrong spot. Another systemic problem was poorly planned depots and transfer sites.<sup>52</sup>



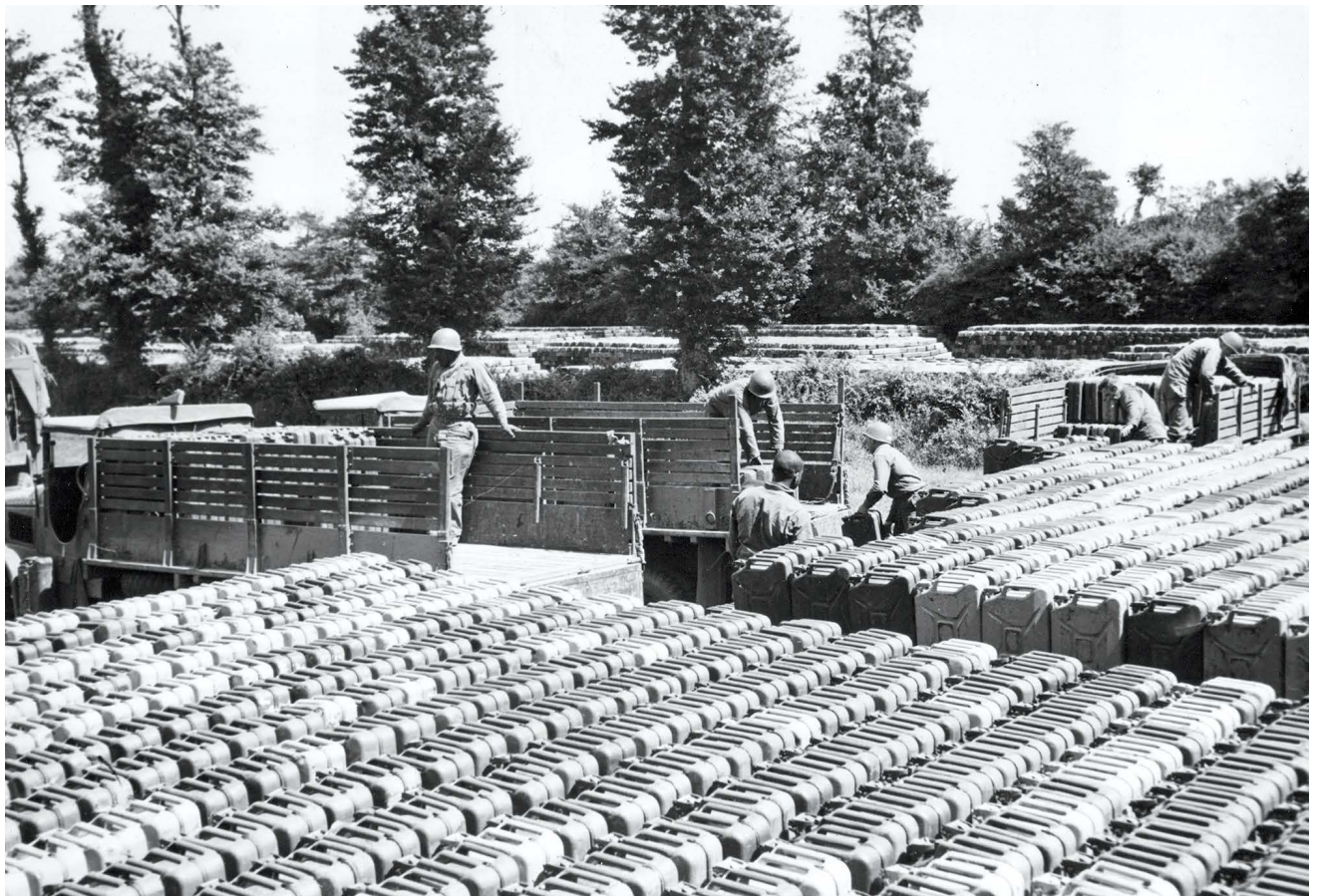
(Map by H. Damon, taken from Roland G. Ruppenthal's *Logistical Support of the Armies, Volume 1: May 1941–September 1944*)

Maintenance remained a constant struggle for the duration of the Red Ball mission. At one point in September, twenty-seven truck companies, totaling approximately one thousand vehicles, went without maintenance for several days.<sup>53</sup> Not only did this violate well-established maintenance protocols, it seriously jeopardized operational readiness. On the return route between the towns of Chartres and Saint-Lô, no vehicle maintenance support was available at all. The lack of maintenance took a toll on engines and wheels. At one low point, American drivers had abandoned eighty-one loaded vehicles on the side of the road between

Vire and Dreux.<sup>54</sup> Ignoring preventive maintenance intervals shortened the lifespan of vehicles, reduced lift capacity, and ultimately threatened future operations.

Under constant pressure to deliver, convoy discipline suffered, particularly in regards to speed limits and maintaining intervals. Red Ball mechanics would remove governors to allow an increase in the vehicles' top speed. Even with convoys ignoring speed limits, some grueling round trips took Red Ball soldiers over fifty-three hours to complete.<sup>55</sup> Exhaustion and fatigue overwhelmed drivers. The prolonged pace of Red Ball was so demanding that even in teams of two, drivers







**Top left:** A road patrol wrecker (*right*) pulls an overturned truck back on its wheels circa 1944 to haul it to the nearest heavy-automotive maintenance depot along the Red Ball Express route in the European theater of operations. Damaged trucks were repaired at once and put back into service. If a truck was damaged beyond repair, it was immediately replaced. (Photo by Lawrence Riordan/U.S. Army) **Bottom left:** Trucks from different units draw cans of gasoline 7 February 1945 from one of the storage fields in the quartermaster depot. After the five-gallon "jerricans" were washed, they were refilled from tankers on the beachheads and returned to the quartermaster depot. (Photo courtesy of the U.S. Army) **Above:** U.S. drivers nap or relax on boxes of ammunition and other equipment 10 October 1944 during the delivery of supplies to a forward area in France. The supply train is one of the Red Ball convoys that constituted an endless chain of trucks operating to and from the front on one-way roads. The highways were marked with Red Ball priority signs and were reserved for urgent supplies. (Photo courtesy of the U.S. Army)

often fell asleep behind the wheel. Accidents were a regular occurrence caused by burnout, speeding, poor road conditions, and collisions with unauthorized traffic.

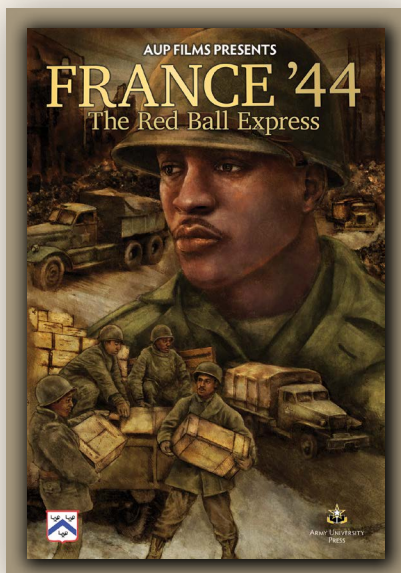
Although conducting a desperate, theater-wide defense, German ground and air forces remained a constant threat to convoys. As part of its retrograde, the Wehrmacht deployed snipers in urban areas and laid minefields along French roads. Having lost air superiority to the Allies, outnumbered Luftwaffe pilots avoided dog-fights against Allied squadrons but targeted vulnerable supply lines and depots whenever possible. When delivering to forward positions, Red Ball drivers often encountered enemy resistance. Sustainers were forced to defend themselves, their vehicles, and their transfer sites.

Despite these internal and external challenges, the Red Ball Express delivered crucial supplies day after day. After conducting major operations for eighty-one consecutive days, the Red Ball Express was discontinued because reports indicated that rail and barge facilities were available east of Paris and the use of liberated harbors, like Antwerp, could shorten supply lines. From 25 August to 16 November, the soldiers of the Red Ball Express hauled more than four hundred thousand tons of supplies at a rate of over five thousand tons a day.<sup>56</sup> On most days, nine hundred vehicles would depart toward combat zones covering 1.5 million ton-miles.<sup>57</sup> By Thanksgiving 1944, the Red Ball Express completed more than 121 million ton-miles in only a matter of months.<sup>58</sup>

## From Red Ball to the XYZ

In addition to the Red Ball Express, several other Allied supply routes were established in the ETO such as the Little Red Ball Express, the White Ball Express, the Red Lion Express, the ABC Express, and the XYZ Express route. Of these, the XYZ Express route was the most transformative as it incorporated numerous lessons from the earlier Red Ball Express to provide continuous and responsive sustainment. One of the last hauls of the war, the XYZ Express route supported the final offensive into Germany. The name for the operation was devised as part of a three-phased system: Plan X required eight thousand tons per day, Plan Y required ten thousand tons per day, and Plan Z required twelve thousand tons per day.<sup>59</sup> Although trains were finally alleviating the stress on motorized transport in eastern France, logisticians anticipated rail networks inside the German border would not be serviceable because of damage caused by Allied bombing and enemy sabotage.

Adopting lessons learned during the Red Ball Express, the Motor Transportation Service provided the U.S. First, Third, Seventh, and Ninth Armies with either a provisional highway transportation division or a quartermaster group. Although not divisions in the traditional sense, the 6956th, 6957th, and 6958th Highway Transport Divisions (Provisional) and the 469th Quartermaster Group were task-organized to support their respective armies.<sup>60</sup> These sustainment units were equipped to travel three hundred



## France '44: The Red Ball Express

After controlling continental Europe for years, German defenders were rolled back by Allied forces until the devastated Third Reich was forced to capitulate in May 1945. This victory would not have been possible without an unrelenting Allied sustainment effort. *France '44: The Red Ball Express* demonstrates how logistics led to the liberation of Europe and the demise of Nazi Germany.

Intertwining current Army doctrine with the incredible story of the Red Ball Express, this film examines the logistical successes and challenges sustainment planners encountered in the European theater of operations. Produced in collaboration with Combined Arms Support Command, *France '44: The Red Ball Express* provides important sustainment lessons for supporting large-scale combat operations that remain relevant today.

To view Army University Press Films' *France '44: The Red Ball Express*, visit <https://www.armyupress.army.mil/Educational-Services/Documentaries/France-44-The-Red-Ball-Express/>.

kilometers past the Rhine River.<sup>61</sup> Sustainers prepared to haul twenty-four thousand tons each day, but daily tonnage capability was expected to decrease slightly as units moved deeper into the German heartland.

Beginning on 25 March 1945, the XYZ established four supply routes originating from Belgium, Luxemburg, and France.<sup>62</sup> Not only did this improve survivability for individual convoys, but it also ensured continuous support in the event one of the routes had to be temporarily closed. By the middle of April, the four U.S. armies were supplied well inside German territory. Unlike the early days of the Red Ball Express when fuel was often shipped via jerricans in 2.5 ton trucks, the XYZ Express incorporated tanker companies capable of delivering four thousand tons of POL per day.<sup>63</sup> Benefiting from its thirty-four companies of ten-ton semitrailers, the 6957th Highway Transport Division (Provisional) was capable of supplying the Third Army with ten thousand tons of supplies and a million gallons of POL per day.<sup>64</sup> The entire operation was aided by the repair of rail lines west of the Rhine, which alleviated pressure on the convoy system.

The XYZ's coordination and synchronization across all levels of war enabled Allied forces to fight deep into the heart of Germany. In three months, the XYZ averaged close to 13,000 tons per day, delivering a total of 870,000 tons.<sup>65</sup> After "Victory in Europe," the motor transportation service considered the XYZ Express one of the most successful operations of the war. These achievements would not have been possible without the experience garnered during the Red Ball Express.

## Conclusion

The Red Ball Express is an outstanding example of the challenges associated with sustaining LSCO. Even with years to plan and prepare, Allied sustainment units encountered serious challenges in France in 1944. After a pre-invasion exercise in England was cancelled, sustainment operations had to be executed in the combat zone without the benefit of a large-scale rehearsal. Although sustainers wanted to deploy a system that utilized a series of semitrailers, they were forced to rely on the smaller vehicles that were readily available in the ETO.

Like their German counterparts, Allied planners had been shocked by the speed of the breakout and offensive across France. While combat troops raced through the French countryside, each victory had consequences for the sustainers who were forced to expand

their operations to keep pace. Allied success led to the creation of the Red Ball Express as a short-term solution. Motor transportation was the only viable option since supplies by rail, barge, and air were incapable of meeting the heavy logistical demands.

The sustainment situation on the ground became so desperate that volunteers were needed to fill out units. This was partially the result of combat units garnering deployment preference over sustainers. Operating on one of the longest routes in the ETO, many of the volunteer drivers had no experience in motor transportation, and some had never driven a truck before. The advancing Allied forces would have been forced to culminate without supplies, so the Red Ball Express went from being a short-term solution out of Normandy to a nonstop, open-ended mission across France. Plagued by poor infrastructure and the lack of enablers, the logistics network came perilously close to the brink of collapse. By the end of the Red Ball Express, exhaustion was causing a breakdown in morale and discipline. Vehicles were discarded along routes, supplies were sold on the black market, and drivers were dying in enemy attacks and roadway accidents.

As a result of learning from the successes and failures of the Red Ball Express, Army planners initiated several changes before the XYZ Express drove into Germany. One of the most significant improvements was the decision to attach veteran transportation divisions to each Army, thereby providing continuous and responsive support. The XYZ Express proved so successful that it became the sustainment standard for future operations.

Today's sustainers must prepare to meet similar challenges to those experienced on the Red Ball Express. As the Army continues to transition away from persistent, limited-contingency operations and prepares for the potential for large-scale combat, it is imperative that the sustainment community recognizes and trains for the demands this will place on the transportation and distribution network. Planners must conduct detailed analysis and careful force tailoring to ensure the appropriate mix of enablers are available to facilitate integrated and responsive sustainment. Leaders must build adaptable organizations capable of improvising to account for both immature theaters and the degraded infrastructure commonly associated with large-scale combat. Embracing these realities and preparing for them will yield a decided advantage to Army sustainers on the twenty-first-century battlefield. ■

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## Notes

1. Gordon Harrison, *The European Theater of Operations: Cross-Channel Attack* (Washington, DC: U.S. Government Printing Office [GPO], 1951, 1989), 19.
2. See General Board, *Motor Transport Service as a Permanent Part of the Transportation Corps* (Frankfurt, Germany: Headquarters, U.S. Forces, European Theater, 1945), 3. The War Department established the Transportation Corps in 1942.
3. Roland G. Ruppenthal, *Logistical Support of the Armies, Vol. 1: May 1941-September 1941* (Alexandria, VA: Saint John's Press, 1995), 559.
4. *Report of Operations: Final After Action Report, 12th Army Group, Vol. 1, Summary* (London: Headquarters, 12th Army Group, 31 July 1945), 21.
5. *Ibid.*, 22.
6. *Ibid.*, 95.
7. Charles MacDonald, *The Siegfried Line Campaign* (1963; repr., Washington, DC: U.S. GPO, 2001), 4.
8. Martin Blumenson, *The European Theater of Operations: Break-out and Pursuit* (Washington, DC: U.S. GPO, 1961), 691.
9. Ruppenthal, *Logistical Support of the Armies, Vol. 1*, 558.
10. *Ibid.*
11. *Report of Operations*, 22.
12. *Ibid.*
13. Joseph Bykofsky and Harold Larson, *The Technical Services: The Transportation Corps: Operations Overseas* (1957; repr., Washington, DC: U.S. GPO, 1973), 331.
14. *Report of Operations*, 96.
15. Service units, which were responsible for missions such as vehicle maintenance and rail reconstruction, were deployed to France at a much slower rate than combat units.
16. There is disagreement between Bykofsky and Larson in *The Technical Services* on page 331 and Ruppenthal, *Logistical Support of the Armies*, on page 558.
17. Loren Ayers, "Truck Loading Reference Data," Headquarters European Theater of Operations, U.S. Army, Office of the Chief of Transportation, Motor Transport Division, March 1944, 1.
18. *Ibid.*, table X-A.
19. General Board, *Motor Transport Service as a Permanent Part of the Transportation Corps*, 15.
20. Ulysses Lee, *Special Studies: The Employment of Negro Troops* (1966; repr., Washington, DC: U.S. GPO, 1970), 415.
21. *Ibid.*, 637–38.
22. *Ibid.*, 633.
23. World War II Exhibit, *Ground Transportation*, U.S. Army Transportation Museum, Fort Eustis, VA, 24 July 2019.
24. *Report of Operations*, 21–22.
25. Ruppenthal, *Logistical Support of the Armies, Vol. 1*, 563.
26. Headquarters, European Theater of Operations, United States Army, *Standing Operating Procedure No. 53: Red Ball Motor Transportation Operations*, 2 December 1944, 3.
27. *Ibid.*, 2.
28. *Ibid.*
29. *Ibid.*, 3.
30. Ruppenthal, *Logistical Support of the Armies, Vol. 1.*, 560.
31. Traffic control personnel were sent to the wrong towns, which led to lost convoys and time.
32. Ruppenthal, *Logistical Support of the Armies, Vol. 1.*, 560.
33. Blumenson, *The European Theater of Operations*, 691.
34. *Report of Operations*, 23.
35. Ayers, *Truck Loading Reference Data*, 13.
36. *Ibid.*
37. *Ibid.*
38. Roland G. Ruppenthal, *The European Theater of Operations: Logistical Support of the Armies, Vol. 2: September 1944-May 1945* (1959; repr., Washington, DC: U.S. GPO, 1969), 202–3.
39. *Standard Operating Procedure No. 53: Red Ball Motor Transportation Operations*, 3.
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60. *Ibid.*, 338–39.
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63. *Report of Operations*, 97.
64. Bykofsky and Larson, *The Technical Services*, 337.
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