A TIMELINE ANALYSIS OF THE CONFEDERATE *EN ÉCHELON* ATTACK ON JULY 2, 1863

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The second day of the Battle of Gettysburg records one of the largest attacks of the American Civil War (ACW). This was the *en échelon* attack of the Confederate Army of Northern Virginia (ANV) on July 2, 1863. It failed, and historians differ in their opinions as to why. This paper does not offer the final word on the failure; rather, it analyzes the attack timeline in detail to determine how deficiencies in planning the attack and in command and control over its three-mile length could have contributed to its failure. It avoids all other controversies surrounding the attack and includes the unusual step of not attempting to justify or criticize Confederate commander Robert E. Lee's choice of tactic for that day, but to simply explain it and accept it as a given.

This paper first describes briefly the *en échelon* attack as explained by Baron Antoine Henri de Jomini, the prominent author of the 19th century on strategy and tactics. It then presents the situation on July 2 and Lee's choice of the *en échelon* attack. At this point, a summary of the execution of the *en échelon* attack on July 2 is presented. The opinions of authors from standard works on the battle are presented chronologically to determine common elements among their commentary. Analyses of the historical attack versus different theoretical attack intervals are then performed. Included in this section are measurements from personal observations on the battlefield. Conclusions are derived from the analyses.

However, some disclaimers are warranted. None of the points presented intends to suggest that either side in that conflict was superior to the other: both North and South were part of the American culture. The day of battle covered in this paper saw some of the hardest fighting in the war on both sides. The incredible and inexhaustible courage and fortitude of the common soldier on this day can never be questioned or doubted. They suffered, regardless of how their generals chose to fight battles: whether victors or losers, men died.

Conventions used in this paper are described below. These simplifications should cause no confusion for the reader and produce a more readable product:

1. For the remainder of this paper, unless the term appears in a quote, the anglicized version "echelon" is used for the French *en échelon.*

2. Confederate brigade names are those of the general who led the brigade in the attack on July 2. A Confederate brigade was often known by the name of a previous commander, and often by the name of its commander at its formation even though he might be wounded, killed, or promoted. The result is that on July 2, Colonel David Lang commanded the brigade of General Edward Perry, and General William Lowrance commanded the brigade of General Alfred Scales. Rather than list a brigade as, for example, "Lang/Perry," it is referred to simply as "Lang." This convention streamlines the tables below.

3. For consistency, all clock times are listed as hours and minutes, such as 4:45. Standard grammatical convention suggests that hourly times may be simply written out, such as "at four p.m.," but because time is an integral part of this discussion, for ease of comparison within the paper, hours and minutes are used throughout.

4. Unless indicated otherwise, all times in this paper are approximate p.m. times, and "p.m." is not included. Note that these times are *not* time as we know it. With no national time standards, the most common time used in 1863 was mean local time. Time zones came after the war, and daylight savings time was not used in 1863 in the United States.

5. The issue of time in general is both important and imprecise, and both should be understandable. Time's importance will become obvious in the analysis of the Day 2 attack, the tactic of which was based on a progression of attacks. Its imprecision is the result of men in battle being otherwise occupied and not taking a moment to look at their watches to remember or record events. A classic work on this day offers this:

> I encountered several vexing problems not unique to the study of this engagement but frustrating nonetheless. One is the matter of time. Rarely were participants in the battle in general agreement as to the hour when this or that happened. Therefore, I deemed it wise not to attempt to ascribe specific hours for most events.[1]

Many authors do the same, some chapters of 30 pages might contain only three or four times, each one a marker for the next few pages.

Therefore, for consistency, in this paper, all times from 4:00 p.m. to that day's end are taken from *Gettysburg, July 2, The Ebb and Flow of Battle* by James A. Woods. In this book, Woods took the opposite tack and organized his book by time such that each section is indexed chronologically, often minute-by-minute. Within each section, all events anywhere on the battlefield are listed and described, providing an internally consistent of times and actions not found in most works.[2]

JOMINI AND THE ECHELON ATTACK

The influence of Jomini is central to this discussion. General Antoine Henri Jomini, who was Swiss, rose in Napoleon's armies and eventually served as his chief of staff. He wrote two books on warfare that influenced a long lineage of generals throughout the 19th century. One of these works, *The Art of War*, was translated by Lieutenant Henry Halleck and published in 1847, so the American reader had two versions to choose from. In his works, Jomini laid out the principles for which he is famous. His approach to warfare was scientific and geometric: direct the mass of force to the decisive point, maneuver to engage a part of the enemy's force, and achieve concentration of effort to overwhelm the enemy. Jomini used examples from the campaigns of Frederick the Great and Napoleon to illustrate the basic mechanics: strategy is the art of directing the army to the battle and tactics is the art of applying them on the battlefield to the decisive point.[3]

Lines of operation and formations were geometric. Battle was a complex pattern of lines (concentric, eccentric, interior, exterior), points, fronts, pivots, and zones. He defined 12 orders of battle, two of which are relevant to this paper and illustrated herein, using his numbering:

5. The simple oblique order, or the oblique reinforced on the attacking wing.

11. The order by echelon on the center.[4]

Jomini's depiction of "The oblique order" (Figure 1) appears thus:

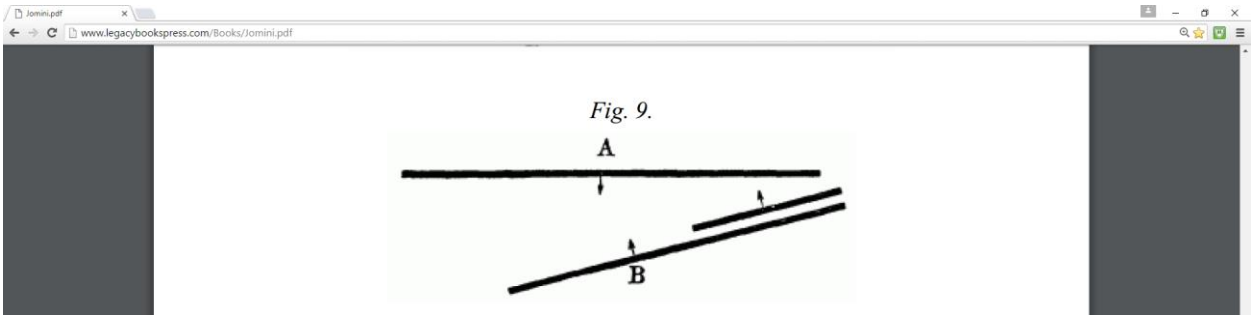

Figure 1. Jomini's diagram of the oblique order.[5]

Jomini's depictions of "Order by echelon on the center" (Figure 2) appear thus:

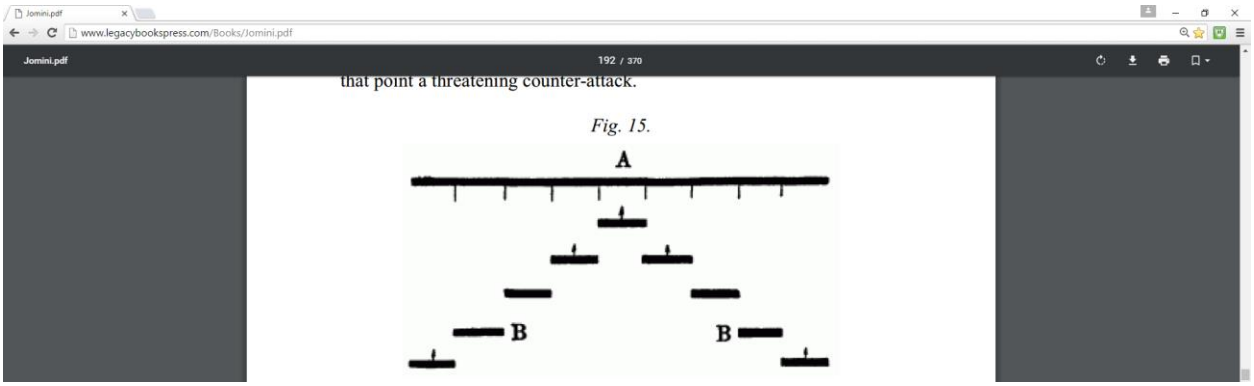

Figure 2. Jomini's diagram of order by echelon on the center.[6]

Both the echelon and oblique are "angular" attacks. In precise military terminology, the term echelon means "an arrangement of a body of troops with its units each somewhat to the left or right of the one in the rear like a series of steps."[7] Rather than a "linear," or simultaneous, attack in which the entire line advances at the same time, the echelon attack is staggered such that each element hits the enemy's line at a different time. The idea is to force the enemy to reinforce the first part of the line hit, thereby weakening other parts of the line, which will make them susceptible to

attacks from later, staggered, echelons. The oblique attack is similar except that the entire line attacks at the same angle, as shown in Figure 1. The echelon is a tactic requiring coordination, timing, patience, and a willingness to take casualties in the early units. The plan of Lee's attack on July 2 was to follow an echelon like that on the *left of the A* in Figure 2.

Jomini exalts the echelon and oblique attacks over all others, which might explain their use in the ACW.[8] In summary, whether in French or English, details on both the echelon and oblique attacks appear to have been available to those with formal military training.

LEE'S DECISIONS ON JULY 2

The meeting engagement between the ANV and the Federal Army of the Potomac (AOP), General George Meade commanding, on July 1, 1863, resulted in a Confederate victory for that day. At day's end, however, the Federals occupied the high ground east and southeast of the town. Their line was a compact three-mile curve extending from Culp's Hill northwest to Cemetery Hill and south along Cemetery Ridge to Little and Big Round Top. The curve of the Federal line is referred to as "the fish hook." The Confederate line followed the same curve, but because it was the outer line, extended five miles to completely match the Union line. This gave the AOP interior lines and a higher concentration of soldiers (27,000 men/mile versus 10,000 men/mile) and guns (118 guns/mile versus 54 guns/mile) along the line than the ANV along its line.[9] The night of July 1 resonated with the sounds of men, horses, and wheels of both armies moving toward town.

By morning, the ANV's disposition was the Second Corps, General Richard Ewell commanding, which went from Culp's Hill north; Third Corps, General Ambrose Powell Hill commanding, which continued south along Seminary Ridge; and the First Corps, General James Longstreet commanding, which was to move to the southern part of the line to the area west of the Emmittsburg Road by the Peach Orchard. Lee was unaware how much of the AOP had converged overnight and did not know that by noon the VI Corps was the only Federal corps not on the field. He was, however, certain that not all the corps had arrived. Because of this, he decided to attack what he thought was an incomplete AOP. Early morning reconnaissance indicated that the Federal line ran from Culps Hill up along Cemetery Hill and south along Cemetery Ridge to just north of Little Round Top, where Lee thought the line ended as an unprotected flank, or in the air. He thought that the Federal left at Gettysburg was in the same state as the Federal right at Chancellorsville in May 1863 and ripe for a similar flank attack.

Lee's plan for July 2 centered on an oblique attack by two fresh divisions, those of Generals John Bell Hood and Lafayette McLaws of Longstreet's corps, and General Richard Anderson's division of Hill's Third Corps, which had seen battle on July 1. Ewell's Third Corps was to execute a diversionary attack from the north as soon as he heard gunfire from the southern attack. Unlike General Thomas Jackson's simultaneous attack perpendicular to the Union line at Chancellorsville, the echelon attack was to advance up the Emmitsburg Road toward town to strike the Federal left, which was supposedly in the air. If the Federal line did not extend west into the path of the attack, the attack was supposed to pivot eastward and attack the Federal line directly. The other

divisions, those of Generals R. Anderson and William Dorsey Pender, would then attack en echelon.[10]

However, after McLaws arrived on the scene with his division and noted with surprise that Federal General Daniel Sickles's III Corps was out as far as the Peach Orchard, Lee recognized that an attack up the Emmitsburg Road was not indicated.[11] (The Emmitsburg Road (modern Business U.S. Route 15) approaches Gettysburg from the southwest, i.e., from seven o'clock on a clock face.) He then changed the plan such that Hood and McLaws would attack along the Emmitsburg Road toward Cemetery Ridge en echelon to be followed by en echelon attacks by brigades in R. Anderson's and Pender's division. Hood was to keep his left on the Emmitsburg Road.[12] Lee's original plan for Longstreet on July 2 involved two aspects, and in discussions of the plan, the identity of each aspect can be lost. McLaws and Hood (starting with McLaws at the Peach Orchard) were originally to advance *up* (along) the Emmitsburg Road, an oblique maneuver. Then, if the Federal line were not hit on the flank, they were to perform another oblique and attack to the east. Overlaid on these obliquities is the echelon attack. The modified plan deleted the oblique up the Emmitsburg Road, but maintained the echelon attack. These maneuvers—oblique or echelon—are complex, and both require coordination and command oversight.

It is important to note that both McLaws and Hood filed protests with Longstreet prior to the attack. McLaws's new assignment to attack a full line of Union infantry (the Federal III Corps) rather than an open flank in the air necessitated a change of alignment. Hood offered repeated protests that the ground before him was rocky and unsuitable for maintaining coherent formations; that the hills to his right (the Round Tops) were empty

and should be taken; and that part of his division should go around Big Round Top to flank the Federals. Longstreet, however, apparently weary of disagreements with Lee over the past two days, insisted that both Hood and McLaws attack per Lee's plan.[13]

EXECUTION AND RESULT OF LEE'S ECHELON ATTACK

After an artillery duel lasting one hour, General Hood attacked at approximately 4:00, with General Evander Law's brigade on the far right and Jerome Robertson's brigade on the left. The echelon attack started to spoil quickly: owing to the terrain and opposition, Robertson veered to the left (north) and Law had to divert his two rightmost regiments to his left to close the gap. Unfortunately, these two regiments ended up amid Robertson's five regiments, leaving Robertson in direct command of only part of his brigade. Shortly after the start of the attack, Hood was near the Peach Orchard behind Robertson, the correct place near his division's center to direct operations—here he was hit severely by shell fragments that tore into his left arm. This took him out of the battle and left Law in division command. Law was with his brigade near Big Round Top so there was a delay of indeterminate duration before Law learned of this and took command. (Oates did not learn of Hood's wounding until he reached the top of Big Round Top, so the delay must have been considerable.)[14]

Hood's brigades continued the echelon attack against Sickles's III Corps for approximately 1.5 hours. General Henry Benning's brigade and then General George Anderson's brigade entered the battle behind Law and Robertson, moving eastward until the entire division was engaged in Devil's Den, and on Houck's Ridge and the Round Tops. By 6:00 regiments from Law and Benning were starting the attack on Little Round

Top. Until now, Hood's brigades of General James Longstreet's corps had occupied roughly six Federal brigades sent to confront them: this shifting of Federal brigades to the left (south) offers justification for the choice of an echelon attack, that in doing so somewhere the line is weakened. Longstreet, exercising the discretion given to him by Lee, had not yet ordered into action any of McLaw's brigades.[15]

Longstreet then ordered General Joseph Kershaw's brigade (of McLaws's division) into the Peach Orchard around 5:30: Kershaw was to stay on Hood's left with General Paul Semmes in support. Semmes's brigade eventually made its way to fight in the Wheatfield. Approximately 45 minutes later, General William Barksdale's brigade was ordered in, and its attack along the Wheatfield Road took it first east and then north approximately 400 yards. General William Wofford followed in support. Both brigades engaged almost a dozen Federal regiments before ending the day. By the time the attacks stopped, Hood and McLaws's divisions ended the day near Plum Run extending from Devil's Den north to the Wheatfield Road.[16]

By 6:00 two hours had passed since the attack started, and Generals Meade and Winfield Scott Hancock, II Corps commander and temporary commander of the AOP's left wing, had shoveled brigade after brigade from the army's right and center into the left (south) end of the line to stem Longstreet's attack. Shortly after, R. Anderson's division started its part of the echelon attack. The brigades of General Cadmus Wilcox and Lang shifted to the left to avoid crossing Barksdale's northern track and started around 6:30 with Colonel Lang's Brigade supporting Wilcox's left. Shortly thereafter, General Ambrose Wright's brigade took off toward the Emmitsburg Road. Both Wilcox and Wright threatened the Federal line directly, but both were repulsed.[17]

When Wright had reached the Federal line, it was after 7:00. The sun was low in the sky and visibility was obscured further by clouds of smoke.[18] At this point, prior to sunset, the attack started to deteriorate "en *reverse* echelon," as it were. Per R. Anderson's order, General Carnot Posey's brigade took off shortly after Wright's, but stopped at the Bliss farm halfway to the Emmitsburg Road and dueled with Federal skirmishers there: his regiments went no farther.[19] Following Posey's movement occurred one of the most bizarre exchanges to have occurred in that war.

The next brigade in line, that of General William Mahone, never left its position. He refused a plea from Posey for support, and this caused R. Anderson to order him to move. The story continues:

> Thereafter, General Anderson dispatched his aide, Lieutenant Shannon, with a direct order for Mahone to move forward. In a breathtaking display of insubordination, Mahone refused to budge.
>
> "I have orders from General Anderson to remain where I am," was the gist of Mahone's response.
>
> "But I am just from General Anderson," stammered the incredulous aide, "and he orders you to advance." Mahone again rejected the order.[20]

It is difficult to imagine that Mahone (or any general, for that matter) could have observed the battle progressing, heard Posey's plea for support, and done nothing, but that is indeed what happened and there is no explanation for this.

To Mahone's left was the division of General Pender, a strict disciplinarian, an aggressive and capable officer. Pender, waiting as he must for signs of the echelon attack from Posey and Mahone, saw no movement from them and decided to ride to the south of his command to determine why R. Anderson's brigades were not moving. While on this reconnaissance mission, a Federal shell exploded near Pender and a fragment tore into his

thigh, knocking him out of the battle. (The wound was mortal and he died July 18.) Word reached Pender's senior brigade commander, General James Lane, around sunset. Lane took command of the division and sent a courier to Hill for orders; but with night falling and the fire to his right subsiding, Lane decided on his own initiative not to advance.[21] The time of Pender's wounding is not known exactly, but because he was traveling south to learn about Posey's and Mahone's delays in the echelon attack, a reasonable estimate is around 7:00 to 7:15. None of Pender's four brigades (Generals Edward Thomas, Lowrance, Lane, and Colonel Abner Perrin) moved from their assembly lines. The attack was over.

On the other side of the battlefield, and not part of the echelon attack, Ewell did attack Culp's Hill in late afternoon, but the attack was late and not as strong as required—in short, ineffective. It offered absolutely no assistance to the Confederate attack from the south. The afternoon echelon attack merely advanced the Confederate line a few hundred yards closer to the Federal line, which held.

Later that night, at Meade's staff meeting with his commanders to assess the condition of his army (and to supply grist for Meade's contemporary and future detractors on his weakness as a commander), a vote was taken to remain or retreat (providing yet more grist). Most commanders voted to stay; Meade agreed. Then an interesting exchange occurred:

> When the conference broke up, Meade was called aside by Major General John Newton, now in command of the I Corps, one of those who had voted to remain on the field. With an ironic smile, the corps leader suggested that Meade "ought to feel gratified with to-day's results."
>
> The army commander was incredulous, "In the name of common-sense, Newton, why?"

> Newton implied with impeccable logic: "They have hammered us into a solid position they cannot whip us out of."[22]

And Newton was correct: Pickett's Charge the next day did not whip the Federals out of their positions.

COMMENTARY ON THE CONFEDERATE ATTACK

With this background, it is now time to turn to General Lee's echelon attack on July 2, and to evaluate critiques pro and con. This paper assumes that Lee chose the tactic he thought best for this attack and therefore his *choice* of attack is not under investigation. He chose it and attacked. Therefore, the present focus is: *Why did the attack fail?*

Opinions here run the gamut from "It was Lee's fault" to "It was Longstreet's fault" to "It was Hill's fault" to "It was the Union army's fault." One can find a book somewhere to offer each view. To offer a balanced collection, it is helpful to present a sample of competent opinions from one participant and five historians of high repute. They are presented in order of publication. To assist in later analysis, each reason is labeled per the following scheme:

"C3" = Command, Control, and Communications ("C3" in the military)

"T" = Temporal

"F" = Federal Army

"O" = Other, to include topographical and geometric reasons and unplanned, random events such as the wounding or death of a general in battle.

The first sample is from Lieutenant Colonel Edward P. Alexander, master gunner, commander of the Longstreet's Second Corps reserve artillery battalion. He coordinated the artillery support for Longstreet's corps for the July 2 attack. In his commentary on this attack, he offers his full opinion of echelon attacks:

> Offensive battles are always more difficult of control than defensive, and there were two special difficulties on this occasion. First, was the great extent of the Confederate lines, approximately five miles — and their awkward shape, making intercommunication slow and difficult. Second, was the type or character of the attack ordered; which may be called the echelon, or progressive type, as distinguished from the simultaneous. The latter should be the type for any battle in the afternoon. Battles begun by one command and to be taken up successively by others, are always much prolonged. We had used this method on four occasions,—at Seven Pines, Gaines Mill, Frazier's Farm or Glendale, and Malvern Hill, —and always with poor success. Our effort this afternoon will be seen to be a monumental failure. General instructions were given to each corps commander, but much was left to their discretion in carrying them out. More than one fell short in performance.[23]

Parsing this quote produces the following list:

1. (C3) Offensive battles are harder to control than defensive, and the July 2 battle offered two special difficulties:

a. The extent of the concave Confederate line, approximately five miles, wrapping around a more compact convex Federal line of three miles with the attendant communication problems around a concave line.

b. The echelon attack rather than the simultaneous, which requires less coordination.

2. (T) Echelon attacks should start early in the day; simultaneous, in the afternoon, meaning that the attack on July 2 started too late.

3. (C3) Unity of command is essential. Switching from one corps to another during the battle (Longstreet to Hill) is less efficient and takes longer unless Lee or a staff member is following the attack to ensure a smooth transition.

4. (C3) Instructions to the commanders were general (not detailed) and they had too much discretion in their execution. Not all performed well. Alexander does not specify which corps commanders underperformed.

The second sample is from Douglas Southall Freeman. Sampling from his two classic Civil War works, *Lee: A Biography* and *Lee's Lieutenants*, for items associated with Day 2, one arrives at this list:

1. (C3) The extent and thinness of the Confederate line. A five-mile long concave fish-hook made communication slow and concentration difficult.[24]

2. (C3) From the standpoint of high command, there were many reasons for the defeat: overconfidence, bad organization, and inept leadership. These were compounded by the fortuity of the AOP, after many defeats, to capitalize on these errors.[25] To this one may add the state of mind of key commanders: Longstreet was disgruntled, Ewell apparently misunderstood his orders, and for whatever reason, Hill's participation was so small that his name appears in few reports of the day's operations.[26] (Yet, he commanded one-third of the divisions that attacked.)

3. (T) A successful echelon attack was impeded by delays in sending in the attacking forces. Freeman maintained that Longstreet waited too long to send in McLaws, which spent Hood's division, and that R. Anderson waited too long to send in his brigades. Freeman states also that Anderson "apparently knew little of what was planned."[27]

4. (C3) Overall lack of co-ordination of the ANV in attack. This is especially true because of the length of the line and the limited staff at each level of command.[28] The failure of Hill to support Wilcox and Wright is particularly notable because each of these brigades reached (Wright) or almost reached (Wilcox) the Federal line but received no help from supporting brigades.

5. (F) The Federal Army, and this item is best offered in Freeman's own words:

> Always to be considered were the skill, persistence and might with which the Army of the Potomac defended on the 2nd and 3rd of July a position of natural strength. In Southern studies of Gettysburg, this factor is more often assumed than stated, but it was in July, 1863, a disillusioning reality and a gloomy warning of what the Confederacy might expect of Northern veterans under competent leadership. The Army of the Potomac fought well in every battle where the blunders of rash or incompetent commanders did not paralyze or counter act the effort of the men. At Gettysburg, the magnificent Federal Divisions had strong ground, interior lines, the sense of fighting for home, knowledge of combat, and the intelligent, courageous leadership of George Gordon Meade, of Winfield Scott Hancock, and other wholly capable captains. Vigorous and experienced as was Lee's Army, it could not prevail over that adversary.[29]

The third sample is from Edwin B. Coddington, whose work *The Gettysburg Campaign* is one of the classics of the battle. His major reasons are:

1. (C3) A lack of what Lee called "a proper concert of action." This is accompanied by a lack of supervision of Hill or R. Anderson even though Lee was in that part of the line during the battle.

2. (T) Some contemporary critics criticized the late start of the attack.

3. (T) McLaws attacked too late.

4. (C3) R. Anderson did not support Longstreet with his entire division.

5. (O) The rugged nature of the battleground. The participants thought it rocky and covered with boulders—a visit today to the battlefield confirms that.[30]

The fourth sample is from Harry W. Pfanz, whose work *Gettysburg: The Second Day* is an extremely detailed account of its topic. His major reasons are:

1. (F) Despite the problems caused by Sickles's position, Meade, Hancock, and Sykes proved crucial to the repulse of the ANV.[31]

2. (C3) Lee delegated too much to his subordinates and did not correct Hill's deployment of R. Anderson's division. In addition, he allowed both first-time corps commanders, Ewell and Hill (the latter important for the topic of this paper), to conduct operations with almost no interference, which was his normal mode of command that had served him well.[32]

3. (O) The removal from the battle of Hood, G. Anderson, Barksdale, and Semmes from wounds, and Law from his brigade command after the wounding of Hood—all degraded the efficiency of Longstreet's corps.[33]

4. (C3) Finally, Pfanz's account is peppered with instances where command or control degenerated at the brigade and regiment levels during the attack, to wit:

a. Law in moving east towards the Round Tops caused a problem for Robertson's alignment: Robertson's orders were to align with Law's left *and* hold the Emmitsburg Road. Soon after moving it became clear that he could not do both because his brigade was split into two wings to accomplish each task. He decided to break with the road and support Law.[34] This was the first of many decisions made by brigade and regimental commanders (without the guidance of capable division commanders) as the battle progressed.

b. Because of this decision, Robertson had minimal control of his brigade. The right wing went with Law's Alabama regiments toward Devil's Den and Little Round

Top. When Law moved his two regiments towards Devil's Den, they had to side step the Texans, which then became part of their line of assault. By that time, Robertson only commanded two of his regiments.[35] It appears that the echelon formation began to degenerate almost from the beginning: the order of regiments from north-to-south at one point was two of Robertson, two of Law, two of Robertson, and three of Law. These became involved in heavy fighting with the Federals in Devils Den and on Little Round Top.

c. Generals Henry Benning and George Anderson then moved out. Benning had orders to follow Law, but learned that he was following General Jerome Robertson instead. It was only fate that put Benning's brigade in an advantageous spot near the Triangular Field.[36] G. Anderson, who had received no orders from Hood or Law, responded to a messenger from Robertson for assistance, and stepped off. Because G. Anderson was thus delayed, when Robertson reached the Union line, his left was exposed until Anderson arrived.[37] Because Longstreet delayed the departure of Kershaw's brigade of McLaws's division, G. Anderson's left was uncovered and subject to Federal artillery from the Peach Orchard until it reached Robertson's left.[38]

d. Kershaw was the first of McLaws's brigades to depart, and was unsupported on his left because Barksdale was held back. Kershaw's brigade thus suffered many casualties from both Federal infantry and artillery facing south along the Wheatfield Road.[39] Barksdale was finally released to attack the Peach Orchard from the west. After pushing the Federals out, three of Barksdale's regiments drove northeast across the Wheatfield Road to attack the Federals there[40] Wofford veered to the right and supported Kershaw and Semmes in the Wheatfield.[41] At this point, few brigades were coherent or

led directly by their commander and no Confederates were attacking the Federal line directly. By the time that Barksdale reached Cemetery Ridge, he had not enough strength or support to carry the position.

e. Earlier in the day, Wilcox's brigade was the right flank of R. Anderson's division of the Third Corps of the ANV. Because it had earlier encountered a Federal regiment reinforced by Berdan's sharpshooters, its rightmost regiment faced south at a right angle to the Confederate line.[42] Partly because of this, Wilcox was slow getting into position on General Barksdale's left. The other part was the result of R. Anderson's not informing Wilcox of the battle plan—why is unclear. And Lee never mentioned the need to realign that regiment either.[43] So, his right flank regiment was still situated facing south when the assault began, and it never did catch up. The result was that Barksdale responded to Federal pressure on his left by moving north as noted above. When Wilcox did receive orders to advance, he had to first shift to the left approximately 400 yards because Barksdale was in his path.[44]

f. This litany of late line departures by the echelon units continues through Lang and Wright. Neither of them started on time, neither kept the pressure off the brigade on their right, but they took off as ordered. Wright made it to the Federal line, but despite pleas for assistance, Posey's entire brigade did not respond. Posey had received orders earlier in the day to place two regiments as skirmishers before the Bliss house.[45] As a result, his attack against Cemetery Ridge was piecemeal. Posey, in turn, requested assistance from Mahone, who did not comply.[46]

g. As stated above, unlike both Hood and McLaws who were organized for a hard punch two brigades deep, R. Anderson's division was not formed for attack. It is

also unclear exactly why Generals A. P. Hill and R. Anderson were not more active during the attack. One brigade staff officer found R. Anderson and his staff stretched on the ground as if no battle was underway.[47]

The fifth sample is from Scott Bowden and Bill Ward's *Last Chance for Victory*. It would almost seem that their goal is to correct what they perceive as false assertions about Lee's performance at Gettysburg. They maintain that much of this misinformation has been repeated so much as to become dogma and that much is largely untrue.[48] Their book is an attempt to correct these alleged misconceptions, some of which concern the echelon attack on Day 2. One of those "misconceptions" they wish to refute is Lee's choice of the echelon attack for Day 2. They spend almost 30 pages describing how Lee formulated this battle plan while at the same time defending it, perhaps the largest amount of text devoted to Lee's choice than can be found even in Freeman.

Because of their considerable attention to this part of the battle, and because they intertwine Lee's reasoning and their defense of that choice, it is reasonable to include their reasons for the *choice* in this section. It will also be helpful for later discussions to offer these reasons first. They posit that Lee's attack plan for July 2 was logical, reasonable, and militarily sound because:

A. An echelon attack was an excellent way of turning Meade's flank.

B. An echelon attack compensated for an army with small staffs by offering commanders the opportunity to use initiative to execute the battle. More on this in a later section on Lee's use of this staff.

C. An echelon attack conformed to Lee's command style, which encouraged initiative and flexibility among his officers. More on this in later sections.

D. Generals defending against an echelon attack often made mistakes and Lee thought his dispositions would allow him to take advantage of this. This was the expectation of echelon attacks.[49] (This expectation is difficult to understand. If the officers on both sides learned from the same books, one must believe that the recipients of an echelon attack, assuming they are not buffoons, would recognize the tactic after the first two or three segments departed their lines, thereby diminishing any "mistakes." Why some modern authors insist on emphasizing this "advantage" is unknown.)

In their last chapter entitled "Reflections," Bowden and Ward offer 17 reasons why the ANV lost at Gettysburg. Reasons for the failure of the July 2 attack are included in the seventeen, and they often repeat the reasons provided in the chapters for that part of the battle. Those from the seventeen applicable to the attack by Longstreet and Hill are included below, with quotes from the applicable chapter text. They are labeled per the scheme defined earlier for this section:

1. (C3) Number 1 is "The breakdown of the July 2 echelon attack and the wounding of Dorsey Pender." This discussion repeats the blame directed at Hill and his generals, but with a twist. Per Lee's echelon attack plan, Pender waited for the progressive advances of R. Anderson's brigades before ordering his brigades forward. The failure of Posey and Mahone to attack in proper echelon sequence caused Pender to leave his division and ride south to investigate the holdup. He was wounded on this trip down the line. Thus, Posey and Mahone are not only responsible for physically breaking up the echelon attack, but their inaction caused the wounding of Dorsey Pender before he could order his division to attack.[50] Therefore, their lethargy converted their original

offense into something with much larger repercussions, not unlike the difference between a simple and compound fracture.

2 (O) Number 3 is "The loss of John Bell Hood early in the fighting on July 2." Hood was wounded 20 minutes into the attack, and the early loss of this hard fighter that early left his division without his tenacious leadership. As it was, his division did engage many Federal infantry brigades and artillery batteries shifted to their own left to counter Hood's attack, one of the goals of the echelon attack (along with the high casualties expected in the initial steps). Without Hood in command, however, it will never be known how successful the attack would have been.[51]

3. (C3) Number 5 is "Powell Hill and the mishandling of Third Corps." It is unclear what malady, if any, affected Hill on July 1 and 2. However, be there any possibility that it might have affected his ability to perform his duty, he should have informed Lee and asked to be temporarily relieved of command. No record exists of such a request. The presence of the Third Corps commander was required for the unbroken execution of the echelon attack per Lee's plan. His task was to ensure that each brigade advanced at the correct time: this he did not do. He failed in his command responsibility on July 2.[52]

In fact, earlier in the book they write, referring to Hill, R. Anderson, Posey, and Mahone, respectively, "One corps commander, one division commander, and two brigadiers, Third Corps generals all, were why the echelon attack failed on July 2, 1863."[53]

4. (F) Number 12 is "Winfield Hancock's excellent performance throughout the battle." Specifically, "On July 2, despite losing effectively one and one-half of his four

divisions, Hancock shifted his troops as needed and inspired his men up and down the corps line." They suggested that General Hancock's performance substantiated Pickett's assertion, "I think the Union Army had something to do with it."[54] This concurs with Freeman's assessment above.

5. (C3) Number 17 is "General Lee's inadequate staff size and faulty organizational structure." In this they explain that Civil War army commanders on both sides had small staffs that were much smaller than those used by Napoleon Bonaparte. Lee wrote often of the need for good commanders and maintained a small staff so that good officers could be placed in command positions. Because of the absence of General James Stuart's cavalry, Lee was forced to use his limited staff for reconnaissance.[55]

In addition, they suggest that one defect of Lee's organization was his failure to use with any effect General Isaac Trimble, who had returned to the army right before the start of the campaign. A supernumerary with no command in the Gettysburg campaign, Trimble was a competent and experienced officer who could have acted as Lee's Napoleonic aide-de-camp. In this capacity, Trimble's presence anywhere on the battlefield would have carried the authority of the commander, Robert E. Lee.[56] (C3)

The sixth sample is from Allen C. Guelzo, whose *Gettysburg: The Last Invasion* offers reasons for the failure of the attack. Whereas some of those reasons are stated as reasons for the loss of the entire battle, they have application to the second day:

1. (O) Inaccurate reconnaissance from the morning indicated that the AOP was far from concentrated. This gave Lee the false impression that he faced only the remnants of the Federal I and XI Corps on Cemetery Hill.[57] This led to Lee's plan to flank the Federal left, which he thought was lightly defended.

2. (C3) Lee appeared to have had a tough time getting his two new corps commanders, Ewell and Hill, to act. Both were proven, competent, and experienced officers and division commanders, but both were new to corps command and might not have realized the difference between commanding a corps' 20,000 men and a division's 6,000 men. (Overall, few of Lee's commanders acted in this battle, and when they did, it was often inconsistent and unpredictable, such as with Stuart.)[58]

3. (O) In addition to being new to corps command, Ewell and Hill were not operating on familiar ground as in Virginia. The larger number of barns and fences in Pennsylvania presented different tactical problems than in Virginia creating more uncertainty.[59] This uncertainty overwhelmed Hill on Day 2 as Posey frittered away his brigade on the Bliss house retarding the echelon attack.

4. (C3) With two of three corps commanders new to corps command, Lee's staff proved highly inadequate in directing them.[60]

Tabulating the reasons broken down by author and label produces Table 1.

TABLE 1. SUMMARY OF AUTHORS' REASONS FOR FAILURE OF ECHELON ATTACK ON JULY 2, 1863

AUTHOR	CMD., CONTROL, COMM. (C3)	TEMPORAL (T)	FEDERAL ARMY (F)	OTHER (O)
Alexander, *Memoirs* (4 reasons)	3	1	0	0
Freeman, *Lee, Lee's Lts*. (5 reasons)	3	1	1	0
Coddington, *Gettysburg* (5 reasons)	2	2	0	1
Pfanz, *Gettysburg, 2nd Day* (4 reasons)	2	0	1	1
Bowden & Ward, *Last Chance* (5 reasons)	3	0	1	1

Guelzo, *Last Invasion* (4 reasons)	2	0	0	2
Totals (27 reasons)	15	4	3	5

The totals seem to indicate that among the authors chosen, one participant and five historians, the primary reasons (15) for the failure of the echelon attack lie in command, control, and communications. The four reasons under "Temporal" cover whether all or part of the attack started late, and two reasons under "Other" involve the wounding or death of Confederate commanders, the main ones being Hood and Pender, which are not the result of any command failure. Four of the 15 reasons under C3 refer specifically to Lee's staff, mentioning its size, use, or effectiveness. It is important to understand the use of a command staff in the ACW and how Lee used his staff during the war. This will be covered later, but first the timing involved in the July 2 echelon attack must be addressed.

TIMELINE OF THE HISTORICAL ATTACK

Many commentators on the echelon attack highlight the feature of beguiling the defender into moving forces along his line as the means to defeat the first step of the echelon, stripping one part of the line to reinforce another. Coordinated timing is difficult to attain in battle, and in the ACW imperfect timing appeared often. The Seven Days battles were fraught with Confederate divisions getting lost on roads, delaying the attack, or changing its nature. The battle of Antietam is an excellent example of what happens when sequential attacks are separated by too much time: the large gaps in time and space between the start of each Federal attack allowed Lee, Longstreet, and Jackson

to shift reinforcements freely among parts of their line, effectively countering the Federals at each point.

It is also easy to overlook the fact that unless the successive echelons are released within certain intervals, each echelon is defenseless on the flank in the lane of the next attacking unit: the longer the interval, the longer the exposure to oblique fire. On July 2, the exposed flank was the left flank of each attacking column. Whereas it is true that the Confederate regiments attacked furiously, many took a beating on their left because the next attack was delayed, not in position, or purposefully held back waiting for the "right time" to attack. The depleted state of most southern regiments at the end of their attacks is testament to this. Lee chose Longstreet's discretion over a set attack schedule and Bowden and Ward praise this; one example: "More than an hour passed without word from 'Old Pete' [Longstreet], who was giving the battle time to develop before allowing General McLaws to slip the leash."[61] This leads to a question: what was the intended interval? This is based on another question: was the attack intended to continue as a night attack?

Nobody knows. The attack interval appears to have not been recorded and it is unclear whether Lee ever specified one. The same is true for the projected end of the attack. It is difficult to believe that Lee would fail to consider the amount of daylight in planning this attack, but if he did fail to do so, this is a major failure. However, it is possible to compute theoretical departure intervals and determine their effect on the attack. There are two types of intervals to determine and compare: the historical intervals on July 2, and theoretical intervals that would result if they were relatively constant throughout the attack. The reader is reminded that all times are taken from Woods's

Gettysburg, July 2, The Ebb and Flow of Battle.[62] These times are used in all tables below and they direct the reader to the section of the book covering that time.

In typical historiography, units are presented as blocks to be shown and moved on a map, like game pieces on a board. However, it should be emphasized that each block, or brigade, represents soldiers, *men, hundreds of men*, and it is easy to forget this. These men were hot and thirsty and carrying weapons across rough ground trying to stay in line while being shelled and fired at. It is especially important to keep these numbers in mind relative to the echelon attack and the responsibility to maintain the timing of the attack while moving these numbers across the fields. To this end, each brigade is listed with its approximate complement at the start of the attack:

CORPS	DIVISION	BRIGADE	STRENGTH
Longstreet	Hood	Law	2,000
		Benning	1,500
		Robertson	1,400
		G. Anderson	1,900
	McLaws	Kershaw	2,000
		Semmes	1,300
		Barksdale	1,600
		Wofford	1,600
Hill	R. Anderson	Wilcox	1,800
		Lang	700
		Wright	1,600
		Posey	1,300
		Mahone	1,500
	Pender	Thomas	700
		Lowrance	900
		Perrin	1,500
		Lane	1,200

Table 2 contains the actual line departure times of each brigade in the attack; however, the reader must keep in mind the physical aspects of such an attack. Two features of this table must be explained. First, Posey started sending out skirmishers around 5:30, probably in response to the Federal incursion onto the Bliss homestead. He did so again at 6:30, and when he arrived at the Bliss farm, at 6:40, three of his regiments were there, but they moved no farther. It is unclear whether he ever gave the command for his entire brigade to attack: for this reason, he is listed on the chart as a non-attack, i.e., with a question mark.

Second, for the estimated departure times of the six brigades that did not attack (starting with Posey), a good estimate is to compute the average departure interval of the attacking brigades and extrapolate that value for the remaining six. The last attacking brigade, the eleventh in the order, is Wofford at 6:35, which is 155 minutes from the start at 4:00. Dividing by 10 yields an average of 15.5 minutes, which for this discussion, may be rounded down to 15 minutes. This interval is used for the historical attack in all the tables; however, because Wofford's brigade is out of order (it is part of Longstreet's corps), the start time for the non-attacking brigades is the *last attacking brigade in the original order*, which is Wright's at 6:30. Details on astronomical definitions related to day and night (such as ECT, EENT, etc.) are covered in Appendix A, Astronomical Definitions.

TABLE 2. JULY 2 ECHELON ATTACK HISTORICAL BRIGADE LINE DEPARTURE TIMES		
TIMES	HISTORICAL (H)	

QUART HOUR	TIME	BRIGADE	INTERVAL (MIN)	NOTES
4:00	4:00	Law	0	
	4:02	Robertson	2	
4:15				
	4:20	Benning	18	
4:30				
	4:40	G. Anderson	20	
4:45				
5:00				
5:15				
5:30	5:30	**Kershaw**	50	
5:45				
	5:50	**Semmes**	20	
6:00	6:00			H: Pender ordered skirmishers forward.
6:15	6:15			
	6:20	**Barksdale**	30	
	6:25	*Wilcox*	5	
	6:27	*Lang*	2	
6:30	6:30	*Wright*	3	
	6:35	**Wofford**	5	H: 15 min after Barksdale
6:45	6:45	*Posey?*	10?	H: Departed line, but stopped at Bliss farm.
7:00	7:00	*Mahone?*	15?	H: First brigade not to advance.
7:15	7:15	THOMAS?	15?	H: Pender wounded
7:30	7:30	LOWRANCE?	15?	
	7:41			**SUNSET** H: Lane took cmd of Pender's

				div.
7:45	7:45	PERRIN?	15?	
8:00	8:00	LANE?	15?	
	8:13			**ECT**
8:15				
8:30	8:30			
8:45	8:45			**EENT**
	8:49			**MOONRISE**

Table 2. July 2 Echelon Attack Historical Brigade Line Departure Times. Rows are darker toward the bottom to indicate increasing darkness between Sunset and EENT. Legend for brigade names: Regular font = Hood, Bold font = McLaws, Italic font = R. Anderson, and Uppercase = Pender.

Observations on the historical attack from Table 2 follow:

1. The values of these intervals range from 2 to 50, an incredibly wide dispersion, which strongly suggests:

a. If Lee did have a departure interval in mind, he did not communicate it well to his subordinates.

b. If Lee did communicate an interval to his generals, they ignored it.

c. If Lee did communicate an interval to his generals that they ignored, he offered no command oversight to ensure that the attack did follow it.

2. Alexander's concern about the attack starting too late is credible because the last three brigades (starting with General Lowrance) appear to be marching to the Federal line and attacking in some phase of diminishing illumination. Also unclear is whether the attack plan included a night attack.

3. The midpoint between 4:00 and sunset (the obvious end of full daylight) at 7:41 is approximately 5:50. General Wofford departed his line at 6:35, slightly over 2.5

hours from the start, leaving roughly 1.25 hours to sunset at 7:41. The clear result from these computations is that Longstreet's attack consumed a large share of the available daylight. This is not necessarily Longstreet's fault: with no planned line departure schedule and no command oversight from Lee or his staff, Longstreet took full advantage of the "discretion" accorded him.

4. The line departure times of Wilcox, Lang, and Wright fall within five minutes of each other. Although these departures are separated by short intervals of two and three minutes, they represent more closely a simultaneous attack more than an echelon attack. It is unclear whether R. Anderson ordered close successive attacks or the brigade commanders were trying to "catch up" within the spirit of an echelon attack.

5. In a true echelon attack, Wofford (Longstreet's corps) would have departed the line before anyone in Hill's corps, but that was not the case. Between Barksdale and Wofford, his supporting brigade, three brigades of Hill's step off the line: Wilcox, Lang, and Wright. The overlapping line departures of Longstreet and Hill and the re-alignments of Wilcox and Lang to avoid Barksdale indicate that planning and oversight were deficient

In summary, these five observations indicate that no planned and overseen departure schedule—necessary for a successful echelon attack, especially one that starts in late afternoon to be completed mostly in daylight—was deployed for the day 2 echelon attack. The following analysis will show that such a schedule was feasible, and could be controlled.

THEORETICAL TIMELINES VERSUS THE HISTORICAL ATTACK

Computing the theoretical intervals starts with determining which divisions were planned for the attack. Hood, McLaws, and R. Anderson are obvious because brigades from those divisions did attack. The other division planned for the attack was Pender's, which is often forgotten because none of his brigades attacked; however, Pender's division was part of the plan. Pender was waiting to go in and was investigating the apparent delay (caused by Posey and Mahone) when he was wounded and removed from the field.[63] This indicates that he was waiting for his cue to order in his first brigade; therefore, any order of battle for the echelon attack must include Pender.

Given the original order and formation of brigades, one can compute theoretical planned attack intervals to compare with the historical attack. Four theoretical orders of attack are offered herein, two with EENT as the endpoint and two using sunset as the endpoint, all of which are presented for contrast to the historical attack. The term "endpoint" used in the context of these analyses means the astronomical marker, sunset or EENT, used to *guide the departure of the last brigade in the attack*, which assumes that the goal is for the last brigade to reach the Federal line by that marker. This means that the last brigade should depart its line at a time equal to the endpoint *minus* the travel time to the Federal line. This last brigade departure time is used to compute the line departure intervals for the other brigades in the attack.

It is unknown whether anyone on Lee's staff consulted an almanac to determine astronomical markers such as sunset; however, were one planning a late afternoon attack, the most obvious astronomical marker is sunset and the knowledge that twilight would continue for some time afterward. For this paper, it is important to remember that the

astronomical markers used in the analyses below are artificial constructs based on the precise times of those markers. These analyses do not suggest that Lee *should* have used these markers or that the attack *might* have succeeded had he used them; rather, they provide reproducible standards for comparative analysis.

As stated above, EENT is used for the first two theoretical studies, and sunset for the second two. EENT is first used as the endpoint because it provides the longest duration between the start of the attack and the endpoint and is therefore the more liberal. This serves to give the historical attack the benefit of the doubt on its timing. Each EENT study uses different attack formations as explained below. Sunset, on the other hand, provides a shorter duration between the start of the attack and the endpoint and is therefore more conservative. This provides a tougher standard for what the attack needed to offer some semblance of an echelon attack.

These computations require an average travel time from the Confederate line to the Federal line. The deployments that afternoon cause a problem in this regard. The advance of Sickles's III Corps out to the Emmitsburg Road caused Confederate units in the southern part of the attack (Longstreet) to hit the Federals much quicker than in the northern part (Hill), but this is what is known today (hindsight). In planning the attack, Lee would have had to estimate the travel time based on the distance between the Confederate and Federal lines *without* the extrusion of Sickles's corps. If possible, this study should use documented travel times to the real Federal line (*not* Sickles). On July 2, this occurred with only two Confederate brigades: Wilcox and Wright.

Wilcox departed the Confederate line at 6:25 and was attacked by the 1st Minnesota regiment near the Federal line around 7:20, for a travel time of 45 minutes.

Similarly, General Ambrose Wright departed at 6:30 and hit the Federal line around 7:18, for a travel time of 48 minutes. The average of these two is 46.5 minutes, but this is misleading because both brigades had to maneuver and fight Federal brigades and artillery brought forward to assist General Daniel Sickles. Given that each brigade's travel across the field involved the movement of over 1,500 men, it is logical to assume that such maneuver and fighting took considerable time and this time may be deducted from the average *for the reproduction of the planned attack interval*. Thus, allowing for approximately 15 minutes extra for fighting and maneuvering across the field roughly one mile long gives a *planned* travel time of approximately 30 minutes. This value is used for all computations below.

1. First Computation of Attack Interval with EENT as the Endpoint. In the historical formations, the divisions of Hood, McLaws, and Pender were organized in attack formation columns of two brigades, each division presenting a *front* of two brigades each with a brigade in support. On the other hand, R. Anderson's brigades were organized in a defensive line of five brigades, presenting a *front* of five brigades with none in support. This produces Schematic 1:

CORPS	DIVISION	FRONT BRIGADES	SUPPORT BRIGADES
Longstreet	Hood	Law Robertson	Benning G. Anderson
	McLaws	Kershaw Barksdale	Semmes Wofford
Hill	R. Anderson	Wilcox Lang Wright	

	Posey Mahone		
Pender	Thomas Perrin	Lowrance Lane	

Schematic 1. Representation of July 2 Echelon Attack with Supporting Brigades.

This first estimation of the interval assumes that the brigade combinations, i.e., one supporting another, such as Law/Robertson, depart with a small delay between them and can therefore be counted as one unit. Using this accounting method, the 11 brigades in the Front Brigades column represent the attacking units, leaving 10 spaces between them. Per Appendix A, sunset on July 2 was at 7:41 and EENT was at 8:45. Using the time computed above for a march under fire across the field to the Federal line of approximately 30 minutes, then for a brigade to leave the Confederate line and arrive at the Federal line with a usable amount of daylight, the last brigade combination, Perrin/Lane must start its march around 8:15. History records that the attack started around 4:00, so if 8:15 is the planned endpoint for the last unit, that produces a total attack period of approximately 4.25 hours (4:00 to 8:15), or 255 minutes, which divided by 10 intervals results in a time of 25.5 minutes between brigade units. This figure may be rounded down to 25 minutes for this discussion. A comparison of the historical attack with this theoretical interval is shown in Table 3.

TABLE 3. JULY 2 ECHELON ATTACK HISTORICAL BRIGADE LINE DEPARTURE TIMES VERSUS THEORETICAL CONSTANT INTERVAL = 25 MINUTES WITH EENT AS ENDPOINT

TIMES		HISTORICAL (H)		THEORETICAL (T)		
QUART HOUR	TIME	BRIGADE	INTERVAL (MIN)	BRIGADE	INTERVAL (MIN)	NOTES

4:00	4:00	Law	0	Law/ Robertson	0	
	4:02	Robertson	2			
4:15						
	4:20	Benning	18			
	4:25			Benning/ G. Anderson	25	
4:30						
	4:40	G. Anderson	20			
4:45						
	4:50			**Kershaw/ Semmes**	25	
5:00						
5:15	5:15			**Barksdale/ Wofford**	25	
5:30	5:30	**Kershaw**	50			
5:40				*Wilcox*	25	
5:45						
	5:50	**Semmes**	20			
6:00	6:00					H: Pender ordered skirmishers forward.
	6:05			*Lang*	25	
6:15						
	6:20	**Barksdale**	30			
	6:25	*Wilcox*	5			
	6:27	*Lang*	2			
6:30	6:30	*Wright*	3	*Wright*	25	
	6:35	**Wofford**	5			H: 15 min after Barksdale
6:45	6:45	*Posey?*	10?			H: Departed line, but stopped at Bliss farm.
	6:55			*Posey*	25	
7:00	7:00	*Mahone?*	15?			H: First

						brigade not to advance.
7:15	7:15	THOMAS?	15?			H: Pender wounded.
	7:20			*Mahone*	25	
7:30	7:30	LOWRANCE?	15?			
	7:41					**SUNSET** H: Lane took cmd of Pender's div.
7:45	7:45	PERRIN?	15?	THOMAS/ LOWRANCE	25	
8:00	8:00	LANE?	15?			
	8:10			PERRIN/ LANE	25	T: Last brigade line departure within daylight offered by EENT.
	8:13					**ECT**
8:15						
8:30	8:30					
8:45	8:45					**EENT**/ T: Theoretical arrival of last brigade at Union line
	8:49					**MOONRISE**

Table 3. July 2 Echelon Attack Historical Brigade Line Departure Times Versus Theoretical Constant Interval = 25 Minutes with EENT as Endpoint. Rows are darker toward the bottom to indicate increasing darkness between Sunset and EENT. Legend for brigade names: Regular font = Hood, Bold font = McLaws, Italic font = R. Anderson, and Uppercase = Pender.

2. Second Computation of Attack Interval with EENT as the Endpoint. The second estimation assumes that although the brigades are in combination, the interval between their departure is large enough to count as two brigade departures. The physical formation is thus the *same* as in Schematic 1 above, but in terms of line departure *times*, this formation *approximates* a continuous line as shown in Schematic 2:

CORPS	DIVISION	BRIGADES
Longstreet	Hood	Law
		Benning
		Robertson
		G. Anderson
	McLaws	Kershaw
		Semmes
		Barksdale
		Wofford
Hill	R. Anderson	Wilcox
		Lang
		Wright
		Posey
		Mahone
	Pender	Thomas
		Lowrance
		Perrin
		Lane

Schematic 2. Representation of July 2 Echelon Attack as an Implicit Single Line.

Using this accounting method, 17 brigades in the right column represent the attacking units, leaving 16 spaces between them. Using the same duration between 4:00 and 8:15 as in the first computation above, division of 255 minutes by 16 intervals results in an interval time of 15.9 minutes between brigades, which may be rounded to 16

minutes for this analysis. A comparison of the historical attack with this theoretical interval is shown in Table 4.

TABLE 4. JULY 2 ECHELON ATTACK HISTORICAL BRIGADE LINE DEPARTURE TIMES VERSUS THEORETICAL CONSTANT INTERVAL = 16 MINUTES WITH EENT AS ENDPOINT

TIMES		HISTORICAL (H)		THEORETICAL (T)		
QUART HOUR	TIME	BRIGADE	INTERVAL (MIN)	BRIGADE	INTERVAL (MIN)	NOTES
4:00	4:00	Law	0	Law	0	
	4:02	Robertson	2			
4:15						
	4:16			Robertson	16	
	4:20	Benning	18			
4:30						
	4:32			Benning	16	
	4:40	G.Anderson	20			
4:45						
	4:48			G.Anderson	16	
5:00						
	5:04			**Kershaw**	16	
5:15	5:15					
	5:20			**Semmes**	16	
5:30	5:30	**Kershaw**	50			
	5:36			**Barksdale**	16	
5:45						
	5:50	**Semmes**	20			
	5:52			**Wofford**	16	
6:00						H: Pender ordered skirmishers forward
	6:08			*Wilcox*	16	
6:15						
	6:20	**Barksdale**	30			
	6:24			*Lang*	16	
	6:25	*Wilcox*	5			
	6:27	*Lang*	2			

6:30	6:30	*Wright*	3			
	6:35	**Wofford**	5			H: 15 min after Barksdale
	6:40			*Wright*	16	
6:45	6:45	*Posey?*	10?			H: Departed line, but stopped at Bliss farm
6:56				*Posey*	16	
7:00	7:00	*Mahone?*	15?			H: First brigade not to advance.
	7:12			*Mahone*	16	
7:15	7:15	THOMAS?	15?			H: Pender wounded.
	7:28			THOMAS	16	
7:30	7:30	LOWRANCE?	15?			
	7:41					**SUNSET** H: Lane took cmd of Pender's div.
	7:44			LOWRANCE	16	
7:45	7:45	PERRIN?	15?			
8:00	8:00	LANE?	15?	PERRIN	16	
	8:13					**ECT**
8:15						
	8:16			LANE	16	T: Last brigade line departure within daylight offered by EENT.
8:30						
8:45	8:45					**EENT**/ T: Theoretical arrival of

						last brigade at Union line
	8:49					**MOONRISE**

Table 4. July 2 Echelon Attack Historical Brigade Line Departure Times Versus Theoretical Constant Interval = 16 Minutes with EENT as Endpoint. Rows are darker toward the bottom to indicate increasing darkness between Sunset and EENT. Legend for brigade names: Regular font = Hood, Bold font = McLaws, Italic font = R. Anderson, and Uppercase = Pender.

Observations from Tables 3 and 4 follow:

1. Both tables show that a plan allowing for twilight attacks with EENT as the endpoint approximates the historical attack. The departure times of the last brigade or combination are within a few minutes of each other: Lane (extrapolated at 8:00), Perrin/Lane at 8:10, and Lane at 8:16. This was intended as a baseline comparison of the two attack schemes (supporting and non-supporting brigades) to the historical attack allowing for movement after sunset.

2. Table 3, in which R. Anderson's division is deployed linearly, illustrates the effect of this formation on the attack. Simply using the theoretical intervals and ignoring considerations of illumination, Hood's, McLaws's, and Pender's divisions would have *each* taken 50 minutes to move four brigades. However, R. Anderson's division would have taken 125 minutes to depart, if this scheme were followed. This inefficient deployment is a good example of the inconsistent command and control offered by the authors above.

3. Regardless of which interval is used, it appears as if Pender's division would have attacked in increasing darkness. What is unclear, is whether this was Lee's intent.

Alexander seems not to think so. A more logical endpoint for the attack would be sunset, analyses for which follow.

3. First Computation of Attack Interval with Sunset as the Endpoint. This computation follows the formation in Schematic 1, which produces a smaller front of brigades (11) to the Federal line and most closely approximates the historical attack order. As determined above, sunset on July 2 was around 7:41. Assuming the same march to the Federal line of 30 minutes, for the last brigade combination to arrive at the Federal line before sunset, Perrin/Lane must start its march around 7:10. For a recorded attack start of 4:00, it is 190 minutes to 7:10, which divided by 10 intervals results in a time of 19 minutes between brigade units. A comparison of the historical attack with this theoretical interval is shown in Table 5.

TABLE 5. JULY 2 ECHELON ATTACK HISTORICAL BRIGADE LINE DEPARTURE TIMES VERSUS THEORETICAL CONSTANT INTERVAL = 19 MINUTES WITH SUNSET AS ENDPOINT

TIMES		HISTORICAL (H)		THEORETICAL (T)		
QUART HOUR	TIME	BRIGADE	INTERVAL (MIN)	BRIGADE	INTERVAL (MIN)	NOTES
4:00	4:00	Law	0	Law/ Robertson	0	
	4:02	Robertson	2			
4:15						
	4:19			Benning/ G. Anderson	19	
	4:20	Benning	18			
4:30						
	4:38			**Kershaw/ Semmes**	19	
	4:40	G. Anderson	20			
4:45						
	4:57			**Barksdale/ Wofford**	19	

5:15						
	5:16			*Wilcox*	19	
5:30	5:30	**Kershaw**	50			
	5:35			*Lang*	19	
5:45						
	5:50	**Semmes**	20			
	5:54			*Wright*	19	
6:00	6:00					H: Pender ordered skirmishers forward.
6:13				*Posey*	19	
6:15						
	6:20	**Barksdale**	30			
	6:25	*Wilcox*	5			
	6:27	*Lang*	2			
6:30	6:30	*Wright*	3			
	6:32			*Mahone*	19	
	6:35	**Wofford**	5			H: 15 min after Barksdale
6:45	6:45	*Posey?*	10?			H: Departed line, but stopped at Bliss farm
	6:51			THOMAS/ LOWRANCE	19	
7:00	7:00	*Mahone?*	15?			H: First brigade not to advance.
	7:10			PERRIN/ LANE	19	
7:15	7:15	THOMAS?	15?			H: Pender wounded (approx.)
7:30	7:30	LOWRANCE?	15?			
	7:40					T: Theoretical arrival of last brigade at

						Union line
	7:41					**SUNSET** H: Lane took cmd of Pender's div.
7:45	7:45	PERRIN?	15?			
8:00	8:00	LANE?	15?			
	8:13					**ECT**
8:15						
8:30						
8:45	8:45					**EENT**
	8:49					**MOONRISE**

Table 5. July 2 Echelon Attack Historical Brigade Line Departure Times Versus Theoretical Constant Interval = 19 Minutes with Sunset as Endpoint. Rows are darker toward the bottom to indicate increasing darkness between Sunset and EENT. Legend for brigade names: Regular font = Hood, Bold font = McLaws, Italic font = R. Anderson, and Uppercase = Pender.

Table 5 shows that an echelon attack with the historical formations occurring mostly in daylight would have benefitted from frontal and supporting brigades attacking in combination and that the brigades would have to depart the line in a constant succession of 19-minute intervals or less. This is a tight schedule considering that within that 19 minutes upwards of 3,000 men must move. Such a maneuver would require an understanding among all commanders of the importance of the line departure schedule versus available daylight and a method of ensuring that each brigade departed on schedule. It appears as if none of these conditions was met. With a 19-minute interval, both Longstreet and Hill would have had adequate amounts of daylight for their attacks.

It is one thing to trust a subordinate of considerable talent such as Longstreet, but it is another to control the battle. With no method of electronic communication, such as

hand-held radios, the only connection Lee had with his commanders (other than going himself) was through his staff. Taking the example of Chancellorsville again, once Jackson was sent on his 16-mile march, there was little Lee could do but wait because messages back and forth across sixteen miles would take too much time on horseback: Jackson had to act independently. However, the distance involved in controlling the battle on Day 2 is less than three miles, and Lee located himself close to the center of that segment.

This was determined by the simple method of driving south on Confederate Avenue (Seminary Ridge) on the battlefield and simply noting the odometer reading between the left (Hill) and right (Longstreet) of Lee's attack, measured by the locations of the brigade markers. (Because Confederate Avenue is one-way north-to-south, clocking the markers was done by necessity in reverse of the echelon order, but the result is the same.) There is some error here in that the markers might not be in the *exact* location of the brigades, but as will be seen, this is immaterial. The authors measured this in Spring 2016. The result is that the distance from Colonel Abner Perrin's brigade marker (Pender's division, Hill's corps) to the right of the Confederate line south just past the Alabama Monument is 2.8 miles.

As recorded, the attack started with General Evander Law's brigade around 4:00. With sunset around 7:41, this offered the attackers roughly 3.6 hours of daylight to hit the Union line, with 3.2 hours to the last line departure. Even with the more liberal EENT, there are over 4.0 hours until the last line departure, depending on the scheme used. Given these values, one only need travel at a speed of 0.9 miles/hour to reach the last line departure prior to sunset or 0.7 miles/hour to reach the last departure prior to EENT. One

could *walk* comfortably at these speeds, but it would of course be quicker on horseback. With the attack occurring near Lee, who observed from Seminary Ridge, it is difficult to understand how or why Lee chose not to monitor the attack himself or have one of his staff perform this function.

Also, from the historical line departure times of each brigade, one finds that Longstreet, with a front of four brigades (Law, Benning, Kershaw, and Barksdale), used up almost 2.5 hours (150 minutes) of daylight waiting for the "right" moments. Had a 19-minute interval (or something similar and controlled) been used with brigades in combination, the line departure times would have been 4:00, 4:19, 4:38, and 4:57 for a total duration of 76 minutes (adding 19 minutes until Wilcox's scheduled line departure at 5:16). This would have left Hill with approximately two hours until his last line departure prior to sunset and over three hours for EENT. Thus, Longstreet's delays in his line departures left less time for R. Anderson's brigades to attack in reasonable daylight. In addition, General William Wofford stepped off after Barksdale in support, meaning that General Cadmus Wilcox could not step off until around 6:15 or so to maintain the step-wise nature of the echelon attack.

This left R. Anderson roughly 1.5 hours until sunset or 2.5 hours until EENT. Because his five brigades (Wilcox, Lang, Wright, Posey, Mahone) were in line, this allowed roughly 15 minutes between each brigade until sunset or 30 minutes between each brigade until EENT. With smoke and approaching darkness, this made it difficult to attack near sunset or beyond to EENT. Of course, attacking *at* EENT would essentially be a night attack and would probably not have been ordered. Maintaining a consistent attack interval could have allowed all attacking brigades enough daylight to offer a

chance of success. In addition to Posey's sluggish advance and Mahone's inactivity, Pender was certainly worried about the setting sun. Indeed, one might argue that Pender was the only general who really understood that the attack was to include all the assigned divisions; unfortunately, his search for the attack's lethargy led to his wounding. The lack of a consistent echelon is probably one reason that Alexander stated that the attack started too late and that the commanders had too much discretion.

4. Second Computation of Attack Interval with Sunset as the Endpoint. Because three of the four divisions (Hood, McLaws, and Pender) formed their brigades in column formation for support, this paper assumes that this was the better formation. This last, completely theoretical computation ignores the historical formations and represents a best case for the July 2 attack. In this case, all four divisions are formed in column order, including R. Anderson's and sunset is the endpoint. This formation follows the formation in Schematic 3, which produces the minimum front of brigades (nine, with eight intervals) to the Federal line. The selection of front and supporting brigades is arbitrary, especially which of R. Anderson's brigades has no support, but for this scheme, R. Anderson's division now projects a front of only three brigades. (One is tempted to believe that if this were the attack formation, Lee would have assigned another support brigade in the empty spot, designated by parentheses, but this digression does not alter the analysis.) This produces Schematic 3:

CORPS	DIVISION	FRONT BRIGADES	SUPPORT BRIGADES
Longstreet	Hood	Law Robertson	Benning G. Anderson

	McLaws	Kershaw	Semmes
		Barksdale	Wofford
Hill	R. Anderson	Wilcox	(-----)
		Wright	Lang
		Mahone	Posey
	Pender	Thomas	Lowrance
		Perrin	Lane

Schematic 3. Theoretical Representation of July 2 Echelon Attack with All Supporting Brigades.

As determined above, sunset on July 2 was around 7:41. Assuming the same march time to the Federal line of 30 minutes, for the last brigade combination to arrive at the Federal line before sunset, Perrin/Lane must start its march around 7:15. Using the same duration between 4:00 and 7:20 as above, division of 200 minutes by 8 intervals results in an interval time of 25 minutes between brigades. A comparison of the historical attack with this theoretical interval is shown in Table 6. This computation assumes that a support brigade is released soon after the front brigade, i.e., well within and part of the interval, to assist the front brigade or to exploit any opening it makes. This is the most theoretical presentation in this paper because both the attack formation and endpoint are unhistorical.

TABLE 6. JULY 2 ECHELON ATTACK HISTORICAL BRIGADE LINE DEPARTURE TIMES VERSUS THEORETICAL CONSTANT INTERVAL = 25 MINUTES WITH SUNSET AS ENDPOINT

TIMES		HISTORICAL (H)		THEORETICAL (T)		
QUART HOUR	TIME	BRIGADE	INTERVAL (MIN)	BRIGADE	INTERVAL (MIN)	NOTES
4:00	4:00	Law	0	Law/ Robertson	0	
	4:02	Robertson	2			

4:15						
	4:20	Benning	18			
4:25				Benning/ G. Anderson	25	
4:30						
	4:40	G. Anderson	20			
	4:50			**Kershaw/ Semmes**	25	
5:00	5:00					
5:15	5:15			**Barksdale/ Wofford**	25	
5:30	5:30	**Kershaw**	50			
	5:40			*Wilcox*	25	
5:45						
	5:50	**Semmes**	20			
6:00						
	6:05			*Wright/Lang*	25	H: Pender ordered skirmishers forward.
6:15						
	6:20	**Barksdale**	30			
	6:25	*Wilcox*	5			
	6:27	*Lang*	2			
6:30	6:30	*Wright*	3	*Mahone/ Posey*	25	
	6:35	**Wofford**	5			H: 15 min after Barksdale
6:45	6:45	*Posey?*	10?			H: Departed line, but stopped at Bliss farm
	6:55			THOMAS/ LOWRANCE	25	
7:00	7:00	*Mahone?*	15?			H: First

						brigade not to advance.
	7:20			PERRIN/ LANE	25	
7:15	7:15	THOMAS?	15?			H: Pender wounded.
7:30	7:30	LOWRANCE?	15?			
	7:32					T: Theoretical arrival of last brigade at Union line
	7:41					**SUNSET** H: Lane took cmd of Pender's div.
7:45	7:45	PERRIN?	15?			
8:00	8:00	LANE?	15?			
	8:13					**ECT**
8:15						
8:30						
8:45	8:45					**EENT**
	8:49					**MOONRISE**

Table 6. July 2 Echelon Attack Historical Brigade Line Departure Times Versus Theoretical Constant Interval = 25 Minutes with Sunset as Endpoint. Rows are darker toward the bottom to indicate increasing darkness between Sunset and EENT. Legend for brigade names: Regular font = Hood, Bold font = McLaws, Italic font = R. Anderson, and Uppercase = Pender.

Table 6 shows that the optimal case for the echelon attack to occur almost totally in daylight would have required frontal and supporting brigades to attack in combination and that the brigades would have to depart the line in a constant succession of 25-minute intervals or less. The idea of supporting brigades is important because of the concentration of force it provides at each step in the echelon. Of course, even if the

arithmetic produces a 25-minute interval, nothing says that Lee could not have chosen a shorter interval. A shorter interval might have provided quicker punches on the Federal line and some of them might have arrived before Federal reinforcements appeared.

In summary, this analysis shows that, in contrast to the historical attack, the July 2 echelon attack with planned intervals was not only feasible, but would have ensured that all brigades from Generals Hood through Pender could reach the Federal line in daylight. The analysis shows that managing the clock is superior to commander initiative and flexibility especially for a late afternoon attack. The question of command and control is covered in the next section.

Even though the departure intervals were not managed well, could Pender's attack have continued in the dark? Colonel E. P. Alexander noted that at the end of battle on July 2 the moon was full.[64] Specifics on the moon's motions and times are rarely mentioned in battle studies, but they are important to offer answers to that question or to at least understand the options. The Naval Observatory result for Gettysburg cited in Appendix A for sunset and twilights also produces lunar data for the input day. Moonrise on July 2 was at 8:49. Per the Naval Observatory data, the closest full moon was the night of July 1 so the next night the moon was starting its waning gibbous phase and its brightness was 97 percent of the full moon. (This decrease in the moon's brightness is therefore astronomical and not meteorological, e.g., cloud cover). For Colonel Alexander's (and this paper's) purposes, the moon was full.[65] The question now is What is the illumination from the full moon?

A 1964 paper by the United States Army entitled "Moonlight and Night Visibility" surveyed the results of six previous studies into the topic (the only six that the

authors could find). Consolidation of all data showed that under a clear night and full moon, a unit of human targets could be seen with the naked eye (that is, without modern night vision goggles) from 150 to 300 meters, or 164 to 328 yards, on average.[66] The lower numbers are for soldiers prone or kneeling and the higher numbers are for soldiers standing. In addition, soldiers facing the moon could see farther than those with the moon behind them, and soldiers could see moving soldiers farther than those halted.[67]

Owing to its effect on visibility, the direction of moonrise must also be considered. Per the Naval Observatory, for July 2, 1863, the moon's azimuth (measured east of north) at 8:50 is 110 degrees and at an (arbitrarily chosen) end time of 11:00 is 132 degrees. These azimuths place the moon rising in the east-southeast to an altitude (elevation) of about 20 degrees, putting it *behind* the Union line and *ahead* of any Confederates attacking from Seminary Ridge.[68] Based on the army survey and given that the attackers were in a large unit and standing and moving, Federal soldiers, with the moon at their backs, would be able to see the Confederates in motion at approximately 151 meters, or 165 yards. The Confederates, on the other hand, facing the moon would be able to see the stationary Federals at 264 m (289 yd.) if the Federals were standing (especially in silhouette), 171 m (187 yd) if kneeling, and 127 m (139 yd) if prone.[69]

The numbers might suggest that given these distances, the battle could continue with Pender; however, four circumstances might impede such an action. First, it would have been night: the results of the army survey indicate how much visibility one can eke out of darkness, moonlit yes, but darkness nonetheless. Still in the ANV's collective memory was the Battle of Chancellorsville two months earlier, in which Jackson, Ewell's predecessor, was shot accidentally while returning in darkness with his staff from a

personal night reconnaissance of the Federal lines. Coordination among the corps and divisions had not gone very well in the battle so far on Day 2, and darkness could exacerbate the ANV's deficient performance in this area.

Second, thick cloud cover might cover the moon during a night attack, negating any benefit from moonlight. The evidence indicates that the evening and night sky were more than likely clear or partly clear, for two reasons. As stated above, Alexander wrote that the moon was full on the night of July 2, indicating that he could view it as it rose over the southeast. In addition, the Reverend Doctor Michael Jacobs, science professor at Pennsylvania College, took weather observations three times per day during the battle. For July 2 at 8 a.m., the sky was covered with low clouds, but at 2 p.m., the sky was three-tenths clear. By 9 p.m., he reported cirrus clouds, which are high clouds and generally translucent.[70] In short, the day started cloudy and was mostly clear by nighttime. Therefore, indications are that cloud cover would not have seriously impeded any visual benefit from moonlight.

Third, smoke from thousands of guns and scores of cannons would be more prohibitive in the dark than in daylight or even twilight, regardless of how much moonlight is available. Third, although the Confederates could have seen the Federals at a greater distance than the Federals could have seen them, the Confederates would have had no artillery at 289 yd from the Union line. In contrast, the Federals had plenty of artillery and ammunition when the Confederates became visible at 165 yd, which would have put the Confederates at a considerable disadvantage during a night attack. (The Confederate deficiency in artillery advancing with the infantry would have calamitous effect the next day during Pickett's Charge.)

Critics might point out that on the other side of the battlefield, brigades in General Edward Johnson's division assaulted Culp's Hill on the evening of July 2. This battle continued well into the night and ended with the Confederates occupying the southern part of the top of the hill. This was followed by a pre-dawn attack by Federal artillery and infantry which recaptured the hill. Although these night attacks succeeded, they were much different from the Longstreet/Hill echelon attack: a much smaller force (four brigades), a much shorter distance to cover (less than one-half mile), no planned phased departure of brigades, and a smaller target. The comparison might be tempting, but it is not as obvious as it appears.

Because Pender's attack did not occur, speculating on its possible outcome serves no practical purpose. Given the exhaustion of Longstreet's brigades and the repulse of Hill's brigades, it is difficult to imagine what his division could accomplish in a night attack across that field with the entire Federal line ready for it.

LEE AND THE USE OF HIS STAFF—NON-MANAGEMENT OF A CRITICAL BATTLE

As mentioned previously, Bowden and Ward praised the choice of the echelon attack; their reason C above states fully that it "allowed Lee's corps and division commanders the flexibility to position their brigades and direct them into action."[71] In other words, give a subordinate an order but do not tell him how to carry it out. This is how the U.S Army has operated ever since. They quote General Lee as telling an officer of a foreign army, "It would be a bad thing if I could not rely on my brigade and division commanders."[72] This had worked well for Lee in many battles; for some, it worked

spectacularly. Chancellorsville is an excellent example: Jackson's 16-mile march around the AOP to attack the open flank of the XI Corps was the centerpiece of the battle often called "Lee's Masterpiece." Lee had divided his undersized army twice by that time in the battle and could not physically oversee Jackson's attack. In that battle, Lee, however, directed all aspects of the attack: with Longstreet on assignment elsewhere, Lee had to deal directly with McLaws, a division commander.

However, this command style of delegation did not work well in all battles. The battles in the later part of the Federal Peninsula Campaign in June and early July 1862 are examples of this. At Fair Oaks (Seven Pines) under General Joseph Johnston (who was wounded) and the Seven Days' battles under Lee, the Confederate effort suffered from delays, miscommunication, traffic jams, unintended detours of entire divisions, countermarches, and little or no attack coordination. Of the five major battles commanded by Lee—Mechanicsville, Gaines' Mill, Frayser's Farm (Glendale), Savage's Station, and Malvern Hill—only one, Gaines' Mill, was a success, but at a high cost of 8,000 casualties.[73] In their explanation of why the echelon attack on Day 2 was a good choice for Lee, Bowden and Ward offer Gaines' Mill as an example of a battle where Lee employed the echelon successfully.[74] Whereas it is true that Gaines' Mill is an example of an echelon attack that succeeded among others that had not, 8,000 casualties indicates that it was not that splendid an example. By not including the other attacks that failed and why, the argument that it had been used successfully in the past is incomplete because previous echelon attacks showed that not all were effective.

Further, it should be clear from the tables above that an echelon attack requires a schedule and adhering to it as closely as possible. Battle conditions might effect minor

changes in the schedule where the flexibility of commanders was important, but not if it blunts the effect of the tactic. Lee might have planned an echelon attack, but what was executed was not exactly that. Per Glenn Tucker:

> The *en échelon* plan ordinarily would be more effective if brigade followed brigade in prompt succession, but would be foredoomed to failure under lackadaisical management, by which it might become a series of individual attacks by isolated brigades, each being repulsed in turn by the whole enemy army.[75]

With this attack starting in late afternoon, a departure schedule was important if all participating brigades were to have enough daylight to attack. That no schedule appears to have been planned nor was it obvious to Longstreet that saving daylight for Hill was important indicates that the commanders were unprepared for any flexibility accorded them by Lee.

Bowden and Ward's reason B above states fully that the echelon attack "helped compensate for an army employing relatively small staffs at every level of command."[76] There are two problems with this statement as it might relate to July 2. First, it assumes that all generals assigned to the attack were aware of the details for the entire line and not just their sector. This appears to have not been the case. Longstreet was permitted to devour minutes with no regard for Pender up the line.

Second, any attack, whether echelon, simultaneous, or flank, requires planning and coordination of some type, and the echelon is one of the most complicated. It is incongruous to maintain that a *more complicated tactic compensates for a smaller staff.* Many coordinative mishaps for battle can be solved or at least alleviated with a competent staff of sufficient size; however, the South did not have the trained manpower and officers to effect this. The South's major problem was the lack of competent field

commanders, and so field command is where Lee assigned his able officers. This resulted in small staffs. (Although northern armies had many more men, they had only slightly larger staffs; the staffs of neither side reached the size of those in Napoleon Bonaparte's armies, the 19th century standard of military excellence.)[77]

A small staff served Lee well in Virginia, where he could depend on the local knowledge of other officers or friendly civilians. However, upon entering Maryland in 1862 it was obvious to Lee that this advantage disappeared. And Lee was aware in June 1863 in Pennsylvania that he had not solved this problem.[78] This does not mean that Lee required a staff of Napoleonic dimensions (50 French staff officers per level of command versus five for the ANV).[79] However it *does* require that Lee either have a staff large enough to do the job *or that Lee use his staff effectively.* Lee apparently chose a smaller staff, probably out of necessity, but it is unclear why he did not use his staff during the battle on July 2. Although it seems clear from Table 2 that proper control of the attack from Lee or his staff did not occur, recent scholarship confirms this view.

In a master's thesis entitled "*Maintaining Order in the Midst of Chaos: Robert E. Lee's Usage of His Personal Staff,*" Robert William Sidwell discusses Lee and his staff in detail. He distinguishes between the Army staff, i.e., the heads of the administrative departments such as artillery, commissary, and medical, and his personal staff, his aides-de-camp, military secretaries, and couriers. The Army staff were assigned to the *army* and not to Lee personally and most of them fell under the authority of their corresponding government departments in Richmond, and this authority theoretically extended over that of the army commander. Lee's personal staff were assigned to him, and a reference to

"his staff" refers to these soldiers and not the army's department heads.[80] As for Lee's personal staff, Sidwell writes:

> Lee retained the same personal staff officers for all three engagements. This thesis will focus on the six officers who formed the personal staff: Robert Chilton, Walter Taylor, Charles Venable, Armistead Long, Charles Marshall, and Randolph Talcott. It will also touch on the couriers who assisted them in carrying Lee's orders to his generals and supervising their execution. Some members of the personal staff (especially Chief of Staff Chilton) also issued orders in Lee's name.
>
> This thesis will demonstrate that Lee's staff on the whole quite competently carried, distributed, and supervised Lee's orders. It will show that Lee often failed to use his staff to supervise, and that this neglect proved crucial in the shifting circumstances of campaigns. Further, it will be revealed that while Lee's use of his staff improved as the war progressed, as late as Gettysburg he had yet to utilize his staff to intervene in situations when his objectives were clearly not being achieved.[81]

The thesis covers three campaigns: The Seven Days', Maryland (Antietam), and Gettysburg. It concludes that although the Seven Days' campaign in June and July 1862 was a strategic victory for the Confederacy, it was not decisive 1) in that the AOP was not destroyed, and 2) Confederate casualties exceeded those of the Union, a luxury the South could ill afford. This was Lee's first experience as the ANV commander. The army organization was poor in that corps were not yet authorized and he was forced to issue commands directly to division commanders. He usually gave commands himself and relegated his staff to supervisory duties such as to oversee the digging of trenches. He never used his staff to issue orders in his name. In short, Lee's staff was competent, but he did not use it effectively.[82] For the Maryland campaign, he used his staff much more for communicating with his commanders, and the performance of his staff improved, but he still did not use them to issue orders in his name.[83]

After Chancellorsville and the death of General Thomas Jackson, Lee reorganized the ANV from two corps to three. Longstreet was his most experienced corps commander, and Ewell and Hill were new to that position. In addition, out of nine division commanders among the three corps, four were new to the rank: Generals Robert Rodes, Johnson, Pender, and Henry Heth. Lee understood that this collective inexperience would require closer supervision than previously.[84]

For the 1863 Pennsylvania campaign, Lee wrote no order covering long durations as he did in the 1862 Maryland campaign (a copy of which wrapped around cigars was discovered accidentally by Federal soldiers), but issued step-wise orders to his commanders as the campaign progressed.[85] Despite Lee's step-by-step instructions prior to July 1, Stuart lost contact with Lee, and Hill, Heth, and Rodes started a major battle despite orders to avoid a general engagement. (These are out of the scope of this paper.) Despite these command lapses, his divisions concentrated in the Gettysburg area more quickly than did the Federals, resulting in the victory that led to the tactical situation on Day 2. However, despite Lee's attention to orders *prior to* the battle, he was less vigilant about instructions *during* the battle.

What is notable about the Pennsylvania campaign up to that day was that Lee used his staff sufficiently. Whereas his staff saw little use during the fighting on July 1, it saw much use that evening as Lee planned for the next day: scouting, delivering orders, and sometimes supervising the execution of those orders. This was much more than in previous battles, but was limited mostly to the inexperienced Ewell and Hill and not to the veteran Longstreet.[86] On the morning of July 2, Lee continued to use his staff for reconnaissance and discussions with corps commanders although he did converse with

General Richard Ewell at Ewell's headquarters. Later, while waiting for Longstreet to move, Lee went to him for a personal discussion. Lee sent Artillery Chief General William Pendleton and Captain Samuel Johnston, an engineer on his general staff, on separate reconnaissance missions to the Federal left. Later Lee went to Longstreet to inquire about the delay in Longstreet's movements. Although he sent Captain Johnston (who had conducted an early morning reconnaissance up to Little Round Top) to guide Longstreet on his march to the Confederate right, he never sent a staff member to supervise the First Corps.[87] Sidwell summarizes Lee's command prior to the attack.

> Although Lee placed great trust in Longstreet, in this instance he failed to use his staff to maintain his control over his openly sulking subordinate. After his three previous failures to obey Lee's orders, Longstreet was obviously reluctant to follow instructions, and he should have been supervised. A staff officer from Lee would have been able to authorize the infantry to take Alexander's route, or at least could have sent a courier back to Lee requesting such authorization. Lee lost control over Longstreet's Corps, and did nothing to regain it.[88]

After the attack began, Lee offered no supervision either from himself or his staff. Sidwell continues:

> After the delayed assault began, Longstreet took no measures to communicate with Lee, and Lee neglected to supervise the attack. When Hood repeatedly insisted that he had found a way to turn the Federal left flank, Longstreet sullenly refused, insisting that "we must follow the orders of General Lee." He sent no staff officer to Lee, and Lee had left no personal staff officer with him; in either case, he could have quickly communicated Hood's discovery to the commanding general, and received appropriate instructions. In fact, Longstreet sent only one message to Lee all day, even as his two divisions battled ferociously in the Wheatfield, the Devil's Den, Little Round Top, the Peach Orchard, and Cemetery Ridge, achieving only modest gains for very heavy casualties. When the day's battle ended, Longstreet did not bother to report to Lee's headquarters, and Lee did not summon him. Lee sent a message to Longstreet ordering him to renew the attack at daybreak on July 3, but apparently did not entrust his messenger to inspect Longstreet's corps and advanced position.[89]

One phase of the attack which should have received command supervision is the transfer of command from Longstreet to Hill, but this appears not to have been accomplished or even attempted. Not only did R. Anderson's entire division fail to attack as ordered—it was not even in an offensive formation—but there appears to have been no attempt to investigate this lapse even when it was clear that the attack was not progressing as ordered. General Lee observed the attack as the brigades advanced, but appears to have not noticed when it started to falter. Remember: because this was an echelon attack with a late afternoon start, its coordination and timing requirements were more stringent than for a simultaneous attack. As the analyses above show, this lack of oversight from Lee and his staff is particularly manifest in the inconsistent and almost erratic line departures of the brigades in that attack.

(One might argue that the *one recorded case* where a staff officer approached a general with new orders, that of R. Anderson's staff officer approaching Mahone, negates this argument because the authority of R. Anderson through his staff officer was insufficient to move Mahone. This is one instance where R. Anderson acted *as a commander* so the fault is not with him. Neither is the fault sending a staff officer because that is one of the functions of a staff officer. The fault here lies with Mahone, whose inexplicable refusal to move Bowden and Ward call "the most unconscionable act committed by an officer on either side during any of the three days of fighting at Gettysburg.[90] It seems that not all of Lee's commanders were made up of the same "stuff" that day.)

SUMMARY AND CONCLUSION

This paper covered General Robert E. Lee's *en échelon* attack of July 2, 1863 at Gettysburg, starting with the works of Jomini. It discussed General Robert E. Lee's plan for the Day 2 attack without critique, and the execution and result of that attack. It sampled six prominent authors for their opinions on why the attack failed. Although no two authors listed the identical set of reasons, there was commonality among the lists. Although citing the terrain, the late attack, and the loss of key generals, the most common reasons for failure fall into the area of command, control, and communications. These reasons cover everything from vague instructions to lack of coordination among the commanders and the size and use of Lee's staff. This paper analyzed the attack's timeline versus four theoretical timelines based on different attack configurations and intervals. Conclusions derived from these discussions follow:

1. This paper analyzed the timeline of the Confederate echelon attack on July 2, 1863. The analysis was presented in three parts: the historical timeline, the historical timeline versus computations of the timeline at constant intervals with EENT as the endpoint, and the historical timeline versus computations of the timeline at constant intervals with sunset as the endpoint. For the theoretical computations, supporting and non-supporting brigade formations were used. The theoretical timeline analyses using EENT and sunset, along with the different brigade formations offer a novel approach to analyze this this attack.

The conclusion is that the historical attack was poorly managed *as an echelon attack*. The line departure intervals were widely inconsistent (2 to 50 minutes) as there appears to have been no plan for what the interval should have been. The latitude accorded to Longstreet in managing his corps during the battle consumed so much time

that Pender's attack would have occurred in increasing darkness. In many parts of the attack, brigades split apart and fell among regiments of neighboring brigades, and parts of the attack in R. Anderson's division appeared more as a simultaneous attack. Finally, owing to a holdup in Anderson's division, Pender's division never took off after he was wounded investigating it. In short, the lack of a departure schedule and suitable command and control severely impeded the ability of the attack to succeed.

The theoretical timeline analyses in Tables 3 through 6 showed that it was possible to produce schedules based on the amount of sunlight in the form of EENT and sunset. These analyses included Pender's division as part of the attack, a novel approach because similar discussions of the attack stop with Mahone's brigade in R. Anderson's division. This was the historical end of the attack, but it was not the *planned* end of the attack. To learn how skewed the attack was against Pender's appearance, one must include his division as part of the plan in any analysis. The analyses showed that planned intervals were possible to produce a daylight attack, but that those intervals could be tight, a short as 16 minutes, meaning that control of the attack was important, especially for an echelon attack starting at 4:00.

2. Another novel approach in this paper was an analysis of a possible night attack by Pender's brigade in the historical attack. Using a U.S. Army survey of naked eye night vision studies, it concludes that with a full moon rising in the southeast on a relatively clear night, the Confederates could have sighted the Federals in silhouette before the Federals could sight them; however, with the rest of the Confederate army stopped, it is unclear what success General Pender could have had against the remaining Federal line. Any prediction beyond that is speculation.

3. If theoretical timeline studies indicate that an attack with a defined line departure interval was possible, could it have been controlled? The answer is yes. As measured, the distance along the Confederate line covering the attack is approximately three miles. Lee's staff of six officers with couriers should have been able to cover two corps commanders and four division commanders over this distance during a projected four-hour attack.[91] This distance is rarely mentioned in discussion of the attack, and combining it with a discussion of Lee's staff and control of the battle is another novel approach appearing in this paper.

During those four hours, a staff officer (or Lee himself) on horseback could have easily covered this distance to ensure proper timing; this was not done, however. Recent scholarship also concludes that Lee could have used his staff more efficiently at Gettysburg, a welcome corroboration to the conclusion of this paper.

This paper also examined two contentions related to command and control from Bowden and Ward on the advantages of Lee's choice of the echelon attack: 1) it utilized subordinates' judgment and initiative and 2) it compensated for small staffs. These are covered in the next two numbered items.

4. The "judgment and initiative" of Lee's subordinates that day in executing an echelon attack are demonstrated by listing the interval times (in minutes) of brigade departures between Law and Wofford: 2, 18, 20, 50, 20, 30, 5, 2, 3, 5. In short, if you intend to rely on the judgment of your subordinates, you had better be sure they possess it, as the historical sequence of departure times indicates otherwise.

One can rightly praise the hard fighting done by Longstreet's two divisions, which is well-deserved. However, in the end, those "best three hours of fighting,"

magnificent though they were, were not matched by three hours of comparable command and control, and were therefore wasted. These intervals do not represent a well-planned, well-supervised, or well-executed echelon attack, especially since the last division (of four) was left to attack in darkness, which would have had its own problems. Longstreet did not take extra time because he was greedy, he took extra time because he was *permitted* to be greedy.

5. "Compensation" for a smaller staff is not the same as "not using" the smaller staff, or more specifically, *choosing* not to use the staff. Many of the failures of command and control of the attack, including the attack intervals, were caused by ineffective staff work. Analysis of the timing of the individual brigades indicates that Longstreet took 155 minutes for 8 brigade departures (19 minutes each). The departure of one of these brigades, Wofford's, overlapped Hill's brigades and affected their movement. This left R. Anderson's and Pender's divisions with 90 minutes for 7 brigade fronts (15 minutes each) with darkness starting to fall.

This absence of command oversight should not be easy to dismiss. By many accounts, Gettysburg was *the* battle of the war; even the participants suspected this during the battle, especially Lee. He knew that he was on Union soil, that Union strength increased monthly, that winning a battle there and then was vital for Southern independence, and that the South might not have another such opportunity. Thus, he chose to stay and fight. To ascribe to Lee good judgment in removing himself and his staff from conduct of this most important battle in favor of his "proven" management style of delegation to subordinates is questionable and worthy of rebuttal. If Lee was as

active as Bowden and Ward contend, rebutting accusations of inactivity, then why choose not to follow this most important battle along three miles of front?

Further, the argument that Lee's style of managing his subordinates was to give orders and "choose" to stay out of their way does not mean that he was *required* not to interfere. As army commander, he could exercise his command responsibility at any point in a battle if he thought necessary, and there are many examples of this. Lee was certainly capable of this and the record shows that he did exercise this right throughout the war. He held back Longstreet at Second Manassas in 1862 until the right time to hit the Federal left flank with his entire corps. At Chancellorsville, Lee, in the absence of Longstreet, gave orders directly to General Lafayette McLaws, a division commander. During the Gettysburg campaign, General John Imboden's cavalry brigade was an independent force reporting directly to Lee. On the morning of July 2 at the planning meeting with Longstreet and his commanders, Lee gave orders directly to McLaws in Longstreet's presence. On the morning of July 3, Lee rode with Longstreet twice along the length of his corps because "for the success of the decisive attack on the Federal center, no preparation should be neglected."[92] A year later, in the battles of The Wilderness and Spotsylvania Court House, Lee was prepared to lead brigades into battle until dissuaded by common soldiers who would not allow him to advance. It might have been Lee's goal not to interfere, but he did so when he deemed it necessary.

6. In addition to executing control over the timing of the departures, at least three other situations could have benefitted from proper army command oversight:

a. If General Hill's illness, whatever it was, rendered him unfit for command, Lee had authority to ask him to remove himself from command and assign command to a

subordinate. If Hill did not comply, Lee had authority to relieve him from command and assign command to another general. It is unclear why Lee did not do this, but one possibility is that Lee had recently appointed Hill as corps commander and did not want to give the appearance of a lack of confidence. Another possibility is the aristocratic Southern code of gentility, whereby it would be an insult to Hill to be removed.

This adherence to the traditions of the Southern code of gentility dictated the deportment of Lee and his officers, especially of the Virginians, and might have affected Lee's judgment in dealing with Hill. Bowden and Ward go into detail explaining the implications of this code in Lee's polite use of "if practicable" and how gentlemen referred to themselves as "your obedient servant" in correspondence as a gesture of good will.[93] Because of adherence of Southern officers to this code, its possible effect on decisions involving the army's mission must be considered, including Lee's consideration regarding Hill in the question of his fitness for command on Day 2.

b. The disposition of R. Anderson's division should have been corrected prior to the attack. His rightmost brigade was partly facing south owing to a clash earlier in the day with a Federal regiment augmented with sharpshooters, but neither Lee nor Hill nor R. Anderson seems to have shown any interest in correcting its alignment. There was certainly time to do so: the engagement occurred around noon and the echelon attack did not start until late afternoon.

c. When line departures were delayed, such as the 50-minute delay between Generals George Anderson and Joseph Kershaw, the 30 minutes between Generals Paul Semmes and William Barksdale, or the inertia of Generals Carnot Posey and William

Mahone, quick investigation by General Lee or his staff would have been warranted. This of course would have been more imperative as sunlight diminished.

7. Finally, what about the Federals? Table 1 shows that only three of the 28 reasons for the battle's outcome involved the Federal army. This result stems partly from the false premise that the South "lost" the battle, not that the North "won" it. Guelzo states this premise quite well:

> It is possible to say…that Robert E. Lee lost the battle of Gettysburg much more than George Meade won it.[94]

It is useful and important here to recall Freeman's words on this matter:

> Always to be considered were the skill, persistence and might with which the Army of the Potomac defended on the 2nd and 3rd of July a position of natural strength…Vigorous and experienced as was Lee's Army, it could not prevail over that adversary.[95]

Therefore, although one might argue that "the South lost the battle," it is no insult to Lee or his army to state that the Federals simply outfought them that day. It is incorrect to conclude from this paper that improved command and control and proper staff usage *only* would have won the day on Cemetery Ridge on Day 2, because it ignores the obvious contribution of the AOP to the Confederate defeat. It is not Lee's fault that for those three days in July 1863, with the right commanders and the experience of the average soldier, the AOP finally figured out how to win. However, it is correct to conclude that, based on detailed analysis of the timing of the attack, the lack of command of control and proper use of staff did contribute to its failure.

The significance of command and control is offered in this quote about the invasion of France in June 1944:

> Of all the features that contributed to the Allied victory in Normandy, the key one, surely, was that of command and control. Without it, all else, even superb performance at the tactical level, would fail. The massive, complex orchestration of the Anglo-American-Canadian invasion of western France needed a superbly talented control organization.[96]

The importance of command and control is no less true for Gettysburg than for D-Day. The echelon attack was a "complex orchestration" compared to the simultaneous attack. It required the best in command and control, but these were inadequate on July 2, 1863.

In summary, at Gettysburg, Robert E. Lee chose his course of action based on his knowledge, experience, and what he understood of the Federal dispositions. His choice of first an oblique attack and then an echelon attack on July 2 was reasonable. Despite hard fighting from Lee's soldiers, the attack failed. It is easy to be enthralled by the echelon tactic and consequently blame Lee's subordinates for the defeat, but it does not stop there. Echelon attacks depend on coordination and timing, especially if starting in late afternoon. Often underestimated are Lee's command failures relative to timing and oversight: no schedule for brigade departures to ensure attack completion before sunset, no replacement for the indisposed Hill to ensure an active command of his corps, no realignment of R. Anderson's division into an attack formation, and no command oversight by his staff over a mere three-miles during the attack. Coupled with an obstinate Federal defense from an army that finally got it right, lapses in Confederate command with no oversight helped doom the attack to collapse. In short, Lee chose a reasonable tactic, but allowed it to proceed with astonishing and indefensible inattention.

APPENDIX A. ASTRONOMICAL DEFINITIONS

This section contains definitions of the astronomical terms used in this paper. They are important to understand both the events of the battle and why control of the battle was more important than thought by some authors.

To determine the amount of daylight remaining, the United States Naval Observatory website is an excellent resource. Selecting the Astronomical Applications page, Data Services tab, and selecting "Complete Sun and Moon Data for One Day" produces an input page.[97] Entering the parameters for the battle produces the required data. The morning data is not germane to this discussion, but the relevant afternoon data is:

Sunset = 7:41

End Civil Twilight (ECT) = 8:13[98]

All times are Eastern Standard Time, correct because in 1863, neither time zones nor daylight savings time existed. Civil twilight is defined below.

In addition, Lieutenant Colonel Mark Boatner's *The Civil War Dictionary* under the entry "Sunrise, Sunset, and Daylight" includes a table of sunrise and sunset times for the middle of each month of the war. The table includes an entry for the End of Evening Nautical Twilight (EENT), where nautical twilight is the period between civil and astronomical twilight. Nautical twilight permits viewing an object on the ground at approximately 400 yards which would allow a Civil War soldier to conduct operations. Using interpolation, on July 2, EENT was approximately 8:45.[99]

At sunset, the upper edge of the disk of the sun is on the horizon; however, owing to scattering of sunlight by atmospheric dust, it remains light after sunset. The amount of

light depends on how low the sun is beyond the horizon. These definitions, edited from the Naval Observatory glossary for end of day, are important:

> *Civil twilight* is defined to end in the evening when the center of the Sun is geometrically 6 degrees below the horizon. This is the limit at which twilight illumination is sufficient, under good weather conditions, for terrestrial objects to be clearly distinguished; at the end of evening civil twilight, the horizon is clearly defined and the brightest stars are visible under good atmospheric conditions in the absence of moonlight or other illumination. In the evening after the end of civil twilight, artificial illumination is normally required to carry on ordinary outdoor activities.
>
> *Nautical twilight* is defined to end in the evening, when the center of the sun is geometrically 12 degrees below the horizon. At the end of nautical twilight, under good atmospheric conditions and in the absence of other illumination, general outlines of ground objects may be distinguishable, but detailed outdoor operations are not possible. During nautical twilight, the illumination level is such that the horizon is still visible even on a Moonless night allowing mariners to take reliable star sights for navigational purposes, hence the name.
>
> *Astronomical twilight* is defined to end in the evening when the center of the Sun is geometrically 18 degrees below the horizon. After the end of astronomical twilight in the evening, scattered light from the Sun is less than that from starlight and other natural sources. For a considerable interval before the end of evening twilight, sky illumination is so faint that it is practically imperceptible.[100]

For the moon's path after moonrise on July 2, 1863, the United States Naval Observatory website is again an excellent resource. Selecting the Astronomical Applications page, Data Services tab, and selecting "Altitude and Azimuth of the Sun or Moon During One Day" produces an input page.[101] Entering the parameters for the battle produces the required data. Altitude and azimuth are angles used to define the position of a celestial object from a point on the ground. Under the Astronomical Information Center, the Astronomical Almanac Online Glossary page offers this definition with author clarification added in brackets:

Altitude – the angular distance of a celestial body above or below the horizon, measured along the great circle passing through the body and the zenith. [Also referred to as elevation, Horizon = 0 degree, and Zenith = 90 degrees]

Azimuth - the angular distance measured eastward along the horizon from a specified reference point (usually north). [North = 0 degrees, East = 90 degrees, South = 180 degrees, and West = 270 degrees][102]

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