

## APPENDIX A

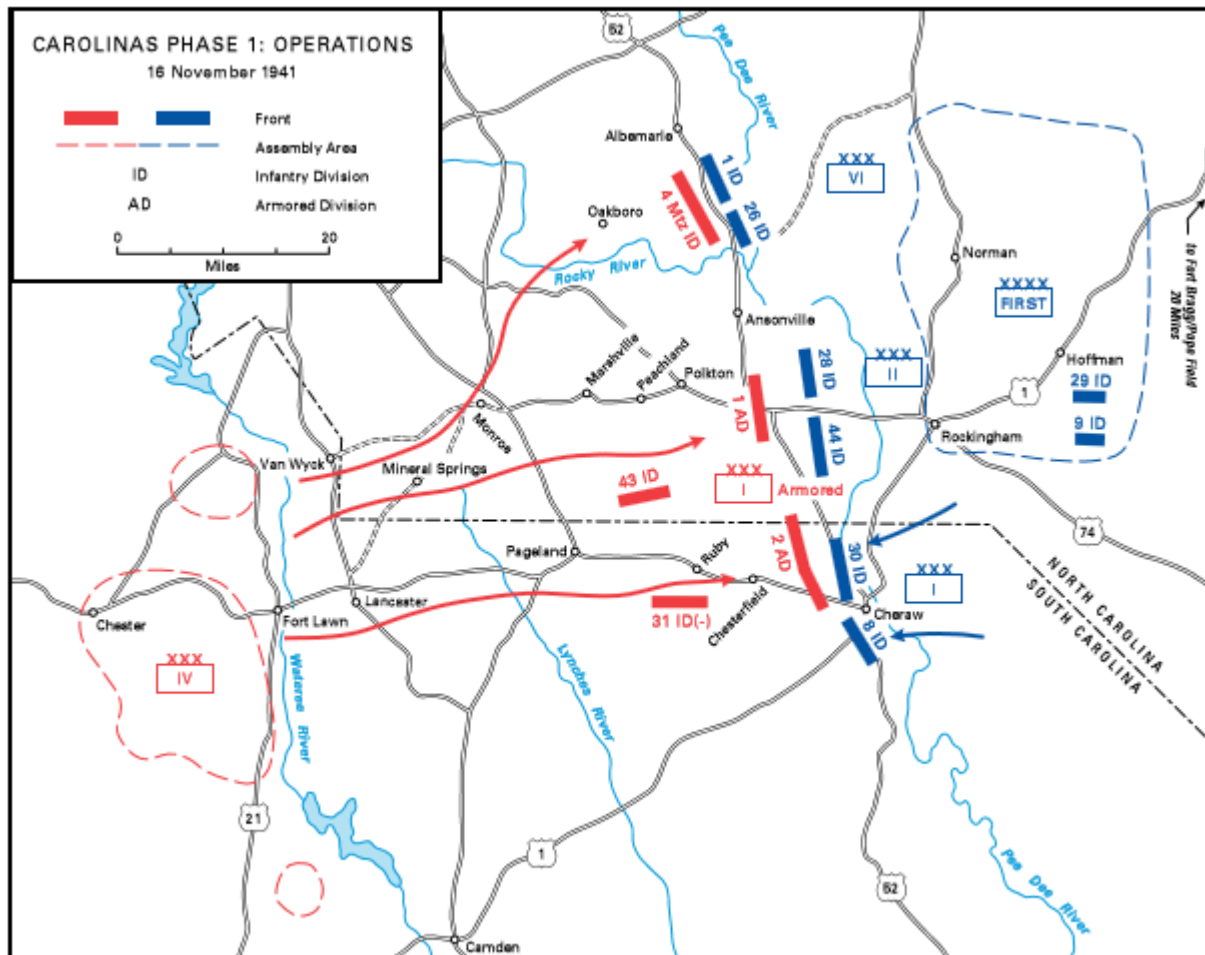
### THE ART OF MANEUVER, 1941 – Execution and Assessment of the Carolina Maneuvers

Excerpted from Mobility, Shock and Firepower, Robert Stewart Cameron – Center of Military History

In 1941 the Army conducted its largest peacetime maneuvers. These events would become the forums for testing the relative capabilities of armored formations and antitank organizations. In a series of maneuvers in Louisiana and the Carolinas, the Army found its armored divisions unable to replicate the combat successes of similarly organized German panzer divisions. Instead, American armor was handicapped by inexperienced commanders, novice soldiers, and scenario designs that prevented their use in a decisive manner. Conversely, antitank operations benefited from General Headquarters (GHQ) support and from maneuver rules that unrealistically boosted their effectiveness against tanks. Consequently, the War Department began to establish a separate antitank force even before the conclusion of the maneuvers. The Cavalry, however, failed to remove the stigma of obsolescence, despite the effectiveness of cavalry organizations throughout the maneuvers. Upon their conclusion, the Cavalry's status continued to decline while armored and antitank organizations expanded.

Carolina Maneuvers In November armored and antitank forces participated in maneuvers that pitted the First Army against the IV Corps and I Armored Corps. The maneuver area encompassed parts of North and South Carolina. It formed a quadrangle bounded in the west by the Wateree River, in the east by the Pee Dee River, in the north by the line Van Wyck–Albemarle, and in the south by the line Camden–Cheraw. The first scenario tested an army's ability to rely on superior mobility to offset numerical deficiency. The Red Army's one hundred thousand men included the IV Corps and I Armored Corps. The former included the 43d and 31st Infantry Divisions and the 4th Motorized Division. The 1st and 2d Armored Divisions constituted the latter. The IV Corps headquarters also served as a de facto army command, directing the actions of the Red Army. The larger Blue First Army numbered one hundred ninety-five thousand soldiers in 8 infantry divisions organized into 3 corps, 1 tank group, 6 antitank units, and 1 anti-airborne unit. In the air, the Red Army's 366 aircraft possessed a slight superiority over the Blue Army's 320.<sup>18</sup> In preparation, I Armored Corps Commander Maj. Gen. Charles L. Scott issued special instructions incorporating lessons learned from the Louisiana maneuvers. He described the nature of expected antitank defenses to allow armored commanders to devise appropriate countermeasures. He did not want armor to charge headlong into antitank positions or suffer unnecessary delays from a single demolition or roadblock. Combined-arms teams of reconnaissance, artillery, infantry, and engineer troops would lead armored columns, securing advance routes for tank units. The latter were to avoid commitment to battle until they were able to strike critical targets in the hostile rear area in accordance with Armored Force doctrine. The use of extended columns of vehicles on roads was discouraged, lest they become victims of enemy air attacks. The Blue First Army organized three Tank Attacker Groups, designated TA–1, TA–2, and TA–3, to supplement its existing antitank forces. The first two units included a combined-arms mix. TA–1 included a light tank company, an antitank battalion equipped with 75-mm. guns mounted on halftracks, a 37-mm. antitank company, an engineer company, a motorized infantry battalion, artillery, and reconnaissance elements. The principal components of TA–2 included three antitank battalions and a tank company. Artillery charged with the

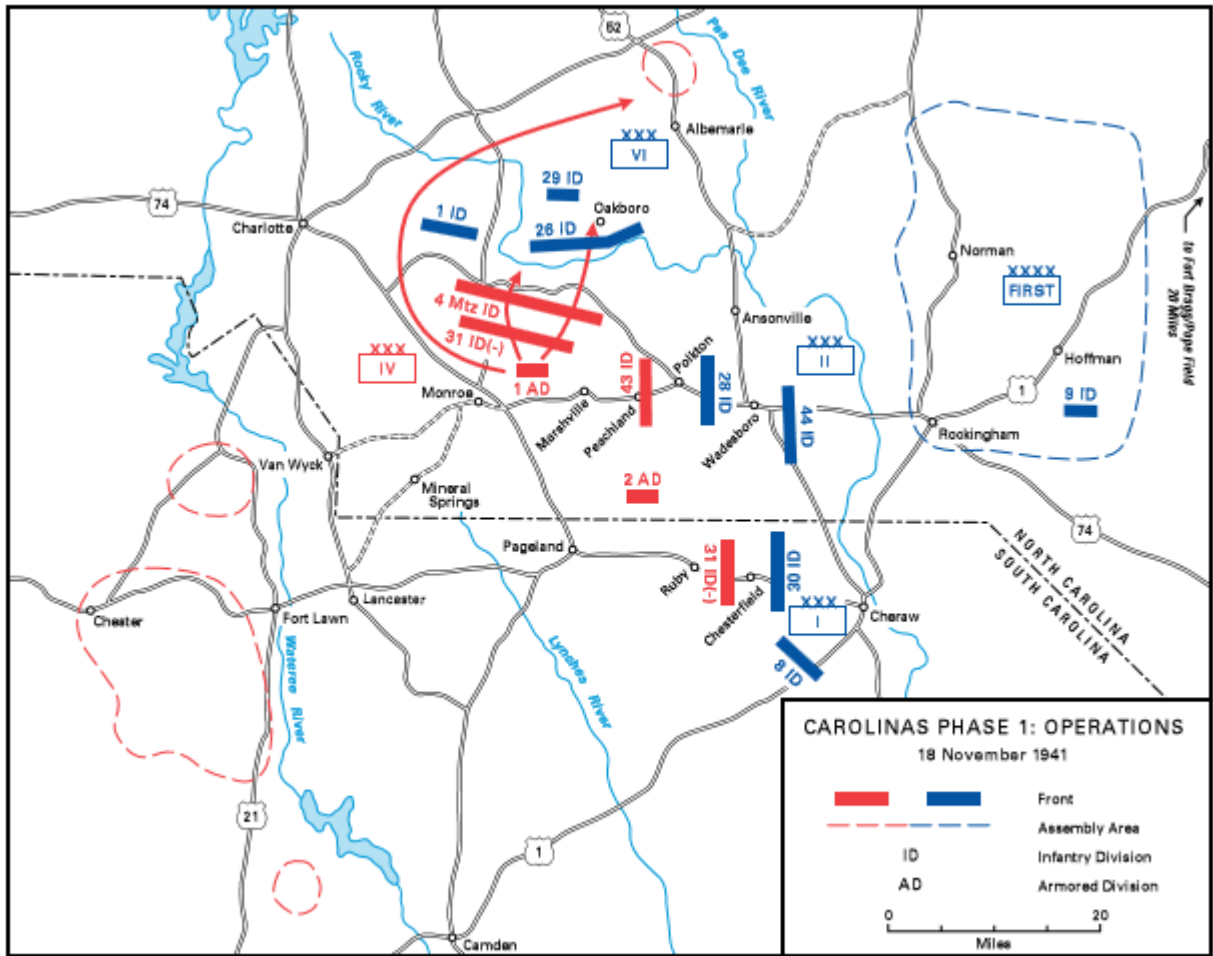
static defense of rear-area installations constituted the bulk of TA-3. The Blue Army also included the antitank groups from the Louisiana maneuvers, redesignated GHQ-X, GHQ-y, and GHQ-z. The attention given to antitank measures and the special mission given to TA-3 reflected the experience of the Blue Army's commander, Lt. Gen. Hugh A. Drum. He had also commanded the First Army during the Plattsburg maneuvers of 1939, during which the 7th Cavalry Brigade (Mechanized) had run amok in the First Army rear area. Drum determined to prevent the I Armored Corps from performing similar feats. Although faced with a much greater armored threat than in 1939, First Army possessed 4,321 antitank and artillery guns distributed among its antitank groups and infantry divisions. Operations began on 16 November. The Blue Army crossed the Pee Dee River and advanced westward to attack Red forces. (Map 5)



Map 5

The Red Army's mission lay in attacking hostile bridgeheads on the Pee Dee River. First, however, the army had to cross the Wateree River and advance seventy-five miles eastward. The Red Army had a one-hour head start, but Blue forces negated this lead by violating deployment and movement restrictions. Each Blue corps therefore secured a bridgehead over the Pee Dee River before the arrival of Red forces. The I Armored Corps raced to contain these crossings, but its forces became dispersed in the process. The Red Army failed to launch a coordinated strike against the bridgeheads; its operations devolved into a series of small, disjointed attacks on just two of the Blue crossing points. The 1st and 2d Armored

Divisions prevented further Blue advances, but they became engaged in combat operations that precluded further maneuver. The 2d Armored Division, for example, captured the city of Cheraw after a protracted struggle. However, it suffered heavy losses in uncoordinated frontal assaults on antitank positions. Resistance ended only after a small column moved cross country to enter the city. Red armor remained in place on 17 November, conducting holding operations while awaiting relief by slower-moving infantry. North of the I Armored Corps, the 4th Motorized Division retreated before the onslaught of the entire Blue VI Corps. This development placed the Red Army's left flank in jeopardy. In response, the 1st Armored Division moved behind the 4th Motorized Infantry Regiment to attack the VI Corps' northern flank on 18 November. (Map 6)

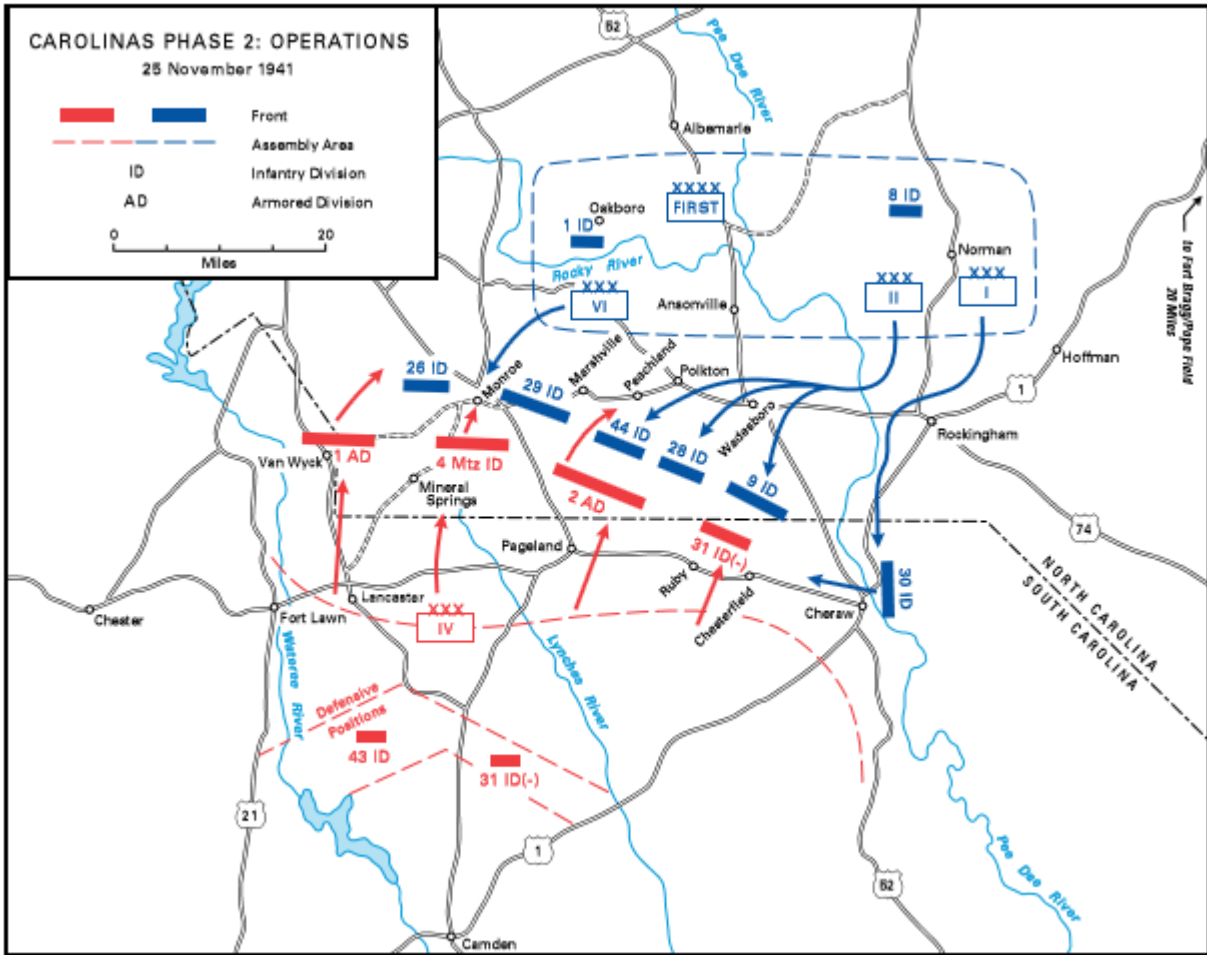


Map 6

This operation was marred by the short notice given to the armored formation and the resultant rushed planning and execution. Bad tactics further eroded the effectiveness of the attack. The armored division attacked in three columns, two of which quickly lost their combat power in unsupported frontal assaults on antitank guns. The third column reached the VI Corps rear area by nightfall, but it lacked infantry to secure its gains. Inadequate security permitted Blue antitank assets to surround it during the night. The morning of 19 November found the 1st Armored Division broken into three pieces, beset by attacking antitank units, and unable to sustain a supply flow. It spent the day vainly trying to improve its position and was defeated the next day. Reduced to a collection of isolated pockets, the division survived only

because the maneuver rules permitted “destroyed” vehicles to return to action the following day. The 2d Armored and 4th Motorized Divisions launched a relief attack into the center of the Blue VI Corps. Despite early progress, the mobile formations could not secure their flanks and faced envelopment. They withdrew, leaving the stranded 1st Armored Division to its fate. When the fighting terminated on 21 November, the Red Army possessed little remaining combat power and faced complete annihilation. The successful surprise attack on the 1st Armored Division survivors by a Blue tank battalion underscored the extent of the Red Army’s defeat. Most Red tank losses, however, occurred during attacks on antitank weapons passively employed. Only the 93d Antitank Battalion maneuvered in response to armor sightings and attacked when possible. GHQ–y spent the entire battle continuously redeploying to avoid being overrun. Most Blue antitank units, however, occupied positions and simply awaited the possible arrival of hostile armor. Both armies employed corps cavalry regiments possessing both horse and mechanized elements. These units performed a variety of reconnaissance and security missions; but senior commanders undermined their efficiency by stripping their mechanized elements, radio equipment, and horse trailers over the objections of their commanders. The Red Army reorganized the 107th and 6th Cavalry Regiments, reassigning the mechanized elements of both to the 6th Cavalry Regiment and the horse elements to the 107th Cavalry Regiment and thereby preventing analysis of the tactical effectiveness of the original corps cavalry regiment. Chief of Cavalry Maj. Gen. John K. Herr attempted to prevent this reconfiguration, but General George C. Marshall overruled him. Nevertheless, cavalry units performed well. Blue cavalry primarily gathered information concerning Red Army movements and dispositions. In this capacity it proved especially successful, capturing the operational plans of the 1st and 2d Armored Divisions. A mixed task force of antitank, cavalry, and engineer elements also screened and protected the Blue Army’s northern flank. Red Army cavalry similarly performed flank security and maintained contact between infantry divisions. The end of the fighting found the Red 3d Cavalry Regiment waging a successful delaying action against superior Blue forces.

In preparation for the next scenario, each army reorganized. The Red Army received the 1st Tank Group headquarters, including one brigadier general and two aides. The Blue Army motorized two of its infantry divisions through the attachment of truck companies and placed these formations in reserve to exploit successes. Both armies received equivalent air strength through the transfer of aircraft from the Red to the Blue Army. In the second scenario, the Red Army defended Camden against Blue forces advancing south across the Pee Dee and Rocky Rivers. Operations began on 25 November with three Blue corps advancing on a broad front on that day and the next. (See Map 7.)



Map 7

The Red I Armored Corps conducted local counterattacks to delay the Blue forces and inflict casualties, while cavalry protected the Red Army's flanks. The Red commander intended to withdraw the armored divisions into the fortified locale being built around Camden. During the night of 26–27 November, however, a miscommunication led the 1st and 2d Armored Divisions to prematurely withdraw in the wrong direction. Their departure left an eighteen-mile strip of Red lines weakly defended. Worse, a Blue scouting team captured a copy of the Red Army's plans. On 27 November Blue forces lunged forward. They seized the town of Lancaster, threatened to disrupt the retrograde movement of the I Armored Corps, and prepared to advance on Camden itself. The I Armored Corps responded with a succession of tank attacks that contained the Blue threat in Lancaster and forced the commitment of Blue reserves. These operations cost the Red Army 219 tanks. Nevertheless, Red attacks continued on 28 November, effectively halting the Blue Army's advance. When the fighting ended, the Red Army was ensconced behind prepared defenses north of Camden. The Red Army could claim victory, but its armor sustained heavy losses in action against Blue antitank guns. The latter were credited with the destruction of 462 tanks, a significant part of the I Armored Corps' offensive capability. However, the ability of Blue antitank units to respond to reports of hostile armor proved less than ideal. The I Armored Corps was criticized for squandering its strength in multiple, local attacks rather than preserving itself for a decisive blow against the Blue Army flank. Nevertheless, armored units performed more effectively against Blue

antitank units through better reconnaissance and the prior dissemination of detailed information on antitank organizations and tactics.

### Assessing Mobile Operations

As the Carolina operations ended, so did the autumn maneuvers. With justification General Marshall claimed, "The troops have performed a particularly important service in convincing the majority of our people that a powerful and highly trained army is developing with amazing speed." While the maneuvers proved reassuring to a public concerned about national security, they also revealed serious deficiencies in combat readiness that required attention. Armored operations constituted one such focus area. Armored corps and division staffs generally included officers experienced in mechanized operations; but brigade, regiment, and battalion leadership proved less capable. Leadership ability tended to decline with command echelon, because the lower levels absorbed most of the officers new to the Armored Force. These novice commanders often failed to supervise the implementation of their orders or coordinate the efforts of subordinate commanders. General Ward served as the General Staff secretary until transferred to the Armored Force in August 1941. He assumed command of the 1st Armored Brigade of the 1st Armored Division on the eve of the maneuvers. In a note to a colleague, he admitted his incomprehension of armored doctrine: "A tank is a far cry from a horse, but I am going to the Armored Force. I am totally ignorant on the subject, so will have plenty to do and plenty of incentive to learn." The 1st Armored Brigade received a severe mauling during maneuver operations in Louisiana and the Carolinas. Despite the Army's emphasis on combined-arms action, the maneuvers revealed the general inability of subordinate commanders to comprehend the purpose and value of combined-arms task forces whose composition changed in relation to tactical developments. Too many commanders preferred the retention of regimental integrity and abstained from violating the precedent of functional separation that constituted the Army's traditional organizational credo. Armored Force doctrine embraced the task force concept, but the maneuver experience indicated the need for additional task force training and familiarization. Multi-arm task forces too often degenerated into random collections of dispersed units that failed to coordinate their actions before attacking enemy positions. Armor officers consistently failed to integrate tanks, infantry, and artillery within these groups. Tactical engagements therefore occurred in which friendly units either attacked while supporting artillery remained idle or failed to apply the principles of fire and movement to pin and envelop enemy forces. Armored Force failures during the maneuvers, however, did not stem exclusively from internal factors. In three of four maneuvers, the I Armored Corps constituted part of an outnumbered army that lacked support elements. These conditions led to the use of armored divisions simply to hold portions of the front in a defensive posture. Such employment contradicted the intended purpose of these special formations. None of the participating army commanders possessed significant experience with armored operations. Maj. Gen. Oscar W. Griswold, for example, became IV Corps commander in October 1941. After one month, he assumed command of the Red Army, which included the I Armored Corps, for the Carolina maneuvers. Although he previously commanded the 4th Motorized Division, he possessed no direct experience in leading armored formations. His staff officers possessed similar credentials. This inexperience detracted from the effectiveness of the army headquarters. Maj. Gen. Charles L. Scott commanded the I Armored Corps throughout the maneuvers. He considered higher headquarters'

inexperience with armored doctrine a major constraint on his formation's activities. Subjected to continuous guidance from higher headquarters, the I Armored Corps achieved little operational independence throughout the maneuvers. Moreover, orders received often left little time for planning and preparation and tended to ignore the status and conditions of available roads. These problems resulted in the employment of the armored corps without regard for its special purpose and ability. Perceived as glorified GHQ tank battalions, armored divisions were either employed as small detachments for infantry support or left in reserve. These practices misused the armored divisions and marginalized the command and control capability of the I Armored Corps. These problems hampered armored operations, especially during the Carolina maneuvers. Red Army headquarters issued attack orders without regard for the preparation time necessary for their implementation. These instructions also generally arrived at night and interfered with the routine maintenance functions conducted during the hours of darkness. In one instance, the I Armored Corps received orders to conduct a dawn attack. This operation required the armored divisions to first refuel and execute a night march, but the divisions did not receive the orders until nearly midnight. These and similar problems led the senior Armored Force umpire to conclude:

I believe the Red high command erred in employing tanks in dribblets at different parts of the front. The Armored Corps Commander should be given a mission and then allowed to work out the details of its execution. Decisions as to employment should be reached in time to allow the planning of proper coordination. Otherwise all the "blitz" is in the planning and none in the execution.

Critics of I Armored Corps operations in the Carolina maneuvers noted its failure to attack en masse to obtain decisive results, instead dissipating its strength in a series of small-scale engagements. Armored formations were believed incapable of sustaining more than three days' continuous combat. Therefore, commanders needed to avoid the piecemeal commitment to battle that actually occurred during the maneuvers, instead preserving the mass of armor for a decisive strike. At the conclusion of the second phase of the Carolina maneuvers, Griswold compounded these errors by separating the tank and support elements of the armored divisions. He deployed their infantry and artillery in static defensive positions near Camden and placed the tank units in reserve, ignoring the importance of divisional integrity and the value of combined action by all three components. Command and staff functions within the armored elements depended on rapid communication of information between commanders, but many officers employed radios as telephones. They sent long voice messages that compromised security rather than the short, coded transmissions prescribed in Army regulations. Criticism of radio usage by armored units, however, tended to overlook Armored Force emphasis on uncoded voice transmissions to facilitate rapid communication. The Armored Force inherited this practice from the 7th Cavalry Brigade (Mechanized), whose leaders considered the speed of transmission more important than security. Communication mediums had a variety of technical problems. The radios possessed insufficient range. The short range limited the effectiveness of antitank groups that relied on distant early warning of enemy armor for timely and concentrated deployment. Frustration with the unreliability of wire and radio communications during the maneuvers prompted consideration by antitank commanders of messenger pigeons to maintain communications among small units in fast-moving tactical situations. Inadequate reconnaissance further hampered armored operations. Attached

observation aircraft failed to provide advance warning of hostile antitank positions, whereas ground reconnaissance units did not aggressively seek enemy weak points for subsequent exploitation by tank elements. Reconnaissance assets too often remained road bound and failed to perform route reconnaissance or identify alternate paths of advance. Armored columns therefore remained unaware of nearby enemy units, blundered into obstacles and ambushes, and suffered unnecessary casualties and delays. These columns also invited aerial attack by standing idle awaiting the clearance of minor obstacles on roads. While reconnaissance operations suffered from lack of aggressiveness, tank units proved overzealous in their efforts to close with the enemy. This combination resulted in headlong frontal assaults against prepared antitank positions that left large numbers of tanks ruled destroyed. Frequently, tanks simply charged the nearest enemy force without using terrain for cover or applying fire and movement principles. They also attacked towns rather than bypass them, advancing into narrow streets without infantry support. Armored commanders violated their own doctrine by not integrating the action of infantry, artillery, and tanks. The preferred method of attacking an antitank position entailed its suppression by artillery fire, followed by a tank attack that neutralized the surviving antitank guns and their infantry protection. Friendly infantry then destroyed remaining resistance and secured the position while the tanks continued their advance. Few commanders followed this procedure. Nor did they delegate the task of eliminating small pockets of resistance to following infantry elements. Instead, they assumed this responsibility themselves despite the associated loss of forward momentum. Armored division infantry relied on halftracks to achieve mobility comparable to tanks. The halftracks also possessed light armor that protected passengers from small-arms fire. Unfortunately, armored infantry commanders tended to employ tactics similar to the tanks, blindly charging opposition without disembarking. Not intended for such employment, the halftracks and their passengers suffered extensive losses. Traffic control problems plagued armored operations throughout the maneuvers. McNair consistently exhorted commanders to learn how to move large amounts of men and equipment via vehicles without confusion and chaos, asserting "there can be no excuse for another Guadalajara." Such skills eluded the U.S. Army in 1941. Vehicular columns of supply and combat elements failed to exploit secondary roads. They crowded onto major highways instead but neglected antiaircraft measures. In one instance, three hundred vehicles moved as one mass while another column moving via highway measured five miles in length. Poor traffic and antiaircraft discipline characterized these columns. Efforts to coordinate their movements largely failed, resulting in traffic jams of staggering proportions throughout the maneuvers. Overuse and misuse of trucks contributed to the vehicular mayhem dominating the maneuver area road nets. The desire to increase the mobility of combat troops resulted in supply, medical, and artillery elements' being stripped of their transport. Consequently, artillery became incapable of intervening in tactical engagements and necessary supplies failed to arrive at their destinations. Misallocation of trucks and faulty coordination of motorized columns resulted in mobile operations' becoming stalled for want of gasoline. Armored units sought to overcome this problem by following the German example of attaching five and ten-gallon gasoline cans to tanks, but this practice incurred the criticism of maneuver umpires. They believed it increased the combat vulnerability of the vehicle and undermined the training of supply officers responsible for ensuring adequate provision of fuel. All motor vehicle operations, moreover, suffered from a general neglect of preventive maintenance. Too many units simply ignored maintenance considerations until the cessation of each maneuver scenario, thereby increasing the rate of mechanical failure. The most common



problems stemmed from damage to transmissions, failure to check lubricants, neglect of tire wear and pressure, and unnecessary collisions. A Third Army inspection of 2,127 vehicles from three divisions revealed an average of ten mechanical deficiencies per vehicle. These deficiencies included dry batteries, broken or missing mirrors, loose wheel bearings, leaking radiators, bent fenders, axle damage, cracked windshields, broken instruments, and a host of other problems related to rough usage. These maintenance concerns could not be readily addressed without sufficient quantities of spare parts on hand. Such supplies were not maintained. Combat units responded by stripping vehicles tagged for rear-echelon maintenance. This practice disrupted the normal repair procedure, resulting in vehicles' arriving in the rear area shops in need of much more extensive and time-consuming overhauls than anticipated. Air support for armored elements proved no more effective than efforts to integrate engineer, reconnaissance, artillery, and infantry actions with tanks. Throughout 1941 the Army sought a viable method of air-ground cooperation that ensured adequate support of ground troops without precluding air attacks on targets of strategic significance. This desire resulted in an air-support procedure that required cumbersome collaboration between ground and air-unit commands. A request for air support had to be channeled from the headquarters of origin to the controlling corps command. At each interim command echelon, discussion ensued between ground and air officers concerning the viability of the request. If the request reached the corps command, an Army Air Forces liaison officer and the corps staff considered it along with all other requests for air support. After prioritizing these requests according to their suitability for aerial operations, the air officers might dispatch available aircraft. This process did not provide rapid responsiveness to the needs of battalion and company commanders. During the Louisiana maneuvers, for example, the average time lag between the initiating request and the arrival of aircraft over the target was nearly one-and-a-half hours. The uncertainty surrounding fulfillment of a request and the time lapse between request and response led some armored formation commanders to ignore air support altogether during operational planning. Air support missions actually flown lacked proper air-ground communications. They also demonstrated the preference of the Army Air Forces for interdicting enemy rear-area movements, attacking enemy air bases, and destroying hostile air strength through aerial combat. Consequently, aircraft did not constitute an important battlefield presence. During the first phase of the Louisiana maneuvers, umpires ruled 501 aircraft from both armies destroyed. Of these losses, 64 percent occurred in aerial combat, 22 percent in attacks on air bases, and 11 percent from anti-aircraft fire. During the first phase of the Carolina maneuvers, the Red Army exhausted its aerial assets in costly attacks on heavily defended bridges.

### Antitank Operations

The high numbers of tanks ruled destroyed during the maneuvers suggested the effectiveness of the antitank units and tactics employed. Antitank units appeared capable of blunting tank attacks. However, the misuse and faulty employment of participating armored units helped to create an environment favorable to antitank action and to obscure deficiencies in antitank operations. The antitank units struggled due to faulty reconnaissance. Aerial observers tended to report every vehicle as a tank. They provided a steady stream of misinformation concerning the movements of hostile armored units that ensured frequent redeployments of antitank weapons and interfered with efforts to hold them in a central reserve for massed employment. Aerial and ground reconnaissance organizations also failed to

coordinate their efforts. This resulted in antitank units' receiving a confusing intelligence picture. In some instances, antitank guns were aware of distant armored movements but ignorant of nearby enemy tanks. The haphazard flow of inaccurate information resulted in uncoordinated antitank deployments and the commitment of antitank organizations against unsubstantiated or erroneous tank sightings. During the Carolina maneuvers the 93d Antitank Battalion, equipped with self-propelled 75-mm. guns, raced from one road junction to another, blindly seeking enemy armor without benefit of accurate intelligence or support from other antitank units. The tank attacker and GHQ antitank groups did not function as massed concentrations of antitank weapons as the Army had intended. Their large size precluded rapid movement and deployment. Their commanders further reduced their responsiveness by requiring all administrative and supply assets to accompany each tactical movement, whether needed or not. To compensate for their increased mass and slower speed, these antitank units often deployed without awaiting the most favorable opportunity to punish attacking tanks. The effect of concentrated combat power might have offset the impact of premature deployment, but the components of these special units were often dispersed. Antitank operations demonstrated the same need for additional training as their armored counterparts. The selection of gun positions showed little cognizance of fields of fire or the avenues of approach likely to be used by hostile vehicles. Antitank weapons emplaced near crossroads, buildings, and small clusters of trees generally lacked concealment. Easy to anticipate, they became prime artillery targets. Gun crews further increased their vulnerability to artillery fire by deploying their weapons in tight clusters. General McNair envisioned highly mobile antitank units moving in response to and attacking enemy tanks. In fact, most antitank guns deployed rapidly in response to reports of hostile armor, but they then remained in place for hours or even days waiting for an attack that might not occur. Infantry divisions similarly employed their artillery in a static antitank role. In both cases, gun crews adopted the dubious practice of relying on willing civilians to provide early warning of hostile tanks. In addition to antitank guns and artillery, the maneuvers also witnessed the use of other countermeasures. General Headquarters encouraged soldiers to stalk tanks and attack them when circumstances permitted. Flour sacks that soldiers could throw at vehicles represented grenades, which General Headquarters believed capable of destroying or disabling armored vehicles. The flour bags tended to be underused due to the absence of plans for their supply and distribution. Soldiers often devised other means of attacking tanks. Armored vehicle crews found themselves the targets of rock-filled sacks, bottles of acid, and 75-mm. blank ammunition fired at pointblank range. Acid attacks proved the most common throughout the maneuvers: "The soldier could not harm the tank so his psychological reaction was to throw whatever he had at an individual in the tank." Such incidents violated the maneuver umpire rules and encouraged the crews of armored vehicles to emulate an armored car driver who tried to run over a machine-gun crew. Overall, antitank operations during the maneuvers did not reflect the mobile, aggressive antitank tactics McNair advocated. Ironically, it was a cavalry organization—the Provisional Antitank Squadron—that most closely approximated the tank destroyer concept. Most antitank guns, however, tended to be dispersed and deployed in passive defensive roles, awaiting rather than seeking enemy armor. The failure of antitank organizations to apply McNair's tank destroyer tactics meant that the maneuvers neither validated nor invalidated the new antitank concept. If anything, the maneuvers demonstrated the feasibility of the echelon defense many Army commanders favored. McNair, however, interpreted the large number of tanks ruled destroyed and the inability of armored formations to achieve major success

as vindication of the tank destroyer concept. Without awaiting the conclusion of maneuvers, he began to press for the establishment of a tank destroyer force. General Marshall supported him by directing the creation of the Tank Destroyer Tactical and Firing Center under direct War Department authority before the start of the Carolina maneuvers. Within days of their conclusion, on 27 November, the adjutant general formally charged the Tank Destroyer Tactical and Firing Center with the organization and training of tank destroyer units for the entire Army. These actions fundamentally changed the nature of antitank development and doctrine in the U.S. Army on the basis of unproven theory. The Tank Destroyer Tactical and Firing Center embodied McNair's views on antitank operations. Although never subjected to extensive field testing, these ideas now became the essence of a de facto branch, which did, however, consolidate responsibility for antitank development.

### Maneuver Management

In preparation for the autumn maneuvers, General McNair supervised the crafting by General Headquarters of a comprehensive umpire manual to govern operations. Completed in February 1941, it marked a major improvement in maneuver management, particularly in its emphasis on small-unit actions. It encouraged the employment of task forces and combat teams, because the actions of these groups determined the ability of their parent formations to accomplish their missions. Similarly, the umpire manual stressed the importance of establishing firepower superiority. The outcome of each simulated engagement rested largely on a firepower comparison between opposing forces. Combat occurred whenever opposing forces came into physical contact with one another. Umpires raised colored flags to notify each side of the other's presence. All activities halted while the umpires conferred to assess combat results using firepower and casualty ratings outlined in the manual. The manual's emphasis on small-unit actions, however, mandated a large umpire staff to permit the assignment of umpires to each command level down to the company. The umpire manual reflected McNair's belief in the superiority of the towed antitank gun over the tank. Whereas Armored Force doctrine encouraged the use of moving fire by advancing tanks to suppress their target, the umpire manual ruled such fire ineffective beyond three hundred yards. This limitation tended to reduce vehicular combat to close-range affairs with consequent high losses. The manual considered weapons fired from stationary vehicles equivalent in effect to similar dismounted armament; but whether moving or stationary, vehicle-mounted weapons could not attack antitank guns. The presence of a tank nullified the combat potential of all infantry within one hundred yards, yet tanks could not destroy antitank guns except by overrunning them. Armored units confronted by an antitank position could either wait for supporting units to act or suffer high losses by charging the guns themselves. Armored Force doctrine stressed the importance of fire and maneuver tactics. When attacking forces encountered an enemy position, they organized one force to fire on the hostile force. A second grouping simultaneously maneuvered to envelop the position. The umpire manual prevented application of this basic principle by requiring all activity to cease when two opposing forces came into contact, including flanking or unseen elements. Only the firepower ratings of those units in direct physical contact counted for determining an engagement's victor. Together with the prohibition against vehicles firing at antitank guns, these restrictions made it difficult to outflank antitank positions and costly to charge them. Only two factors determined the effect of antitank fire at armored vehicles: range and number of guns firing. The umpire

manual ignored crew proficiency, the target's armor protection, and how well the gun was positioned. It also overrated the lethality of antitank weapons. Both the 75-mm. and 37-mm. guns were permitted to destroy any vehicle within one thousand yards. The manual also allowed the .50-caliber machine gun used by infantry and horse cavalry units to destroy light tanks at one thousand yards. Light tanks constituted the bulk of those used in the maneuvers. Many carried a .50-caliber machine gun, but this vehicular armament was declared ineffective against tanks at any range. These rulings exceeded the actual antitank capabilities of these weapons and artificially boosted the lethality of antitank fire throughout the maneuvers. The capabilities of other antitank weapons were similarly exaggerated. The manual ruled that tanks hit with grenades or contacting a mine were destroyed. However, in actual combat, grenades had not proved capable of halting tank attacks. Mine usage abroad also did not warrant this ruling. Foreign armies using antitank mines had thus far achieved only limited success against armored attacks. Moreover, American antitank mines were few in number and possessed only a fraction of the explosive charge found in German mines. The representation of artillery fire and assessment of its impact remained a problem throughout the maneuvers. Soldiers and umpires were not always aware of the presence of artillery fire. The problematic influence of artillery support was discouraging to those armored commanders seeking to coordinate tanks and fire support. In frustration, many units simply left their artillery in road columns to the rear during attacks rather than employ them to no effect. Combat resolution forced frequent interruptions of tactical operations while umpires compared the firepower ratings of the units involved. These pauses, however, contradicted the Armored Force emphasis on rapid, continuous action. Umpire rulings tended to generate disputes and further delays to the resumption of operations. Soldiers crowded around the umpires to voice their opinions, and brawls sometimes resulted. The subjective rulings of partisan umpires also led to disagreements that hindered the speedy determination of a battle's outcome. The inadequate provision of umpires for antitank units further reinforced the tendency for argument, because participating unit commanders assumed umpire responsibility. Disputes also surrounded attempts by senior officers to use their rank to overrule or ignore adverse decisions.

Determination of tank-antitank gun combat often led to controversial interpretations of the umpire manual. Armored Force umpires claimed the exclusive right to rule a tank destroyed. In their absence, tank commanders frequently ignored loss assessments and argued that the presence of a tank neutralized all infantry and antitank guns within one hundred yards. Such activities led the antitank director for the maneuvers to conclude: "No wonder they [the Armored Force] have been so successful previously." Another participant predicted: "Until we get rid of the 'prima donna' aura now surrounding the tanker we can expect trouble with tank umpiring." But antitank umpires exhibited similar shortcomings. Some refused to rule antitank guns neutralized under any circumstance and did not modify tank destruction rates to account for the time necessary to move and deploy an antitank gun. When umpires signaled the cessation of activity to determine combat results, many antitank guns continued to advance, thereby increasing the firepower rating in their favor. The paucity of equipment resulted in the use of guidons to represent antitank guns, which in turn enabled antitank guns to achieve unrealistic levels of mobility. The unlimbering procedure devolved into throwing the guidon from a truck. One gun crew threw its guidon off the transport and raced through heavy underbrush to attack a tank. The crew claimed the tank's destruction, although it could not have moved an actual antitank gun

with the same speed and agility. Tank crews responded by exploiting the cross-country mobility of their vehicles to creep through heavy brush in the blind zone of antitank guns and surprise them. Such action, however, did not provide a quick combat resolution. Tank and antitank gun crews could not be entirely sure when they were fired on or when they had been spotted. More arguments ensued. The maneuvers ended with calls for more realistic representation of tank-antitank engagements. Recommendations included better representation and computation of antitank fire and the inclusion of fire and movement principles in assessments of tactical engagements. In addition, stationary vehicles were to be permitted to destroy antitank guns by fire while the ostensible lethality of .50-caliber machine guns, Molotov cocktails, and hand grenades was to be reduced. Some analysts warned against hasty conclusions regarding the efficacy of antitank units based on the maneuver experience. They noted the deficient training status of participating armored and antitank units and the paucity of equipment. None were considered ready for combat. The confining terrain of the maneuver areas also provided opportunities for antitank action not necessarily available in an actual combat theater. This cautious approach to maneuver analysis did not prevent or slow the establishment of the Tank Destroyer Tactical and Firing Center.