CHAPTER V

Varsity--The Airborne Assault Across The Rhine

Preliminary Planning

AFTER MARKET the next Allied airborne operation in the ETO was VARSITY, an enterprise designed to facilitate a crossing of the Rhine in the Wesel area. General Bradley had stated on 5 September that he wanted an airborne assault to help him hurdle the river. He had hopes of a breakthrough at Aachen followed by a drive toward Cologne, and with this in view Airborne Army prepared an outline plan for an operation called NAPLES II, the seizure by two airborne divisions of a bridgehead between Cologne and Bonn.

On 17 October Brereton's staff learned that Bradley was contemplating an additional new offensive on his left flank to reach the Rhine near Wesel. They examined the terrain north of Wesel, and, having found it for the most part very well suited to airborne operations, produced on 7 November a short staff study containing the original plan for VARSITY. This entailed the use of the 17th Airborne Division and the British 6 Airborne under command of XVIII Corps to take bridgeheads east of Emmerich, east of Rees, or in both areas in support of a prepared crossing by Ninth Army.[1]

It was originally supposed that the Rhine might be crossed before the end of November. However, Ninth Army plagued by bad weather, supply shortages, and revived German resistance, was stopped at the Roer River, and on 20 November a meeting at SHAEF set New Year's Day as the target date for either VARSITY or NAPLES II. This schedule was swept into the wastebasket by the German Ardennes offensive which began on 16 December, and during the ensuing Battle of the Bulge Allied planning was necessarily defensive in character. By mid-January a full-scale counteroffensive was under way, and with the initiative once more in their hands Eisenhower and his staff again turned their attention to the question of how to secure decisive and final victory.

They decided on a three-phase campaign, first an advance to the Rhine on so broad a front as to take the entire Rhineland and give the Allies the west bank of the river from Holland to the Alps, then assaults across the Rhine north of the Ruhr between Emmerich and Wesel and south of the Ruhr between Mainz and Karlsruhe, and finally a dual thrust into the heart of Germany. To satisfy Montgomery and the British Chiefs of Staff, who wished to concentrate on a single drive into northern Germany, the Supreme Commander agreed that the northern assault should be given maximum strength and should be launched as soon as possible, even before operations west of the river were concluded. Thus the main effort to cross the Rhine was to be made in the very area for which VARSITY had been proposed. On 2 February the Combined Chiefs of Staff gave their approval to this strategy.[2]

The firm decision by SHAEF to proceed with VARSITY and to give it priority over other proposed airborne operations was apparently taken about a week later. On 8 February Brereton was called in to confer on the subject with Eisenhower, and a day or so after that Ridgway was accorded an interview with the Supreme Commander, during which he was notified that the airborne troops in VARSITY would be commanded by XVIII Corps. On 10 February Airborne Army dusted off the November staff study and reissued it with remarkably few changes as an outline plan.[3]

The greatest change was in the surface forces

whose crossing VARSITY was intended to support. The sphere of 21 Army Group had been extended to include the Wesel area, displacing the United States Ninth Army southward so that its objectives beyond the Rhine lay between the Lippe river and the Ruhr. In addition Montgomery had been given operational control of Ninth Army, so all operations north of the Ruhr were in his hands. Already, on 4 February he had issued instructions which called for the Second British Army under Dempsey to secure crossings at Xanten 7 miles west of Wesel and at Rees, 12 miles northwest of the city in conjunction with a crossing by Ninth Army at Rheinberg, which was about 8 miles south of Wesel. The British amphibious operations were given the code name of PLUNDER. The Rheinberg operation was later called FLASHPOINT.

To the two airborne divisions originally selected for VARSITY was added the American 13th Airborne. This was an inexperienced outfit which had just arrived in France; no other divisions were available. The British 1 Airborne had been shattered at Arnhem, and the American 82d and 101st Divisions, having been held in the line almost continuously since September on what General Brereton considered very dubious grounds, would need several months to retrain and refit for airborne missions.[4]

Development of the Assault Plan

The main features of VARSITY were shaped during the last half of February and the first week in March by the Second Army, Airborne Army, and XVIII Corps commanders, Dempsey, Brereton, and Ridgway, with a minimum of participation by Montgomery. Detailed planning between the troop carriers and the airborne appears to have begun with a conference on 21 February and to have been almost completed inside a fortnight, although IX TCC did not issue its field order until 16 March. In this process the principal participants were IX TCC, 38 Group, and XVIII Corps, assisted by representatives of 46 Group, the troop carrier wings, and the airborne divisions.

During February Air Staff, SHAEF* blocked out an outline plan for the employment of cooperating air forces in VARSITY. On the 28th representatives of 21 Army Group, Airborne Army, Second Army, and the various air forces concerned met at SHAEF Forward to discuss their tasks and requirements. At that meeting responsibility for directing subsequent planning was given to Second Tactical Air Force, to which SHAEF, influenced by the evident need for more unified control of cooperating air forces than in MARKET, had delegated operational control of all such forces in VARSITY. At a meeting at Headquarters, Second TAF on 17 March plans were completed for all auxiliary air operations with the exception of some newly proposed by 21 Army Group, and on 20 March Second TAF issued its Air Plan, a most complex and comprehensive document.

It was clear from the start that there was barely enough lift for two divisions, so the 13th Airborne was placed in reserve. Employment of the unit in missions east of Wesel a few days after the original drops and crossings was considered and rejected, partly because the objectives were unsuitable, and partly because such a commitment would leave hardly any troops or gliders on hand for other airborne operations. Therefore on 6 March Brereton asked that the 13th Division be released from VARSITY. SHAEF agreed and reallocated the division to CHOKER II, an airborne operation to help the United States 7th Army cross the Rhine at Worms. However, by getting a foothold across the river between Worms and Mainz on the night of 22 March, a week before the target date for CHOKER, General Patton's 3d Army rendered that airborne enterprise unnecessary and, indeed, impracticable, because at that moment the troop carriers were marshalling for VARSITY. Several operations involving the 13th Airborne were planned later, but all were cancelled for one reason or another, leaving it the only American division in the ETO which did not see action in World War II.[5]

Mindful of the way weather had disrupted the missions scheduled for the third day of MARKET, Brereton and his colleagues were anxious to deliver all the airborne troops for VARSITY in one lift. However, it was not until 5 March that they felt sure they had the means to do this. Never before had two divisions been flown into battle in one single continuous effort. Larger numbers of troops had been delivered in both NEPTUNE and MARKET, but those operations had been extended over several days so that planes and crews could be used more than once.

*Air Staff, SHAEF had assumed responsibilities of headquarters, AEAF, which had been dissolved 17 October 1944.

At the end of February IX TCC had on hand 1,264 C-47's, 117 C-46's, 1,922 CG-4A gliders, and 20 CG-13 gliders. Roughly speaking the C-46 was equivalent in capacity to two C-47's and the CG-13 to two Wacos. The commanders decided against using the CG-13's because there were not enough of them to warrant the complications their inclusion would produce in the flight plan and because they had arrived so recently that the troop carriers were still unfamiliar with them. Also they required exceptionally good and large landing fields, since their minimum landing speed was 80 miles an hour.

At a meeting of airborne and troop carrier representatives on 26 February, General Williams proposed to dispatch 400 paratroop aircraft and 588 tug aircraft towing 660 Wacos for the American airborne and 243 more planes to carry the British paratroops. The spokesman for the 17th Airborne considered that 370 C-47's would be enough to lift its two parachute combat teams but asked for more gliders than Williams had offered. They finally agreed that the American airborne should have a paratroop lift of 226 C-47's and 72 C-46's, the equivalent of 370 C-47's, and a glider lift of 906 Wacos towed by 610 C-47's. Since the C-46 could tow no more Wacos than the C-47 but could carry twice as many paratroops, its use for the latter purpose was logical.

The 50 percent increase in glider lift was made possible by a decision to make extensive use of double-tow, a tactic which had never been successfully used in combat,* although it had been known for some time that the C-47 could tow two Wacos at once. The flying personnel of IX TCC had been familiarized with double-tow during the winter and had not found it unduly difficult. A C-47 with two extra fuel tanks could fly 315 miles with two Wacos in tow. Insufficient for missions mounted from England, this range was adequate for planes based in the Paris area.

The British with their very limited troop carrier force had great difficulty in finding enough lift for 6 Airborne. On 26 February the division asked for 275 American aircraft to carry its paratroops. Williams responded that 243 planes was all he could spare, and that was all the division got. The airborne wanted between 406 and 425 planes from 38 and 46 Groups to tow their gliders, but the two groups estimated that they could provide no more than 350 aircraft between them. Airborne Army raised 46 Group's quota from about 100 to 120 aircraft by insisting that SHAEF pry 25 of its planes away from transport work for service in VARSITY. The commander of 38 Group appealed to the Air Ministry on 1 March to give him 104 converted Stirlings and Halifaxes as soon as possible. He got enough of them to raise his group's contribution from 240 to 320 planes.

By using every qualified man including those whose tours of duty had expired and those assigned to training units the two groups managed to scrape up crews for the extra planes. The British airborne, having expended their glider pilots freely at Arnhem, had only 712 men left in the Glider Pilot Regiment. To provide a pair of pilots for each of the 440 British gliders in VARSITY the regiment had to take pilots from the RAF and retrain them in glider flying and infantry tactics.

The Americans would have had an adequate number of glider pilots had they not been required to keep a sufficient reserve to fly 926 gliders in CHOKER. Thus they too had to use converted power pilots as glider pilots. About half of the co-pilots for the Wacos in VARSITY were drawn from this source.[6]

It had been decided between 25 January and 8 February that in any of the airborne operations then under consideration the British troops would be flown from England and the Americans from the Continent.* Early in October 38 Group had been moved to bases in Essex northeast of London, a shift which put it about 100 miles nearer the VARSITY area and within reasonable range of its objectives in that operation. It would obviously have been preferable to base it on the Continent, but runways capable of handling its Halifaxes and Stirlings were not obtainable in France.

One American troop carrier wing, the 50th, had been located since late September in territory southwest of Paris with its headquarters at Chartres, the 439th Group at Chateaudun, the 440th Group at Bricy, the 441st at Dreux, and the 442d at St. André-de-l'Eure.

On or about 7 February the 53d Wing was informed that it would soon be moved to France. On 9 February orders were given to IX TCC and

*An attempt to use double-tow for an airborne mission in Burma in March 1944 had gone very badly.

*For route orientation refer to Map No. 11, p. 162.

IX Engineer Command to repair and expand 15 French airfields before 15 March for troop carrier use. On 11 February IX TCC issued movement orders directing the 53d Wing to begin moving to France next day and be fully established by the end of the month with headquarters at Voisenum, the 434th Group at Mourmelon-le-Grand, the 435th at Brétigny, the 436th at Melun, the 437th at Coulommiers and the 438th at Prosnes. These bases were dispersed over a wide area southeast of Paris.

While all or most of the above actions had been decided on before the outline plan of 10 February was issued, the location of the 52d Wing and 46 Group had not been settled. Because the British needed every plane in 38 and 46 Groups to tow gliders, three groups of the 52d Wing were allocated to carry their paratroops. Picked for the job were the 61st, 315th, and 316th Groups, the first two of which had flown British paratroops in MARKET. It would be very difficult for those groups to fly their missions from their home bases in the Grantham area or for 46 Group to do so from its fields in south-central England. Therefore it was decided that they should stage from East Anglia where they would be near 38 Group, could operate under its direction, and would have substantially shorter distances to fly.

The question of which airfields would be used for the purpose was not settled until 2 March when the Eighth Air Force agreed to loan Gosfield, Birch, Boreham, Chipping Ongar, and Wethersfield. The first two went to 46 Group. The 315th got Boreham, and the 61st received Chipping Ongar. After some uncertainty as to whether Wethersfield would be usable that base was assigned to the 316th Group.

The rest of the 52d Wing was slated to move from England to a group of bases between 60 and 90 miles north of Paris, but its shipment was delayed presumably because of doubt as to whether the bases would be ready in time. Finally on 23 February IX TCC ordered wing headquarters to Amiens, the 313th Group to Achiet and the 314th Group to Poix. Three neighboring fields, Abbeville-Drucat, Amiens/Glisy and Vitry-en-Artois, were being repaired for use by units of the 52d. At a conference on 26 February the wing commander successfully insisted that his three groups flying British troops from the United Kingdom be allowed to land at those bases after the operation instead of having to go back across the Channel.

Up to that time the role of the pathfinder group in VARSITY had remained in doubt. The objectives were so close to friendly territory that use of pathfinder teams would hardly be necessary, and so close to German positions that an advance drop by such teams would be suicidal. However, another group was wanted to fly paratroops for the 17th Division, and to fill that need the pathfinders were ordered on 27 February to move from Chalgrove to Chartres.[7]

Plans for the exercise of command and control were complete by the end of February. General Brereton would command Airborne Army with Williams heading its troop carrier component and Ridgway its airborne. Since both Brereton and Ridgway would be on the Continent, operational control of the troop carrier missions to be flown from England was delegated to AOC, 38 Group. Air Marshal Sir Arthur Coningham, AOC of the Second Tactical Air Force, RAF, was to command all cooperating air forces except bombers on resupply missions, which, of course, would be under Brereton's jurisdiction. Coningham delegated control of the air over the battle area to the AOC, 83 Group so that quick changes could be made there if the tactical situation dictated. Coningham and Brereton together would coordinate the airborne missions with the auxiliary missions and would decide whether VARSITY was to be cancelled or postponed.

The headquarters from which VARSITY was to be directed were distributed of necessity among three widely separate places, Paris, Brussels, and Mark's Hall, the 38 Group headquarters. Most of the troop carrier bases in France were fairly near Paris, so on 18 February Airborne Army moved its headquarters to Maison Lafitte on the outskirts of that city. On 22 February the troop carrier headquarters at Ascot detached a group of plans and operations men for duty at the Chateau de Prunay in Louveciennes, about six miles from Maison Lafitte, and on the 24th, Forward Headquarters, IX TCC, was officially opened at the chateau.

Although XVIII Corps had its headquarters at Épernay about 70 miles from Paris, it was able to maintain close liaison with Airborne Army. Not so with Second TAF. Coningham's large headquarters was firmly established in Brussels beside

that of Montgomery. Since Coningham and Brereton would have to decide jointly on whether to postpone VARSITY and might have to make joint decisions during the operation, it was decided that the latter, accompanied by a small staff, would go to Brussels shortly before the launching of VARSITY and set up a Command Post at Headquarters, Second TAF. This CP, officially called FAAA TAC, was opened on 22 March. The operations center at Maison Lafitte was then designated FAAA CCP. Routine control and supervision of the airborne missions would be exercised partly from Maison Lafitte and partly from Mark's Hall. Command decisions would be made in Brussels and transmitted to the distant controllers for implementation. It was certainly an awkward arrangement, and although it worked without a hitch during the execution of VARSITY, everyone seems to have been rather relieved that it did so.[8]

Obviously PLUNDER and VARSITY could not be launched until the enemy had been driven from the Rhineland. In early February Montgomery believed that the crossing might be made by 15 March, but stubborn German resistance caused the target date to be set back to the 25th and then to the 31st of March. Finally, late in February, the Nazis cracked, and on 2 March Ninth Army broke through to the Rhine at Neuss.

The army commander, Lt. Gen. William H. Simpson, seeing little opposition ahead of his forces, proposed to make a surprise crossing. Montgomery, always inclined to prefer a "set piece" to impromptu action, vetoed the suggestion, but he did decide to advance the target date for VARSITY to 24 March, and he seems to have seriously considered launching it on short notice in the event of a breakthrough near Wesel. On being asked how long it would take to mount a "hasty" VARSITY, Airborne Army replied on 3 March that it would need at least a week to do a good job. No such haste was required. The Germans facing Second Army continued to fight with desperate fanaticism and held the west bank of the Rhine until 10 March. Then they withdrew across the river under cover of bad weather, blowing the last bridge behind them. Since by that time it was clear that a crossing in the Wesel area would meet substantial opposition, Montgomery adhered to his plans for an overwhelming blow requiring a fortnight for deployment. Accordingly on 8 March SHAEF officially set the 24th of that month as the target date for VARSITY.[9]

In order to launch VARSITY on the day prescribed, Airborne Army required visibility of at least three miles, a ceiling above 1,500 feet, and winds less than 20 miles an hour. In addition the planners wanted at least two days of good weather immediately before D-day for preliminary air operations. In northwest Germany March is not a pleasant month. Weather experts estimated that between 15 March and 15 April only about half the days would meet FAAA requirements and that there would be only two periods of three successive days suitable for air operations. So essential did Montgomery consider his airborne cohorts that on 19 February his chief of staff told Brereton that if the troop carriers were grounded by bad weather PLUNDER would be postponed until they could go. Later he agreed that a postponement of up to five days would be acceptable.[10]

Barely a week before D-day, representatives of 21 Army Group, probably speaking on Dempsey's behalf, asked for preparation of an alternate airborne operation ready to fly on 24-hour notice in support of PLUNDER in case bad weather did force cancellation of VARSITY. By 21 March Airborne Army had drawn up plans for an alternate operation in the vicinity of Erle, a town 12 miles east of the Wesel area. However, both Coningham and Brereton insisted on 48 hours notice to provide for rebriefing and anti-flak operations.[11]

General Dempsey of Second Army gave VARSITY its objective, the Diersfordter Wald, a wood between three and five miles east of the Rhine on the crest of a gentle rise. Though scarcely 100 feet above the river, the high ground provided the only good natural observation points in that area and the trees provided cover from which artillery could rake the stream. Until the wood was taken no bridge could be expected to last long.

Consequently Dempsey urged that instead of being put down close to the river as proposed in the outline plan, the airborne should be placed further east, close to the Diersfordter Wald, and out of the field of fire of artillery supporting the amphibious assault. Brereton and Ridgway agreed, and the trio decided to drop and land the troops as near the wood as possible, thereby eliminating long marches such as had cost the British so dearly in MARKET. After occupying the wood XVIII

Corps was to push west to make contact with Second Army, then south to the Lippe to seal off Wesel and make contact with the Ninth Army. After that it would prepare to advance eastward as part of Dempsey's forces.

According to the initial plans the airborne and amphibious assaults were to be launched simultaneously and at night. With the change in objectives went a change in timing. The open fields by the river might well be attacked at night, but it would be tempting fate to make a night attack on prepared positions in the depths of a wood. Also, whereas the river bank would have had to be taken early to aid the surface assault, there was no necessity to take the Diersfordter Wald until bridging operations began. On such grounds as these General Dempsey recommended that the airborne attack go by daylight after PLUNDER had begun. For reasons of his own Brereton agreed. Besides a conviction that troop carrier operations would be much more accurate by day, he had a strong expectation that they would be safer. By day the Allies ruled the skies challenged only by a handful of jet fighters. After dark the German night-fighter force, conserved for the defense of the Reich, was still a serious threat.* Accordingly the plans were drawn for an amphibious assault an hour or two before dawn, followed at 1000 hours by the airborne attack. Since hitherto the airborne phase had ordinarily begun first, this timing offered a fair prospect of catching the Germans in the Diersfordter Wald by surprise.[12]

Drop and landing zones† were selected on the basis of previous studies of the VARSITY area by IX TCC. Eight were on or near the east side of the Diersfordter Wald, and two, both for paratroops, were set into indentations on the west side of the wood at its northern and southern tips where it was relatively narrow. None of the eastern zones was more than 200 yards from a neighbor, and even those on the west side were within a mile of other zones. All 10 were packed into an area less than six miles long and five miles wide, an unprecedented degree of concentration. The chance that any airborne unit would be isolated was remote, but the risk of overlapping and confusion was considerable.

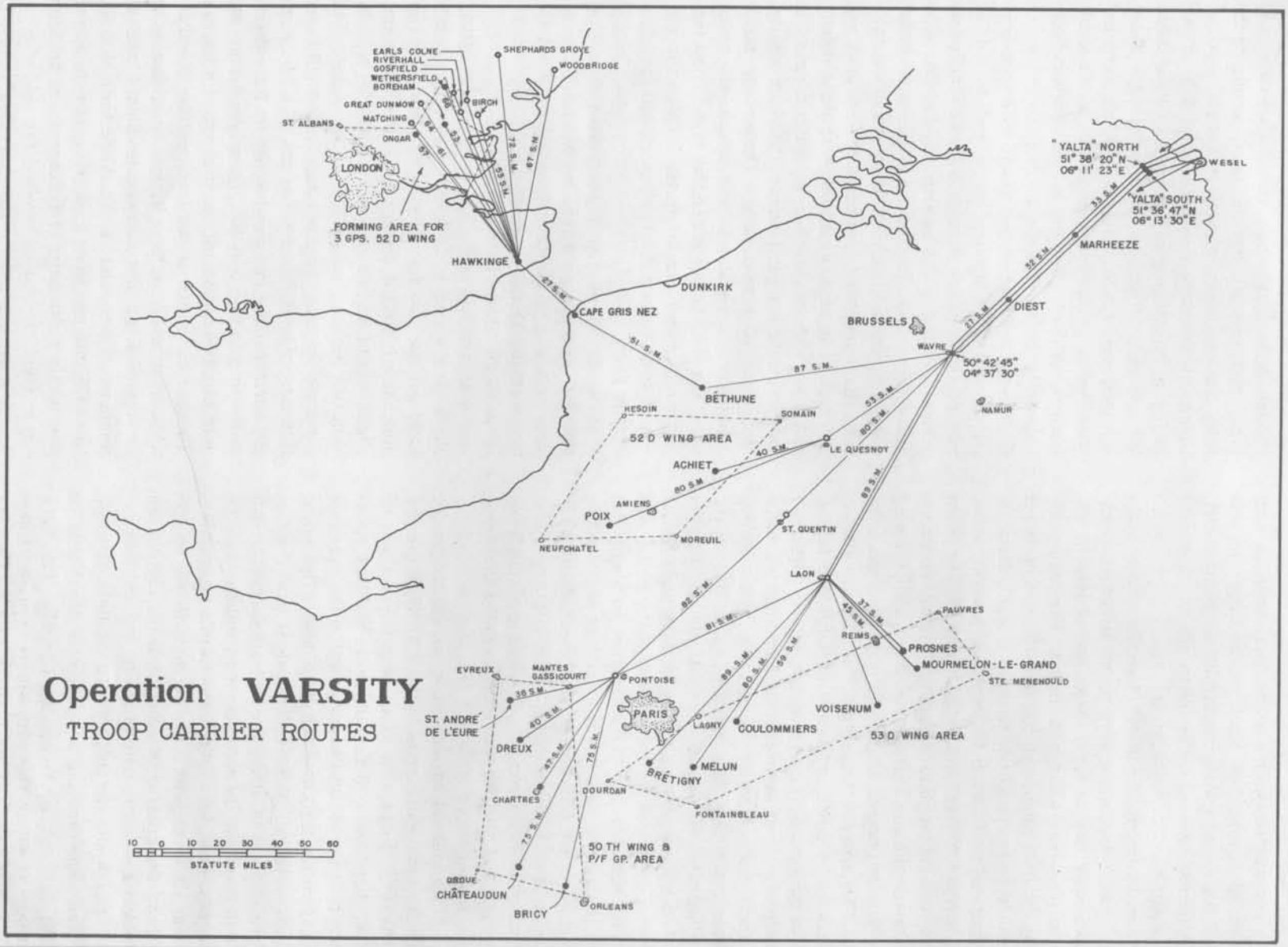
Almost all of the drop and landing area was firm, level ground, and the zones consisted of fields and meadows averaging 200 to 300 yards in length. Hedges were small and fences light, about half of the latter being made of wire. Ditches were few and small. There was no sign that the enemy was preparing landing obstacles. Aside from the Diersfordter Wald itself, there were five notable features. A double-tracked railroad to Wesel cut diagonally across the area from northwest to southeast. A few hundred yards to the east of the railroad was a high-tension power line on 100-foot pylons, a major hazard to gliders and paratroops. Bordering the eastern edge of the area and running south-southeast was the Issel River, a water barrier 60 feet wide. Just east of the river lay a half-completed autobahn (trunk highway) 150 feet wide, heavily embanked at some points, and lined with construction equipment. About a mile inside the northeast corner of the area was the little town of Hamminkeln. There were many minor hazards, tree-bordered roads, local power-lines, windmills, and the like, but it was most important to avoid depositing the airborne in the woods, in or beyond the Issel, or against the high-tension line.[13]

In November the Operational Plans Officer of IX TCC had proposed that the VARSITY missions follow a route from England to Blankenberge on the Dutch coast and from there to an IP at Goch, about 10 miles west of Rees. This way was short and straight with plenty of natural check points, but it involved a long overwater flight and was too far north to be convenient for units based around Paris. In March a course which would be about equally feasible for all units was finally chosen.* The British and American troop carriers based in East Anglia would use Hawkinge near Folkestone on the Kentish coast as their departure point and would fly from there to the tip of Cape Gris Nez, an overwater leg of only 27 miles to an easily recognizable landmark. Thence they would go east-southeast for 51 miles to Bethune and from there 87 miles east-northeast to Wavre, a rail and highway junction 11 miles southeast of Brussels. A straight flight from Gris Nez to Wavre had to be avoided because it would pass within radar range of German forces holding out at Dunkirk, and so involved the risk of premature discovery. Wavre was to be the Command

*It should also be noted that the bad condition and short runways of some troop carrier fields in France made them unsuitable for glider operations at night. (Notes of Group Commanders' Mtg, 50th TC Wing, 8 Feb 45 in Hist 50th TC Wg, Feb 45.)

†For DZ and LZ orientation, refer to Map No. 12, p. 175.

*See Map No. 11, p. 162.


Operation VARSITY
TROOP CARRIER ROUTES
EARLS COLNE
RIVERHALL
GOSFIELD
WETHERSFIELD
BOREHAM
GREAT DUNMOW
BIRCH
SHEPHARDS GROVE
WOODBRIDGE
ST. ALBANS
MATCHING
ONGAR
LONDON
FORMING AREA FOR 3 GPS. 52 D WING
HAWKINGE
CAPE GRIS NEZ
DUNKIRK
BÉTHUNE
"YALTA" NORTH 51° 38' 20" N 06° 11' 23" E
"YALTA" SOUTH 51° 36' 47" N 06° 13' 30" E
WESEL
MARHEEZE
DIEST
BRUSSELS
WAVRE
50° 42' 45" 04° 37' 30"
NAMUR
HESDIN
SOMAIN
52 D WING AREA
ACHIET
LE QUESNOY
AMIENS
POIX
NEUFCHATEL
MOREUIL
ST. QUENTIN
LAON
PAUVRES
REIMS
PROSNES
MOURMELON-LE-GRAND
STE. MENEHOULD
VOISENUM
53 D WING AREA
LAGNY
COULOMMIERS
EVREUX
MANTES GASSICOURT
PONTOISE
ST. ANDRÉ DE L'EURE
DREUX
CHARTRES
PARIS
BRÉTIGNY
MELUN
COURDAN
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50 TH WING & P/F GP. AREA
DROUE
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ORLEANS
10 0 10 20 30 40 50 60
STATUTE MILES

Map 11.

Assembly Point. This location involved the least possible detour for the troop carrier wings in France and could be reached by all of them without their crossing each other's courses or wing assembly areas. At the same time it was far enough from the front so that the troop carrier columns could be massed on one route under full escort before coming within range of enemy fighters.

From Wavre the course went straight for 92 miles to the northeast, passing over the road and rail junction of Diest 27 miles from Wavre and over the hamlet of Marheeze 32 miles beyond Diest, to Weeze, a village on the Nierse River about a dozen miles west of the Rhine. Weeze was chosen as the principal Initial Point and was given the code name YALTA.

The system of multiple traffic lanes used in MARKET had been proposed for VARSITY in November and was embodied in the final plan. There were to be three lanes spaced 1½ miles apart. The contingent bringing 6 Airborne Division from the United Kingdom would follow the northern lane to their Initial Point, head from there for the six northernmost zones, and turn north onto a reciprocal course after delivering their troops. Their IP, (YALTA NORTH) was located beside a railroad north of Weeze, and east of an oxbow loop in the Nierse River. It lay between 15 and 18 miles from the zones.

Actually there were two northern routes, lying at different levels. The American C-47's flying paratroops were to fly at 1,500 feet until nearing the IP, while the British glider stream would keep to an altitude of 2,500 feet. This would enable the American serials flying British paratroops at 140 miles an hour to pass under the Dakotas of 46 Group, towing Horsas at 115 miles per hour, and make their drop ahead of them. The British had some tug-glider combinations in 38 Group cruising at 135 miles per hour and others at 145 miles an hour. In order to get a continuous stream at the IP the slow units were given a head start at Hawkinge such that by holding to the proper speed the faster ones would catch up with them at Weeze.

The American glider serials would occupy the center lane and use a bridge over the Nierse on the east side of Weeze as their IP. The paratroop serials of the 17th Airborne would follow the southern lane to their IP (YALTA SOUTH), a castle beside the Nierse 1½ miles south of Weeze. Although the last two paratroop serials in the south lane would fly for a while parallel to the first glider serial in the center, the former because of greater cruising speed were expected to pull ahead by five minutes before reaching their Initial Point.* All the American airborne were to be dropped or landed on the four southernmost zones, after which the planes bringing them would make a 180 degree turn to the right onto a reciprocal course for the return trip.

These arrangements made it possible to deliver the two divisions simultaneously, and, by the use of tight spacing, to compress the whole operation within a period of 2 hours and 37 minutes. The paratroop serials, formed as usual of 9-aircraft V's of V's in trail, were to be spaced at 4-minute intervals if numbering more than 40 aircraft and at 3-minute intervals if smaller than that. American glider serials would fly in pairs of pairs in echelon to the right with a 1,500-foot interval between successive elements. Single-tow serials were to be seven minutes apart. Double-tow serials got 10 or 12 minutes depending on whether they contained as many as 40 planes, because the novelty of double-tow made it advisable to allow margin for error. The British glider stream, flying in loose pairs at 10-second intervals, had a time length of only 39 minutes as compared to 2 hours and 6 minutes for the American gliders. However, the former had only 440 big gliders to deliver, while the latter had 906 Wacos.[14]

Navigation in VARSITY would be relatively easy, since flight was to be by day, over a straight course from Wavre to Weeze, and in friendly territory to within six miles of the objectives. Notwithstanding this, navigational aids were to be installed at 17 places including all turns. The longest unmarked stretches were one of 89 miles between Laon and Wavre and one of 87 between Bethune and Wavre. Beyond Wavre the longest gap was a mere 33 miles. From Wavre on, the missions would never be out of range of a Eureka beacon. All check points were to have Eurekas. Beacon lights of the type known as pundits were to be used at wing departure points and at Bethune, Wavre, and the IP. Cape Griz Nez, St. Quentin, and all points from Wavre to the Rhine inclusive were to have M/F beacons. In addition

*All American gliders were limited to the pace of the double-tow serials, 110 miles an hour. Two of the last three paratroop serials were made up of C-46's travelling at 165 miles an hour, the other of C-47's at 140 miles an hour.

smoke signals and colored panels were to be set out at LAST LAP, L, K, M and N, the points where formations would cross the west bank of the Rhine. All parties operating navigational aids were kept in contact with FAAA by radio or telephone, so that they could be notified of any change of schedule.

Separate pathfinder operations were omitted. They were regarded as unnecessary because navigation was so easy, as suicidal because the zones were in a strongly defended area, and as harmful because they would forfeit all chance of surprise. However, the lead aircraft in the first serial to pass over each of the four British and American drop zones was to drop a stick of pathfinder troops who were to set out colored panels and smoke but no beacons for the initial missions. Each airborne division was to bring in two M/F beacons and have one in operation on its supply drop zone in time to guide in the B-24 resupply mission. Eureka beacons were to be used on the zones for the D plus 1 resupply missions if IX TCC so desired. To avoid flak on its resupply mission 38 Group had worked out a plan to drop from around 8,000 feet on verbal directions from the pathfinder party by "talking Eureka" (Eureka with voice hook-up) to personnel in a "master" plane who in turn would direct the drop verbally over VHF radio. Three sets of "talking Eureka" were brought in, but the group never got a chance to try its scheme.

One promising type of radar, the SCR-717 was rejected, because the terrain along most of the route was not such as would show up well on its scope and because the BUPS beacons which could be used with it were not available. Gee, however, would be employed. Good coverage was available from three existing chains and another was about to open. Instructions for use of Rebecca followed the sensible pattern adopted after NEPTUNE. Only flight leaders or their substitutes were to operate Rebecca unless the formations broke up, in which case the leader of each separate element was to turn on his set. Use of IFF by flight leaders or stragglers when above overcast was authorized, but it was made unnecessary on D-day by the imposition of rigid restrictions on antiaircraft fire and by the clear weather then prevailing.

Communication between aircraft during VARSITY was limited to extreme emergencies and exercise of command functions at or above wing level until planes were at least 40 miles along on their homeward way. Then navigational information might be requested. This air-to-air communication was to be by VHF. A special ground-air W/T station was to be operated by IX TCC Forward. Over it, if necessary, recall signals could be sent to serials anywhere on the route. Two aircraft in each flight were to watch that frequency.

Two new organizations, the combat control team and the forward visual control post, had recently been created to remedy the communications deficiencies which had played so serious a part in MARKET. Both were used in VARSITY.

The troop carrier command had begun in January to organize combat control teams from its glider pilots and enlisted technicians on the basis of two teams for each American airborne division. The function of the teams was to inform headquarters and incoming serials of conditions in the battle area, particularly weather and enemy resistance, and to notify the airborne in turn of any changes in troop carrier plans, especially regarding timing, course or zones. Each team was composed of five men with a jeep and a quarter-ton trailer, modified to hold a power unit, an SCR-399 or 499 for communication with headquarters, and an SCR-522 for VHF radio conversation with missions overhead. In the coming operation two teams, one a spare in case of accidents or casualties, were to be landed at opposite ends of LZ N to operate for XVIII Corps. Each was to go in three Wacos, one for the jeep, one for the trailer, and one containing equipment for medical evacuation by glider pick-up. Two gliders loaded with wounded had been "snatched" very successfully from the Remagen bridgehead, and the troop carriers were prepared to evacuate large numbers of patients by glider in VARSITY under the direction of a combat control team if conditions warranted.

The forward visual control posts were fighter control teams with the primary purpose of directing close support aircraft. They had recently been organized by 38 Group. Each team had a jeep and a trailer and for VARSITY was equipped with two VHF sets, one for ground-to-ground communication by which to call for support aircraft and one for air-to-air communication by which to direct the planes to their targets. A whole team could fit in one Horsa. In VARSITY three FVCP's were to be flown in to 6 Airborne Division. One would serve that division, one would move

south to work for the 17th Airborne, and one would act as a reserve. Because the FVCP's had been created only a short time before the operation, their personnel had very little training in either airborne operations or close support. Notwithstanding this handicap they were to prove very valuable.[15]

Although Airborne Army expected its troops to link up with the British ground forces within a few hours, it regarded resupply by air as highly desirable, because Second Army probably could not put more than one bridge in operation on D-day and at first would need everything that could be brought in by bridge or boat. However, it was in the critical early hours of the operation that the airborne, too, most urgently would need supplies, particularly ammunition. On D plus 1 resupply might be too late or might be prevented by bad weather. Resupply at night might be inaccurate and surely would be hard to recover. On D-day itself the troop carriers would be fully occupied with the initial missions. The solution was to fly the supplies in by bomber as had been done on the second day of MARKET. On 28 February Airborne Army asked USSTAF to have Eighth Air Force dispatch 240 Liberators from England on D-day with 540 tons of supplies for its troops. The request was granted.

The supply drop was scheduled to occur at 1300 hours, about 20 minutes after the last gliders landed. So early a drop involved some risk that zones still would be in enemy hands, but it also had great advantages. The same air effort set up to protect the troop carriers from enemy air and ground action would serve to protect the bombers; and the airborne, instead of keeping large numbers of fighting men waiting for hours to guard zones and pick up supplies, could collect their bundles soon after assembling and go about their business. Both troop carrier and resupply missions were to follow the same route. Primarily intended to simplify control of fire from Allied antiaircraft batteries, this plan also facilitated fighter protection and use of navigational aids.

Remembering the miscarriage of MARKET, Brereton and Ridgway were anxious to provide against the contingency, however remote, that the Second Army assault might be contained, leaving the airborne cut off from supplies. Therefore on 5 March the two agreed to have a resupply mission ready to go on D plus 1 unless cancelled. In final form this consisted of 440 C-47's of IX TCC carrying 550 tons of materiel and 240 planes of 38 Group carrying 530 tons, enough to last the two divisions for two days. If bad weather in England or over the Channel grounded 38 Group, a substitute force of 75 Dakotas of 46 Group would take off from Nivelles near Brussels with high-priority items for the British airborne. Likewise, if the troop carrier units on the Continent were grounded, C-47's from England would fly a one-day level of supplies to the 17th Division. In addition, preparations were made to deliver on request an additional two-day level of supplies for 6 Airborne and a one-day level for the 17th Airborne.[16]

Not until after the middle of March were decisions reached on how to protect the troop carrier missions from being fired on in error by Allied gunners, but the action finally taken was very thorough as far as the D-day missions were concerned. Fighter Command, RAF, agreed to prohibit antiaircraft fire near the troop carrier path in England from 0700 to 1500 hours. A representative of the naval commander concerned made a like promise for naval antiaircraft in the Thames estuary and within a 10-mile belt along the troop carrier route across the Channel. The 21 Army Group directed that on the Continent within a strip 30 miles wide centered on the route no flak was to be fired west of the Maas between 0700 and 1500 or east of it between 0900 and 1400. Outside the prohibited zone no guns were to fire on aircraft during the period of the missions unless they committed a hostile act.

On the Second Army front no guns or mortars near the troop carrier lanes were to fire on trajectories higher than 500 feet between 0958 and 1330 hours. As further insurance the artillerymen were to detail a special watch to report on approaching formations and on such damaged aircraft as might dip low over the guns on their return.

During the resupply mission on D plus 1 antiaircraft batteries were to fire only on planes committing hostile acts, except that within 12,000 yards of the Rhine crossings at Xanten and Rees they might fire on aircraft definitely recognized as hostile. This exception destroyed most of the value of the protective clause, for within the 12,000-yard radius around the crossings was the very area where battle-smoke and battle-tension might cause the supply formations to be fired upon. The

determination of Second Army to protect its pontoon bridges from German bombers was reasonable enough, but the fact remains that the D plus 1 mission in VARSITY was to have no more protection from Allied antiaircraft fire at the front than the unfortunate follow-up mission to Sicily, which had been smashed by friendly guns.[17]

Planning for Auxiliary Air and Artillery Action

Traditionally the most important task of cooperating air units in an airborne operation was to protect it from enemy air. This was not so in VARSITY, for the German Air Force was in eclipse. Its maximum 24-hour effort against VARSITY had been estimated in November as 365 sorties by day and 265 by night. On 16 March IX TCC rated its capacity as 425 by day and 410 by night.[18]

Weak as it was, German air could inflict great damage by night attacks on troop carrier fields during the marshalling period. A survey made late in February showed that the small size and bad condition of many troop carrier fields in France made dispersion impossible. Thus a few raiders sweeping over a crowded parking area could put a whole group out of operation. On 3 and 4 March the Germans demonstrated their ability to make such a raid. Night fighters sneaked in behind homeward-bound British bombers, inflicted substantial losses on the British, and did some damage in secondary attacks at Cottesmore and Barkston Heath. Action to meet the threat was initiated by IX TCC on 6 March with the result that at least one automatic antiaircraft battery was stationed at every troop carrier base in France, and Ninth Air Force agreed to hold night-fighter units on call during the critical marshalling period after 20 March to defend those airfields.[19]

The Luftwaffe did have a new and formidable weapon, the jet fighter. About 80 jets, able to fly rings around all Allied fighters then in action, had been accumulated during the winter at a group of airfields near Rheine within easy range of the Wesel area. The best way to stop the jets was on the ground. Once they were in the air, at least a few of them could probably outrace escorting fighters and make a stab at the troop carriers. Therefore on 17 March the Eighth Air Force was given the task of bombing the five jet bases and 10 others within 25 miles of Wesel which were suitable for jets. This was to be done on D minus 3 or as soon thereafter as weather permitted. Since some damaged fields might be repaired within 36 hours, the bombing was to be repeated on D-day before 0915, subject to confirmation by Second TAF. To make sure no jets got away, RAF fighters of 83 Group would patrol over the jet bases from first light on D-day until the bombers arrived. On confirmation by Second TAF, Eighth Air Force was also to bomb German night-fighter bases just before dark on D-day. This action, however, was intended to protect the troops on the ground, rather than the troop carriers.[20]

Escort and cover were to be provided on a massive scale. The troop carrier stream from the United Kingdom would be escorted as far as the Rhine and back by 11 Group, RAF. Units based in France would be escorted to and from the river by fighters of Ninth Air Force. Beyond the Rhine there would be no escort, but a system of standing patrols would be maintained on D-day from dawn to dark. Responsibility for the VARSITY assault area rested on 83 Group, RAF, which was to patrol a zone 50 miles deep bounded by the Lippe, the Rhine, and a line touching Emmerich, Enschede, Münster, and Hamm. Similar zones to the north and south would be patrolled by 84 Group and the XXIX Tactical Air Command respectively. Fighters of the Eighth Air Force would patrol east of the three zones to intercept enemy aircraft approaching the battle area from other parts of Germany.[21]

Diversionary feints in the direction of Borkum, an island off the German coast, were to be flown by Coastal Air Command, RAF, and certain missions by Bomber Command, RAF, against targets on the northern edge of the Ruhr had in part a diversionary purpose. These thrust were well suited to draw off interceptors which might be used against the troop carriers. Although Fifteenth Air Force agreed to send a very large bomber force from Italy against Berlin, Munich and other targets in Central Europe, the direction of approach and the fact that all its objectives were over 300 miles from Wesel make it difficult to regard this effort as diversionary in the strict sense of the word. It may have been meant to discourage redeployment of German fighter units to the western front. A diversionary dummy-dropping mission by Bomber Command was considered but not

attempted, partly because that kind of deception was considered useless by day, which was when VARSITY would need it most, and partly because units previously used in such work were not available.[22]

Flak was the weapon most feared by the planners of VARSITY. This fear was due as much to the nature of the operation as to the weakness of the Luftwaffe. There was no way for the troop carriers to fly around the enemy strong points. Those strong points were their objectives. In December the A-3 of IX TCC had warned that antiaircraft fire might inflict losses such as the command had never before encountered. In March Air Marshal Coningham called flak his chief anxiety. On 19 March intelligence experts reported a very considerable build-up of German antiaircraft artillery in the VARSITY area.[23]

The situation had one advantage in that over 2,000 Allied guns were massed within range of the German batteries. Second and Ninth Armies agreed to neutralize flak within range of their field artillery. German batteries further away or masked from artillery fire were to be dealt with by air action. The line dividing the two areas of attack split the drop and landing area approximately in half, providing an opportunity to compare the results of shell-fire and bombardment.

Known enemy batteries were to be left strictly alone until D-day so they would not go into hiding. On the 24th, an hour before the troop carrier columns arrived, medium bombers of the Ninth Air Force and 2 Group, RAF, would begin a half-hour attack on antiaircraft positions beyond the artillery boundary, using fragmentation clusters and proximity fuses as far as possible to avoid cratering the drop and landing zones. Between the departure of the mediums and the arrival of the airborne missions Allied artillery would hammer flak positions within its sector. Flak-busting fighter-bomber patrols contributed by 83 and 84 Groups and XXIX TAC would arrive at 0930 as the mediums left and would be maintained over the area until 1300 in readiness to silence batteries observed firing on the troop carrier missions.[24]

As to the German ground forces opposing PLUNDER and VARSITY, Allied hopes that they had been shattered in the Rhineland gave way as D-day approached to a sober conviction that the enemy had extricated much more than anticipated, and that there would be a real fight ahead. Aware that Wesel was a logical place to cross the Rhine the Nazis had, it was estimated, massed about 10 of their best remaining divisions within 20 miles of the area selected for Montgomery's assaults. However, they had been so reduced by attrition as to number less than 50,000 combat effectives. Among them were two or three panzer divisions with perhaps 100 tanks and self-propelled guns, but these were reported to be near Duisburg, Isselburg, and Bocholt, more than 10 miles away from the assault area. Brereton kept order of battle teams on duty 24 hours a day up to the last minute before VARSITY was launched, undoubtedly to prevent panzer units from surprising the airborne at Wesel as they had done at Arnhem.

A maximum of 12,000 troops including two divisions and a brigade group were thought to be within a 10-mile radius of the airborne assault. If they concentrated in the Diersfordter Wald to oppose the amphibious landings the airborne, arriving in their rear and on their flanks, would cut them off. Since the German commanders reputedly anticipated an airborne operation and had even rehearsed defense measures against one, it was more likely that they would place only a holding force in the wood and keep their main strength back of the Issel River to await developments. In that case the airborne might be the ones encircled.

Whatever the defense plan, it was evident that as little as five minutes after arrival the paratroops and glider men might be in combat with substantial German forces in well-prepared positions. The initial fighting might be hard. Thereafter the duration and severity of the battle would probably depend on the extent to which the Nazis could bring up reinforcements. To stand a chance of winning they would need to get half a dozen of their depleted divisions into the battle area. The Allies proposed to stop any such movement through the use of their superior airpower.[25]

In contrast to MARKET, which had no systematic interdiction, VARSITY was the beneficiary of four interdictory operations. The original program asked for and obtained by Second Army and FAAA was short, small, and efficient. It called for bombing a dozen vital communications centers within 15 miles of the assault area* late on

*Dinslaken, Anholt, Isselburg, Dingden, Brunen, Raesfeld, Bocholt, Borken, Dorsten, Gladbeck, Sterkrade, and a bridge near Sterkrade.

D minus 1 or on D-day. If successful, this would block every good way by which German reinforcements could approach the battle area. On D-day armed reconnaissance patrols of 83 and 84 Groups and XXIX TAC would sweep the highways clean of military traffic west of Zwolle, Münster, Hamm, and Siegen and similar patrols of Eighth Air Force fighters would do so east of that line.

To supplement this plan 21 Army Group proposed on 17 March that, since the Germans obviously would not be taken by surprise, they should be softened up by several days of preparatory bombing directed against barracks and military installations within a 30-mile radius of Wesel. Next day Second TAF, and the air forces concerned agreed to bomb 26 such targets north of the Lippe and 16 south of it at least twice every 24 hours from D minus 3 through D minus 1, preferably both by day and by night so that the enemy could get no rest. This program was aimed solely at German reserves. The assault areas were excluded for fear of damage to zones or riverbanks. Most of the places already on the interdiction list were included, and the general effect was to reinforce the interdiction of the VARSITY area. It should, however, be noted that about half the targets named were too far away to affect the airborne operation, important as they might be to later phases of 21 Army Group's offensive.* The same thing applies to the interdiction patrols flown by the fighters of Eighth Air Force. Their effect was to prevent creation of a second line of defense rather than reinforcement of the front.

Even more remote from VARSITY, though not without influence on it, was a project proposed early in February by Lt. Gen. Hoyt Vandenberg, commander of the Ninth Air Force, to isolate all territory between the Rhine and an arc from Bremen along the Weser and Lahn rivers to Coblenz by bombing 18 bridges and viaducts, and then to paralyze the railroads in that area by destroying their rolling stock. The operation was approved, mainly, it appears, for its economic and general strategic value, and not as direct tactical assistance to VARSITY.

It began on 21 February and by 21 March the only remaining serviceable bridges were three at the northern extremity of the arc; 20 out of 25 marshalling yards had been knocked out; and railroad traffic was at a standstill. This situation must have hampered Nazi efforts to build defenses along the Rhine, but, even if the way had been clear, they had almost no reserves east of the Weser. The industries of the Ruhr were strangled, as Vandenberg had intended they should be. The tactical value of the operation as far as VARSITY is concerned is uncertain but probably rather limited.[26]

One other air operation was a bombing of Wesel itself. Second Army asked for this very urgently on 17 March, and Bomber Command, RAF, was given the assignment of attacking the city on D minus 1. Dempsey had decided to take Wesel by a commando assault at 2230 on the 23d and considered bombing essential to soften up the defenders. Since the flak batteries in Wesel were a threat to the troop carrier missions, this decision to hit the city hard and take it early would be of real assistance to VARSITY.[27]

Close support of the airborne troops was to be divided between artillery and air units in much the same way as flak suppression. A "cab rank" of rocket-firing Typhoon fighter-bombers dispatched in relays of four every 15 minutes was to be maintained throughout the day over the Wesel area, ready to attack targets on requests received by radio from control parties with the troops. Requests for additional aircraft to fly close support were to be made through the control parties to an advanced control center of 83 Group.

Artillery support was to play a role never before possible in an airborne operation. At 1000 hours on D-day XVIII Corps was to receive operational control of 104 guns for direct support of 6 Airborne Division and 88 guns for direct support of the 17th Airborne plus a battery of heavy antiaircraft guns for each division. An additional 176 guns including 155-mm. pieces and 240-mm. howitzers were to be under corps control for general support. Since only 51 guns were to be flown in for the 17th Division and only 24 for 6 Airborne, it is easy to see that the ability to call on ground artillery multiplied the firepower of the airborne force many times over.[28]

Training

In contrast to the vestigial training for MARKET, preparation for VARSITY included a rehearsal, a short period of intensive joint training,

*Tedder, Spaatz, and Vandenberg expressed the opinion on 21 March that this operation should have been concentrated against reserves near the front, omitting several objectives deep in the rear.

and, before that, a systematic training program designed to maintain proficiency. Particular credit for this last feature should probably be given to Brereton's insistence that his troop carriers be given adequate opportunity to practice troop carrier operations. In the face of ground pressure for more air supply SHAEF was persuaded to agree that between 17 December 1944 and 17 January 1945 only two troop carrier groups need be held on reserve for CATOR and later that only three would be reserved between 17 January and 17 February. The other groups were slated to go into training, but emergency air supply and transport work during the Battle of the Bulge occupied them during the latter part of December.

Early in January the battle subsided and training went into full swing. During that month and the next about two thirds of the aircraft dispatched by IX TCC were on training flights, and about 50,000 hours of flying time were devoted to such flights. Most attention was given to formation flying, which took up some 21,000 hours. Glider towing occupied over 9,000 hours, and glider landing was stimulated by a requirement that every glider pilot make at least five landings a month. Navigational and instrument flights were also stressed, and the large number of replacements, especially in the 52d Wing, necessitated a great deal of transition flying. Joint training with the airborne was necessarily on a low level, because the troops were in action or otherwise unavailable. Only 101 paratroops jumped during the two-month period.

Plans for three weeks of intensive combined troop carrier-airborne training in preparation for VARSITY were discussed and approved on 28 February. Among other things they called for five jump exercises by regimental combat teams. Training was to end on 20 March, about 10 days before the operation, and was to culminate in a rehearsal.

What was conceived as a well-rounded program was in fact seriously curtailed. When VARSITY was moved up to 24 March, it became necessary to terminate training on the 15th. According to troop carrier statements, all other cancellations and changes were made at the request of airborne representatives. The principal change was the reduction of the paratroop exercises to one of 135 planes for the 507th PIR of the 17th Airborne and one of 154 aircraft for the 13th Division, which, incidentally, came after that unit had been diverted to CHOKER. One exercise was eliminated by the shortening of the program. The 17th Airborne cut out another because of staging difficulties, caused by the fact that its quarters near Chalons were over 50 miles away from all but one operational troop carrier base. Many training flights for the division were staged from two small, unoccupied strips at Chambry and Malmaison, but this expedient would not do for large exercises. Also abandoned was a paratroop exercise by the 52d Wing with paratroops of 6 Airborne Division.

No glider exercises were planned or attempted. At most of the fields, facilities for mass glider landings were so inadequate that General Williams had limited non-tactical glider lifts from any base to 16 at a time. As for the rehearsal, the airborne declined to participate in it for fear of possible losses. It developed into a mere simulated exercise by a skeleton force to test troop carrier command arrangements and tactics.

The American troop carriers did accomplish a great deal. During the period of joint training they dropped 19,678 paratroops, and carried 26,666 glider troops. Almost all of this, however, was done by eight of IX TCC's 15 groups*. The 50th Wing, already established in its French bases made 4,329 glider tows between 1 and 18 March, and on the 9th its A-3 Officer boasted that the wing was giving the airborne three times as much practice as they had asked for. Three groups of the 53d Wing were also active, especially the 435th, which carried 15,642 glider troops, and the 438th, which dropped 6,649 paratroops between 10 and 15 March. The 436th also did its share.

In the 52d Wing only one whole group, the 313th, engaged in joint training, and it had to, because it was equipped with the new and unfamiliar C-46. General Williams had wanted to have two paratroop regiments familiarized with the Commando and, if possible, to have it tested in an exercise. Busy until 10 March in moving to Achiet and in competing transition training on the new craft for its crews, the 313th Group then sent out 125 planes over a five-day period and dropped 3,246 men of the 513th PIR, its partner in the coming operation, to familiarize them with the characteristics of the C-46, especially its double jump-doors. The group did not attempt any mass drops. On 9 March a dozen planes of the 315th

*Counting the pathfinders as a group.

Group were sent from Spanhoe to Nether Avon to give jump training to paratroops of 6 Airborne. Before returning on the 15th they dropped 4,128 men, and the divisional commander expressed himself as well satisfied.

The other groups of the command did little or no joint training. The 434th Group was unable to participate because its base at Mourmelon was not ready for it to begin moving there until 10 March. Why the others did not do so is not clear, although both movement to new bases and distance from airborne units undoubtedly were inhibiting factors. Besides the American units, 46 Group, RAF, was also very short of training; 90 percent of it was retained on transport work until D minus 2.

Since these seemingly undertrained units did well in VARSITY, one may hazard the conclusion that joint training with airborne troops before an operation is not essential for experienced troop carrier units. What counted in VARSITY was the recovery of proficiency in troop carrier tactics and navigation by hard training during January and February in IX TCC and at regular intervals by relays in 46 Group.[29]

Special attention was given to the role glider pilots were to assume after landing. Their status as integral components of the troop carrier squadrons was not changed. However, for combat purposes the glider pilots of each troop carrier group were organized into units equivalent to infantry companies. The wing glider officer and a small staff would act as a battalion headquarters exercising tactical and administrative control of those companies during the ground phase. Training in infantry tactics was conducted by the 17th Airborne Division, and the glider pilots were provided with such infantry equipment as compasses, canteens, entrenching tools, and light sleeping bags, the lack of which had been felt in MARKET.

It is significant that glider pilot employment was to be much as before. On landing they would assist in unloading, then proceed to the assembly area of the airborne unit carried, assemble there into their own tactical organizations and move as units to a specified wing assembly area. There after mustering them by squadrons the wing glider officer, working in conjunction with a previously delegated representative of the airborne commander, was to assign them to such tasks as guard duty, supply collection and, circumstances permitting, to protection of usable gliders from vandalism. In spite of all the talk of using them to reinforce the infantry, it was specified that the glider pilot units were not to be committed to battle except in extreme emergency, and then only in a defensive role. Furthermore, they were to be evacuated from the combat area on the highest possible priority. Evidently Airborne Army had not been convinced that trained pilots were as expendable as riflemen.[30]

The rehearsal, appropriately called TOKEN, was postponed by unfavorable weather from 16 March to 17 March. Command arrangements, communications, navigational aids and tactics were like those planned for VARSITY. However, each serial in the coming operation was represented by a single element, including the leader and assistant leader of the serial. The VARSITY route was used as far as Wavre, after which a similar course with modified headings was used to zones near Montlaucon and back on a reciprocal route. No troops were carried and no gliders released, except that two gliders with a combat control team were landed on Villeneuve-Vertus airfield to test the functioning of the team.

While results were generally very good, an unexpected tail wind of 20 miles an hour upset the timing and caused some elements to reach their objectives as much as 12 minutes ahead of schedule. Reception of the M/F beacons along the route was poor in many cases, and the signals of the Ruhr Gee chain showed a tendency to fade. There were also failures in land-line communications with the troop carrier forces in England. The signal lines were speedily repaired, since even a brief loss of contact with 38 Group during the actual operation could have been serious. Another significant result of the rehearsal was a decision by General Williams that after passing the command departure point at Wavre the troop carrier serials would adhere to indicated air speeds instead of attempting to reach each checkpoint at a scheduled time. This change was intended to prevent the confusion which might result if some groups interfered with others by excessive slowing or speeding in an effort to meet their schedule.[31]

Briefing and Security Measures

Because VARSITY was a set piece scheduled well in advance, there was plenty of time to pre-

pare orders and conduct briefings. On 16 March, D minus 8, IX TCC issued its field order. In accordance with instructions in a recent letter from Airborne Army, this set briefing times as late as possible. Wing commanders were to be briefed on D minus 3, group and squadron commanders and key personnel on D minus 2, and combat crews not until D minus 1. However, the practical advantages of obtaining more time to prepare outweighed these adjurations. Indications are that the wing commanders all had a good working knowledge of the operation many days before the 16th. The American wings briefed the commanders and key personnel of their groups and squadrons on D minus 5 and D minus 4; 38 Group, RAF, had held a similar briefing at Mark's Hall on 18 September, D minus 6. A majority of the combat crew briefings were held on D minus 1, but in many cases, especially where space limitations prevented a group from briefing all its squadrons at once, crew briefings had begun on the 22d.

The briefings, carefully prepared and embodying the accumulated experience of previous operations, were generally held to be excellent. The extent and quality of the intelligence provided was a source of surprise and satisfaction to the recipients. All pilots and glider pilots got maps of the route on scales of 1:500,000 and 1:250,000 and a map of the Wesel-Diersfordt area on a scale of 1:100,000. Maps and defense overprints of the DZ-LZ area on a scale of 1:25,000 were distributed for briefing in quantities of 20 or more for each group and with them numerous overlays of the area on the same scale showing the DZ's and LZ's, landmarks and obstructions, known flak positions, and the German order of battle. Photographic cover, though not complete, was very good. Every group got two sets of lithographed mosaics of the DZ-LZ area on a scale of 1:8,000 and one run-in mosaic on a scale of 1:33,000. Enlarged vertical photographs of the various zones were also distributed and in such quantity that every glider pilot received a picture of his landing zone blown up to page size. Each group was given a set of oblique photographs of the run-in strip and several of oblique panoramas of the DZ-LZ area.[32]

The security precautions taken for VARSITY were intended to conceal the composition of the attacking force and the exact time and place of the operation. The fact that an assault would soon be made across the Rhine north of the Ruhr was clear to any skilled observer of the military situation and was made even more obvious by Montgomery's massive preparations and by reports in the newspapers.

Particular pains were taken to conceal changes in radio traffic from which the enemy might deduce what was brewing. The movement of the airborne divisions to the airfields was done as unobtrusively as possible with identification marks removed from uniforms and equipment. The ground echelons of those divisions were disguised as Communications Zone troops during their move up to the front. At the airfields the precautions taken were like those before the invasion of Normandy, though not quite as stringent. On the arrival of the troops, traffic in and out of the bases was restricted and the troops were sealed in their bivouac areas. Briefed troop carrier personnel were segregated from those unbriefed, telephone service was curtailed and calls monitored, and outgoing mail was stored in special bags until after the operation.[33]

Auxiliary Air Operations

By rare good fortune VARSITY had favorable weather, not only for its grand finale but also for the three days of preparatory air operations. The opportunity was used to the full. On 21 and 22 March 1,744 Fortresses and Liberators of the Eighth Air Force, escorted by 752 fighters, dumped about 4,000 tons of bombs on the 5 jet bases and 10 other airfields which they were to put out of action. Almost all the runways attacked were thoroughly cratered. Approximately 5 bombers and 11 fighters were lost, but reports indicated that at least 62 enemy fighters had been destroyed, most of them on the ground.

On D-day 1,452 B-17's and B-24's escorted by 95 fighters dropped slightly over 4,000 tons more. In the morning they hit the jet fields again, and during the morning and afternoon they hammered a dozen additional bases, mostly night-fighter fields. Photographs showed that all the targets were badly cratered and apparently out of operation. Somehow the Germans did put jet fighters in the air on D-day, but they were a mere handful of survivors flying not as units but as individuals. The price of the D-day attacks on airfields was

eight bombers all of which so far as is known, fell victim to flak, not to the Luftwaffe.[34]

Interdiction and harassing operations by the Allied air forces between first light on D minus 3 and dawn on D-day were monumental in size and complexity. In 3,471 effective bomber sorties some 8,500 tons of bombs were dropped against communications targets. Barracks and other military installations received some 6,600 tons of explosive, delivered by 2,090 bombers. Most notable of these missions against the German ground forces was the accurate dropping of 1,090 tons of bombs about 2230 on D minus 1 by 195 Lancasters and 23 Mosquitoes of Bomber Command, RAF on Nazi positions on the northwest side of Wesel only 1,500 yards ahead of British commando troops poised for assault. In addition to specific bomber missions, fighter bombers swept on armed reconnaissance over the railroads and highways, the pilots claimed a total of 215 rail cuts, 80 locomotives, 2,383 railroad cars, and 318 other vehicles.[35]

Certain bombing missions on D-day were primarily interdictory. In a morning attack on the edge of the Ruhr 506 Halifaxes and Lancasters of RAF Bomber Command dropped over 1,900 tons of bombs on marshalling yards at Sterkrade, troops near Gladbeck and industrial plants near Bottrop and Dortmund, in an operation which was at once diversionary, strategic, and interdictory. That afternoon 317 medium bombers of IX Bombardment Division were sent on a turnaround mission with the dual purpose of finishing off bridges at Colbe, Pracht, and Vlotho under the Vandenberg plan,* and hitting Borken, Bocholt, and Dorsten, these latter being among the 12 targets originally selected for interdiction on behalf of VARSITY. The bridges were hit and smashed by 173 of the 202 bombers dispatched against them. For some reason Borken and Bocholt were not attacked, but Dorsten and secondary targets at Stadtlohn, Aalten, and Dulmen were severely damaged by 120 tons of bombs dropped by 100 planes between 1500 and 1531.

Brunen and Raesfeld, two more of the original 12 interdiction targets, were also hit on the 24th by 66 medium bombers of Second TAF with 98 tons of bombs. Troop concentrations in Brunen, which was only five miles east of the Diersfordter Wald, would have been in a particularly favorable position for a counterattack against the airborne.

The bombing of flak positions prior to the arrival of the VARSITY missions was greatly handicapped by smoke and haze. Although IX Bombardment Division dispatched 433 medium and light bombers (plus 11 carrying WINDOW) for that purpose, only 285 bombed their primary objectives, and most of them had to rely on radar (Oboe) in making their attacks. Of the rest, 8 bombed other gun positions, 73 struck at miscellaneous targets, and 67 made no attack. In all, 799 tons of fragmentation and 13 tons of general purpose bombs were dropped on that mission between 0744 and 0904.* About the same time 71 medium bombers of 2 Group, RAF, were dropping 109 tons of bombs on four other antiaircraft positions. They, too, were hampered by low visibility but claimed hits on two of their objectives.[36]

On D-day escort and cover west of the Rhine were provided for the airborne missions by 213 planes of 11 Group, RAF, and by about 330 American fighters under IX Tactical Air Command.† Since in most areas relays of fighters were used to maintain protection throughout the operation, no more than a dozen American fighter squadrons and half a dozen from the RAF were guarding the route at any one time. To avoid boundary problems, the RAF fighters kept their patrols on the north side of the troop carrier lanes between Wavre and the Rhine, while the Americans stayed on the south side.

East of the Rhine, 83 and 84 Groups had five squadrons on patrol after dawn at altitudes of 5,000 and 12,000 feet over the strip bounded by Wesel, Arnhem, Winterswijk, and Dorsten. They added two more at 0930 and kept seven on the watch until after 1300. The Spitfire squadrons which formed the bulk of this force had to be replaced at one-hour intervals because of their limited fuel capacity.†† Additional fighter cover south of Wesel was provided by XXIX TAC, which had one fighter squadron on duty from 0630

*See above, p. 168.

*The figures given above are taken from the history of the bombardment division. Most reports rely on its operations summary, which states that 327 planes dropped 695 tons of bombs on flak positions.

†Both IX TCC and FAAA report that 676 American fighters were used as escort and cover for the troop carriers, but that figure appears to include 273 sorties by XIX TAC in the Mainz-Mannheim area more than 150 miles south of the VARSITY objectives.

††In escort, cover, and fighter sweeps 83 and 84 Groups made some 900 fighter sorties that day.

to 1000 and three during the airborne assault for a total of 72 sorties.

All the escort and cover sorties were uneventful. Only a few German planes were seen, and all kept their distance.[37]

During the airborne assault, flak positions in the vicinity of the drop and landing areas were attacked by fighter-bombers of Second TAF. Seventeen British planes were lost in this anti-flak operation.

Working south of Wesel along the exit route from the southern zones and occasionally attacking guns in the assault area itself was the 406th Fighter Group from XXIX TAC. This group made 48 sorties in relays of 12,* and lost 3 planes but claimed hits on 36 gun positions. As in MARKET the task of hunting out mobile flak batteries was difficult and dangerous; low-flying decoys had to coax the gunners into revealing their position.[38]

Besides protecting the troop carriers with air cover and anti-flak patrols. Second TAF provided all air support in the battle waged by the airborne troops. Its light bombers and fighter bombers made 412 sorties against prearranged targets, including three German headquarters. Operating partly from "cab rank" and partly on special request, 254 rocket-firing Typhoons gave close support. Meanwhile, fighters prowling north and east of the assault area flew 212 sorties on armed reconnaissence. Another 180 planes made regular reconnaissance flights.[39]

East of Münster, the Eighth Air Force made 1,158 sorties during the day in fighter sweeps against air and ground targets. Its pilots intercepted a formation of 20 German fighters about noon and another of 30 about 1530, and claimed to have destroyed 53 enemy aircraft in combat. The intercepted formations, which were both headed west, probably represented feeble efforts at air action against VARSITY. Some of the sweeps were directed against ground transportation and reportedly destroyed 8 locomotives and 132 other vehicles.[40]

*Widely accepted reports that 121 American fighters flew anti-flak sorties for VARSITY have a basis in Ninth Air Force totals, which probably lumped some other missions under that heading (Hq. 9th AF, Air Summary of Operation, 24 Mar 45, in 533.332).

The Final Decision and The Ground Assault

The decision on whether or not VARSITY would be launched on schedule was made by Brereton and Coningham at 1600 on 23 March. This time there was no question of postponement. The meteorologists predicted fine weather for the next day. There would be rather thick haze in the Wesel area during the early morning, but this would clear before the troop carriers' approach, giving them visibility of at least two miles there and over four miles elsewhere. Surface winds would blow at 10 to 15 miles an hour at the bases and about 10 miles an hour on the drop and landing zones. Accordingly the commanders directed that VARSITY proceed as scheduled with P-hour, the moment of the first drops, set at 1000A on 24 March. ("A" Time was Greenwich Mean Time plus one hour.) The decision was reaffirmed at 0600 on the 24th after receipt of another forecast issued at 0400. The predictions closely followed those of the previous evening. VARSITY could go as planned.[41]

Presumably General Montgomery had authorized the launching of PLUNDER, his amphibious assault, the moment he had the air commanders' assent to VARSITY. He has written that he gave the orders at 1530 on the 23d. The operation went with the textbook precision that was his trademark. At 2100, exactly as scheduled, the first wave of assault boats pushed out into the Rhine, carrying the first elements of four battalions of 51 Division. Their objective was Rees, 12 miles downstream from Wesel. At 2200 the Commando Brigade began its crossing about two miles west of Wesel. At 0200 a crossing in the Xanten area midway between Wesel and Rees was begun by four battalions of 15 Division. The 9th Army assault south of the Lippe also began at 0200. All these crossings were completely successful. Everywhere the opposite bank proved thinly held, initial resistance was feeble, and the initial artillery reaction slight.

Fierce fighting did develop at some points. German paratroops facing the northern prong of the assault held Rees throughout D-day and kept 51 Division pinned close to the river. With artillery and mortars still in positions from which they could rake the river in that sector, the Nazis prevented any bridge-building there and made ferry operations difficult. No help would reach the air-

borne from 51 Division, but it was engaging its share of the German defense force. The commando brigade also had its hands full. Despite the severe pounding received from Bomber Command, the garrison of Wesel clung stubbornly to portions of the town throughout the day. However, in the center 15 Division did well and by 1000 hours on D-day was in a position to capitalize on the airborne assault which was to strike the hilltop positions ahead of it.[42]

The Lift and Initial Operations of the British Airborne Division

The first mission in VARSITY to get under way was that of the 61st, 315th, and 316th Troop Carrier Groups carrying the paratroop echelon of 6 Airborne Division from Chipping Ongar, Boreham and Wethersfield. They were favored with almost perfect weather, clear skies and excellent visibility. Emplaning at Boreham was briefly delayed while the British finished their inevitable tea, and a flurry of excitement was produced at Chipping Ongar by a buzz-bomb which passed overhead and exploded near the base. However, take-offs went off about on schedule with the first plane in the air at 0709 and the last shortly after 0740. Of 243 aircraft slated to go, only one failed to depart and that because no load had been provided for it. Aboard the rest were close to 3,900 troops and 137 tons of supplies.

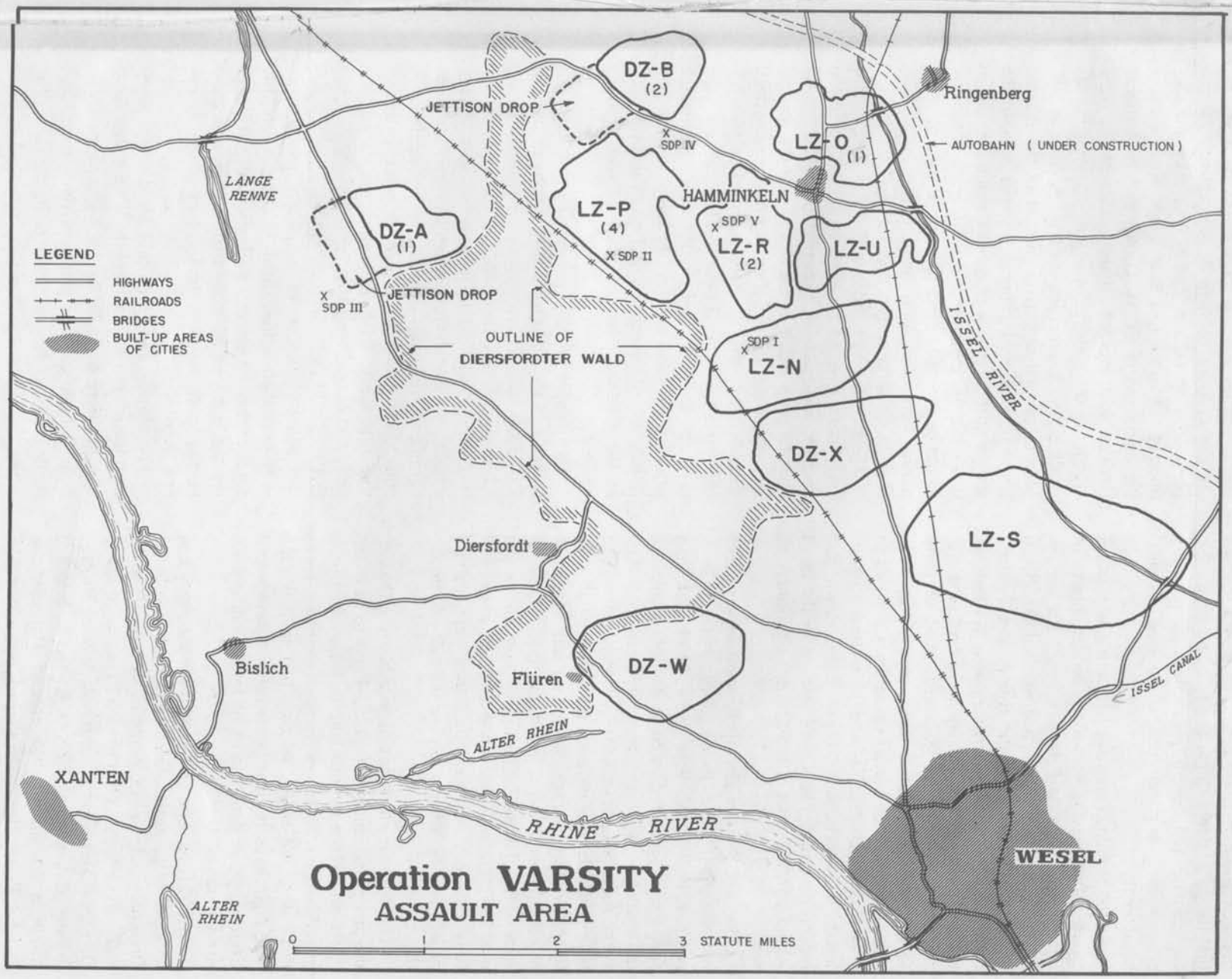
As usual the planes assembled into elements, the elements into flights, and the flights into serials, which then swung over their bases and headed for the departure point at Hawkinge. They reached there approximately on schedule after sighting more robot missiles en route, missiles immune to antiaircraft fire because they were in the troop carrier lane.

From England to the Rhine everything went smoothly. No navigational problems arose. The 213 planes of RAF Fighter Command guarding that part of the route had little to do, for not one enemy aircraft came within sight of the mission that day. The only flaw was an error in timing which caused the various serials to arrive from 6 to 10 minutes ahead of schedule. The crews were aware of their true position and the red warning lights flashed as usual four minutes before the actual arrival time. However, this premature arrival did cut out nearly a third of the artillery bombardment of German flak batteries which had been scheduled to last from 0930 to 1000 hours.

Near the Rhine an unexpected navigational difficulty arose. Montgomery had shielded his amphibious operations with a huge smoke screen extending for nearly 50 miles along the Rhine. Although the generators were turned off early on D-day after reconnaissance pilots reported that unfavorable flying conditions were developing, the smoke did not have time to clear. Borne on the southeast wind it covered the visual aids at Last Lap so they could be seen only from directly overhead and combined with local haze to reduce visibility between the river and the drop zones to one mile or even less. Fortunately the distance was short, less than three miles to one zone, five miles to the other; landmarks on the run-in were plentiful and not such as to be readily obscured by haze; and good Gee fixes were available in case of need. In addition some pilots were helped by the visual aids set out on the zones by the pathfinders from the lead serials. At any rate both supplies and troops were dropped with great accuracy.

Of the first three serials all reached the zone except two which had to turn back for mechanical reasons. At 0951 the rest, 80 planes of the 61st Group and 39 of the 316th began their drop of 1,920 men of 3 Parachute Brigade on or near DZ A, an irregular area about 1½ miles in diameter on the west side of the panhandle which formed the northern end of the Diersfordter Wald. The British troops showed a tendency to become entangled, with the result that some jumped late, others required a second pass, and at least 13 were brought back. Some formations, probably in the rear, came in much too high and dropped their troops from heights up to 1,150 feet. Until after the drop, flak was insignificant, but thereafter it thickened and brought down three aircraft and damaged about 30.

The next three serials had a much harder time. Their objective was DZ B, an irregular area 1½ miles long on the east side of the wood about two miles beyond DZ A. The Nazis in the wood put up surprisingly little fire. All the planes, 40 from the 316th Group and 81 from the 315th, are believed to have reached the zone and dropped at least some of their troops, although at least two aircraft were hit and burning before the jump began. The lead formation reached the zone at 1003, and during the next quarter-hour 1,917 men of


DZ-B
(2)
JETTISON DROP
SDP IV
Ringenberg
LZ-O
(1)
AUTOBAHN (UNDER CONSTRUCTION)
LANGE RENNE
DZ-A
(1)
LZ-P
(4)
HAMMINKELN
SDP V
LZ-R
(2)
LZ-U
SDP II
LEGEND
HIGHWAYS
RAILROADS
BRIDGES
BUILT-UP AREAS OF CITIES
SDP III
JETTISON DROP
OUTLINE OF
DIERSFORDTER WALD
SDP I
LZ-N
ISSEL RIVER
DZ-X
LZ-S
Diersfordt
Bislich
Flüren
DZ-W
ISSEL CANAL
ALTER RHEIN
XANTEN
RHINE RIVER
WESEL
Operation VARSITY
ASSAULT AREA
ALTER RHEIN
0
1
2
3 STATUTE MILES

Map 12.

5 Parachute Brigade were dropped from altitudes between 700 and 1,000 feet. The troops testified that the pilots flew straight and true and gave them an accurate and generally excellent jump. Only seven soldiers were returned, all because of fouled equipment.

As the formations swung left onto a homeward course after leaving the zone, sudden blasts of intense and accurate light flak swept the serials. Of the 121 planes which had reached DZ B, 10 were shot down east of the Rhine, and 7 others crash-landed in friendly territory in such condition that only one or two of them were ever repaired. An additional 70 were damaged, most of them severely enough to make them temporarily non-operational. Troop carrier casualties amounted to only 6 dead, 20 missing, and 15 wounded or injured. However, many crews came down just behind the front; others were rescued by the rapid Allied advance after a brief term as prisoners of war.

The high ratio of aircraft losses deserves sober consideration. The losses were inflicted in a comparatively small area from which flak had supposedly been eradicated by the systematic use of overwhelmingly superior airpower. As Airborne Army analysts noted, the batteries doing the bulk of the damage were too far east to be affected by the artillery barrage. Some may well have been mobile pieces brought in at the last minute in spite of the elaborate interdiction program. Others may have eluded observation or been unsuccessfully attacked. Anyway, there they were, painful proof that flak suppression is a difficult and uncertain business.

The 61st Group returned to Abbeville-Drucat, the first plane landing at 1125. Plans to have the 315th and 316th Groups land in France had been abandoned on 22 March because their new bases there were not ready, so they had to make the long flight back to their home fields, Spanhoe and Cottesmore, at which most of their members arrived about 1300.[43]

At 1021, as soon as the British paratroops had finished jumping, the glider echelon of 6 Airborne Division was to arrive, borne by 440 gliders of 38 and 46 Groups. Of these, 370 were to carry Divisional Headquarters and 6 Airlanding Brigade to four landing zones, LZ's O, R, and U, bunched within a one-mile radius around Hamminkeln, and LZ P, an irregularly shaped area about 1½ miles long from north to south which was just west of those zones and just south of DZ B. The other 70 gliders were to land reinforcements for the paratroops on DZ's A and B. Actually, the outlines of the zones had little significance, because the commanders of 38 Group and 6 Airborne Division had decided on the advice of the commander of the glider pilot regiment to make many small, separate, precision landings as close as possible to tactical objectives instead of the massed landings employed hitherto. Speed was to be sought at the expense of concentration. Although in a sense this meant that *coup de main* procedure would be generally used, two special *coup de main* parties were to land on the eastern edges of LZ's O and U to seize bridges over the Issel.

The first tug and glider took off at 0600. This early start, over an hour ahead of the paratroop aircraft, was necessary because it took about an hour to get a batch of 60 gliders into the air and more time still to haul them up to the prescribed altitude. Only one of the tugs failed to take off. However, the heavy Horsas and Hamilcars were very apt to abort, and in this case, despite the superlatively good weather, 35 broke loose or had to be released prematurely. Two of them ditched in the Channel, but all aboard were speedily rescued.

Two hostile planes were sighted, but none attacked and the high-flying British column suffered little from flak. It lost only seven planes and had 32 damaged. At least 402 of the gliders were successfully released in the combat area. Haze, smoke and dust from the artillery and air bombardments reduced visibility to between 1,000 and 3,000 yards but helped to some extent to shield the fliers. Releases began about 10 minutes early and ranged from the planned height of 2,500 feet to 3,500 feet. So accurate were the releases that about 90 percent of the gliders landed on or very near their zones, many of them within 100 yards of their objectives. Only half a dozen missed the landing area by more than a mile, and those landed to the south in the territory of the American airborne.

The Horsas and Hamilcars fared much worse than their tugs. About 10 of them were shot down and 284 were damaged by flak. The high releases gave German gunners plenty of time to get their sights on the gliders, and they made the most of it. About half of the gliders were damaged in land-

ing, which is not surprising considering the brittle nature of the Horsa, the inexperience of many of the pilots, and the difficulties of landing through smoke and under severe fire.

Ground resistance in many parts of the landing area was at first vigorous and effective. Artillery and incendiary bullets destroyed 32 gliders and the occupants of 38 others were so pinned down by German gunners that they could not unload. That unloading went as well as it did was attributed to the fact that most of the gliders were Mark II Horsas which had hinged noses as well as detachable tails. Only 88 gliders, less than a quarter of those reaching the battle area came through unscathed. As for their pilots, 38 were killed, 37 were wounded, and 135 were missing, a casualty rate of 28 percent.

The glider contingent would have had a much harder time had it not been for the presence of British paratroops on DZ's A and B and of American paratroops, dropped by mistake, on zones west of Hamminkeln. Thus it cannot be said that the British operations in VARSITY provide a good precedent for glider landings on zones not previously occupied by paratroops. However, the gliders did bring into the assault area a force of 3,383 airborne troops with 271 jeeps, 275 trailers, 66 guns, ranging in size from 6-pounders to 25-pounders, and a wealth of other equipment including trucks and bulldozers.

Perhaps the most successful of the three British airborne brigades was that on DZ A. It cleared the zone within an hour of its drop and by 1400 had occupied all objectives in its sector, which was on the northwest side of the Diersfordter Wald. About 1500 a battalion of 15 Division pushed up the hill and entered the paratroop positions. East of the wood the troops on DZ B suffered about 300 casualties in hard fighting around their drop zone and were not able to take their assigned place on the north flank of the division until about 1530.

The two *coup de main* parties were landed with great accuracy, and each speedily took the bridge assigned to it. The resistance encountered by the other glider troops varied tremendously from place to place. However, by nightfall all organized resistance in the British sector from the western edge of the woods to the Issel had been broken, six bridges across the river had been seized intact, and over 600 prisoners had been taken. The cost to 6 Airborne was 347 dead, 731 wounded, and 319 missing, but many of those missing soon rejoined their units.[44]

The Lift and Initial Operations of the American Paratroops

The lift of the American troops began at 0725 on the 24th when a plane of the pathfinder group, which was to fly the lead serial, took off from Chartres with the group commander, Colonel Crouch, as pilot and Col. Edson D. Raff, commander of the 507th Parachute Infantry Regiment, as a passenger. Raff had commanded the paratroops who made the first American combat jump outside Oran during the invasion of North Africa. Crouch had led the pathfinders in missions to Italy, Southern France, Normandy, and Holland. Now, appropriately enough, the two men held the place of honor in the last major airborne operation of the war.

The 46 planes in Crouch's serial flashed into the air in less than five minutes, and assembled so rapidly that they swept over the field in formation on their way to the command assembly point only 10 minutes after the last aircraft left the ground. From Prosnes, Mourmelon, and Achiet six other paratroop serials proceeded to Wavre to take their positions behind the serial from Chartres.

Over northern France and the Low Countries the sky was clear and visibility unlimited. At Achiet, which had only one usable runway, gusts of wind, blowing at 10 to 15 miles an hour across the runway caused one C-46 to swerve and crash on take-off. Only deft handling kept others from a similar fate. Not one of the C-47's in the paratroop formations failed to take off or had to turn back. However, engine trouble and a flat tire kept two C-46's from taking off, and another with engine trouble had to return after take-off. Except for three men injured in the crash, all troops in the aborting planes were transferred to four substitute aircraft, which were standing by, and flew after the rest. The last left Achiet about 0930, half an hour behind schedule.

The C-46 serials from Achiet were scheduled to reach Wavre at 0934 and 0938. In order to take their place in the right-hand lane, they would have to cross the path of the leading American glider serial, which was to enter the center stream from their right at 0936. The remedy prescribed for this awkward situation was to have the C-46's fly

in the left lane, then temporarily free of British traffic, until their greater speed put them well ahead of the gliders, after which they would shift to the right-hand lane. Ingenious as it was, the arrangement left too little margin for error, considering that two very different types of formation, employing different types of planes, were to converge on the Wavre area from widely separate starting points.

What happened was that, as the C-46 pilots approached Wavre, they beheld the glider column crossing directly in front of them. The lead serial turned left, outpaced the gliders, and swung around them into its assigned lane, but it had had to make a considerable detour to do so. The second climbed to 2,000 feet and went over the gliders without changing course. Troop carrier records barely mention the incident and indicate pretty clearly that the Achiet serials quickly recovered their proper course and altitude. However, the commander of the paratroops aboard them, the 513th PIR, believed that the first serial at least never did get fully reoriented and that the subsequent inaccurate drop of his men was a result of this episode.[45]

The first four paratroop serials, a force of 181 C-47's, were to carry 2,479 troops of the 507th PIR and its teammate, the 464th Parachute Field Artillery Battalion, to DZ W. The drop zone was an egg-shaped area of fields and bottom land with a main axis about 2,000 yards long parallel to the direction of approach and with a maximum width of 1,500 yards. It nestled against the south side of the Diersfordter Wald east of the hamlet of Flüren and 2½ miles northwest of Wesel. To reach it the troop carriers would cross the Rhine at a sharp bend in the river near Xanten and from there would fly east-northeast for about three miles to the zone. During most of the run-in they would have on their right a natural pointer, the Alter Rhein, a long, straight, narrow lake in an old riverbed parallel to their course. Shortly before reaching the zone the fliers would pass for a few hundred yards over a hook of woodland projecting from the southwest corner of the Diersfordter Wald.[46]

Given even passable visibility the drop was almost bound to be accurate, but DZ W lay under a pall of smoke blown by the southeast wind from the bombed ruins of Wesel and from Second Army smoke pots along the river, only a mile south of the run-in. The fliers could glimpse colored panels at Last Lap and see the Rhine. Beyond the river the ground was invisible except through an occassional rift in the smoke.

Enemy action had little or no effect on the drop. Since the Germans had already been driven from the open land near the river, ground fire was negligible west of the woods. The first two serials found it everywhere very slight, probably because they took the enemy by surprise. They lost only one plane, hit on its homeward turn, and had five or six damaged. The other two serials bound for DZ W received more fire, mostly from small arms, but, although 29 planes were hit not one was shot down. There was no air opposition although one or two hostile planes were seen on the way back.[47]

The lead serial, which carried the 1st Battalion, lost its way in the smoke, and at about 0950* its first three flights dropped Raff and 493 men on the western edge of the Diersfordter Wald more than two miles northwest of DZ W. This placed them in the sector allotted to the 513th PIR and a little way northeast of the fortress known as Schloss Diersfordt, a major objective, the taking of which had been delegated to the 3d Battalion of the 507th. The rear elements of the serial held closer to course and dropped 200 men of the 1st Battalion somewhat to the south of the castle.

Instead of attempting a trek to the drop zone, both groups went into action on the spot. Raff's men drove confused and wavering German troops out of good positions in the nearby woods, killing some 55, taking over 300 prisoners, and capturing a battery of 150-mm. howitzers. Then they marched south to attack the castle where at about 1100 they found the rest of the battalion already engaging the German occupants.

The second and third serials, both flown by the 438th Group, approached DZ W accurately in good formation and placed the 2d and 3d Battalions of the 507th squarely on the zone. The 2d Battalion came down under heavy fire from German troops concentrated in the woods north and west of it. Nevertheless, the paratroops assembled quickly into platoons and companies, moved against the enemy strongpoints, and by 1100 had taken them in a series of short, fierce actions. Their biggest prize was a battery of 81-mm. mortars which had been zeroed in on the zone. The

*Troop carrier and airborne sources give times ranging from 0948 to 0957, but this is considered most likely. (Hist 1st TC Pfdr Sq, Mar 45.)

3d Battalion also had to conduct a fighting assembly, in the course of which it took about 150 prisoners. However, within 45 minutes after its jump 75 percent of the battalion had been concentrated in readiness to move to Schloss Diersfordt. Altogether, the regiment is reported to have had 90 percent of its personnel assembled within an hour and a half after its jump. Under the circumstances this indicates a high degree of concentration in all three drops as well as excellent performance by the troops.

The fourth serial, which reached the zone about 1005*, was fairly accurate, but its drop of the 464th Field Artillery Battalion was somewhat dispersed. Elements of the battalion were dropped as much as 1,500 yards northwest of the DZ. Under brisk fire from the woods as they hit the ground, the artillerymen hastily set up three 50-cal. machine guns and three howitzers and laid direct fire on the most troublesome enemy positions. After the fighting around them died down, they moved according to plan to the northeast end of the zone and by 1300 hours had 9 of their 12 howitzers set up there. The other 3 had been damaged in landing because the parachutes did not open properly. The battalion only fired 50 rounds that day, most of them during the afternoon in a difficult but successful duel with an 88-mm. gun, two 75's, and a mortar located around a house which the 464th had intended to use as its command post. Maj. Gen. William M. Miley, the divisional commander, jumped with the artillery, but was little more than an observer during the initial stages of the battle. High-level coordination of the innumerable small-unit actions was neither possible nor necessary.

During the afternoon German morale weakened, and resistance in the 507th's sector almost vanished. The last big fight was at the castle. The 3d Battalion arrived there at 1200 after a rapid march through the woods, relieved the 1st Battalion, excepting Company A, which was already deployed, and launched an attack. Within an hour they had taken all the fortress but an isolated turret, bagging some 500 prisoners and five medium tanks.† Evidently German hope and fighting spirit were vanishing together.

Within 3½ hours after its jump the 507th had taken all its assigned objectives, and it appears to have done so in the face of numerically superior forces. It captured that day approximately 1,000 prisoners* belonging to three regiments of the German 84th Division, an artillery regiment, a GHQ battalion and an antiaircraft battery.

What remained to be done was to link up with the ground forces and other airborne units. Contact with elements of the 194th Glider Infantry east of DZ W was achieved early in the afternoon. At 1300 Company D met advance elements of 15 Division, and Company F reported contact with that division at 1434. At 1803 the paratroops joined forces with the British airborne on the northern boundary of their sector, and at 0200 next morning a patrol to the southeast reached the British troops in the Wesel area. In contact with friendly forces on all sides the 507th had nothing more to do in its sector except a little mopping up.[48]

The last three of the seven serials carrying American paratroops were to bring the 513th Parachute Infantry Regiment and the 466th Parachute Field Artillery Battalion to DZ X. This zone was a rough quadrangle, some 2,500 yards long from east to west and about 1,000 yards wide, consisting mostly of small, flat fields. The double-track railway to Wesel ran just inside its western boundary, making an excellent checkpoint for the drop. DZ X was set against the east side of the Diersfordter Wald about 1¼ miles east-northeast of DZ W and 2½ miles north-northwest of Wesel. For more than a mile before reaching the zone the troop carrier formations would have to fly over the central portion of the wood.

The whole air echelon of the 513th PIR, 2,071 men with 64 tons of supplies and equipment, had been lifted from Achiet by 72 C-46's of the 313th Group, 35 in the lead serial, 34 in the second and 3 substitutes flying many miles behind them. Because of the speed of the C-46 the verbal warning was given 15 minutes before the jump instead of 20, and the red light 3 instead of 4 minutes in advance. There was much jostling within the serials, probably because the 313th Group had had insufficient opportunity to fly their new planes in large formations. One jam which occurred as they approached the Rhine may have played its

*Again there is disagreement on the time.

†The paratroops knocked out one tank with a Gammon grenade and two with recoilless 57-mm. guns. The other two were destroyed by the fire of heavy artillery from across the Rhine.

*There are very large discrepancies in the POW figures reported by the airborne troops. The captives had come in so rapidly that it was hard to keep track of them.

part in throwing them off course. The pilots all appear to have believed that they crossed the river at the proper point, but their crossing place was not particularly distinctive, and it is perhaps significant that only one crew reported seeing the panels set out near the west bank to mark it. East of the Rhine the visibility was about half a mile, very bad, though a little better than that on the approaches to DZ W.

Moderate and rather inaccurate light flak and small-arms fire met the two serials as they passed over the wood. Several planes, including the lead ship, flown by Lt. Col. William L. Filer, commander of the 313th, burst into flames, but all were able to continue. Although no one bailed out or turned back the plight of the leader may have affected the accuracy of the drop.

At 1008 the first serial of the 313th reached what appeared to be the drop zone. As they let down to make their drop they were raked by intense and accurate light flak and small-arms fire from positions on their left and received some heavier flak from the right. Suddenly the sky seemed full of burning and exploding planes. The formations began to break up and congestion forced some pilots to slow to as little as 80 miles an hour. The C-46's displayed remarkable resistance to stalling, but one, apparently unhit, did dive into the ground with all its crew and troops. The other 68 in the serials dropped their troops from heights of 600 to 1,000 feet. Of three stragglers, two dropped behind the seventh serial at 1023, and the other after running into interference in two passes over the zone dropped its troops on the west bank of the Rhine. On one plane a bundle stuck in the door prevented a dozen men from jumping, and eight others were brought back, most of them because of wounds. Several paratroops made the jump in spite of being already wounded.

Accurate and intense ground fire, especially from positions along the Issel, continued while the C-46 serials were making their right turn after the drop, and some shooting followed them until they got back to the Rhine. As the remnants of the 313th trickled into Achiet between 1110 and 1147 it became evident that the group had suffered a disaster. The German guns had taken a toll of 19 planes destroyed or fit only for salvage and another 38 damaged, many of them severely. Personnel losses, though less than at first expected, stood a week later at one dead, 22 wounded or injured, and 33 missing.

Of the 19 planes lost, 14 had gone down in flames. Participants in the mission agreed that the C-46 seemed to catch on fire every time it was hit in a vital spot. The 313th Group blamed this inflammability on the plane's complex hydraulic system. The technicians of the 52d Wing attributed it to the arrangement of the wing tanks which, when they were hit, caused gasoline to travel along the inside of the wing toward the fuselage.

In other respects the C-46 showed it could endure punishment very well. One Commando received a direct flak hit on the left engine, then three in the fuselage, and glided to a landing after another hit stopped the right engine. The crew tried to count the small holes in the plane from bullets and shrapnel, but quit when they reached 200. Another plane landed safely at a friendly base with two large shell holes in the left wing, one in the right stabilizer, and major flak damage to the left propeller, the controls, the fuselage, the tail wheel nacelle, and the wheel itself, not to mention numerous bullet holes, some of which had punctured a gas tank.[49]

Unlike the pilots of Crouch's serial, who were vaguely aware that they had missed their mark, those of the 313th were sure that they had either hit their zone or come extremely close to it. Actually they had deposited their paratroops between 1½ and 2 miles north of DZ X in fields southwest of Hamminkeln. Where they crossed the Diersfordter Wald the wood was about as wide as on their proper course, and the relative position of the double-track railroad beyond it was similar to what it was on the true zone. Thus such glimpses as the fliers had of these landmarks merely confirmed them in their error. Indeed, the commander of the 513th PIR was equally deceived and supposed himself to be on the drop zone for quite a while after he reached the ground. The puzzling aspect of the situation is not the failure of visual navigation but the failure of radar to correct it. The 313th reported that its navigators made frequent and successful use of Gee both along the route and in the DZ area, relying principally on the Ruhr chain. As observed earlier, pinpoint accuracy in the use of Gee was not easy to attain, but in this case a single good fix should

have sufficed to show that the 313th was too far to the north.[50]

Most of the 513th Parachute Infantry came down within an area approximately the same size as their intended zone. The drop pattern was such that they were able to concentrate within an hour into about six large groups. The greater part of the 2d Battalion assembled and organized within thirty minutes under intense small-arms fire.

Once assembled the paratroops engaged the enemy in their vicinity and disposed of them effectively. The British airborne into whose sector they had descended testified that the Americans were excellent fighters and very helpful. Fighting and reconnoitering in the drop area occupied a majority of the 513th PIR until after noon. Not until after 1230 did three groups of its men, one from the 1st Battalion, one from the 2d, and another led by the regimental commander, join forces about a mile southwest of Hamminkeln. This regimental nucleus then reorganized and prepared to fight its way south into its assigned area. The movement was sharply contested and had to be interrupted several times for operations against strongpoints along the line of advance. However, the main body of 513th reached DZ X about the middle of the afternoon. Other portions of the regiment made their way to the zone independently against opposition varying from fierce to feeble. First to reach it was a group from the 3d Battalion which had oriented itself quickly, moved south immediately after assembly and reached the drop zone about 1300. Other bodies of men arrived at 1330 and 1530. Because the regimental objectives in the Diersfordter Wald had already been cleared by the 1st Battalion of the 507th PIR and those east of the wood had been taken by members of the 194th Glider Combat Team, the 513th after reaching DZ X was able to deploy almost unopposed into its assigned positions in the northern portion of the 17th Division's sector. In spite of, or perhaps because of, its peregrinations the regiment had destroyed two tanks and two batteries of 88-mm. guns and captured about 1,150 prisoners during the day.

One question which had perplexed the leaders of the 513th PIR during the morning was the whereabouts of their supporting artillery unit, the 466th Parachute Field Artillery Battalion. They were all completely out of contact with it. The reason was that the battalion had come down where it was supposed to, on DZ X. The last parachute serial, a formation of 45 C-47's from the 434th Group, had flown accurately to the drop zone and dropped 376 artillerymen and 12 howitzers* there at 1023. Nine overeager men had jumped west of the Rhine, and two wounded men were brought back. Ground fire against that serial was nowhere more than moderate. It caused the loss of only one plane and damage to 17. This record suggests that if the two preceding serials had followed the proper course their losses would have been much less than those they did incur.[51]

At first the fighting in the drop area was severe, and the artillerymen with only a couple of sticks of infantry to assist them were in a difficult position. All the officers in one battery were killed or wounded within a few minutes after they hit the ground. However, the 466th fought manfully to clear its zone and was greatly aided by glider troops landed north of it on LZ N and south of it on LZ S. Here is a case in which the closeness of the zones and the decision to bring in the gliders immediately after the paratroops was beneficial and may have saved the artillerymen from heavy losses. The amount of infantry fighting that the artillerymen had to do is shown by the fact that they killed some 50 Germans, took 320 prisoners and captured ten 76-mm. guns, eight 20-mm. guns and 18 machine guns.

Within 30 minutes after its jump the battalion had some howitzers in operation. Except for one piece which had been damaged by enemy fire, all its 12 howitzers were in position and ready to fire by 1300 hours. Radio contact with the 513th Regiment was made about noon, and during the regiment's move south the 466th gave it effective artillery support against several German strongpoints. The gunners' performance was the more creditable in that they were in the strange situation of firing from behind the enemy toward their own attacking infantry.[52]

The Lift and Initial Operations of the American Glider Troops

A *Stars and Stripes* headline on the day after VARSITY proclaimed that "All Was Clockwork" in the American glider operations. Successful they

*Three howitzers landed by glider on LZ N joined the battalion later.

Figure 11. Troop Carrier Aircraft Carrying Paratroops in Operation VARSITY, 24 March 1945.

certainly were, but like most combat missions, they did not go with metronomic smoothness.

Of the 610 C-47's and 906 Wacos scheduled to go, 8 planes and 14 gliders had to be replaced by substitutes, either because of unfitness to take off or because they aborted soon after starting. An additional 21 gliders dropped out along the route, principally on account of loose or ill-balanced loads, but also because of structural weaknesses and towing difficulties. Three pairs of Wacos flying in double-tow had the short-tow glider foul its mate's rope, with the result that two lost wings and crashed and three had to be cut loose. Aside from these accidents, double-tow worked well. Although the slowness with which double-tow combinations took the air, even on runways close to 6,000 feet long, made observers hold their breath, there were no crashes on take-off. Formation flying along the way was made difficult by extreme turbulence, which Col. Adriel N. Williams of the 436th Group called the worst he had ever experienced. So strenous was the task of holding the gliders in position that many of their pilots and co-pilots were glad to be able to alternate in 15-minute stints at the controls. As a further complication, the prescribed air speed of 110 miles an hour turned out to be too slow, causing some near stalls and much jockeying for position. Thanks to the clear skies, the simple course, and the effective system of beacons no serious navigational problems appeared until the formations reached the Rhine. The intercom sets, as usual, proved unsatisfactory. In the 50th Wing less than half of them functioned.

The first contingent, two serials apiece from the 437th, 436th, 435th, and 439th Troop Carrier Groups (the last being under the control of the 53d Wing for the operation), all used double-tow, and were the only ones to use it. They flew the 194th Glider Infantry Regiment, the 680th and 681st Field Artillery Battalions and four batteries of the 155th Antiaircraft Battalion to LZ S. The zone was a crude rectangle more than two miles long and more than a mile wide, with its long axis tilted east-southeast. It was about half a mile southeast of DZ X and about two miles northeast of Wesel. The double-track railroad ran just to the west of it. The most obvious landmark on the LZ itself was the Issel, which curved across the zone, isolating the eastern quarter from the rest.

The standard procedure was take-off at 30-second intervals from static hook-up. At Melun and Brétigny the 435th and 436th groups were able to use two runways, one for each serial, but the 437th at Coulommiers and the 439th at Chateaudun had to get along with a single runway apiece. Nevertheless, the 437th Group, which began its take-offs at 0734 had its first serial as-

Figure 12. Paratroop Drop near Wesel, Germany, during Operation VARSITY, 24 March 1945.

sembled and swinging over the field onto course at 0823. The rest followed it to Wavre and down the center lane to the Rhine. Their performance en route was good but, for reasons already noted, by no means perfect. The commander of the 53d Wing, while expressing himself later as very well pleased with his men, considered that even the best formation could have been improved.

The run-in from the bend in the Rhine near Xanten to LZ S was about six miles long. It touched the southern edge of DZ W. There the column was to split in two, one line heading for the northern part of the landing zone and one for the southern part, so that the gliders in each serial could avoid congestion by landing in pairs in two separate patterns. In order to land into the wind they were to make a 270° turn to the left after release.

The glider formations met with the same smoke and haze which had proved such an obstacle to the paratroop echelon. Visibility over parts of the run-in area was reported to be as low as an eighth of a mile, and the landing zone itself was very hard to see. However, only a fraction of one or two serials appear to have gone off course. Possibly the pilots could observe the landmarks better than the faster-moving paratroop formations, or possibly the zone was far enough to the southwest to be somewhat in the lee of the smoke.

During the approach ground fire brought down two planes in the lead serial, forcing their gliders to cut and land about a mile short of their destination. However, the thickest fire was at the LZ and on the turn and consisted at worst of moderate light flak and intense automatic and small arms fire. In all, out of 295 planes entering the battle area on their way to LZ S, 12 were shot down, one lost by accident on its return, and about 140 damaged. Although 14 of the damaged planes were forced to make emergency landings and about that many more needed 3d or 4th echelon repairs, a great many had nothing but harmless bullet holes. Of the crews, four men were known to be dead, seven wounded, and 23 missing at the end of the month.

The lead serial made its release at 1036, the last at 1140. Within little more than an hour they delivered approximately 572 gliders containing 3,492 troops and 637 tons of cargo, including 202

jeeps, 94 trailers, and 78 mortars and artillery pieces, to the vicinity of LZ S.*

As usual that day most of the serials appear to have reached the zone between 5 and 10 minutes ahead of schedule. An exception to this was the 436th Group, which was 14 minutes early. It overran the rear formations of the 437th Group, causing a jam. As a result about half the pilots of the 436th had to climb and release their gliders from altitudes between 1,000 and 1,700 feet. The other serials maintained safe intervals and with few exceptions released in formation from heights of 400 to 800 feet.

Once Wesel was passed, the return was unopposed. The planes swept back across the Rhine, dropped their tow ropes in a specially designated zone five miles south of Xanten,† and headed home on the prescribed reciprocal course. The first planes of the lead serial reached Coulommiers on schedule at 1225, and by 1345 most formations had landed. The flow of stragglers continued until 1500. At least 37 of them had simply stopped at authorized emergency fields to refuel.

In accuracy and concentration the glider landings compared favorably with those in previous operations. Since the conditions were far from favorable, the improvement may be attributed to better training and especially to the rule that every glider pilot make at least five landings a month. Of 157 loads delivered by the first two serials, 139 were well concentrated at their proper destination, the east end of LZ S, 11 landed within a mile of the zone, 4 fell short as a result of enemy action, 2 were missing, and 1 straggler landed several miles to the north. A sequence of 15 gliders at the tail of the lead serial achieved the feat of packing themselves into a strip a quarter-mile long, and the first dozen of the next serial did equally well in a neighboring area.

In the four middle serials the Wacos were spread loosely all over the zone, about a dozen outliers were scattered up to a mile away from it, and two landed more than two miles off in the British sector. After the last two serials split at DZ W, part of the left-hand line deviated too far to the north. In consequence, of 141 gliders brought across the Rhine by those two serials, only 58 landed as they were supposed to on the west end of the zone, a couple of others were on other parts of the LZ, about 50 within a mile of it, mostly to the northwest, 21 between 1 and 2 miles northwest, 4 slightly further in that direction, and 6 were missing.

This error by the 439th Group, the only significant inaccuracy by American glider formations in VARSITY, was less serious than it might have been. Since most of the territory for three miles northwest of LZ S was occupied by other drop and landing zones, most of the misplaced glider men found themselves among friendly troops.

As the gliders swooped down in their 270° turn, they ran into savage fire from flak and small arms. According to one prisoner, the Germans had fused their shells to burst at 500 feet, a little low for most of the planes but effective against the gliders. Also, it was observed that the gunners seemed to concentrate on the gliders rather than on the planes. Over 50 percent of the descending craft were hit by flak and a similar proportion by small arms. Less than a third were unhit. The gliders given high releases by the 436th Group seem to have suffered a little more than the rest from flak, but otherwise all serials fared approximately the same. Never had the toughness and stability of the Wacos shown to better advantage. Though most of them were hit, only a few, perhaps half a dozen, were shot down.

The enemy had set up no landing obstacles worthy of mention, but many gliders were wrecked on landing, usually by collision with trees, phone poles or other gliders. Wounded pilots and damaged controls were contributing factors in some cases. The report on one glider was "Controls hit by flak in air. Wings and nose gone. Pilot and co-pilot hit. 12 EM WIA." "Wing tip shorn on telephone pole. Landing gear shorn in trees. Flak hit tail in air. Load and personnel O.K." was the laconic entry on another.* As usual a majority of the Wacos suffered minor damage to landing gear, nose or wings, generally from landing on soft ground or hitting fences or hedges. Such accidents, however, rarely harmed occupants or cargo. One glider plunged through three fences without damaging its contents.

*The initial load had been 592 Wacos with 3,594 troops and 654 tons of cargo including 208 jeeps, 101 trailers and 84 mortars and guns.

†Similar areas had been designated for other glider missions, but this was the first in which friendly territory could be used for the purpose. Tow ropes were too valuable to be dropped at random or over enemy territory if it could be avoided. At the same time, falling ropes were too dangerous to allow their being dropped on the zones or near the troop concentrations on the west bank of the Rhine.

*Report of Glider Operation, 24 Mar 45, Serial #10, in KCRC, files of 17th Abn Div.

The moment after landing was the most perilous of all. The zone was infested with entrenched riflemen and machine gunners. Every building in sight seemed to house its crew of snipers. There were several batteries of 20-mm. flak guns, at least four 75-mm. and 88-mm. pieces and innumerable mortars in action. At least nine gliders were destroyed on the ground by shells and tracers. Several other Wacos were so raked by machine guns and rifle fire that all or most of the occupants were hit before they could take cover. Under the circumstances fighting came first and assembly second.[53]

The role of the 194th Glider Infantry and its attendant artillery was to occupy the southeast corner of the divisional sector bounded on the east and south by the Issel River and Canal. It was to make contact with the British commandos on the southwest, the 507th PIR to the west and the 513th PIR on the north.

At first LZ S was a scene of the wildest confusion with at least 150 small battles raging at various points. In these fights concentration counted heavily. The 2d Battalion with 90 percent of its gliders on the zone, most of them well grouped, was off to the best start. Its companies had assembled and were advancing on their objectives within 45 minutes after landing. Fastest of all was half of Company E. Thanks to exemplary performances by pilots and glider pilots of the 437th Troop Carrier Group in the second serial it was able to assemble within a quarter of an hour, taking 50 prisoners in the process. Shortly thereafter it and part of Company F converged upon a German regimental CP and took it with a rush. So bewilderingly swift had been their onslaught that as the German commander was going out the door of the dugout under guard, an orderly, unaware that the CP had been captured, dashed out of an inner room calling "Sir, you forgot your maps."

By noon the 194th Glider Regiment was 73 percent assembled, and German resistance was beginning to crumble. The defenders' efforts had been directed principally at knocking out the airborne forces as they landed. Once the speed and size of the attack and the aggressiveness of the attackers made it evident that that was a vain hope, most of the Nazis saw no point in further resistance. The only area in which substantial counterattacks were attempted was to the south. In that sector the Germans struck back, using several Mark IV tanks. Four of the tanks were knocked out by bazookas, but Company G was repeatedly pinned down and had some of its positions overrun. Not until sundown did a patrol get through to Wesel to make contact with the commando troops. That night much of the area between the landing zone and the city was still a no-man's land. Out of it about midnight emerged a force of about 150 Germans with two or three tanks and self-propelled guns. They ran into the glider pilots of the 435th Group, who, organized as an infantry company, and with the help of a couple of antiaircraft batteries, were guarding a crossroad northeast of Wesel. The defenders held their fire until the enemy was close, then smashed the attack with a single volley, which killed about 50 men and knocked out a tank. The Germans stumbled off into the darkness, ran against a position manned by glider infantry and broke up. So ended organized resistance in the territory allotted to the 194th Glider Regiment. The regiment had taken about 1,150 prisoners and had destroyed or captured 10 tanks, 2 flak wagons, 37 artillery pieces and ten 20-mm, antiaircraft guns. The airborne units on LZ S had had over 50 dead and 100 wounded or injured during the landings and the initial assembly period. Of the glider pilots accompanying them 18 were killed, 80 wounded or injured, and 30 still missing three weeks later.

It is to be noted that the first artillery support received by the 194th Glider Infantry came not from the guns landed with it but from British guns across the Rhine, against targets given them over the radio of the 681st Field Artillery. They went into action soon after the landings, at a time when assistance was particularly welcome, and continued to good effect throughout the day. In some contrast to this was the effort of the 680th Field Artillery which fired only three missions totalling 20 rounds that day, although it did manage to get eight guns into position after a dispersed landing and some hard infantry fighting. Two of its guns had been landed too far away to reach the unit on D-day, and two had been destroyed by enemy fire. The 681st was firing coordinated missions within two hours after landing and executed six missions that day, firing a total of 79 rounds. It had assembled 10 usable guns. Another, landed beyond the Issel, was fired, but later abandoned. All of the antiaircraft guns appear to have arrived safely.[54]

The last seven American glider serials were to go to LZ N. This zone, about 1½ miles long and half a mile wide, lay against the east side of the Diersfordter Wald about 4 miles north of Wesel. It was tightly sandwiched between DZ X on the south and two British landing zones to the north. Once again the principal landmark on the zone was the ubiquitous double-track railway, which slanted across its western end.

The 440th Group was to send two 45-plane serials to LZ N from Bricy, the 441st one of 48 from Dreux, the 442d one of 48 from St. André de l'Eure, and the 441st and 442d would each contribute half of another 48-plane serial from Chartres. These were all from the 50th Wing and would fall into line at Pontoise, the wing departure point. Two 40-plane serials of the 314th Group from Poix in the 52d Wing area would take position behind them at Wavre. All were to haul Waco gliders in single-tow. Bricy had a giant runway 7,700 feet long, but the other bases were unsuitable for double-tow operations, either because of short runways or lack of marshalling facilities.

The load going to LZ N amounted to 1,321 troops and 382 tons of supplies and equipment, including 143 jeeps, 97 trailers and carts and 20 guns and mortars. The troops consisted of the 139th Engineer Battalion and a mélange of medics, signal men and staff personnel. These specialists had been protected as far as possible by sending them last and by providing that the 513th PIR should occupy the landing zone before they arrived. However, at the time of the landings the 513th was still pulling itself together after its unexpected drop near Hamminkeln.

Take-off and assembly was punctual and without serious accidents, although the strong wind created difficulties, especially at St. André de l'Eure, where it blew at right angles to the runway. The leader of the 440th Group took off from Bricy at 0831, and all 90 of his group's tug-glider combinations were in the air within 38 minutes, having taken off at 20-second intervals.* The 442d Group's 48-plane serial from St. André began its take-offs at 0900 and swung over the field in full formation headed for Pontoise at 0935.

Wind, turbulence, prop-wash, and the unduly slow air speed specified in the orders gradually distorted the glider formations, and caused the rear elements of the serials to stack up until they were some 400 feet or more above the leaders. On the other hand, all but one glider, which was cut loose because of structural weakness, arrived at the Rhine squarely on course, within sighting distance of the white panels and yellow smoke which marked the point where they were to cross the river. Excellent fighter cover, both above and below their level, protected them as they approached the battle area. Between Wavre and the Rhine eight flights of fighters were seen, and protection by one flight or more was continuous. No German fighters came forth to challenge them.

Ground fire between the Rhine and the landing zone was remarkably meager and ineffective. There was only an occasional rattle of small-arms fire as the serials crossed the concave waist of the Diersfordter Wald. Most of the enemy in that part of the wood had already been dealt with by the 507th Parachute Infantry. Fire from the zone itself was hot enough to make Lt. Col W. H. Parkhill of the 441st Group describe it as a flaming hellhole, but the shooting was directed at the gliders. The planes were mostly left alone.

Between 1404 and 1505 the serials returned to their bases almost intact amid a festive atmosphere at opposite poles from the anxiety and sorrow in the 313th Group. Out of 313 planes winging over or near LZ N only 3 were lost and 44 damaged. Moreover, only 9 of the damaged craft needed 3d or 4th echelon repairs. Not a man in their crews was killed or missing and just 3 were wounded. All losses and most of the damage appear to have been incurred during the turn, a mile or more beyond the zone at points where the formations came temporarily within range of enemy positions beyond Issel.

The first glider release over LZ N was made at 1155, five minutes ahead of schedule, and subsequent releases ran from three to six minutes early. The seven-minute interval allotted each serial proved a little too tight for 48-plane formations, and one or two of them overran their predecessors. This happened to the 441st Group's serial from Dreux, and probably accounts for the fact that it released too soon and too high, at the west end of the zone instead of the east and at 1,000 to 2,000 feet instead of 600 feet above the ground. In other serials the lead elements generally came in at about the right height, but the rear usually slanted up to over 1,200 feet and in the last serial as high as

*Two had to return with engine trouble and were replaced by substitutes.

2,500 feet. Such differences in altitude made it impossible to follow a uniform landing pattern. Many gliders were so high that their pilots felt it necessary to make more than the prescribed 270 degree left turn, and some in the 441st Group made one or even two complete circles before beginning that turn.

Haze and smoke, which still held visibility to about half a mile, also disrupted the landings. The glider pilots could see the ground beneath them quite well but could make out very little ahead of them or to the side until they were about 200 feet from the ground. Men who did not know exactly where they were on release needed a rare eye for terrain to orient themselves on the basis of a few fields and farm buildings. Many had no idea where they were when they landed.

Intense fire, mainly from small arms, met the gliders as they coasted down. As a rule, whether by design or because they could not see through the smoke, the Germans held their fire until the Wacos were below the 500-foot level, so the high releases did not produce appreciably greater damage or casualties than the normal ones. Only one glider is known to have been shot down, but at least a quarter of them were hit, producing some damage and several casualties.

Every one of the serials intended for LZ N appears to have released over or very near that zone.* This is sufficiently demonstrated by the fact that of 302 gliders, the positions of which are recorded, about 200 landed on the zone, not more than 15 landed over 1,000 yards away from it and none more than a mile and a half away. The south wind combined with the low visibility to produce a tendency to land further north than was proper. In the first five serials only 6 gliders landed south of the zone and 61, including 5 outside the 1000-yard mark, landed to the north. The last two serials, which had been allotted the southwest portion of the zone, released over or outside the edge within sight of panel markings and smoke set out on DZ X. As a result none of their gliders came down north of LZ N but about 31 landed south of it, 7 of them far enough south to be on or near LZ S.†

Although accuracy was fairly good, concentration was poor. The first two serials, scheduled to land in the north central part of the zone, spread out quite evenly all over it. The next, supposed to use the east end of the LZ, put 15 gliders at its western end and scattered many others. The last four serials were likewise dispersed, but with a tendency to string out from north to south. It was exceptional for a sequence of more than four gliders to land together. Thus, whereas initial assembly of the airborne on LZ S was frequently by platoons and pairs of platoons, on LZ N it had to be by squads and pairs of squads. Although there were some complaints that the glider pilots had lacked air discipline and had gone on the principle of every man for himself, the prevailing view was that they had landed as well as could be expected, considering that they had to contend with low visibility and intense ground fire and that so many of them had been released from faulty formations at improper altitudes. Those in the later serials had the added excuse of having found the best of their assigned fields already occupied not only by American gliders but by several British Horsas.

Unwilling to serve as targets any longer than necessary, a large proportion of the glider pilots dove down in tight spirals and made fast, rough landings. Over 50 percent of the gliders were damaged in accidents, but once again almost all their loads came through intact. While some gliders landed among friendly troops north or south of LZ N, the zone itself was enemy territory. No advance party of paratroops had arrived to neutralize it. The Germans seemed to have a detachment in every building or patch of woods, and although loath to venture from cover, they maintained a steady fire. Many glider men were slain in their seats, and many loads were burned or destroyed by mortars. In several cases the airborne were pinned down for as much as two hours. As of early April, glider pilot casualties stood at 14 dead, 26 wounded, and 51 missing, a ratio indicating resistance almost as severe as that on LZ S. Actually the defending force in the vicinity of LZ N appears to have been relatively small and lacking in artillery* but its opponents, not much more numerous, were mostly semi-combatant specialists, and rather widely dispersed. Fighting lasted

*As on LZ S, the formations were to split as they approached the zone and release in columns of pairs 600 yards apart. Elements of these columns may have spread too widely.

†The three landing farthest south had made a right turn instead of a left turn on release. (MR 50th TC Sq, 24 Mar 45; Hq 50th TC, Operation VARSITY, Composite Narrative of Squadron Glider Pilots, 30 Mar 45.)

*A single 88-mm. gun is said to have been the only piece of sizable artillery on the zone. (Hist 97th TC Sq; Mar 45.)

until about 0530 with the 139th Engineer Battalion doing the lion's share of the work in clearing the zone. That day its men killed 83 Germans and captured 315.[55]

Resupply

Close behind the last troop carrier formation came the bombers engaged in the D-day resupply mission. In contrast to the bombers' supply drop in MARKET, this had been planned well in advance. The Second Air Division had been told in general terms by the Eighth Air Force on 9 March to prepare for such a mission. On the 14th in collaboration with Eighth Air Force planners the Division had blocked out a tentative plan which called for a run on a south-to-north heading followed by a quick left turn into friendly territory. However, in the big conference at Second TAF on the 17th the plan was changed to give the bombers the same route as the troop carriers as far as the drop zones and a right turn after the drop to take advantage of measures to be taken against flak in the Wesel area.

The field order issued by the Division on the 22d called for 240 B-24's to take off from East Anglia and pick up the troop carrier route at Hawkinge. The bomber force was to keep in the right-hand lane from Wavre on and was to descend gradually from heights of 3,000 feet over England, 1,500 feet over the Channel, and 1,000 feet at Wavre to a drop altitude between 300 and 500 feet. From a cruising speed of 160 miles an hour at Wavre the B-24's were to slow to 155 miles per hour at the IP and to 150 or under for the drop. Any danger that they would overrun the much slower glider formations was to be reported by the escort commander in time for the bombers to regain a proper interval by making a circle or a dogleg. At Wavre the nine groups committed were to fall into trail and at the IP the individual flights would do so. The basic formation would be the nine-plane V of V's, loose en route and tightened for the final run. Two weather planes 20 minutes ahead were to report on conditions at the destination.

At 1257 the first planes were to begin dropping supplies for the 17th Airborne to Supply Drop Point W. This was an oval about 2,000 yards long from east to west and 1,500 yards from north to south, roughly identical with DZ W. It may be recalled that the big bend in the river near Xanten, the lake known as the Alter Rhein, and the southern edge of the Diersfordter Wald provided convenient landmarks on the way to that zone. Airborne troops on the spot were to mark the zone with a red T, white letter W and red smoke and were also to have an M/F beacon in operation. The 120 planes in the rear of the column were to deliver their loads to 6 Airborne Division on SDP B. This was a diamond-shaped area about 2,000 yards across located about 4½ miles east of the Rhine and about ¾ of a mile west of Hamminkeln with the double-track railroad on its southwest edge. It was to be marked with a yellow T, green smoke, and a white letter B, supplemented by an M/F beacon. In addition a VHF landing beacon (SCS-51) was to be set up at the IP and aimed at SDP B so that the bombers could ride along its beam to their objective. After completing the drop the bombers were to turn to the right, climb to 2,500 feet and return along the troop carrier route to Wavre. From there they would make almost a bee-line return to their bases by way of Ostend.

Supplies for the airborne had been requisitioned well in advance. Those for the Americans had been packed by the 490th Quartermaster Depot Company and those for the British by the Air Dispatch Group. The packages were then sent to the Third Strategic Air Depot at Neaton, and from there between 20 and 23 March they were distributed to the bomber bases, all of which were within 30 miles of the depot. At 1430 on the 23d loading began. Thanks to careful preparation this unfamiliar task was accomplished without difficulty. The Second Air Division had conducted tests and issued a special letter of instructions; the 490th Quartermaster Company had provided two-instructor-demonstrators and the personnel of the bomb groups had been given special training in loading and dropping procedure.

Each plane was to carry about 2½ tons of cargo, wrapped in 20 or 21 bundles, a dozen forward in the bomb racks, five or six in and around the ball turret well (the turret having been removed), and three at the emergency escape hatch in the tail. Because their load was abnormally light, the Liberators tended to be tail-heavy. Consequently ammunition and other heavy articles were concentrated forward. All bundles of gasoline cans were placed at the turret well. Some

indestructable items were to be allowed to fall free, but most were to have parachutes, each of the four classes being distinguished by a chute of a different color.[56]

The first bombers rose into the air from their East Anglia bases at 0910. Take-off and group assembly were fast and efficient. The big planes rolled away at average intervals of considerably less than a minute apiece. Briefing errors caused some groups to take wrong positions in the line, and though attempts were made to correct this situation, the confusion thus created seems to have caused recurrent overrunning and stringing out. Most inconvenienced by this was the 491st Group, which was to lead the drop at SDP B. It had to make several "S's" and doglegs to keep behind the 44th Group and had to swerve again to avoid it as they reached the Rhine. At least one group went down on the deck to avoid the prop wash of its predecessor.

Navigation was very good, and unintentional deviations from course were few and generally unimportant. Two flights of the 389th Group did find themselves heading to the south of SDP W and had to circle for a second pass. In the 448th Group, headed for SDP B, an accidental drop west of the Rhine by one plane caused four more to drop all or most of their loads west of the river. Two other pilots in that group reported dropping at random in the American sector. The first formation made its drop at 1310 and the last about 1330. There seem to have been no major errors, but minor ones were sufficient to spread supplies all over the Diersfordt area. Fortunately, few pilots overshot the mark by so much as to put them beyond the territory held by the airborne, so almost all the bundles were recoverable.

The bomber men blamed the dispersion of the supplies on haze and smoke so thick that a formation half a mile ahead was invisible. Because the bombers were making their run at speeds 20-30 percent faster than those of the troop carriers and were engaged in an unfamiliar type of operation, this short field of vision was a particularly serious handicap for them. They also complained that reception of the M/F beacons had been poor. However, their Gee sets had functioned perfectly, the VHF beacon beamed at SDP B had worked very well, and the columns of colored smoke at the drop points had been plainly seen by many pilots.

Probably the biggest source of error was approach from too low an altitude. Many flights came in at altitudes between 100 and 300 feet, and some pilots had to zoom to clear the high tension line. This sort of hedge-hopping was not conducive to accurate navigation, nor could pilots coming in on the deck have a right to expect much assistance from either radio beacons or visual aids. Another factor contributing to dispersion was the time taken to eject the bundles. Bundles in the bomb bay could be released by turning a switch, and those in the rear of the plane could, if all went well, be shoved out in six seconds after the men there were notified by the alarm bell, but a balky bundle or a fouled line could easily cause enough delay for a plane moving at 150 miles an hour to go a mile or two. There was also an element of risk inhibiting hasty movement around an open hole. One man was whisked through the turret well along with the bundles he was pitching out.

The 17th Division G-4 was unable to collect more than about 50 percent of 306 tons of supplies dropped for that division. However, it was known that many bundles had been picked up and used on the battlefield without any report. The British airborne reported that about 85 percent of their 292-ton consignment landed in the divisional area and 10 percent to the north of it. On 7 April they reported having recovered about 80 percent, a very high ratio for parachute resupply. Probably the actual recovery ratio for the 17th Division was equally good.

The Liberators met no opposition until after the supplies were dropped, but after that they ran into light flak and small-arms fire which in the opinion of some participants surpassed anything they had encountered on bombing missions. In spite of their armor 15 of the B-24's were shot down* and 104 of them were damaged. Astonishing to relate, the bombers' loss ratio was seven times that of the C-47's which had flown to LZ N only a few minutes earlier. The losses and damage were so distributed that no single battery could have caused more than a small fraction of them. Some planes were hit very near their zones, others near Wesel after turning homeward. Seven of the 15 lost aircraft were missing and unaccounted for. It seems possible that in some cases the momentum of the relatively fast and heavy Liberators carried them beyond the Issel before they could complete their turns, thus giving German gunners who had

*One may have hit a mast or other obstacle.

never had a shot at the C-47's nor revealed themselves to the flak eradicators of 83 Group an opportunity to spray the bombers at close range.[57]

Before the last bomber dropped its load of supplies, the airborne troops had made contact with advance elements of Second Army. As the afternoon advanced other contacts were made, and German resistance disintegrated at an accelerating tempo. Accordingly, although 6 Airborne Division requested that the resupply mission for D plus 1 be sent as scheduled, Second Army cancelled it about 1600 on the 24th on the grounds that it was not needed. VARSITY was over.[58]

The Exploitation of VARSITY

Although the airborne troops employed in VARSITY had been integrated into the ground offensive before the end of D-day, and although no further airborne or resupply missions were flown, a brief look at subsequent events is necessary to reveal the results of the operation.

As recorded earlier, the fighting done by the airborne during the first few hours had been on a small-unit basis, with regimental headquarters gradually establishing control. Corps and divisional staffs did not begin to function until after mid-afternoon. General Ridgway and a small staff from XVIII Corps reached DZ W at 1526 hours after having crossed the Rhine by assault boat. The 17th Division opened its CP at Flüren at 1600 hours, and the corps headquarters shared its facilities.

After beating off counterattacks east of Wesel and west of Ringenberg on the night of the 24th both airborne divisions spent most of D plus 1 in mopping up very feeble resistance. The front ran from the Rhine about a mile north of Bislich to the Issel River, a mile north of Hamminkeln, along the river to the Issel Canal, and along the canal to the outskirts of Wesel. It included several Allied bridgeheads on the far side of the river and the canal. In Wesel itself the commando brigade, which became attached to XVIII Corps on the morning of the 25th, continued to have hard fighting throughout the day at some places but had nearly finished its task by nightfall.

During the afternoon and night of D plus 1 the 17th Airborne moved quietly across the Issel and into positions along the autobahn. At 0900 on the 26th it attacked with ample artillery and tank support, swept ahead easily, and by 1100 had reached points six miles east of Wesel. That afternoon elements of the 507th PIR took a bridge over the Lippe outside Krudenburg seven miles east of Wesel and made contact there with units of Simpson's Ninth Army. The British airborne also pushed between two and three miles eastward but were unable to take Ringenberg on their northern flank.

On the 27th General Miley gave the order "Advance to Dorsten. This is a pursuit." At midnight a British armored brigade passed through the positions of the 17th Division, and next day troops of that division rode tanks into the outskirts of Dorsten, some 14 miles east of Wesel. All German lines had been broken, and Montgomery's armored columns, sweeping through the gaping hole, were free to drive into the heart of Germany. On the 29th a spearhead plunged 16 miles to Haltern and Dulmen. On the 30th XVIII Corps Headquarters closed its command post and retired to the rear. A few days later the 17th Division was also withdrawn.

Nothing shows the collapse of German resistance after the first few hours of fighting more strikingly than the Allies' casualty figures. Up to 2400 on D plus 2 the 17th Division had 231 men reported killed in action and 670 wounded, exclusive of injuries. Most of these casualties had been suffered in the first five hours of the operation. During the five days from D plus 2 through D plus 7 only 74 more were reported killed and 102 more wounded, including about 40 men who had been previously listed as missing. On 31 March the division reported a total of 284 men missing and 182 injured, only 20 of the injuries being serious. Since few were injured and hardly any cut off after the initial phase of the operation, these figures probably approximate the toll of injured and captured resulting from the VARSITY drops and landings.

The Americans on their part took about 3,000 German prisoners on D-day. During the spectacular advances of the next four days they took less than 1,000, and most of those were overrun rather than overcome. During much of that time there was no contact with organized enemy forces. Resistance consisted of little more than sniping and the defense of a few roadblocks. Meanwhile, the American Ninth Army had been moving rapidly, despite stiff opposition in some places,

and by the 28th had pushed its front to a line extending from Dorsten south to Gladbeck. On the northern flank, however, Montgomery's troops in the Rees area were held close to the Rhine throughout four days of hard fighting. They were able to advance on the 28th as far as Emmerich on the north and the Issel on the east, but even this success must be discounted, because by then their opponents' position had been rendered untenable by the deep penetration of the Allied airborne troops south of them. While it seems impossible for the Germans to have stopped the massive forces arrayed for PLUNDER, the slow costly progress around Rees indicates that they might have contained a purely amphibious assault by Second Army for several days. If so, VARSITY deserves recognition as the decisive stroke which brought about a quick breakthrough.[59]

Special Features of VARSITY

Some aspects of VARSITY, notably the roles of the forward visual control posts, the combat control teams, the glider pilot "companies," and glider salvage, require special mention. The Horsas carrying the three forward visual control units landed safely and accurately. However, the equipment for one team burned after being hit by German artillery. A second team was in operation at the 6 Division CP within two hours after its landing. It quickly made radio contact with the Forward Ground Control Center and that afternoon directed fighters from 83 Group's "cab rank" against four targets given it by the G-3 Air of 6 Division. Next day the team handled 22 accurate and generally successful missions against targets which were sometimes within as little as 300 yards of the British positions. On an average requests took only about five minutes to go from the troops to brigade to G-3 for evaluation and another five for transmission to the pilots by the forward visual control post (FVCP) with the forward ground control center monitoring and assigning priorities. The plan to have the other FVCP join the 17th Airborne after landing on a zone in the British sector proved unrealistic. The difficulties of moving for several miles across an area in which fighting was going on prevented the unit from reporting until the morning of D plus 1. After it did arrive it was not much needed and directed only four strikes. While the employment of the FVCP's was limited, their success, particularly in the British sector strongly indicated the value of having such a system to provide for the airborne troops, through precise and punctual air support, the firepower which they themselves lacked. Tanks were the worst enemy of the airborne, and in its brief period of operations the FVCP with 6 Division was credited with calling down aerial destruction on 16 German tanks.[60]

The two combat control teams landed at opposite ends of LZ N, took cover for an hour, and then unloaded their equipment. Thanks to the policy of duplication they were able to function although one of their six gliders had crashed and the radio aboard another had been damaged. Both teams reported to the 17th Division CP at 1700 hours that afternoon. Next morning at 0800 they went on the air, made contact with the Combined Command Post at Maison Lafitte half an hour later, and continued in operation until 1050 on D plus 2. Cancellation of all airborne missions after D-day deprived them of their planned function of coordinating troop carrier traffic. They might have had difficulty in exercising that function, for they did not receive any messages from FAAA, although seven out of nine radio messages sent by them were received by FAAA.[61]

The discipline and combat effectiveness of the glider pilots won high praise from the airborne. On both American landing zones they did a good job under fire which was everywhere harassing and frequently intense. A majority participated in the initial assembly and came under the control of the wing organizations before nightfall. The senior glider officer on LZ S sent 50 pilots to guard the CP of the 17th Division, two "companies," to hold positions along the railroad embankment at the west end of the zone, one "company" to guard a crossroad, and one to guard prisoners. As noted earlier, the unit at the crossroad performed like veterans that night in beating off a German force of superior size. The rest had a surprisingly quiet night. They were relieved at 0900 next morning and marched back to the Rhine, 583 strong, as escort for 2,456 prisoners. After delivering the prisoners they were taken by DUKW's across the Rhine and to a British artillery base, where they were given refreshments, put aboard trucks and transported to an airfield at Helmond. From Helmond troop carrier planes flew them back to their home stations.

Most of the glider pilots landing on LZ N were organized into "companies" under the command of the 53d Wing CP and did guard duty or held defensive positions during the night for the 513th Parachute Infantry. One of their units had a brisk fight in the dark with German troops and did well. They were not relieved until 1530 on D plus 1, and did not leave the battle area until 1730, too late to reach Helmond that day.

Despite some delays at Helmond three quarters of the glider pilots were returned to their units before the end of D plus 4, and almost all who were fit to travel were back within six days. As of 9 April only 55 out of about 1,770 American glider pilots reaching the combat area were still missing. Only 35 glider pilots had been killed, 85 wounded and 21 injured.

Although the low casualty rate suggests that landing gliders in the midst of an enemy line of defense was much less dangerous than had been expected, the glider pilots expressed a preference for having paratroops on the landing zone ahead of them. If assault landings were to be made, they recommended that the gliders be provided with more and better exits and with some armor or at least flak curtains. Also, if they were to play the part of combat troops they wanted some heavy weapons such as bazookas and BAR's. Once again they called for better maps of the landing area, preferably on a scale of 1:25,000. In spite of all precautions, scattered landings and battlefield confusion had forced large numbers of the glider pilots in VARSITY to find their own way, and in such cases possession of an adequate map was a life and death matter. On the whole, however, they felt that the planning and execution of the glider side of VARSITY was the most efficient to date and that the problems raised by previous missions had mostly been solved.[62]

The gliders in VARSITY had fared much worse than their occupants. A caretaker detachment sent in on D plus 2 found them in bad shape with most of their clocks and compasses gone. Some 600 repairmen arrived on 4 April and repaired 148 Wacos enough so they could be snatched" and flown to Grimberghen for complete overhaul. In the case of the big British gliders, pick-up tactics were not considered feasible. Of those conveniently located and in good condition, 24 were disassembled and hauled away by road to a base where they could be repaired, reassembled, and flown back. The rest of the American and British gliders were salvaged. Salvaged materiel from the Wacos alone filled 47 trucks and 30 trailers. Nevertheless, the fact remains that less than 17 percent of the American gliders and 6 percent of the British gliders which had landed east of the Rhine were recovered in usable condition.[63]

Conclusions

General Brereton described VARSITY as a "tremendous success" and rated it the most successful airborne operation hitherto attempted. Through the use of multiple traffic lanes, the C-46 aircraft, and double-tow, nearly 17,000 well-equipped airborne troops had been poured into an area of less than 25 square miles within four hours. This concentration in time and space was decisive.

Captured documents, the testimony of prisoners, and the postwar statements of German generals agree that the defenders had anticipated an airborne assault in the Wesel-Emmerich sector and had prepared for it. They appear to have had at least 10,000 men in carefully organized defensive positions in the Diersfordt area. An initial attack by one airborne division or less might have been resisted stubbornly, as was the assault at Rees. Instead the unprecedented and unexpected weight of the blow overwhelmed resistance and shattered the precarious morale of the defenders. Contributing to this was surprise as to the precise location of the assault area and paralysis produced by the terrific Allied air support effort. The Germans had kept their reserves several miles back. When the day came only one regiment was able to make its way to the assault area. Without sufficient reinforcements for holding operations, let alone a counterattack, the Nazis were unable to prevent a complete breakthrough. The airborne also aided in the progress of PLUNDER as planned by covering the flank of the commandos at Wesel and by preventing observed artillery fire at British pontoon bridges across the Rhine above Bislich, but these effects were insignificant compared to their success in smashing a hole through the German lines.[64]

The fact that the Diersfordt area was only three miles away from ground troops who had successfully pushed across the Rhine, even before VARSITY began, undoubtedly facilitated the task of

the airborne troops. On the afternoon of D-day advance elements of XII Corps eliminated any serious threat to their rear by linking up with them at several points. That night the guns massed west of the Rhine shielded them with a massive barrage which not only multiplied their effective firepower, but also enabled the airborne artillerymen to conserve their scanty ammunition. While the batteries of the 17th Airborne were firing 15 missions, the supporting artillery of the Welsh 53 Division fired 29.* In terms of rounds the disparity was probably much greater, since the latter had 88 guns, and the American airborne had only 42 in action out of the 51 they had brought with them.[65] Finally, the arrival of ground reinforcements, particularly tanks, on D plus 1, enabled the airborne to exploit their initial success to the full.

All concerned agreed that the air side of the operation had gone with remarkable smoothness and that General Williams and his command deserved great praise. Of 540 planeloads of paratroops every stick had been brought to the combat area and less than 1 percent of the troops had been brought back because of sickness, accidents, wounds, or refusals. Of 908 American gliders, about two-thirds of which were in double-tow, all but 23, or 2.5 percent, reached the Rhine despite windy, turbulent weather. Of the British gliders 36 or 8.2 percent of their quota of 440 failed to get there. Although this figure might have been lower if they had had substitute aircraft available, one may infer that it was easier to manage Wacos in double-tow than a Horsa in single tow. Whether the difference lay in the size of the British gliders, the greater prop-wash of 38 Group's four-engine planes, or some other factor is an open question.

Route, schedule, and tactics had proved sound. Not one pilot had failed to follow the simple, well-marked course to the IP. The 43 serials had flown from 23 bases spread over an area which was about 300 miles long and divided by the English Channel. They reached their destination in proper sequence within 10 minutes of schedule, in spite of their adherence to specified air speeds† instead of arrival times. Some flaws there were. The confusion created by the crisscross of the 313th Group at Wavre might possibly have been avoided. Probably the Waco serials would have been able to keep better formation had their time intervals been slightly longer and their prescribed flying speed five miles an hour faster—adjustments which might well have been made before the operation had there been even one realistic, large-scale glider exercise.

The accuracy of the drops and landings in VARSITY was much better than in NEPTUNE or even in MARKET. Except for 1½ sticks of paratroops dropped west of the Rhine and less than a score of gliders, all appear to have come within about two miles of their zones and most within a mile of them.

However, the low visibility contributed to some serious errors. Exposure to smoke during the last three to five miles of their flight caused three paratroop serials to make their drops approximately two miles north of their true zones. It is of course possible that they were off course before reaching the Rhine, but then they could have corrected themselves by the Eureka beacons at the IP and on the west side of the river. The visual aids on the riverbank were at times obscured by the smoke; the M/F beacons performed erratically and were not much relied on; but the Eurekas were working beautifully at an average range of 16 miles with no jamming or failure.

Beyond the Rhine the leaders of the paratroop serials had to judge their position by visual navigation, compass, and Gee. The most likely culprit for the three inaccurate drops is visual navigation, since in the smoke and haze east of the river mistakes in observation would be easy to make and hard to check. The wind was stronger than predicted, but hardly enough so to cause significant deflection from course between the Rhine and the drop zones. Gee was reported to have worked very well. Signals from the Ruhr and Reims chains came in strong and clear at all points on the route. Although the enemy used both jamming and decoy signals as countermeasures, the latter were easily recognized, and the former were disposed of in most cases by employment of the anti-jamming switch or by shifting from one chain to the other. However, Gee signals were not easy to interpret precisely, especially under combat conditions. Two of the three inaccurate paratroop serials had special grounds for error. The lead plane of the 313th Group had been set afire soon after crossing the Rhine, a circumstance likely to

*The fire of the British artillery was controlled by radio instructions from forward observers who had gone in with the airborne infantry battalions.

†Seven different air speeds had been prescribed, each for a different type of formation.

interfere with accurate navigation, and the pathfinder serial had tried to use the new Münster Gee chain for which they had not yet received charts and may thereby have gotten a bad fix. Whatever the causes of deflection, it is evident that the problem of ensuring accuracy in an airborne mission was still not fully solved.[66]

With the exception of one serial, the concentration and pattern of the paratroop drops ranged from good to excellent. It is significant that the 507th PIR was able to assemble 90 percent of its strength within an hour and a half and the 513th did almost as well, although both had had to spend much time and effort in fighting during the period of assembly. Indeed, since they were dropped in the presence of strong enemy forces, good initial concentration had been a prerequisite to their success. The formation flying which produced that concentration deserves praise, but with the qualifications that it was done by daylight and that during the approach to the zones little resistance was encountered.

The glider serials were more accurate but less orderly than the paratroop formations. Except for about four flights and a handful of individuals, all seem to have released their gliders over or very near their proper zones. Ragged formations, overrunning of some serials by those behind them, and a general tendency of rear elements to climb to avoid prop wash produced considerable confusion, with American gliders being released at altitudes varying from 500 to 2,500 feet and British gliders at 2,500 to 3,500 feet. This situation coupled with the inability of the glider pilots to get a good view of the terrain until they were below the 200-foot level prevented a majority from landing in their assigned fields and caused dispersion all over the landing zones and the adjoining area. Enough gliders were able to land in sequence in the proper spot to show that it could be done, given a good release and the luck to sight a few landmarks on the way down. It should also be said that, especially on LZ S, the units that were well concentrated on landing played a disproportionately important part in the early stages of the fighting.

The extreme inflammability of the C-46's pushed their loss rate (including salvaged craft) to an unhealthy 28 percent. No doubt some C-47's were saved from fire by their new self-sealing fuel tanks. Yet the ratio of losses to damage among C-47's was almost exactly what it had been in MARKET.* A substantial proportion of the American losses, though not of the damage, was caused by a few light flak batteries which by camouflage or movement had escaped the preliminary anti-flak effort. Such guns were probably responsible for the heavy losses among planes dropping troops on DZ B. Had that one trouble spot been removed and no C-46's been used, IX TCC might have lost less than 2 percent of its planes. Had the Germans had a few more batteries in action and the troop carrier command been fully equipped with C-46's, VARSITY could have been extremely costly. So delicate is the balance in airborne operations.

The over-all cost of VARSITY was moderate, 7 British troop carrier aircraft destroyed, 46 American craft destroyed (plus 9 salvaged), and 15 of the bombers in the resupply mission destroyed. Damaged were 32 British craft, 339 from IX TCC, and 104 of the bombers. The loss ratios for planes crossing the Rhine were 1.7, 5.0, and 6.4 percent, and damage ratios 8, 31, and 44 percent. However, only 100 of IX TCC's planes needed 3d or 4th echelon repair. The rest had received minor damage, mainly from small arms.

The British attributed their comparative impunity to keeping above an altitude of 2,500 feet, out of effective range of small-arms fire. At that height, too, they may have been shielded by the smoke, and perhaps they benefitted from German gunners' instructions to concentrate on low-flying planes and gliders. That height was a protection is confirmed by the fact that the high-flying American glider serials over LZ N had even smaller losses than the British and that the low-flying resupply mission suffered worst of all.

Flak neutralization had, as in MARKET, been difficult but on the whole successful. Interdiction and close support had worked wonders, and the British FVCP's had proved the value of having fighter control teams with the airborne. Perhaps the most brilliant achievement of the Allied air forces was the complete neutralization of the Luftwaffe on its own home ground. Less than 20 German planes came within sight of the troop

*The 313th Group did not have self-sealing tanks. It appears that a majority of the other groups in the command had them, but the author has not found any statement of the number installed before VARSITY. Although 599 such tanks had been received by the end of February, a large proportion of them needed modification. Only 76 had been installed as of 5 March. (Hist IX TCC, Jan-Feb 45, Pt VIII, Sec 5 and 6.)

carrier formations, and there is no evidence that any of them were able to make a kill or even a pass. The weather for once had been on the side of the Allies. Five days of clear skies, an extraordinary phenomenon for that time and place, had enabled them to use their aerial superiority to the full. However, the planners had been careful to allow leeway for bad weather, and, thanks to the concentration of the airborne missions and initial resupply within a four-hour period, any two consecutive favorable days between the 23d and 28th of March would have sufficed for the execution of PLUNDER, VARSITY, and all essential supporting operations.

CHAPTER VI

Conclusions Regarding Large-Scale Airborne Operations

THE MOST IMPORTANT lesson taught by VARSITY, MARKET, and airborne operations in NEPTUNE was that airborne assaults on a corps scale could be successfully executed, something which had been seriously doubted after the painful experiences in Sicily. While in Normandy and Holland the lift had to be spread over several days, that for the Rhine crossing was concentrated into a four-hour period, greatly increasing the impact of the assault, and reducing escort requirements and the risk that bad weather would ground important elements of the force. It also freed the airborne troops from the need to keep a large part of their men guarding drop and landing zones for subsequent missions.

In all three cases troop carrier resources were stretched to the limit. However, had IX TCC been fully equipped with C-46's in time for VARSITY, it could have added a third division to the two actually carried on D-day. Larger planes would also have reduced the number of bases needed to accomplish a given lift. Lack of forward bases was a grave handicap to MARKET and caused a very awkward dispersal of the take-off fields in VARSITY. On the other hand, it was much easier to find bases suitable for the C-47, which could take off within 3,000 feet from an unsurfaced runway, than it was for four-engined aircraft or even for the C-46. This was why a dozen fields in France could be allotted to American troop carrier units at a time when none were available for the converted heavy bombers of 38 Group.

Massive paratroop assaults in MARKET and VARSITY had achieved a success which disarmed criticism. The principal doctrinal change in that field was the reaction against night paratroop operations after NEPTUNE. The dissatisfaction of both troop carrier and airborne leaders was focused on the means of supplying and reinforcing the paratroops. The principal means of reinforcement and of bringing in heavy equipment was the glider, a neglected step-child which had never been popular.

Gliders used up shipping space, cluttered up airfields, deteriorated rapidly and were destroyed by hundreds in storms. They required large numbers of glider pilots and glider mechanics, unassimilated specialists whose presence created problems of employment and morale within the troop carrier squadrons.* Glider operations were inherently wasteful in that they required two aircraft and two crews to do the work of one. To keep gliders under control and in close formation required good light and almost perfect weather. Glider missions occupied about 50 percent more air space and moved 30 to 40 miles an hour more slowly than equivalent paratroop formations. During the tow, in landing, and immediately after landing, gliders were much more vulnerable than paratroops, hence their relegation to follow-up missions rather than to the initial assaults. Furthermore, experience had shown that in most combat operations at least 80 percent of the gliders

*If the glider pilots had been organized in separate groups, as was done on a provisional basis in the Mediterranean Theater they would have been able to follow a coherent and continuous training program of their own, working with whatever troop carrier units were engaged in glider training and spending slack periods on realistic infantry practice instead of stagnating during the long periods when the squadrons they were assigned to were preoccupied with non-glider activities. The advantage of permanently teaming tug and glider pilots together was in practice largely lost in every big operation by massive shifts of glider pilots from units not scheduled for glider missions to others that were.

used would have to be written off afterwards as destroyed or irrecoverable.

In rebuttal it should be said that the light, durable Waco had certain advantages that other types of assault craft have not achieved after 10 years of postwar experimentation. It could land safely in smaller, rougher fields than an assault plane. It had no engine to hit, no fuel to catch fire. It could be towed at twice the speed of present-day helicopters. Above all, it could be produced in great numbers for as little as $15,000 apiece. One wonders whether the Allies would have accepted the cost and the risk of crash-landing a thousand assault planes among the swamps and hedge-rows of Normandy or of setting down a thousand helicopters within point-blank range of enemy guns as they did gliders in VARSITY. Gliders did those difficult and dangerous jobs acceptably and could be assigned to do them in the reassuring certainty that they were expendable. The British even dared to use their gliders for *coups de main* against bridges and other key objectives and found them very satisfactory for the purpose.

One drawback of the American gliders was their small size. Instead of the Waco with its 3,750-pound load the airborne wanted a glider which would carry a truck or a 155-mm. howitzer. By the end of the war they were thinking in terms of gliders with 4, 6 and even 8-ton payloads. However, no large gliders except the CG-13A (which proved unfit for tactical operations) was sent overseas or even placed in production by the United States during World War II. Even if a suitable glider in the 4-ton class had been available the C-47 would probably have been incapable of towing it. The Americans might have made some use of the Horsa in MARKET and more in VARSITY, but their experience in Normandy with its brittleness and other peculiarities seems to have given both troop carriers and airborne a lasting prejudice against it.

Resupply by parachute avoided the difficulties of a glider tow and the hazards of a glider landing, but it was inefficient and wasteful. A C-47 capable of carrying about three tons could deliver little more than a ton by parachute from its pararacks or in bundles pitched out its side door. Installation of conveyor belts in the cabin was helpful in handling bundles but such conveyors did not go into production in the United States until the spring of 1945. Moreover, the bundles had to be small to get out the door or fit the pararacks. Even the 75-mm. howitzer had to be broken down into several parts to be dropped. New techniques were on the horizon. The British had used parachute clusters to drop whole jeeps and artillery pieces from the bomb bays of Halifaxes. However, even with them the dropping of heavy equipment was still in the experimental stage. Not until after the war, when they received the C-82 with its big cargo door in the rear, were the American troop carriers able to make such drops.

Further weaknesses of parachute resupply were inaccuracy and dispersion. Supplies were rarely dropped with precision by either the British or the Americans and were usually scattered over several miles of ground. The task of collecting the scattered bundles was difficult and hazardous. General Gavin estimated after MARKET that to get proper recovery of the supplies dropped for his division in that operation he would have had to put a third of his force on supply detail, something not usually practicable in the presence of the enemy. Even after a vigorous collection program under relatively favorable conditions as in VARSITY at least 20 percent of the bundles would probably be lost. A force hemmed in by the enemy as the British were at Arnhem might recover very little of what was dropped for them. For instance, on D plus 1, in MARKET, 1 Airborne Division got more supplies from three bulk-loaded Hamilcar gliders than it did from a parachute drop by 33 four-engined aircraft.

The use of B-24 bombers for resupply was a valuable supplement to the American troop carrier effort in MARKET and VARSITY. However, it was equally wasteful in that the big aircraft capable of carrying six tons of bombs could deliver less than 2½ tons in a parachute drop. Also, the bombers had to be withdrawn from their primary mission several days before an operation for modification, loading and other preparations. The performance of the bomber crews was roughly similar to that of the troop carriers, but their loss rate was relatively high. With more experience in resupply work they might have reduced their losses by shifting to drops from medium altitude or by other changes in tactics, such as avoidance of climbing turns after completion of their drops.

The value of airborne forces striking close behind enemy lines to pave the way for a ground

assault was demonstrated in Normandy and again on the Rhine. In Holland an attempt to employ them in a more independent role some 60 miles beyond the front failed, but by so narrow a margin as to indicate that such ventures were feasible. Had German strength and dispositions been as expected, MARKET would almost certainly have been a decisive victory. As it was, success would probably have been achieved had the British airborne picked zones close to their objective, had the weather been favorable on D plus 2, and had the British ground forces advanced more aggressively.

Many people, including General Arnold, felt that more and bigger airborne operations should have been attempted.[1] The reasons why more were not made are many and complex. Assuredly it was not for lack of eagerness on the part of Airborne Army and the airborne planners who preceded it. Dozens of plans were made which never won SHAEF approval, and over a dozen were cancelled after reaching the stage of detailed planning.

Much of the time the means for a large airborne mission were not available. During periods of heavy fighting as in Normandy, Holland, and the Ardennes, airborne divisions were kept at the front for months at a time and when relieved were in need of recuperation and retraining. For this reason the three weeks before MARKET and the month before VARSITY were the only times after the invasion of Normandy when a three-division operation would have been possible. Whenever a breakthrough did occur, the leaders of the advancing armies clamored for air supply to the exclusion of all airborne operations, regardless of the needs of other ground commanders. Thus Third Army bitterly opposed Montgomery's request for MARKET and later did the same to Seventh Army's request for EFFECTIVE.

When plans were made to exploit a victory by airborne action, the final planning and preparations were usually so slow and the objectives so close to the front that advancing ground troops reached the area before the missions were launched. The resultant cancellations represented a great waste of time and effort at critical moments. To some extent this was inevitable. Large operations did require time for preparation. It was risky, as MARKET proved, to strike far beyond the front on the assumption that an advance would continue. On the other hand, the rewards of success in a venture like MARKET might be complete and final victory, a prize worth gambling for. It should also have been possible to pre-package small missions in readiness to seize key points on short notice ahead of the most rapid ground thrust.* After all, a regiment had been dropped at Salerno on less than 12-hours notice, under difficulties greater than usually prevailed in the ETO.

Another factor which limited the use of the airborne and made ground commanders reluctant to rely on them was weather. Even paratroop missions could not risk a 20-mile wind or low clouds at the drop zone. Stormy weather was a major factor in the defeat of the airborne in Holland, almost grounded them in the invasion of Normandy, and was a source of worry to the planners of VARSITY. Purely local and temporary weather conditions could have serious results. Such phenomena were the cloudbank over the Normandy coast that scattered the first four missions in NEPTUNE, and the pall of smoke hanging over the objectives in VARSITY. To avert such unpleasant surprises, systematic weather reconnaissance was provided during MARKET and VARSITY, and periodic weather reports were sent out during VARSITY by radio teams with the airborne. Such warnings might make it possible to avoid unfavorable conditions, but sooner or later in all three of IX TCC's airborne operations the command had to accept marginal weather, and that acceptance usually brought trouble in its wake.

Clouds might disperse formations; wind could render gliders unmanageable; but the greatest weather hazard was low visibility, since not merely the success of the mission but the survival of the airborne troops depended on the accuracy with which they were delivered. When, as on the first day of MARKET, the fliers could see their route and observe panels and smoke signals set out by pathfinders on the drop zones, they could carry out a most exacting mission with more than sufficient accuracy. When they could not see their way, they were inaccurate because they had to depend on two unreliable guides, dead reckoning and

*One or two such operations were planned in the closing weeks of the war, but the only one carried out was AMHERST, a harassing operation in Holland executed on the night of 7 April by 38 Group, RAF, and French troops of the Special Air Service (a kind of air commando organization). (Air Ministry, A.H.B. Airborne Forces, 1951, pp. 199-203.)

radar. The troop carriers had learned the pitfalls of dead reckoning as early as TORCH and never relied on it thereafter when they could help it. Radar, although helpful, had serious limitations.

Responsor beacons to mark points in hostile territory had to be set up by agents, partisans or pathfinders. Such episodes as the Lindemans case* show that the first two methods involved a grave risk of discovery or betrayal. Preliminary pathfinder flights also reduced the chance of surprise for the main force. In addition, pathfinder planes might be shot down, as happened in Holland, or miss the zone by a wide margin, as some did in the invasion of southern France; and pathfinder troops might be neutralized by enemy action after reaching the ground, as many were in Normandy and most would have been in VARSITY, had they been used. The Rebecca-Eureka beacon, in standard use by the troop carriers had a range of less than 30 miles at the altitudes below 2,500 feet which were usually flown in airborne missions. More serious was the difficulty in making precise readings of the Rebecca scope when near the beacon. This made the normal margin of error with that equipment greater than a mile.

Certain airborne radars, including the SCR-717, produced a rough map of the terrain on a scope. Since only coastlines and large cities showed up well, such instruments were of limited value in airborne operations. The SCR-717 did prove helpful in making an accurate landfall in NEPTUNE and in MARKET.

A third type of radar (or radio) was used to establish the position of a plane in relation to a chain of stations in friendly territory. The British system of this type known as Gee was used by all airborne missions in the ETO. However, the effectiveness of Gee depended on the skill of the navigator reading it, the plane's distance from the stations, and, especially, the plane's azimuth. Since Gee chains were bulky and complex installations, requiring months to establish, airborne operations which were small or were flown on short notice would seldom have a Gee chain ideally situated for their use. Thus, although in theory Gee could be accurate to within 100 yards, it was rarely precise to within a mile in operations. In AMHERST the average Gee error was over three miles, and this was condoned as inevitable.[2]

Except in unusually open country a small error might put the airborne on dangerous ground or place difficult obstacles in their path. Notable examples would be the drop of paratroops in NEPTUNE into the swamps of the Merderet and on the far side of the Douve. Apart from these risks the difficulty of a contested advance across unfamiliar terrain made it likely that every mile of inaccuracy would cost hours of delay in reaching the objectives. Thus, although radar could remedy gross errors, it was not sufficiently precise to justify sending airborne missions in darkness or low visibility if that possibly could be avoided.

Another consideration restricting the employment of airborne forces was their vulnerability, both in the air and on the ground. This vulnerability is indicated in the case of the troop carriers not by the over-all losses, which were kept so low as to make pessimists like Leigh-Mallory seem absurd, but by the way loss rates shot up on occassions when something went wrong.

In every airborne operation in the European Theater the combined losses of British and American troop carrier aircraft were less than 4 percent of those employed; less than 2 percent of the crews were killed or missing; and less than 1 percent of the troops were shot down or incapacitated by enemy action before they jumped or their glider was released.* On the other hand, some formations in each operation were very roughly handled. In several instances exposure for two or three minutes to light flak and small arms fire caused the loss of between 10 and 20 percent of the planes exposed. One small British mission attacked by German fighters lost 20 percent of its aircraft.

The degree of air superiority which enabled the United States and Great Britain to send 10,000 sorties over France and western Germany on the day of VARSITY while the Luftwaffe could make less than 100 sorties against them made it possible to protect an airborne mission very thoroughly. It was standard procedure to destroy or neutralize enemy airfields within fighter range, set up perimeter patrols to intercept fighters flying in from outlying areas, and provide the troop carrier formations with extensive escort or area cover to dispose of the few foes who might manage to ap-

*See above, p. 117.

*Planes were seldom much exposed to enemy fire before approaching their objectives, so if they were hit short of the assault area the pilot could usually coax them to it and deliver his troops. More than half the crew members who bailed out or crash-landed were saved by the proximity of Allied troops, the efficiency of the Air Sea Rescue Service, or the assistance of friendly civilians, particularly the Dutch underground in MARKET.

proach them. Except for the one episode in MARKET when defensive measures were in abeyance it is doubtful whether German fighters ever got close enough to an Allied airborne mission to make a pass at it.

If an air attack was deadly but preventable, ground fire, other than heavy flak, which the troop carriers carefully avoided, was indecisive but galling. In VARSITY missions were flown in broad daylight right over the enemy's main line of defense with quite moderate losses in most cases. A C-47 could take hundreds of bullets and keep flying. Light flak was much more dangerous than small arms. The guns were mobile, hard to locate, and dangerous to attack. Anti-flak operations in MARKET almost ruined two good fighter groups, and even in VARSITY, where the area to be neutalized was relatively small, the batteries few in number, and the weather favorable, such operations were only moderately successful. In the latter operation some troop carrier formations suffered severe losses in passing over a handful of 20-mm. batteries which had survived all efforts to suppress them. Thus, even though light flak could theoretically be neutralized, its presence in quantity was a strong deterrent.

Airborne troops were most vulnerable immediately after arrival on the ground. Paratroops could be picked off while they were still dispersed and shaken. Gliders made splendid targets for mortars and machine guns. Even the low-grade, defeatist forces encountered in VARSITY made the period of initial assembly difficult and costly. Kesselring later expressed the opinion that had they been first-rate troops the operation would not have succeeded. On the other hand, drop or landing zones which, like those in MARKET, were virtually undefended, could seldom be found near really valuable objectives, and the long distance between zones and objectives at Arnhem proved a fatal barrier to success. At Ste Mère Eglise, the Grave bridge, and a score of other places it was proven that by far the best way for the lightly armed airborne troops to take an objective was to rush it before a strong defense could be organized. The question was whether the airborne could be delivered within quick striking distance without suffering defeat or crippling losses during assembly and unloading.

A second weakness was vulnerability to counterattacks supported by tanks and armor. Once the airborne troops were assembled, their fighting qualities made them a match for superior numbers of infantry and for almost any amount of militia. They showed remarkable ability to dispose of individual tanks and guns. However, their extremely limited firepower could be outmatched by a comparatively small artillery concentration, and they were altogether unable to cope with panzer divisions in the open field. That was demonstrated at Arnhem, when the crack troops of 1 Airborne Division were terribly mauled by depleted, warweary panzer units.

Sometimes, as in VARSITY and the last stages of MARKET, ground artillery could provide a protective barrage for the airborne. Also in VARSITY, interdiction and close air support proved effective means to prevent counterattacks. However, there was the chance in any operation far beyond the front that the artillery would not get within range and that supporting air units would be grounded or rendered ineffective by unfavorable weather. These considerations help to explain why no serious consideration was given in the ETO to any airborne operation in which the ground forces were not scheduled to make contact with the airborne within three days, nor to any in which the airborne troops were expected to encounter considerable numbers of tanks before ground reinforcements reached them. Violation of these rules in MARKET was not intentional but the result of faulty intelligence and errors of judgment.

Another way to give the airborne the firepower they needed was to establish an airhead, that is, to seize an airfield on which to land reinforcements and supplies. The C-47 mission to the Grave landing strip on D plus 9 in MARKET showed that this kind of mission was perfectly feasible on a small scale with small planes. It doubled the payload carried in parachute resupply and eliminated dispersion, loss, and drop damage. It also eliminated use of the glider with all its overhead and tactical inefficiency.

However, the defense and maintenance of an independent airhead required a very massive lift, able to handle many more and bigger guns that had hitherto been assigned to the airborne, other heavy items, particularly engineer equipment, and a resupply level of some 400 tons (mainly ammunition) per division per day, instead of the 250 tons which had been customary. Such an operation called for big planes, long, hard-surfaced runways

to receive them, and specially equipped supply units. Except for fewer than 200 C-46's acquired near the end of the war, IX TCC had to rely entirely on the relatively small C-47. Large airfields were usually well defended if in good condition and, once destroyed, required extensive reconstruction operations. As for airhead supply units, the Americans had nothing of the sort, and the British experimental unit known as AFDAG was allowed to disintegrate after MARKET.

Assuming that an airhead was established, it would have to be firmly held. A breakthrough like those achieved by the Germans around Veghel during MARKET would probably mean disaster. Indeed, the operation would be imperilled if the enemy simply got near enough to the airfield to place observed artillery fire on it or to rake missions with close-range antiaircraft fire during landing or take-off. The report of the 101st Division on MARKET expressed the opinion that in an airhead operation one entire airborne division would be needed exclusively for the defense of one airfield. Also, normal fighter escort and cover would have to be extended to protect the airfield at all times, especially during the hours of unloading. Despite these considerations, FAAA did toy with the idea of engaging in independent airhead operations far beyond the front, but the tactical and logistical problems involved were such as to cause the rejection or shelving of most such projects at an early stage.*

The only enterprise of this kind to approach completion was EFFECTIVE, a plan to put down the 13th Airborne Division near Bisingen, a village about 30 miles south of Stuttgart, seize an airfield, and establish an airhead over 50 miles in the rear of the German forces opposing Seventh Army in the Black Forest area. On 9 April 1945 SHAEF tentatively approved the operation and ordered completion of detailed plans. A week later, Seventh Army, which was still facing stubborn resistance, announced that it wanted EFFECTIVE. SHAEF agreed to set 22 April as the target date. Once again an airborne attack was forestalled by German collapse. On the 18th a breakthrough by armored units ensured the encirclement of the Black Forest region, and late on the 19th EFFECTIVE was cancelled.[3]

After dwelling on the limitations and vulnerability of the airborne forces, it is well to emphasize that these were comparable to those of amphibious forces, except perhaps in the field of logistics. If lift for three divisions was hard to find before OVERLORD, assault boats for five divisions were even harder to get.* Storms could halt amphibious operations on an unsheltered coast about as easily as they did airborne and resupply missions. The June gales in Normandy proved that. While troop carrier navigation was not precise, it compares reasonably well with that of the naval forces which missed UTAH Beach by a mile and a half. Vulnerable as the airborne were during delivery and assembly, their worst initial losses were paralleled by the casualties in certain amphibious assaults.† Even in ability to cope with counterattack, the record of the three airborne divisions in MARKET compared favorably with that of the three beach-landed divisions which were bottled up at Anzio. Any airborne operation larger than a raid required air superiority, but throughout the war that was a prerequisite, not only for amphibious operations, but for all ground offensives, except perhaps the German drive in the Ardennes.

At the end of World War II airborne and troop carrier commanders alike were convinced that airborne operations would play an important part in future wars. However, there were good reasons for qualifying such opinions. In a major war such operations could be no more than auxiliary to traditional ground warfare until airborne forces gained the firepower and logistical capabilities to maintain themselves for long periods against first-rate opposition. As General Gavin put it "We have . . . barely begun to solve the problems of airborne transport and equipment."[4] Today many of those problems have been solved. More serious was the fact that without air superiority, airborne warfare involved excessive risk. To ensure superiority fighter planes and bombers would have to

*One spectacular plan which died an early death was that for ARENA. The objective of this operation was the seizure by four airborne divisions of an area near Kassel containing several airfields to which several infantry regiments would subsequently be transported by air. The plan involved as many as 2,500 air landings and 1,000 parachute resupply sorties a day. (SHAEF G-3, Operation ARENA GCT/370-44/Plans, 2d Draft, 15 Mar 45, in 505.61-3.)

*Moreover, troop carrier aircraft could be moved from theater to theater for an assault within a few days, as was done for DRAGOON, while landing craft took months to assemble.

†By far the heaviest initial losses by Allied airborne divisions were in Normandy where the 82d Division had 156 men killed, 756 missing, and 347 wounded on D-day, and the 101st had 182 killed, 501 missing, and 557 wounded in that time. The 2d Marine Division had 913 killed and missing and 2,037 wounded during its assault on Tarawa. (Harrison, *Cross-Channel Attack*, pp. 284, 300; R. W. Shugg and H. A. DeWeerd, *World War II* [Washington, 1946], p. 242.)

receive priority over troop carriers in the postwar budget. Finally—and most important of all to the future of airborne warfare—the advent of the atomic bomb, by giving strategic bomber forces the power to win a war overnight, threatened to render all other means of warfare secondary, if not superfluous. Although the role of airborne forces in an atomic war is still in dispute, their value in non-atomic warfare under suitable conditions was demonstrated in World War II—and is certainly much greater now than it was when they flew to victory in VARSITY.

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Footnotes

CHAPTER I

1. Gordon A. Harrison, *Cross-Channel Attack* (Washington, 1951), p. 47; Hq 8th AF, Flow Chart 5 Apr 43, in USAFHD 505.24-1A. (Unless otherwise noted, documents cited in this study are identified by their file number in USAFHD.)
2. Frederick E. Morgan, *Overture to OVERLORD* (Garden City, 1950), pp 27, 29, 41; Hq AEAF, Historical Data, US Component Allied Expeditionary Air Force, in 505.24-1A.
3. W. F. Craven and J. L. Cate, *The Army Air Forces in World War II,* II (Chicago, 1949), 635-37; CCS 244/1, ann IV, app A, 25 May 43 (excerpt) in USAFHD files; Hq 8th AF, Flow Chart, 5 Apr 43 (pencilled note "Brought to U.K. by Stratemeyer."); ltr, Brig Gen R. C. Candee, CG VIII ASC, to CG 8th AF, subj: Flow Chart for Tactical Air Force, 15 May 43; Hq VIII ASC, Tactical Air Force Tentative Proposed Troop Basis Amended, 24 May 43, all above in 505.13-5; Hq VIII ASC Tactical Air Force Tentative Proposed Troop Basis, 21 May 43, in 505.13-4 (see also table, same title and date in 505.13-5).
4. Harrison, *Cross-Channel Attack,* pp 72-75, 183; min of COSSAC Staff Confs, 2, 9, and 23 Jul 43, in 505.10-7; COSSAC(43) 28, App O, Operation "OVERLORD" Airborne Forces, 15 Jul 43, in 505.14-3; COSSAC(43) 32 (Final), Digest of Operation "OVERLORD," 27 Jul 43, in 505.12-7; COSSAC(43) 36, Transport Aircraft and Gliders for Operations "OVERLORD," 28 Jul 43; memo for C/AS *et al* from Lt Col S. R. Richards, subj: European Theater Troop Carrier Requirements, 17 Aug 43, in 505.14-2; ltr, AM T. Leigh-Mallory, CG AEAF, to AOC-in-C Br TAF and CG 9th AF, subj: Preparation of Tactical Air Forces for Operation "OVERLORD," 6 Oct 43, in 505.33-11; Hq AEAF, Airborne Forces and Air Supply in Operation "OVERLORD" and "RANKIN," Position as of the 12th October 1943, 18 Oct 43, in 505.14-23; ltr, Air C-in-C AEAF to AOC 2d TAF and CG 9th AF, Directive to Tactical Air Forces Operation "OVERLORD," 6 Dec 43, in 505.25-31; memo for CG AAF from Brig Gen G. C. Jamison, subj: Troop Carrier Requirements First Half 1944, 29 Dec 43, in USAFHD files; msg OP 544, MAAF Adv to CG 12th AF and CG XII TCC, 8 Jan 44, in 650.1622.
5. Lecture, Col J. T. Dalbey, C/S Abn Comd, subj: Airborne Troops in a Landing Assault, 28 May 43, in 502.141; min, COSSAC Staff Conf, 2 Jul 43; min of Meeting Held at Norfolk House on August 10th [1943] to Discuss Future Policy Relating to the Employment of Air Borne Forces, in 505.10-6; Hq AEAF, Airborne Forces and Air Supply in Operation "OVERLORD," 18 Oct 1943.
6. Craven and Cate, *The Army Air Forces in World War II,* II, 455-6; Air Ministry, A.H.B., *Airborne Forces* (1951), pp. 96-7, 246-49; min of Meeting Held at Norfolk House on August 10th (1943) to Discuss Future Policy Relating to the Employment of Airborne Forces; Hq AEAF, Airborne Forces and Air Supply in Operation "OVERLORD," 18 Oct 43; COSSAC 3140/Sec, Annex, Operation "OVERLORD" Points for Further Investigation as a Result of COS(43) 180th Meeting, and JP(43) 260(Final), 7 Aug 43, in 505.12-7; lecture, Brig Gen P. L. Williams, The Airborne Assault Phase of the Sicilian Campaign, 17 Aug 43, in 611, 452-1; Lt Col S. R. Richards, Capt R. K. Ward and Capt J. L. Morris to CG VIII ASC, subj: Board Findings on Towing of Horsa Glider with C-47A Airplane, 24 Aug 43, in 505.14-22; War Cabinet, Chiefs of Staff Committee, Airborne Forces, Joint Memorandum by the General and Air Staffs, 20 Sep 43, in 505.06-1; NJC5 (Final) "Neptune" Zero Hour for the Assault, Covering Recommendations by Principal Staff Officers, app D, Airborne Considerations, 14 Dec 43; NIC (Final) "OVERLORD" The Effect of Weather, 14 Dec 43, both in 505.25-2.
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8. Ltr, Maj Gen L. H. Brereton to Maj Gen I. C. Eaker, 19 Sep 43, in 519.818.
9. Hist IX TCC, 16 Oct-Dec 43; Hist 50th TC Wg, Oct-Dec 43; Hist 434th TC Gp, 9 Feb-Dec 43; Hist 435th TC Gp, 25 Feb-Dec 43; Hist 315th TC Gp, 17 Feb 42-30 Nov 43.
10. Ltr, Air C-in-C AEAF to AOC 2 TAF and CG 9th USAF, subj: Directive to Tactical Air Forces Operation "OVERLORD," 6 Dec 43, in 505.25-31; Agenda for Meeting of Joint Commanders-in-Chief at St. Paul's, 7 Dec 43, in 505.25-2; min of Meeting at AEAF Headquarters to Discuss the Employment of Airborne Forces in Continental Operations, 9 Dec 43, in 505.27-11.
11. Incomplete file of min of Airborne-Air Planning Committee AEAF, in 505.27-11.

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21. Ltr, Gen G. C. Marshall to Gen D. D. Eisenhower, 12 Feb 44, in 506.451-322B; Hq AAF Plans Div, Daily Activity rpts, 7 and 9 Feb 44, in USAFHD files.

22. Harrison, *Cross-Channel Attack,* pp. 185-86; min of Supreme Commander's Conferences, mtg 5, 18 Feb 44, in 505.25-6.

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CHAPTER II

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CHAPTER VI

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Appendix

Appendix I

STATISTICAL TABLES—OPERATION NEPTUNE
5-13 June 1944

I. Paratroop Operations of IX Troop Carrier Command

	ALBANY	BOSTON	TOTAL
Aircraft			
dispatched (1)	433	378	821
effective (2)	436	377	813
abortive (3)	2	1	3
destroyed or missing (4)	13	8	21
damaged	81	115	196
Plane crewmen			
wounded or injured	4	11	15
killed or missing (1 Jul 44)	48	17	65
Troops			
carried	6,928	6,420	13,348
dropped (5)	6,750	6,350	13,100
Artillery			
carried (6)	12	2	14
Cargo			
tonnage carried (7)	211	178	389

(1) Including pathfinders
(2) Included if any troops jumped or cargo was dropped over France
(3) Unable to fly or returning with load
(4) Excluding aircraft in BOSTON destroyed before take-off
(5) An approximation
(6) Including howitzers only
(7) Short tons

II. Glider Operations of IX Troop Carrier Command

	CHICAGO	DETROIT	KEOKUK	ELMIRA	GALVESTON	HACKENSACK	TOTAL
Aircraft							
dispatched (1)	52	52	32	177	102	101	516
effective	51	52	32	175	100	101	511
abortive	1	—	—	2	2	—	5
destroyed or missing	1	1	—	5	—	—	7
damaged	7	38	1	92	26	11	175
Horsas							
dispatched	—	—	32	140	20	30	222
abortive	—	—	—	2	2	—	4
Wacos							
dispatched	52	53	—	36	84	70	295
abortive	1	1	—	—	2	—	4
Plane crewmen killed or missing (1 Jul 44)	4	4	—	1	—	—	9
wounded or injured	1	3	—	8	—	—	12
Glider pilots							
dispatched	104	106	64	352	208	200	1,034

II. Glider Operators of IX Troop Carrier Command—Continued

dead or missing (1 Jul 44)	14	14	—	26	—	3	57
Troops							
carried	155	220	157	1,190	968	1,331	4,021
landed	153	209	157	1,160(2)	927	1,331	3,937
landing casualties							
Waco troops	27	30(2)	—	15	35	16	123
Horsa troops	—	—	44	142	80	74	340
Artillery pieces carried (3)	16	16	6	37	20	—	95
Vehicles							
carried	25	27	40	123	41	34	290
Cargo							
tonnage	14	10	19	131	26	38	238

(1) Including one paratroop plane carrying 16 troops in ELMIRA, two gliders and planes of the 435th Group in GALVESTON and a pathfinder plane without troops in HACKENSACK.
(2) Estimate.
(3) Howitzers and antitank guns.

III. Resupply Operations of IX Troop Carrier Command

	FREEPORT	MEMPHIS	MISSIONS ON CALL (8-13 June)
Aircraft			
dispatched	208	119	34
effective	153	117	34
abortive	55	2	—
destroyed or missing	11	3	—
damaged	94	35	—
Plane crewmen			
dead or missing (1 Jul 44)	29	2	—
wounded or injured	22	4	—
Troops			
carried (1)	76	—	15
dropped	22	—	15
Cargo tonnage			
carried	211	221	7
dropped	156	215	7
recovered (2)	100	(?)	7
Gliders			
dispatched	—	—	10
effective	—	—	10
Vehicles			
carried and landed	—	—	4
Cargo tonnage			
carried and landed	—	—	23
Troops			
carried and landed	—	—	44

(1) Included in FREEPORT total are 54 quartermaster personnel who did not jump.
(2) Probably included in FREEPORT total are some supplies sent in MEMPHIS.

Appendix 2

STATISTICAL TABLES—OPERATION MARKET
17-30 September 1944

I. Paratroop and Parachute Resupply Operations of IX Troop Carrier Command
A—Missions for 101st Division; B—Missions for 82d Division; C—Missions for British

	17 Sep A	17 Sep B	17 Sep C	18 Sep C	19 Sep B	20 Sep A	20 Sep B	21 Sep A	21 Sep B	21 Sep C	23 Sep C	25 Sep A	Total
Aircraft													
dispatched	428	482	143	126	60	46	311	30	33	114	41	34	1,848
effective	428	481	143	126	35	46	310	24	31	72	41	34	1,771
abortive	—	—	—	—	24	—	1	6	2	41	—	—	74
destroyed or missing (1)	17	10	—	6	2	—	—	—	—	5	—	—	40
damaged	101	131	5	24	16	5	6	—	—	33	—	—	321
Plane crewmen killed or missing (2)	26	25	—	22	5	—	—	—	—	11	—	—	89
Troops													
carried	6,735	7,274	2,283	2,119	—	125	—	—	—	1,511	560	—	20,607
dropped	6,712	7,229	2,279	2,110	—	125	—	—	—	998	558	—	20,011
drop casualties	109	124	(?)	(?)	—	2	—	—	—	(?)	(?)	—	—
Artillery carried	—	12	—	—	—	6	—	—	—	—	—	—	18
Cargo tonnage carried	167	247	57	51	71	47	442	16	15	66	28	49	1,256

(1) Out of 87 planes listed in these tables as destroyed or missing in MARKET, 19 were later repaired or salvaged.
(2) Total as of 31 Oct 44.

II. Glider and Aircraft-Land Operations of IX Troop Carrier Command
A—Missions for 101st Division; B—Missions for 82d Division

	A	B	A	B	A	A	B	26 Sep B	29 Sep B	30 Sep B	Total
Aircraft											
dispatched	70	50	450	454	385	84	406	209	11	22	2,141
effective	64	48	437	450	250(?)	79	402	209	5	22	1,972
abortive	6	1	13	4	130	5	4	—	6	—	169
destroyed or missing	6	1	4	10	17	—	9	—	—	—	47
damaged	42	5	112	100	169	—	96	—	—	—	524
Gliders											
dispatched	70	50	450	454	385	84	406	—	—	—	1,899
effective	62	48	429	424	225	79	351	—	—	—	1,618
abortive	6	1	13	4	130	5	4	—	—	—	163
Plane crewmen killed or missing(1)	18	4	8	23	31	—	13	—	—	—	97
Troops											
carried	311	216	2,624(?)	1,773(?)	2,310	395	3,378	882	20	3	11,912
landed	291	215	2,605	1,650(?)	1,363	350	3,000(?)	882	20	3	10,374
landing casualties	5	6	26	45	22	12	17	—	—	—	133
Artillery pieces											
carried	—	8	—	60	68	15	25	—	—	—	176
effective	—	8	—	54	40	14	24	—	—	—	140
Jeeps											
carried	43	28	156	206	136	23	104	134	—	—	830
effective	32	24	151	177	79	21	92	134	—	—	710
Trailers etc											
carried	19	7	124	123	77	13	59	104	—	—	526
effective	15	7	122	106	49	12	50	104	—	—	465
Cargo tonnage carried	77	10(?)	244	211	245	95	253	379	30(?)	56	1,600

(1) Total of 31 Oct 44.

III. Operations of 38 and 45 Groups, RAF

	D-day	D plus 1	D plus 2	D plus 3	D plus 4	D plus 6	D plus 7	D plus 8	TOTAL
Aircraft									
dispatched	371	329	209	164	117	123	21	7	1,341
effective	331	302	177	152	91	115	17	6	1,191
abortive	31	10	2	2	2	2	—	—	49
destroyed or missing	—	3	13	9	23	6	—	1	55
damaged	7	44	106	62	61	63	4	3	350
Paratroops dropped	186	—	—	—	—	—	—	—	186
Net tonnage dropped	(?)	87	388	386	271	291	—	8	1,431
Gliders									
dispatched	359	296	42						697
effective	319	372	30						621
abortive	31	9	2						42
Glider troops landed	2,908	1,200	107						4,215
Artillery pieces landed	44	52	9						105
Other vehicles landed	420	443	63						1,026

IV. Resupply Operation by 2d Air Division—18 September 1944

Aircraft (B-24)	
dispatched	252
effective	246
destroyed or missing	11
damaged	70
Tonnage	
carried	—
dropped	486

V. Casualties

	Killed	Missing	Wounded or injured
IX TCC Crews	31	155	66
IX TCC Glider Pilots	12	65	37
RAF TCC Crews	31	217	17
British Glider Pilots	59	636	35
2d Air Division	1	63	34(?)
	—	—	—
TOTAL	134	1136	187

Appendix 3

STATISTICAL TABLES—OPERATION VARSITY
24 March 1945

I. Operations of IX Troop Carrier Command

	DZ A	DZ B	DZ W	DZ X	DZ X	LZ N	TOTAL
Aircraft							
dispatched	121	121	181	45 (C-47) 74 (C-46)	300	314	1,082 (C-47) 74 (C-46)
effective	119	121	181	44 (C-47) 70 (C-46)	296	313	1,074 (C-47) 70 (C-46)
abortive	2	—	—	1 (C-47) 2 (C-46)	4	1	8 (C-47) 2 (C-46)
destroyed or missing	3	16	1	1 (C-47) 20 (C-46)	14	3	38 (C-47) 20 (C-46)
damaged	30	47	35	21 (C-47) 38 (C-46)	137	44	314 (C-47) 38 (C-46)
Paratroops							
carried	1,973	1,924	2,479	387 (C-47) 2,071 (C-46)			6,763 (C-47) 2,071 (C-46)
dropped	1,920	1,917	2,469	376 (C-47) 1,995 (C-46)			6,682 (C-47) 1,995 (C-46)
Para. Arty.							
carried	—	—	12	12			24 (C-47)
Cargo							
tonnage carried	71	66	105	111			353
Gliders							
dispatched					594	314	908
effective					572	311	883
abortive					17	1	18
Troops							
carried					3,594	1,321	4,915
landed					3,492	1,318	4,810
Artillery pieces							
carried					40	3	43
Jeeps carried					208	142	350
Trailers, and other vehicles carried					101	97	198
Cargo tonnage					654	382	1,036

II. Operations of 38 and 46 Groups, RAF

Aircraft	
dispatched	440
effective	402
abortive	35
destroyed or missing	7
damaged	39
Gliders	
dispatched	440
effective	392
abortive	35
Glider troops carried	3,383
Artillery pieces carried	66
Jeeps and trucks carried	285
Other vehicles carried	553
Tanks (Locust T9) carried	3

III. Resupply Operation by 2d Air Division

Aircraft	
dispatched	240
effective	237
abortive	—
destroyed or missing	15
damaged	104
Cargo tonnage	
carried	598
delivered	582

IV. Casualties

	Killed	Missing	Wounded or Injured
IX TCC Crew Personnel	8	108	47
IX TCC Glider Pilots	33	55	106
RAF TC Crew Personnel	7	—	20
British Glider Pilots	38	135	77
2d Air Division Crew Personnel	5	116	30
TOTAL	91	414	280

Glossary

AEAF	Allied Expeditionary Air Force
Airborne mission	Sequence of flights to and from an objective or group of objectives by aircraft engaged in an airborne operation
Airborne operation	Operation in which troops are transported by air for entry into combat
Airborne troops	Ground units organized and/or trained for airborne operations
Airhead	Isolated area within which airborne troops are reinforced and resupplied by airplanes landing on airfields or landing strips. Any isolated area held by airborne troops in hostile territory.
Airportable (airtransportable) troops	Ground units suitable for transportation by air, but not organized or trained for airborne operations
Aldis lamp	Powerful flashlight with a very narrow beam visible only from the point at which it is directed.
AMHERST	Small British airborne operation in Holland in April 1945
AOC	Air Officer Commanding
ARENA	Proposed airborne operation in 1945 to establish a large airhead in the Kassel area
BENEFICIARY	Proposed airborne and amphibious operation in June or July 1944 to take St. Malo
BOXER	Proposed airborne operation in August 1944 to take Boulogne
BUPS	Radar responsor beacon for use with SCR-717
CHOKER II	Proposed airborne assault across the Rhine near Worms

COMET	Proposed airborne operation in September 1944 to secure a bridgehead across the Rhine at Arnhem
Commando	C-46 two-engined medium transport
COSSAC	Chief of Staff, Supreme Allied Commander
CP	Command Post
Departure Point (DP)	Designated point from which all or part of the serials in an airborne mission set out on course at specified intervals.
Drop Zone (DZ)	Area designated for the dropping of troops and supplies by parachute or, in the case of some supplies, by free fall
Element	Smallest aerial formations; usually two or three aircraft
EFFECTIVE	Proposed airborne operation in April 1954 south of Stuttgart
FAAA	First Allied Airborne Army
FLASHPOINT	Amphibious crossing of the Rhine by Ninth Army near Rheinberg in conjunction with VARSITY-PLUNDER
Flight (troop carrier)	Formation usually composed of two or more elements and roughly equivalent to a squadron
FVCP	Forward Visual Control Post
GARDEN	Ground attack toward Arnhem in conjunction with MARKET
Gee	British radio/radar navigation system similar to LORAN
Hamilcar	British glider of 17,500 pounds carrying capacity
HANDS UP	Proposed airborne and amphibious operation in June or July 1944 to seize Quiberon Bay area
Holophane light	Powerful and highly directional electric light used to mark routes and drop zones

Horsa	British plywood glider of 6,900 pounds carrying capacity
IFF (identification friend or foe)	Radar system for identifying friendly aircraft
Initial Point (IP)	Designated point from which the formations on a mission set their final course to their objectives
Jumpmaster	Member selected to take charge of the jump of a plane load of paratroops
Landing zone (LZ)	Area designated for the landing of gliders
Liberator	B-24 four-engined bomber
LINNET I	Proposed airborne operation in Tournai area in September 1944
LINNET II	Proposed airborne operation in September 1944 to seize bridges over the Meuse north of Liege
Luftwaffe	German Air Force
MARKET	Airborne operation in September 1944 to secure a bridgehead across the Rhine at Arnhem
NAPLES II	Proposed airborne assault across the Rhine south of Cologne
NEPTUNE	The assault phase of OVERLORD
Occult	Aerial lighthouse
OVERLORD	Allied invasion of northwest Europe
Panzer Division	German armored division
Pararack	Rack in or under an aircraft in which supply bundles (parapacks) are carried and from which they may be salvoed by means of a release switch.
Paratroops	Units organized and/or trained to drop by parachute for entry into combat
Pathfinders	Force sent in advance of an airborne mission to set up navigational aids

PIR	Parachute Infantry Regiment
PLUNDER	Ground assault across the Rhine in conjunction with VARSITY
Rebecca-Eureka	Radar navigational aid. The Rebecca, an airborne sender-receiver indicates on its scope the direction and approximate range of the Eureka, a responsor beacon
SCR-717	Airborne radar scanner which produces a pattern on its scope corresponding to the topography of the landscape scanned
serial	Formation usually composed of several flights and separated from other formations by a specific time interval
SHAEF	Supreme Headquarters, Allied Expeditionary Force
Stick	Paratroops assigned to jump from a given exit on a single pass
SWORDHILT	Proposed airborne and amphibious operation to take Brest
TCC	Troop Carrier Command
TRANSFIGURE	Proposed airborne operation south of Paris in August 1944 to cut off German retreat
Tug	Aircraft towing a glider or gliders
VARSITY	Airborne assault across the Rhine near Wesel in March 1945
VHF	Very high frequency radio
Waco (CG-4A)	American glider of steel and canvas construction of 3,750 pounds carrying capacity. Called "Hadrian" by the RAF.
Window	Bits of foil dropped to obscure by their radio "echoes" the scopes of enemy warning radar sets. Also known as "chaff."

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