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ALLIED AIRBORNE OPERATIONS IN HOLLAND

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REPORT ON OPERATIONS "MARKET" AND "GARDEN"

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REPORT ON OPERATIONS "MARKET" AND "GARDEN"

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INTRODUCTION

OPERATION "MARKET".

1. "MARKET" was the codename given to the airborne operation to assist Second British Army in their advance to the ZUIDER ZEE.

2. Under the orders of First Allied Airborne Army, it was carried out by HQ British Airborne Corps with the following under command:-

1 British Airborne Division
82 American Airborne Division
101 American Airborne Division
1 Polish Parachute Brigade

Certain additional units shown in detail at Appendix 'A'.

3. Aircraft and gliders were provided for these troops by 38 and 46 Groups RAF and Ninth United States Troop Carrier Command. Glider pilots were provided by British Glider Pilot Regiment for all gliders towed by British aircraft and by Ninth United States Troop Carrier Command for all gliders towed by American aircraft.

4. Air support and air escort were provided by 2 Tactical Air Force, 2 and 11 Groups RAF and Eighth United States Air Force (both fighters and bombers), all under the control of HQ Allied Expeditionary Air Force. All arrangements for air escorts, and all air support up to H hour, were made by First Allied Airborne Army with AEAF. First Allied Airborne Army also made the arrangements for Air/Sea rescue and diversionary dummy parachute drops.

OPERATION "GARDEN".

5. "GARDEN" was the codename given to the operation for the advance by Second Army from the general line of the ALBERT and ESCAUT CANALS in BELGIUM to the ZUIDER ZEE in HOLLAND. The 30 Corps came under command of Second British Army on landing.

6. The advance was to be on a very narrow front, with only one road most of the way, through EINDHOVEN - STEENBERGEN - VEGHEL - UDEN - GRAVE - NIJMEGEN - ARNHEM - APELDOORN - ZUIDER ZEE at NUNSPEET 6721. It was to be carried out by 30 Corps (consisting of Guards Armoured Division with 43 and 50 Infantry Divisions), while 8 Corps on the right, and 12 Corps on the left, advanced more slowly on the flanks.

7. Distances are approximately as follows:-

Start line, 30 Corps,	to EINDHOVEN	13 miles
"	to UDEN	32 "
"	to GRAVE	43 "
"	to NIJMEGEN	53 "
"	to ARNHEM	64 "
"	to ZUIDER ZEE	99 "

8. Second British Army, after hard fighting in NORMANDY, had advanced about 280 miles from R. SEINE to the ESCAUT CANAL between the end of August and 11 September. Their lines of communication ran from the beaches near CAEN by road, with no intermediate ports and practically no assistance from the railways, but with some valuable assistance from aircraft landing supplies. There were just sufficient supplies, ammunition and vehicles to equip and transport 30 Corps provided the opposition was not great; a shortage of these necessities in the forward area prevented any chance of a quick advance by 8 or 12 Corps. The ground organisation of the Tactical Air Force had been severely strained.

9. The German Army had been overwhelmed in FRANCE and, although fighting hard on the line of the ALBERT and ESCAUT canals in BELGIUM, was believed to be in no fit state to resist another determined advance. It was considered that once the crust of resistance in the front line had been broken, the German Army would be unable to concentrate any other troops in sufficient strength to stop the break-through.

10. On the assumption that operation "MARKET" was successful, it was estimated that 30 Corps might reach the ZUIDER ZEE between 2 - 5 days after crossing the BELGIAN - DUTCH frontier. They were expected to join 1 Airborne Division in ARNHEM between D + 1 and D + 3.

WEATHER and TERRAIN.

11. The weather forecast was good for the period 17 to about 20 September, subject to the usual sudden changes in this area at this time of the year.

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12. Generally speaking, the country does not lend itself to a quick advance. There are many canals and three major rivers (including the RHINE) between the BELGIAN - DUTCH border and the ZUIDER ZEE. Much of the country off the roads is unsuitable for tanks and heavy vehicles.

13. The ground generally in HOLLAND in September is very much more suitable for landing parachutists and gliders than was thought. Both the photographic interpretation and the reports of Dutch officers who had lived and trained in the areas concerned, exaggerated the dangers of very boggy ground and numerous very large dykes. In fact parachutists could have landed practically anywhere except in the towns and woods; gliders could also have landed, and their loads reached tracks or roads, far more freely than was expected. It was thought to be impossible to land any large number of gliders between ARNHEM and NIJMEGEN, between the R's. NEDER RIJN and MAAS; in fact, a full divisional lift could have landed there if a not unreasonable amount of delay and dispersion was acceptable. Had there been time to tap all sources of information and to check that information more thoroughly, alternative and possibly better detailed plans might have been made.

OPERATIONAL READINESS.

14. The conversion of HQ British Airborne Troops to a skeleton operational Corps HQ was approved on 7 August by 21 Army Group. Corps HQ Signals received various increments (British and American), to make them operational during August. But, even so, it was necessary during the actual operation to make further additions from British sources of over 250 signals personnel. Including personnel at Rear HQ over 600 were employed for the operation within British Airborne Corps Signals. This figure is comparable with the requirement of an ordinary Corps Signals and a similar number of personnel will be required for any future Airborne Corps operation.

15. 1 British Airborne Division was at full strength and, although never committed to action since their return from ITALY, had been concerned in the planning of sixteen airborne operations since 6 June 1944. 82 and 101 American Airborne Divisions had taken part in the original NORMANDY landings and had been reconstituting in ENGLAND for 7½ and 8 weeks respectively. 1 Polish Parachute Brigade had not been in action and was not mobilized until 1 July 1944.

THE OBJECTS OF THE OPERATIONS.

16. The object of operation "GARDEN", vide Second Army's "Notes for Planning Future Operations" dated 12 Sep 44 and 30 Corps Operation Instruction No. 24 dated 15 Sep 44, was as follows:-

To place the Second Army including airborne forces astride the rivers MAAS, WAAL and NEDER RIJN on the general axis GRAVE 6253 - NIJMEGEN 7062 - ARNHEM 7577 and to dominate the country between the RHINE and the ZUIDER ZEE, thus cutting off communications between GERMANY and HOLLAND.

17. The object of operation "MARKET", vide Airborne Corps Operation Instruction No. 1 dated 13 Sep 44, was as follows:-

Airborne Corps will capture and hold crossings over the canals and rivers on Second Army's main axis of advance, from about EINDHOVEN to inclusive ARNHEM.

(The actual crossings were detailed in the operation instruction and are shown on the maps attached to this report at Appendix 'B' (Maps 1 and 2).

THE SCALE OF OPERATION "MARKET".

18. Operation "MARKET" was by far the biggest and most ambitious airborne operation ever carried out by any nation or nations. Its scale may be judged from the following summary of facts:-

(a) Airborne Forces Involved.

(i)	Number of parachute troops actually dropped			
	On D Day (17 Sep)	16,500		
	Subsequently	3,690	TOTAL	20,190
(ii)	Number of troops landed by glider		-	13,781
(iii)	Flown in by aeroplane		-	905
(iv)	Total airborne troops flown in by aeroplane, glider or as parachutists, who arrived		-	34,876

(b) Number of gliders and glider pilots actually employed.

	HORSAs	HAMILCARs	WACOs	TOTAL	British Glider Pilots	US Glider Pilots
On D Day (17 Sep)	331	13	147	491	742	240
On D + 1 (18 Sep)	284	15	904	1203	598	1808
Subsequently	43	1	875	919	88	1750
TOTAL:	658	29	1926	2613	1338 ϕ	3798

ϕ Total of British Pilots employed is as stated, as some unable to complete missions on one day flew again on subsequent days.

(c) Number of Troop Carrier Aircraft actually employed (including tug and re-supply aircraft)

	38 Group RAF	46 Group	IX USTCC	TOTAL
On D Day (17 Sep)	230	130	1174	1534
On D + 1 (18 Sep)	207	122	1031	1360
On D + 2 (19 Sep)	142	56	445	643 =
On D + 3 (20 Sep)	100	64	356	520
On D + 4 (21 Sep)	64	53	177	294
On D + 5 (22 Sep)	-	-	-	-
On D + 6 (23 Sep)	73	50	531	654
On D + 7 (24 Sep)	-	21	-	21 ≠
On D + 8 (25 Sep)	-	7	34	41 ≠
Total Sorties:	816	503	3748	5067

= Note: In addition 8 US Air Force dispatched 252 aircraft on D + 1 on re-supply missions.

≠ Note: Based in Belgium.

Note: AFDAG flew in to airfield at OUD KEEMT on D + 9 in 209 IXTCC aircraft.

(d) Aircraft employed in supporting Operation "MARKET" including escort to Troop Carrier Formations.

Date	Formation	Despatched Bomber	Despatched Fighter	Lost	Total despatched for day Bomber	Total despatched for day Fighter
D-1 & D (16-17 Sep)	RAF BC	282		2	282	
D (17 Sep)	RAF BC	100		-		
	8 AF	891		2		
	8 AF		703	17		
	ADGB		371	-		
	9 AF		166	1		
	2 TAF	122		3	1113	1240
D + 1 (18 Sep)	8 AF	252		13		
	8 AF		608	28		
	ADGB		259	6	252	867
D + 2 (19 Sep)	8 AF		182	9		309
	ADGB		127			
D + 3 (20 Sep)	ADGB		248	3		
	8 AF		679	5		970
	9 AF		43	-		
D + 4 (21 Sep)	ADGB		137	-		
	8 AF		95	4		232
D + 5 (22 Sep)	8 AF		79	-		79

(d) Aircraft employed in supporting Operation "MARKET" including escort to Troop Carrier Formations. (continued)

Date	Formation	Despatched		Lost	Total despatched for day	
		Bomber	Fighter		Bomber	Fighter
D + 6 (23 Sep)	ADGB		193	2		
	8 AF		586	22		779
D + 7 (24 Sep)	ADGB		36			
	2 TAF	-	22	-		58
D + 8 (25 Sep)	2 TAF		177			
	ADGB		60	-		237
Grand Totals to D + 8 (17-25 Sep)		1647	4771	117	1647	4771

(e) Amount of supplies dropped by parachute.

	38 Group RAF	46 Group RAF	IX USTCC	Eighth US Air Force	TOTAL
On D day (17 Sep)	NIL	NIL	NIL	NIL	NIL
On D + 1 (18 Sep)	87 (144)	NIL	NIL	505	592
On D + 2 (19 Sep)	266 (439)	126 (161)	64	NIL	456
On D + 3 (20 Sep)	264 (437)	126 (161)	462	NIL	852
On D + 4 (21 Sep)	168 (280)	105 (132)	23	NIL	296
On D + 5 (22 Sep)	NIL (b)	NIL (b)	NIL	NIL	NIL
On D + 6 (23 Sep)	193 (319)	98 (125)	NIL	NIL	291
On D + 7 (24 Sep)	NIL	41 (52)(c)	NIL	NIL	41
On D + 8 (25 Sep)	NIL	14 (17)(c)	43	NIL	57
TOTAL	978 (1619)	510 (648)	592	505	2585

NOTES:-

1. All tonnages figures are NET. Tons shown in brackets are gross.
2. Total tonnage figures are NET tons -

(a) For supplies landed by glider, see appendix 'J'.
(b) Sup drop cancelled by Div.
(c) From Brussels.

(f) Number of base airfields used by Troop Carrier Aircraft.

38 Group RAF - 6

46 Group RAF - 3

IX USTCC - 18

(g) Time taken to prepare the operation.

From first warning to day of take-off - 8 days.

(Note: Planning was done at HQ 21 Army Group and Second Army in Belgium, and at First Allied Airborne Army, Allied Expeditionary Air Force, Troop Carrier Command Post, and Airborne Corps HQ in England).

(h) Examples of Weapons and Vehicles carried by air.

Type	American	British	TOTAL
105 mm Gun	12	-	12
75 mm Gun	72	24	96
17 Pounder A.Tk.	-	16	16
6 Pounder A.Tk.	48 +	52	100
.5 Hy Machine Gun	40	-	40
37 mm Gun	6	-	6
Jeeps	842	559	1401
Trailers	118	428	546
Motor Cycles	44	348	392

+ This gun is known in the US Army as the 57 mm A. Tk. Of these, 24 75 mm guns were dropped by parachutes. All the remainder were carried in gliders.

(i) Casualties, all causes, personnel.

(Up to incl. 25 September, when the airborne operation, as such, may be said to have been concluded).

	Killed	Wounded	Missing	TOTAL
HQ Airborne Corps & Signals	4	-	8	12
1 British Airborne Div.	286	135	6041	6462
82 American Airborne Div.	215	790	427	1432
101 American Airborne Div.	315	1248	547	2110
1 Polish Parachute Brigade	47	158	173	378
British Glider Pilots	59	35	644	738
American Glider Pilots	12	36	74	122
38 Group RAF	6	23	184	213
46 Group RAF	8	11	62	81
IX USTCC	16	204	82	302
TOTAL	968	2640	8242	11850

1 Airborne Division were evactuated from the battle area on 25 September. Since then, up to 28th October, a further 110 all ranks of that division have escaped to our own lines.

Between 26 September and 23 November the following further casualties were sustained:

	Killed	Wounded (Incl.Sick)	Missing	TOTAL
Airborne Corps HQ	-	-	-	-
82 American Airborne Div.(b)	310	1396	206	1912
101 American Airborne Div	375	1307	(a)	1682
1 Polish Parachute Brigade	2	1	-	3
TOTAL	687	2704	206	3597

Note: (a) Number of missing reduced by 142 during period.
(b) Casualties up to 5 November only.

Negligible casualties were sustained by the airborne troops on landing, probably well under one per cent of the total force.

(j) Casualties to aircraft, 17 - 24 September.

	No. of sorties involved	Losses	Percentage	% Loss against initial equipmt.
38 Group RAF	827	32	3.87	13.91
46 Group RAF	513	23	4.48	11.11
IX USTCC	3765	89	2.36	7.58
TOTAL	5105	144	2.84	9.39

INTELLIGENCE NOTES.

19. See Appendix 'C'.

THE COURSE OF EVENTS UP TO THE TIME OF THE FIRST AIRBORNE LANDINGS.

20. "Y" day for operations "MARKET" and "GARDEN" was fixed for 17 Sep 44. As the airborne operation was vital to the combined operation, and as surprise regarding the direction of the main thrust of Second Army had to be maintained, there could be no appreciable advance by the ground forces before the initial airborne landings had been achieved. It was therefore decided that both operations must, if necessary, be postponed until the weather was suitable for the airborne operation, but, to deny time for reorganisation to the enemy, the first opportunity must be seized even though preliminary bombing of enemy flak had to be reduced. Postponement would be for 24 hour periods and the decision to postpone would be the responsibility of the Commanding General, First Allied Airborn Army. A minimum of 4 hours notice of postponement at HQ Second Army was required.

If the ground situation caused Second Army to postpone D day, a minimum of 4½ hours notice before the first aircraft was due to take off was required at HQ British Airborne Corps.

In the event no postponement was necessary, although the heavy bomber programme against flak on D - 1 was curtailed by difficult flying conditions.

21. The period from 17 Sep onwards was a non-moon period and night landings on a large scale were therefore impossible. It had always been considered that daylight landings unless attended by overwhelming air support against flak and overwhelming air escort against fighters, together with the achievement of complete surprise, would be too expensive. These conditions appeared, however, for the first time in the history of airborne forces, to be possible of achievement. Furthermore, daylight landings would greatly increase the chances of accuracy and would give the attacking troops a better chance of concentrating quickly and taking advantage of the surprise achieved. The Commanding General, First Allied Airborne Army, decided to utilize daylight.

22. As previously stated, opposition on the ground in the rear areas to be attacked by airborne forces was expected to be ill-organised and of varying standards. It was not expected that any mobile force larger than a brigade group, with very few tanks and guns, could be concentrated against the airborne troops before relief by the ground forces. Actual enemy defensive positions were being improved rapidly, particularly in the NIJMEGEN - MAAS-WAAL CANAL area, but it seemed that these would be inadequately manned if D day was not postponed.

23. Enemy flak, on the other hand, was expected to be formidable. The map at Appendix "D" shows located batteries; in addition, air reconnaissance and the previous experience of the air force indicated a large number of mobile light flak units and flak barges. Plans were made to attack these by preliminary bombing and by fighter-bombers acting as escorts to the convoys. Dropping zones and landing zones were chosen so that they avoided as far as possible, the flak concentrations. For this reason it was not possible to land close to any of the bridge objectives.

24. Enemy fighter opposition was not expected to be great but the vulnerability of troop-carrying aircraft and gliders made adequate precautions essential. It was anticipated that the period of greatest danger would be after the leading troop-carrier aircraft had arrived over the target area, as by that time the enemy would have plenty of time to concentrate any fighters within reach.

25. Thus the general picture, before the operations started, was that the flight and landings would be hazardous, that the capture intact of the bridge objectives was more a matter of surprise and confusion than hard fighting, that the advance of the ground forces would be very swift if the airborne operations were successful, and that, in these circumstances, the considerable dispersion of the airborne forces was acceptable. Priority must obviously be allotted from the south northwards, so that the break-out and the advance of the ground troops was assured.

DESCRIPTION OF THE OPERATIONS

D DAY (17 Sep)

26. Operation "MARKET" started during the night 16/17 September with the bombing by RAF Bomber Command of four enemy fighter airfields, from which the enemy would have been able most easily to interfere with the subsequent troop-carrier flights, and one important enemy flak position. A small force of Eighth U.S. Air Force bombers attacked another enemy airfield early on 17 September. Results of all these bombings were effective and they were so designed as not to indicate anything unusual.

27. The weather on 17 September was fair with slight haze and a cloud base generally of 1500 - 2000 feet. Wind was light and mainly westerly. Visibility was 4 - 6 miles.

28. The airborne operations started according to plan. Between 1025 hrs. and 1155 hrs 1544 troop carrier aircraft (including pathfinders) and 491 gliders took off. In general terms they

carried Advance Corps HQ and all the parachute troops and a few glider loads of both American Airborne Divisions with one parachute brigade and over half the airlanding troops of 1 British Airborne Division.

29. The aircraft and gliders of Corps HQ, 1 British and 82 American Airborne Divisions followed a northern route over the Dutch Island of SCHOUWEN and thence over enemy territory. Those of 101 American Airborne Division, followed a southern route, over friendly territory until they turned North over the ESCAUT CANAL. Both routes are shown on maps 3 and 4 at Appendix 'B'. The average time of flight to objective was 2½ hours.

30. Air support for the airborne operations was of four kinds:-

(a) Fighters provided escort and withdrawal cover.

(b) Fighters provided umbrella cover over the Drop and Landing Zones.

(c) Fighters undertook anti-flak patrol.

(d) Bombers attacked flak positions.

Since the northern route lay over enemy territory from the coast to the objectives, whereas the southern route did so only after crossing the Belgian-Dutch frontier, most of the anti-flak operations were along the northern route. Eight hundred and twenty-one B17's of the Eighth Air Force dropped 3139 tons on 117 flak position with 43 good, 24 fair and 50 poor results. They were escorted by 153 P-51's. In a daylight mission 85 Lancasters and 15 Mosquitoes of the RAF Bomber Command bombed three coastal defense batteries in the WALCHEREN area, dropping 535 tons with good results. Escort was provided by 53 Spitfires.

A Force of 550 Eighth Air Force P-47's, P-38's and P-51's performed escort and anti-flak patrols. Air Defense of Great Britain contributed 371 Tempests, Spitfires and Mosquitoes on the northern route, about 60% to escort, and 40% to anti-flak patrols. The Ninth Air Force gave umbrella cover over the Drop and Landing Zones with 166 fighters.

What may be regarded as air support to the airborne troops on the ground rather than to the operation itself, was given by 84 Mosquitoes, Bostons and Mitchells of 2nd T.A.F. which attacked barracks at NIJMEGEN, CLEVE, ARNHEM and EDE. Three aircraft were lost on these missions. On the evening of D day the RAF Bomber Command executed two dummy drops with 10 aircraft each in areas west of UTRECHT and east of NIJMEGEN near EMMERICH.

The air attacks on flak positions were very successful. Not only were land batteries knocked out, but several flak ships and barges off the Dutch islands were destroyed. Not one British troop carrier aircraft or glider was lost by enemy action, but 35 American troop carrier aircraft and 13 American gliders were destroyed mostly on the southern route.

Luftwaffe reaction to this great airborne operation was hesitant. Approximately 15 Focke Wulf 190's, which engaged one group of Eighth Air Force fighters near Wesel, were the only enemy aircraft encountered. Seven were shot down, for the loss of one U.S. fighter. Most of the other losses of supporting air forces were to flak. Totals for the day were: ADGB 0, Ninth Air Force 1, Eighth Fighter Command 17, Eighth Bomber Command 2, Second Tactical Air Force 3.

31. In this report, from now on, the descriptions of the activities of the airborne forces are described throughout from SOUTH to NORTH, as this gives the better overall picture.

32. 101 American Airborne Division, who came under direct command of 30 Corps, (except for Airborne supply and reinforcement) on landing, were conveyed accurately and with light losses to their proper DZ's and LZ's (Map 1, Appendix 'B'). Surprise was complete and opposition on the ground was light. ZON, ST. OEDENRODE and VEGHEL had been occupied by last light and one battalion was fighting near BEST. All bridges were held and were intact except that over the WILHELMINA CANAL south of ZON, which had been destroyed. By last light this canal had been crossed by one regiment from the north on an improvised bridge and their leading troops had reached BOKT 4423.

33. Advance Airborne Corps HQ and 82 American Airborne Division (For DZ's and LZ see Map 2, Appendix 'B') also landed successfully and accurately against light opposition and achieved complete surprise. By dark on 17 September, the division had seized intact the bridge over R MAAS at GRAVE and the bridge over the MAASWAAL canal at HEUVEN 700539; they were holding them without difficulty. The remainder of the division were moving north and north west dominating the vital wooded hill area which lies just south east of NIJMEGEN, while at the same time leaving a small party to dominate the LZ's for the following day. Enemy troops encountered were of a poor type, and were easily dealt with.

Advance Corps HQ, having themselves had the unusual experience for a HQ of that seniority of capturing a few German prisoners, were established in the area of the MOOKSCHE BAAN 743540. They were in touch with 82 American Airborne Division and Airborne Corps (Rear) in ENGLAND, but the other wireless links, although the sets had landed intact, were not in working contact.

34. 1 British Airborne Division, also against light opposition, had secured the area of the

Landing and Dropping zones, (See Map 2, Appendix 'B'). 1 Parachute Brigade was moving on the ARNHEM road bridge at 747769, with Brigade HQ and 2 Parachute Battalion actually holding its northern end. This bridge was intact but the railway bridge at 706765 had been blown and the centre span of the pontoon bridge at 738775 had been removed.

35. 30 Corps starting at 1435 hrs. had advanced some 7 to 8 miles against strong opposition but had not broken through the enemy's main defenses. Their leading troops harboured for the night at VALKENSWAARD, still about 6 miles south of EINDHOVEN. In spite of enemy effort, progress had been disappointingly slow.

36. As a general summary of the day's operations, the flight and landings of all the airborne troops had been an unqualified success with very few casualties and their operations on the ground were well up to schedule, but the advance of the ground troops to their assistance had met stiffer opposition than was expected and had suffered delay.

D + 1 (18 Se .

37. On 18 September the weather was again suitable for flying along the northern route but thick cloud spreading northwards from FRANCE made the use of the southern route inadvisable. The northern route was used, therefore, by all aircraft including those carrying 101 American Airborne Division. Fog at bases in ENGLAND, however, delayed take-off slightly and the first aircraft could not leave until 1030 hrs; such morning fog is common in the airfield areas at this time of year.

38. 1360 troop carrier aircraft and 1203 gliders took off. In general terms they carried one glider infantry battalion of 101 American Airborne Division and all other glider-borne troops of both American Divisions; also one parachute brigade and the remainder of the airlanding troops of 1 British Airborne Division. Losses were again very light (22 aircraft and 21 gliders). Later in the day, 252 Eighth American Air Force bombers (B-24's) (13 lost) dropped supplies to the American Divisions.

39. The escort for the troop carriers was provided by ADGB and Eighth American Air Force. These forces also despatched fighters to strafe and knock out flak positions. 277 Spitfires, Tempests, Mustangs and Mosquitoes of the former and 415 P-47's and P-51's of the latter were employed. Enemy reaction was much stronger than the day before but the escort was completely effective. Eighth Air Force fighters encountered some 90 Messerschmidts. Losses to escorting fighters from all causes were:-

ADGB	6
Eighth Air Force	28

40. 101 American Airborne Division continued to hold ZON, ST. OEDENRODE and VECHEL, and the enemy attacks in these areas were easily dealt with. In spite of sending reinforcements to BEST, however, the division were not able to capture the bridge there as the enemy had also been heavily reinforced. The regiment from south of ZON advanced southwards on EINDHOVEN at first light, met considerable opposition one mile north of the town, enveloped it from the east and seized it by 1300 hrs. Contact was made with 30 Corps reconnaissance patrols at 1215 hrs. and with their main forces at 1900 hrs. just south of the town. By dark 101 American Airborne Division were in complete control of the town and its important bridges, the latter still intact.

At about 1530 hrs., one glider infantry battalion and divisional troops arrived by glider on the landing zone just north west of ZON. In addition, supplies and ammunition were brought up by 20 Waco gliders and 121 B-24 bomber aircraft (parachute). Recovery was glider 100%, parachute 40%.

41. 82 American Airborne Division retained the initiative throughout the day by extremely vigorous offensive action, and dominated the vital wooded hill area previously mentioned. They also attacked northwards along the MAAS WAAL canal, reaching and capturing the bridge for the main road GRAVE - NIJMEGEN that evening; the bridge was damaged and, though fit for normal traffic, it was doubtful if it could carry tanks. Considerable enemy opposition in NIJMEGEN town delayed the division there, though a few men, assisted by the Dutch Resistance, got within 300 yards of the main road bridge over the R WAAL. That bridge, and the railway bridge just west of it, were intact but were strongly held by the enemy.

During the morning, the enemy started to counterattack north westwards from the area of KRANENBURG and the FORST REICHWALD, and when the second (glider) lift of the division arrived, four hours late owing to morning mist in ENGLAND, the landing zones were in many cases in the fighting area. In spite of this and considerably increased enemy flak, the landings were very successful. This lift consisted mostly of artillery and medical units and about 90 per cent of the guns were in action that afternoon.

The resupply by heavy bombers was about 30 per cent effective, some of it falling into the enemy's lines and some of it too far away to be collected at the time.

42. Airborne Corps HQ (Advanced) remained at the same place. Communications with 82 American Airborne Division were naturally good. The wireless worked well at times to Rear HQ in ENGLAND, but there was considerable difficulty and the shortage of cipher personnel at Rear HQ was already making itself felt. Little effective wireless communication was established with 30 Corps or 1 British Airborne Division. As far as was known at last light, 30 Corps had not advanced beyond EINDHOVEN and were staying there for the night.

43. 1 British Airborne Division held the area of the landing and dropping zones, although they were unable wholly to prevent enemy fire on them. They were able to make very little further progress towards the ARNHEM bridge, although a few men did get through. The second airborne lift arrived successfully at 1500 hrs. (as described above), though 4 hours later than hoped owing to the early morning fog. The division was now complete and a further unsuccessful effort, against growing opposition, was made to establish a corridor to the bridge. The troops of 1 Parachute Brigade at the northern end of the bridge were still holding out and dominating the immediate area against counter attacks by infantry, "Tiger" tanks and SP guns.

44. 30 Corps, led by Guards Armoured Division, resumed their advance from VALKENSWAARD at 0600 hrs. against considerable opposition. Fighting for most of the day centred round AALST 4213 and between there and EINDHOVEN. Flanking attacks to the east and west of the main axis were also strongly opposed and in many cases the country was unsuitable for tanks. The capture of EINDHOVEN by 101 American Airborne Division operating from the north eventually eased the situation and the leading troops of Guards Armoured Division reached the southern bank of the WILHELMINA Canal below ZON at about 2100 hrs.

Thus the position of 30 Corps at the end of this day was that leading troops of the Guards Armoured Division were between EINDHOVEN and ZON, harbouring for the night and building a bridge over the WILHELMINA Canal, while the rest of the Corps were further south and employed to a considerable extent in mopping up operations. It was known at HQ 30 Corps that all other bridges along the axis up to inclusive GRAVE were intact and held by the Airborne Forces.

D + 2 (19 Sep)

45. The weather on 19 September was bad for flying. In spite of postponement, only the aircraft located in the central part of the airborne base (i.e. 38 and 46 Groups RAF and that part of IX U.S.T.C.C. on and near GREENHAM COMMON) could take off. Owing to the dispersion of the remaining airfields of the airborne base and the shortage of time, the troops and loads at the other airfields could not be transferred and so could not be flown in. The northern route was forecast, correctly, as good for weather while conditions on the southern route were cloudy and unreliable, but the Commanding General, First Allied Airborne Army, adopted, for tactical reasons, the southern route only. It should be remembered that the northern route had already been used on two consecutive days and the Luftwaffe might well expect it to be used again.

46. 655 troop carrier aircraft and 431 gliders took off. In general terms they carried the remaining glider infantry of 101 American Airborne Division, a small resupply for 82 American Airborne Division, a full resupply for 1 British Airborne Division and the glider element of 1 Polish Parachute Brigade; the latter brigade was under command 1 British Airborne Division and was to join the division near ARNHEM. Due mainly to weather but partly to enemy action, 226 aircraft and 185 gliders failed to arrive at their destinations; of these, 40 aircraft and 112 gliders were listed as missing, but a considerable proportion of the glider loads rejoined their divisions during the operations and subsequently.

47. Air escort was provided by 127 Spitfires of ADGB and 182 Mustangs of Eighth American Air Force. Severe flak was encountered between the I.P. (i.e. the point where the air columns dispersed) south of HERTOGENBOSCH and the landing and dropping zones. Moreover, the enemy put up strong fighter formations, Eighth Air Force fighters alone encountered more than 425 Messersschmidts 109's and Focke Wulfe 190's, claiming 23 destroyed against their own loss of 9.

48. 101 American Airborne Division continued to hold the road open this day for the advance of 30 Corps, but enemy opposition increased particularly west and north west of VEGHEL from the SCHINDEL 4137 - DINTHER 4341 area. Leading elements of 30 Corps passed through VEGHEL unopposed by 0645 hrs. and the main axis was a mass of vehicles streaming northwards. 101 Division fought hard all day the whole way along the axis and in addition captured the bridge at BEST (where 15 88 mm. guns were destroyed, 1056 prisoners were taken and 300 enemy dead were left on the field.)

15/19 Hussars, from 30 Corps, came under command 101 Division and assisted at BEST and in the EINDHOVEN Area.

The third glider lift for the division began to arrive at 1400 hrs. carrying two infantry battaliors and the majority of the divisional artillery. They landed on the same landing zone north west of ZON and some anti-tank guns were just in time to repulse an enemy attack on the ZON bridge from the south east. As stated above, a considerable proportion (some 97 out of 385) of this glider lift failed to arrive this day.

49. 82 American Airborne Division successfully withstood several enemy attacks during the day while at the same time endeavouring, with inadequate forces, to capture the NIJMEGEN bridge. The

enemy had increased his force in the FORST REICHWALD (south east of NIJMEGEN) and attacked all along the south east front of 82 Division from MOOK 7251 to BEEK 7560, but particularly at the latter place. Enemy forces included some tanks and 88 mm. guns. 508 Parachute RCT distinguished themselves in very hard fighting in the BEEK area during this and succeeding days.

The bridge over the MAAS WAAL canal at 672604 had been captured during the night but was damaged and might not be able to carry tanks without some repairs. Guards Armoured Division was therefore routed from GRAVE via HEUMEN 7053.

At 0830 hrs. the leading elements of Guards Armoured Division crossed the GRAVE bridge, still held intact for them, and at 1700 hrs. one battalion of 82 Division and Grenadier Guards Group of Guards Armoured Division made a combined attack on the NIJMEGEN bridge; the bridge, however, together with that part of the town adjacent to the south bank of R WAAL, was strongly held and the attack was once more unsuccessful. In the meantime, Coldstream Guards Group were in support of 82 Division in case of emergency on the REICHSWALD front.

Owing to the weather it was not possible to fly in the glider infantry regimental combat team as planned. This was most unfortunate as it meant that the forces available to capture the NIJMEGEN bridge were still inadequate, indeed, the troops already on the ground were only just sufficient to hold their own. As will be seen later, the repercussions of this shortage of infantry affected the ARNHEM operations as well, and troops of 30 Corps had to be diverted from their primary role.

36, out of 60 aircraft that took off, dropped supplies which were widely scattered and difficult to pick up. Transport was still short.

50. Advance Airborne Corps HQ moved early in the day to DE KLUIS 7057 so as to be on the main axis of advance. The Corps Commander met Commander 30 Corps at about 0830 hrs. and agreed the plan of action for the day. After the failure of the attack against NIJMEGEN bridge at 1500 hrs., they decided, unless infiltration tactics were successful during the night, that a crossing of the R WAAL by one parachute regimental combat team (RCT) by boat, followed by a simultaneous assault on both ends of the bridge, would be required the next day; on this basis, Commanders of 82 Division and Guards Armoured Division started detailed planning, during the late evening.

Communications from Advance Airborne Corps were now good to 82 Airborne Division, 30 Corps, Second Army and Airborne Base (in ENGLAND). They were still very intermittent and unreliable to 1 Airborne Division and a shortage of cipher personnel at Airborne Base delayed re-transmission. The situation at 1 Airborne Division was not known to any satisfactory extent but civilian reports by telephone indicated that opposition was heavy. Various expedients were tried to improve communications but they were not wholly satisfactory. The first situation report received at Corps HQ from 1 British Airborne Division arrived at 0800 hrs. this day but did not give the complete picture.

A landing strip for light aircraft was started at DE KLUIS immediately on arrival and, with the willing assistance of the local Dutch, it was completed and in use by early next morning. 2 TAF also used it as a message dropping station, employing Spitfires.

DDMS arrived by road and immediately started an effective and large-scale organization of hospitals in the NIJMEGEN areas using local resources to the utmost.

51. 30 Corps, led by Guards Armoured Division, pressed on northwards at first light. They were unopposed and, although they had had little rest for the past 36 hrs. and were confined to one not particularly good road, their advance was very swift. The action of Guards Armoured Division has already been described above. The remainder of the Corps were still mopping up pockets of resistance about EINDHOVEN but certain groups specially detailed to assist 101 and 82 Airborne Divisions, and the leading elements of 43 Infantry Division, had begun to move north. Their one and only road axis was still threatened on both sides and 8 Corps, on the right, and 12 Corps on the left, had made little progress.

Tactical HQ 30 Corps arrived at MALDEN during the afternoon. Main 30 Corps HQ moved north from HECHTEL 3483 at 1740 hrs. with the intention of moving direct to MALDEN 7755 but, as described later, it was delayed in movement.

52. 1 British Airborne Division were now beginning to concentrate all available forces some 3 miles west of the ARNHEM road bridge in the general area surrounding HARTESTEIN 6978, while at the same time guarding the landing and dropping zones for 1 Polish Parachute Brigade. HQ 1 Parachute Brigade and one battalion were still holding the northern end of the ARNHEM bridge, but casualties were heavy, opposition considerable and ammunition and supplies running short; the two other battalions of the brigade, together with one battalion from each of 4 Parachute Brigade and 1 Airlanding Brigade, failed to break through to the bridge and very few survivors returned.

Nearly all the resupply this day (about 390 tons) fell into enemy hands as the pre-arranged dropping zone could not be guarded adequately. 31 out of 46 gliders of 1 Polish Parachute Brigade arrived in face of considerable opposition on the ground but several anti-tank guns were saved;

the parachute troops of that brigade could not take off from the airfields in the GRANTHAM area in ENGLAND.

Thus, at the end of the day, 1 British Airborne Division still held, precariously, the northern end of the ARNHEM bridge but were mainly concentrated round HARTESTEIN. They also controlled the HEVEADORP ferry 9176 from the northern bank. Four battalions, in addition to the one at the bridge, were out of touch and, except for a few personnel, never rejoined the division.

Communications to Airborne Corps and to Airborne Base were unreliable and slow; the seriousness of the division's situation was not apparent to HQ Airborne Corps at the time, although it was known that enemy opposition was heavy and resupply that day had been a failure.

D + 3 (20 Sep).

53. The weather on 20 September was worse. There was low stratus cloud, base about 500 to 1000 ft., in England in the morning; this lifted somewhat by 1130 hrs. in the south but not until about 1400 hrs. in the GRANTHAM area. In the channel there was haze in the morning becoming 7/10 to 10/10 cloud in the afternoon, with bases 2000 to 3000 ft., visibility 1 to 2 miles. In the afternoon over the target areas there was 6/10 to 8/10 cloud with visibility 1 to 2 miles in haze. In these circumstances the Commanding General, First Allied Airborne Army, decided to send parachute resupply missions only and no troops (except one battery of parachute artillery successfully dropped to 101 Division). The southern route was used again for all missions.

54. 163 British and 356 American aircraft took off and 162 and 338 reached the area of their supply dropping zones. Losses were 14 and nill respectively. Flak in the ARNHEM area, where the British were dropping supplies, was very intense and accurate. Escort was by 248 fighters of ADGB and 679 of Eighth American Air Force. Losses were 3 and 5 respectively. No enemy aircraft were encountered. Ninth American Air Force had 43 P.47's on uneventful patrol over the MARKET area in the late afternoon.

55. 101 Airborne Division had an easier day though still a busy one. A sharp attack on ZON by a German Panzer force from the east early in the morning was repelled and counter-attacked with the assistance of 15/19 Hussars and 44 Royal Tanks; this enemy attack did, however, have the effect of stopping movement on the main axis for some hours.

STOEDENRODE and VEGHEL were held without difficulty and DINTHER was seized (with 420 prisoners) by one battalion. The troops at BEST were withdrawn closer in to STOEDENRODE.

At last light dispositions were as follows:-

502 Parachute RCT and 327 Glider Infantry RCT	-	area ZON
Div HQ and 502 Parachute RCT	-	area STOEDENRODE
501 Parachute RCT	-	area VEGHEL - DINTHER - EERDE

The division was complete except for some 90 glider loads, mainly infantry, whose flight on D + 2 from England had been abortive. They were the only troops still due to arrive. The following additional British troops had been effectively under command of the division from the last night and remained under command for some days to come:-

15/19 Hussars
Two squadrons Royals
44 Royal Tanks
Two field batteries, RA

56. 82 American Airborne Division were still without their Glider Infantry RCT and, as previously stated, they could not be flown in this day. The shortage of infantry therefore became even more acute and attacks from the enemy building up in the FORST REICHSWALD became more serious. Coldstream Guards Group of Guards Armoured Division remained in support. The enemy was held by means of hard fighting and vigorous offensive patrolling by small parties over a wide front. Thus 504 Parachute RCT remained available for the crossing of R WAAL and one battalion of 505 Parachute RCT continued to assist Guards Armoured Division in clearing the enemy still in NIJMEGEN.

As planned overnight and confirmed after infiltration attacks towards the road bridge during the night had been only partially successful, a combined attack to capture the NIJMEGEN bridges was put in by 504 Parachute RCT and Guards Armoured Division (with one battalion 505 Parachute RCT under command) in daylight. At 1500 hrs., after a morning of preparation, and instruction in the use of British Assault boats never previously seen, 504 Parachute RCT began

the assault by boat across the river about 1 mile northwest of the railway bridge. They had to cross a formidable river in full view of strong enemy defences, with enough boats to carry one battalion at a time (but no heavy weapons), advance over several hundred yards of flat ground on the far bank, capture a strong fort surrounded by a water dyke, and then advance to capture the northern ends of two strongly defended bridges. They had the support of the limited amount of 30 Corps artillery available, their own 75 and 105 mm. guns (90 guns) and the fire support of two squadrons of tanks of the Irish Guards. Smoke was ineffective owing to the weather. By 1845 hrs. they had captured the northern end of the railway bridge; they swept on to capture the northern end of the road bridge by 1930 hrs., at which time the Grenadier Guards rushed the southern end of the road bridge and joined up. This action by 504 Parachute RCT, magnificently supported by units of the Guards Armoured Division, was a fine example of what can be done by really high-class infantry under almost impossible circumstances. Desperate resistance by a strong and determined enemy, with every advantage of position, had been insufficient to stop these men.

By 2015 hrs. a close bridgehead had been firmly established on the northern bank with the assistance of infantry and tanks of the Irish Guards Group.

Resupply by some 170 aircraft was about 60 per cent successful.

SRY and one squadron Royals came under command from 0900 hrs. this day and provided real assistance to the parachute infantry. They worked most effectively with 82 Div. throughout the period of operations up to 7 Oct., when they were withdrawn to 30 Corps.

57. Advance HQ Airborne Corps moved to the southern outskirts of NIJMEGEN at 726596 at 1500 hrs., the defence platoon of glider pilots and some of the staff taking action on the way to clear a wood of snipers.

At about 1800 hrs., when it seemed that the NIJMEGEN bridge operations would be successful, the two Corps Commanders agreed on the plan for next day. It was now known that the position of 1 Airborne Division was serious but that the northern end of the ARNHEM bridge was still held by a small party, while the remainder of the division were forming a close perimeter round HARTESTEIN and retained control of the HEVEADORP crossing.

The plan was for 5 Guards Brigade (armour), starting at first light, to attempt an immediate crossing of the road bridge at ARNHEM 7476 or, failing this, to dominate the area south of R NEDER RIJN. 32 Guards Brigade (infantry) were to attempt a crossing at the ARNHEM railway bridge 7076.

Communications with 1 Airborne Division were now better but erratic and unreliable. The Dutch liaison party provided by SFHQ for Airborne Corps HQ did excellent work in establishing telephone communication with the Dutch Resistance and getting their reports on the situation at ARNHEM. Their liaison with the Resistance was good throughout and most valuable.

DA & QMG joined Advance Airborne Corps HQ by road, having come in with Main HQ 30 Corps.

58. 30 Corps, apart from the actions described above, had given every priority on the road to the urgent moving up of fighting troops, especially infantry. 43 Division was moving up but was still south of GRAVE at last light. There had been some hours delay while the road was cut early in the morning near ZON. 50 Division was still engaged far to the south and could not be freed for the northern battle until 8 and 12 Corps, heavily engaged, could advance further.

59. 1 Airborne Division made wireless touch at 0820 hrs. with the troops of 1 Parachute Brigade at ARNHEM road bridge. They were still holding the north end of the bridge and continued to do so throughout the day against heavy attacks. The remainder of the division completed their concentration in the HARTESTEIN perimeter, still controlling the HEVEADORP ferry. They were exposed to heavy shelling and mortaring throughout the day and continuous enemy pressure on all sides.

The resupply drop was the most successful during the operation, about 35 per cent of the original 386 tons being collected. The failure once more to fly in 1 Polish Parachute Brigade, owing to weather, had serious consequences as the division's casualties had been heavy and the troops were tired.

D + 4 (21 Sep)

60. The weather on 21 September was again difficult for flying, with low clouds and medium visibility except over the NIJMEGEN and ARNHEM areas where the weather was fine. Thick mist and low cloud persisted longer in the GRANTHAM area than in the southern airfields area, clearing sufficiently for take off at 1400 hrs. in part of the former area and 1100 hrs. in the latter. Under these circumstances, Commanding General, First Allied Airborne Army, was again forced to limit airborne operations to the dropping of supplies and the parachute troops of 1 Polish Parachute Brigade. In view of the ground situation of 1 British Airborne Division, the dropping zone for 1 Polish Parachute Brigade was altered to south of R NEDER RIJN east and southeast of DRIEL 6875 (opposite the HEVEADORP FERRY).

61. 294 troop carrier aircraft took off, 117 being British aircraft carrying supplies to 1 British Airborne Division and 177 being American aircraft carrying supplies to the American Divisions and the parachutists of 1 Polish Parachute Brigade (110 aircraft). Of these, 114 British and 128 American aircraft completed their missions, but 29 of the former and 4 of the latter were lost (mostly to enemy fighters) before they could get back to friendly territory. Between 80 and 100 enemy fighters were in wait for the Allied aircraft. These were engaged both by some of the 137 Spitfires, Mosquitoes and Mustangs of ADGB escorting the British Stirlings and Halifaxes and by some of the 95 P.47's and P.51's escorting the C.47's. 20 enemy aircraft were destroyed.

62. 101 American Airborne Division held the road open without much difficulty this day. They successfully attacked the enemy east and southeast of ZON. The area between EINDHOVEN and ZON was being gradually taken over by the ground forces and 506 Parachute RCT prepared to move north the next day. The enemy attacked ST OEDENRODE from the northwest but was repulsed with loss. 501 Parachute RCT extended their operations west of VEGHEL and seized the northwest corner of SCHIND[illegible].

30 C.47's dropped supplies of food and ammunition, approximately 30 per cent being collected on the main dropping zone northwest of ZON. The food included about 14000 "K" rations.

63. 82 American Airborne Division during the morning beat off strong attacks from the south and southwest. The attacks in the area BEEK 7560 - UEBERGEN 7361 were troublesome owing to the few troops available to oppose them and the close nature of the country on the ridge. The enemy's policy of bringing most of his troops across in the open, and overlooked, ground to the east before assaulting the ridge was of great advantage to 82 Division.

130 Infantry Brigade of 43 Infantry Division took over the defence of the NIJMEGEN bridgehead about 1230 hrs., 504 Parachute RCT withdrawing south of R WAAL.

Airborne operations were again limited to resupply owing to the weather. The prolonged non-arrival of 325 Glider Infantry RCT was becoming more and more serious in its effects and the Coldstream Guards Group of Guards Armoured Division still had to be held in reserve for emergencies.

64. Main British Airborne Corps HQ joined Advance HQ this day and extra signal resources became available. Communications with 1 British Airborne Division, however, remained unreliable and it was confirmed that at any rate part of the difficulty was due to the enclosed country from which the divisional wireless sets had to work; the main reason was definitely that neither the division nor Corps were equipped with a suitable set for medium distances and frequencies could not easily be changed on crystal sets.

Reconnaissance of possible landing grounds for C.47's had been started and today the Chief Engineer located one at OUD KEENT 5854, west of GRAVE. This was a grass airfield which had been used to some extent by the Germans, though not for operations. It was not marked, had no buildings or runways and was not known to the Intelligence staff, either Army or Air Force; its capacity was estimated at 800 tons daily for five days, or equivalent. There was also a good landing zone for gliders just to the east, which could quickly be converted to an adequate fighter strip by airborne aviation engineers. Late that night it was decided, if approval could be obtained, to use the airfield to bring in supplies and possibly 52 (L) Division (air portable) and to offer to improve the landing zone to enable it to be used as a fighter strip. The latter could not be developed into a good supply airfield as the road approaches were bad. Second Army was asked to approve this proposal and to authorise immediately the flying in of 878 Airborne Engineer Battalion (American), the Airborne Forward Delivery Airfield Group and 2 Light Anti-Aircraft Battery, to be followed by supplies and possibly 52 (L) Division. The original intention had been to use the DEELEN 7387 airfield (north of ARNHEM) for this purpose but obviously this was now impossible.

65. 1 Polish Parachute Brigade, less their gliders which had already landed with 1 British Airborne Division on D + 2, left the GRANTHAM area at 1400 hrs. in 110 C.47's. The weather en route was bad. 53 aircraft reached the area of the dropping zone but were mostly somewhat south and west of it, 41 aircraft returned without dropping, 13 were missing and 3 landed at BRUSSELS. The parachutists landed on and near the dropping zone met a certain amount of enemy opposition on landing but by that night they had concentrated, having had few casualties, about DRIEL 6875. The force consisted of Brigade HQ and the equivalent of two weak battalions, about 750 personnel. Their intention was to cross the river to join 1 British Airborne Division as soon as possible making use of the HEVEADORP FERRY. Their external communications did not work until next morning but their general movements were reported by Dutch civilians to Airborne Corps HQ through the SFHQ Liaison Mission.

66. 30 Corps had two main objects this day, to improve the security of the NIJMEGEN bridgehead and to relieve 1 British Airborne Division. To do this more infantry were essential and every effort was made to bring them up the one axis road, in spite of the urgent requirements for up and down maintenance traffic and artillery ammunition.

It was hoped that a quick break-out from the NIJMEGEN bridgehead would be possible but it

was fully realised that the nature of the country, with almost impossible going for tanks off the roads, would allow a few determined enemy with anti-tank guns to delay the advance very considerably. Guards Armoured Division (less the Coldstream Group in support of 82 American Airborne Division and, until the afternoon, the Welsh Guards Group guarding the GRAVE bridge) made every effort to advance but were held up after very little progress. The enemy had formed a strong anti-tank screen east and west of RESSEN 7167.

Although too late to take part in the battle north of NIJMEGEN this day, 43 Infantry Division had concentrated most of their troops in the NIJMEGEN area by the night and had been able to do some reconnaissance for an attack next day. They also assumed responsibility for the NIJMEGEN bridgehead itself.

64 Medium Regiment RA, from about HEES 6862, by chance obtained good wireless communication with the artillery Forward Observation Unit of 1 British Airborne Division and, as well as passing important operational messages on this link from now on, rendered the division excellent support with very accurate fire close in to their perimeter.

67. 1 British Airborne Division withstood constant heavy attacks on their perimeter, which was slightly reduced. During the day they lost control of the HEVEADORP FERRY, which was most unfortunate in view of the arrival of 1 Polish Parachute Brigade during the night and the closer approach of 30 Corps; the enemy had completely surrounded them in the HARTESTEIN area and was determined to prevent their relief. The support of 64 Medium Regiment RA of 30 Corps, was invaluable and very encouraging. Attempts by the division to get ammunition to that part of 1 Parachute Brigade at the ARNHEM bridge failed and that gallant party, now under 100 strong and without any supplies or ammunition, was forced to surrender to greatly superior forces.

The parachute supply this day was heavily opposed over the dropping zone, which was becoming more and more under enemy control. A very small proportion was collected by the division.

D + 5 (22 Sep)

68. The weather on 22 September was too bad for any flying from England. There was cloud base at less than 1000 ft. over bases until 1400 hrs. and much the same conditions prevailed over the battle area all day. There were patches of stratus over the NORTH SEA at 300 to 600 ft. Despite these conditions 10 Focke Wulf 190's attacked 1 British Airborne Division during the day.

69. 101 American Airborne Division passed from under command 30 Corps to under command Airborne Corps for operations, with the object of freeing 30 Corps for operations from NIJMEGEN northwards.

As 8 Corps was now moving up and could take over all responsibility as far north as ZON, 506 Parachute RCT was ordered to move quickly by march route and any available transport to UDEN 5342. The reconnaissance party of some 150 officers and men moved ahead and reached UDEN at 1000 hrs. but soon after this the enemy cut the road from the east, between UDEN and VEGHEL. This force was estimated at three battalions of SS troops supported by 30 to 40 tanks and artillery, under the command of 107 Panzer Brigade; they had moved up from east of ZON. Having cut the road, their objective was VEGHEL itself. 501 Parachute RCT, assisted by 506 Parachute RCT as it arrived, 44 Royal Tanks, and British Artillery en route for the north, held the town and its approaches except from the north. In the meantime 502 Parachute RCT extended northwards from ST OEDENRODE (in spite of the enemy shelling the road in that area) and joined up with 501 Parachute RCT west of the axis. 327 Glider Infantry RCT also moved north during the day and assisted in the battle at VEGHEL as they arrived.

70. 82 American Airborne Division, with SRY (Armoured Regiment) and one squadron Royals under command, cleared the enemy from the area exclusive NIJMEGEN - along the south bank of R WAAL to 764645 - UBBERGEN 739615, so as to protect the NIJMEGEN bridge and improve their defensive position. Otherwise activity was confined to active patrolling.

71. 30 Corps intended that this day Guards Armoured Division should rest and maintain its positions, while 43 Infantry Division, taking all risks, should occupy the ARNHEM bridge and make contact with 1 British Airborne Division. 69 Infantry Brigade of 50 (N) Infantry Division and Royal Netherlands Brigade would take over the defence of the NIJMEGEN and GRAVE bridges respectively.

The Corps directive was now altered by Second Army so that their advance north was limited to APELDOORN instead of the ZUIDER ZEE.

During dark, partols of Household Cavalry Regiment (armoured cars) moved forward from REEK 5851, crossed the NIJMEGEN bridge at first light and, under cover of mist, moved west of ELST to join up with 1 Polish Parachute Brigade about DRIEL at 0800 hrs. During the day they sent back valuable information, damaged a German steamer and sank three German barges on R NEDER RIJN.

At 0830 hrs. 214 Infantry Brigade attacked towards ELST 7070 along the ARNHEM road. Held up south of ELST they extended to the west and, with infantry mounted on tanks and others following at their best possible speed, one battalion passed through VALBURG 6669 to reach 1 Polish Parachute Brigade before dark. One further battalion reached VALBURG by midnight. DUKWS with ammunition and

supplies for 1 British Airborne Division accompanied the leading battalion and were handed over to 1 Polish Parachute Brigade.

129 Infantry Brigade, starting after 214 Infantry Brigade, pressed the attack along the main ARNHEM road. Opposition was strong, the ground hindered deployment, and by last light they were halted on the line of the 675 northing (half-way to ELST). 130 Infantry Brigade was relieved by 69 Infantry Brigade at the NIJMEGEN bridges and came into reserve.

Further south, the cut in the road at VEGHEL required assistance to 101 American Airborne Division to reopen it quickly. Accordingly 32 Guards Brigade was sent south about 1300 hrs. to attack towards VEGHEL from UDEN. By last light contact with the enemy had been made about half-way between these two places but no decisive action had been fought.

72. 1 Polish Parachute Brigade maintained their positions round DRIEL throughout the day without difficulty but were unable to cross the river by daylight as the enemy held the northern bank in force. That night the DUKWs were found unsuitable, there were no assault boats and only a few rafts carrying about 50 Poles and a little food and ammunition could be got across.

73. 1 British Airborne Division, contracting their perimeter slightly, continued to hold out against enemy attacks and increasing mortaring and shelling. Contact by wireless and Liaison Officer was made by Divisional HQ with 1 Polish Parachute Brigade and 43 Infantry Division, but control over the river crossings could not be regained.

D + 6 (23 Sep)

74. The weather, which had been so unfavourable for 4 days, improved in the morning of 23 September over England and in the afternoon over the Continent. A cold front cleared the target area by 1400 hrs. giving very good conditions behind. Visibility was over 8 miles with cloud 5/10 to 8/10 at 2000 to 3000 ft. Wind was northerly at 10 - 15 mph increasing to 15 - 20 mph over land. Time over dropping and landing zones was fixed for late afternoon to take advantage of the best weather. The southern route was used by all aircraft.

75. 654 troop carrier aircraft and 490 gliders took off. 73 bombers of 38 Group RAF and 50 C.47's of 46 Group RAF carried a parachute re-supply of 291 tons for 1 British Airborne Division, losing 12 aircraft in the battle area. 41 American C.47's dropped the remainder of 1 Polish Parachute Brigade east of GRAVE, as requested by HQ Airborne Corps; the drop was accurate and successful. 84 gliders were despatched for 101 American Airborne Division to the landing zone northwest of ZON; 79 arrived safely but only 1 glider was actually lost. 406 gliders carrying 325 Glider Infantry RCT of 82 American Airborne Division were despatched on a successful mission to the landing zone just east of GRAVE north of R MAAS; 33 did not arrive but none were actually lost. Only 1 American aircraft was lost this day.

76. Escort was furnished by 193 fighters of ADGB and 586 fighters of Eighth American Air Force. The Luftwaffe reacted more strongly than on any previous day. Eighth Air Force encountered some 135 enemy fighters, of which 8 were destroyed for their own loss of 22. ADGB had no enemy encounters but lost 2 Spitfires to flak.

77. 101 American Airborne Division continued their battle to clear the main axis road north of VEGHEL, while at the same time continuing to defend ST OEDENRODE with 502 Parachute RCT. During the early morning the enemy attacked VEGHEL from the southeast; this attack and others from the west against EERDE 4536, held by 501 Parachute RCT, were repulsed without difficulty. 327 Glider Infantry RCT defended north of VEGHEL. A combined attack, northwards from VEGHEL by 506 Parachute RCT and southwards by 32 Guards Brigade from UDEN, cleared the road sufficiently for some traffic to resume by 1530 hrs; the road was still, however, subject to interruptions by shelling, bazookering and small arms fire.

The remainder of 327 Glider Infantry RCT and some artillery after landing by glider northwest of ZON during the afternoon without difficulty, were sent up to VEGHEL immediately.

As 8 Corps had now been directed to take over responsibility for the lines of communication up to exclusive GRAVE, 101 American Airborne Division passed to their command at 1655 hrs. this day, except that their ground administration was still the responsibility of 30 Corps.

78. 82 American Airborne Division continued to hold their front and carried out minor operations to improve their positions. Patrolling was active and shelling considerable. During the late afternoon the long awaited 325 Glider Infantry RCT arrived on the landing zone just east of GRAVE and that night moved into divisional reserve. The 41 aircraft loads of 1 Polish Parachute Brigade also came under the command of 82 Division for that night and were concentrated in reserve in the woods about 7355, west of GROESBEEK. As enemy pressure was increasing, particularly in the MOOK area 7251, the arrival of these reinforcements was of the utmost value.

79. 30 Corps used Guards Armoured Division (less 32 Guards Brigade employed as described in the VEGHEL area and Coldstream Guards Group still in support of 82 American Airborne Division) to guard the right flank of the NIJMEGEN bridgehead north of R WAAL. 69 Infantry Brigade Group continued to be responsible for the protection of the NIJMEGEN bridges. 43 Infantry Division had as their

main task the capture of ELST 7070 and the securing and strengthening of their junction with 1 British Airborne Division. After a day of heavy fighting in difficult country and against a stubborn enemy, 130 Infantry Brigade was fairly well established just south of R NEDER RIJN about DRIEL, while 214 Infantry Brigade were fighting in ELST itself. Some assault boats were got up with difficulty and priority given that night to the ferrying over of a limited quantity of ammunition and supplies for 1 British Airborne Division and some 250 personnel of 1 Polish Parachute Brigade; the enemy still controlled the northern bank of R NEDER RIJN and ferrying was slow and hazardous. 1 British Airborne Division were not strong enough to clear the enemy from the northern bank.

80. 1 British Airborne Division again withstood heavy and continuous attacks, with shelling and mortaring, throughout the day. The perimeter was again reduced slightly in size. There was fierce house to house fighting and enemy snipers had infiltrated into the thick country within the perimeter. Ammunition and supplies were very short and the supply drop was not a success, very little being picked up. Again this was due mainly to enemy action and the very constricted area held by the division. It was hoped, if 5/DCLI of 43 Infantry Division managed to cross the river that night, that an attack might be put in to clear the northern end of the ferry, but this proved impossible as 5/DCLI (as explained previously) could not cross.

81. Airborne Corps HQ remained in the same location and during the day took over command of Royal Netherlands Brigade for the defence of the GRAVE bridge. Airborne Corps also took over the responsibility for the defence of the NIJMEGEN bridges and the bridge over the MAAS-WAAL canal at 671605.

At 1025 hrs. permission was received from Second Army for Airborne Corps to use the grass airfield at OUD KEENT 5854 to fly in supplies, as requested. No mention was made of the suggestion for a fighter strip to be developed nearby. As the airfield itself needed no immediate work on it except marking, Airborne Corps did not then request the flying in (in gliders) of 878 Airborne Aviation Engineer Battalion. 2 Light Anti-Aircraft Battery, Airfield Control Unit, and Airborne Forward Delivery Airfield Group were however required urgently and Airborne Base were asked to fly them in as soon as possible. Additional light anti-aircraft artillery to the extent of a whole regiment was also borrowed from 30 Corps for the effective defence of the airfield.

At 2020 hrs. a message was received from Second Army giving permission to withdraw 1 British Airborne Division from north of R NEDER RIJN if the position so warranted.

At 2240 hrs. a further message from Second Army stated that 52 (L) Division would not be flown in without reference to the Army Commander.

Communications were by this time working well.

D + 7 (24 Sep).

82. The weather on 24 September was again bad. There was rain and low cloud over England in the morning and the same conditions prevailed over the battle area in the afternoon. There was no flying from England but a few essential items were dropped from bases in Belgium. 4 C.47's of 46 Group RAF took off to drop supplies to 1 British Airborne Division, but 2 were unable to find the dropping zone and turned back; the other 2 dropped but saw no signals on the ground and the supplies were not picked up. There were no losses of aircraft but they were all damaged by flak. 17 C.47's of IX USTCC resupplied 82 American Airborne Division without casualties; 15 dropped their bundles successfully and 2 landed on the OUD KEENT airfield near GRAVE. 36 Spitfires of 2 TAF furnished uneventful escort.

83. 101 American Airborne Division confirmed at dawn that the enemy forces that had attacked VEGHEL previously had now withdrawn out of touch to the southeast. 506 Parachute RCT therefore continued its move north to UDEN and took over the defence of that area. Divisional HQ moved from ST OEDENRODE to VEGHEL at 1000 hrs. 327 Glider Infantry RCT remained in defence of VEGHEL, while 501 Parachute RCT held the area DINTHER - EERDE. 502 Parachute RCT continued to defend ST OEDENRODE.

At 1000 hrs. the enemy launched a series of probing attacks against 501 Parachute RCT, moving from SCHIJNDEL towards KOEVERING 4434. An attempt by 502 Parachute RCT to intercept this movement failed and the enemy cut the main axis north of KOEVERING just before dark. During the night the enemy built up a considerable force including tanks and SP guns in this area and all movement on the road ceased again.

84. 82 American Airborne Division consolidated their positions during the day and made minor attacks to the southeast, dominating the area. Fighting was bitter and shelling considerable. Enemy pressure towards MOOK 7251 was persistent and it was evident that he was building up his forces in FORST REICHSWALD, some of his troops being of a good standard. 325 Glider Infantry RCT reconnoitered the front and prepared to take offensive action in the MOOK area.

The shortage of troops for the long front again became acute, as the division had to take over the defence of the NIJMEGEN bridges from 1400 hrs. This was necessary in order to free 30 Corps for the operations to the north.

85. 30 Corps again concentrated every effort to relieve 1 British Airborne Division and their orders were that every risk should be taken. Guards Armoured Division (less 3 Guards Brigade and Coldstream Group but with 69 Infantry Brigade under command) were directed to protect the right flank of the Corps from inclusive BEMMEL 7367, which had to be captured, to exclusive ELST, and generally to ensure 43 Infantry Division a free hand for their operations. 32 Guards Brigade continued to operate south of GRAVE on the main axis. 43 Infantry Division were directed to secure the right flank of the Corps from inclusive ELST north to R NEDER RIJN along the railway, to ferry 1 Polish Parachute Brigade across the river to join 1 British Airborne Division and to follow this up by passing two companies of their own across the river. It will be noticed that there was now no immediate intention of attacking the ARNHEM bridge, as opposition was too great and time too short.

After heavy fighting all day, by last light 214 Infantry Brigade had almost cleared ELST but Guards Armoured Division were still held up short of BEMMEL. During the night, with great difficulty, some 300 to 400 personnel of 4 Dorsets of 43 Division crossed the river. 4 Dorsets were a little to the west of 1 British Airborne Division and never really joined up with them, although their operations were undoubtedly of great assistance in enabling the division to hold on next day. None of 1 Polish Parachute Brigade had got across, mainly owing to the late arrival of the assault boats.

86. Airborne Corps continued their task of holding the general area from inclusive GRAVE to inclusive NIJMEGEN, now assisted by the "seaborne elements" of 52 (L) Division who had arrived by road. 30 Corps artillery continued to render invaluable assistance, firing or able to fire on a 360° arc in support of any troops requiring help. An Inter-communication Flight (three Austers), provided by 38 Group RAF, arrived for Corps HQ; more use would have been made of it if visits to 1 British Airborne Division had been possible.

87. 1 British Airborne Division spent another day of heavy and continuous fighting along the whole perimeter. The shortage of anti-tank weapons was now a particularly serious handicap. It was obvious that the division, now down to an effective strength of some 2000 men, tired, short of food, water and ammunition, could not hold out much longer and was quite incapable of a concerted movement backwards or forwards. Relief must come to the division or they must be evacuated in small parties through the enemy lines.

D + 8 (25 Sep)

88. The weather on 25 September was more favourable than on the preceding day but there were showers with cloud bases 1000 to 2000 ft. over the channel and the Holland area. In view of the decision, described later, to withdraw 1 British Airborne Division, and the fact that 82 American Airborne Division were not in urgent need of airborne supplies, airborne operations were confined to the resupply of 101 American Airborne Division. 34 American C.47's successfully dropped supplies to them, with no casualties. An uneventful escort was provided by 60 Spitfires of ADGB.

89. 101 American Airborne Division continued to hold ST OEDENRODE, EERDE and VEGHEL with 502, 327 and 501 RCTs respectively against several minor attacks, while 506 RCT, starting at 0300 hrs., moved south again from UDEN with the object of clearing the road about KOEVERING. By daylight leading elements of 506 Parachute RCT were east of VEGHEL and at 0915 hrs. they, with one squadron of 44 Royal Tanks, attacked the enemy at KOEVERING. The attack went well for about 2000 yds. but was then stopped by well-directed fire from artillery, infantry and dug-in tanks. At 1400 hrs. one battalion of 506 RCT started a wide enveloping movement of the enemy's southern flank while 50 Infantry Division, moving up the axis from the south, also attacked. By dark the enemy had been cleared from all except a very small area south of the road, which was, however, still closed.

90. 82 American Airborne Division continued to hold their area and to dominate their front but it was evident that the enemy was building up his strength in the FORST REICHSWALD and south-east of MOOK. Shelling and mortaring was considerable. During the day the division cleared the area of BEEK 7560 (in Germany) with some hard fighting in very enclosed country and 325 Glider Infantry RCT took over the MOOK front.

91. Airborne Corps continued its role of the previous day. In conjunction with Commander 30 Corps, the Corps Commander decided at 0930 hrs. to withdraw 1 British Airborne Division during the night (25/26 September) and all preparations were made for their evacuation to NIJMEGEN and their reception there. 1 Polish Parachute Brigade was also to be withdrawn from the DRIEL area.

92. 30 Corps, in the early morning, ordered Guards Armoured Division (strength as for 24 September) to continue their same tasks, extending to inclusive ELST when captured, while 43 Infantry Division was ordered to establish a bridgehead over R NEDER RIJN in the area west of RENKUM 6276 as soon as possible. The ground there offered good possibilities for a crossing under cover of a limited bridgehead on the high ground immediately north of the river and the enemy was believed not to be holding it in strength.

The hard fighting which continued in the ELST and BEMMEL areas, the shortage of assault

boats, the fact that 4 Dorsets had been unable, in spite of every effort, to turn the tide north of R NEDER RIJN, the precarious situation of 1 British Airborne Division, and the continued closing of the main axis south of VEGHEL all combined to convince the Commanders that for the time being no further advance could be made and all troops north of the river must be withdrawn. It was also known that the enemy strength was increasing in the FORST REICHSWALD, with an attack from this area likely in the near future, and that considerable enemy reserves, including tanks, had arrived at ARNHEM, with more on the way. In fact there were not sufficient Allied troops, particularly infantry, in the forward area to force the NEDER RIJN for further operations in the near future.

By 1630 hrs. 214 Infantry Brigade had cleared ELST and 1700 hrs. 69 Infantry Brigade were established in BEMMEL.

43 Infantry Division, in particular 130 Infantry Brigade and 4 Dorsets, concentrated on getting 1 British Airborne Division south of R NEDER RIJN during the night. That part of 4 Dorsets themselves north of the river acted as covering party. All available assault boats were collected under CRE 43 Division and manned by the engineers of that division and Canadian engineers under their command. A very strong artillery programme was arranged to cover the withdrawal and the noise made by the ferrying; this was helped by the weather, as it poured with rain practically the whole night. Arrangements were made to collect the evacuated personnel some 2 miles south of the river, whence transport would take them to NIJMEGEN. These operations were carried out with the greatest skill and gallantry by 43 Division, some 180 men of 4 Dorsets acting as covering party being left on the northern bank of the river as there was not time to evacuate them as well before daylight.

93. 1 British Airborne Division with difficulty held out during the day. Arrangements were made with 43 Infantry Division for the evacuation by small parties during the night. These small parties had to take their chance in moving through country dominated, and in places occupied, by the enemy. They would then find the assault boats and be ferried across the river as and when they arrived.

Evacuation started at 2200 hrs. Enemy opposition was light and the surprise had been well kept. By first light on 26 September, when the enemy fire became too strong for further evacuation, 2163 officers and men of 1British Airborne Division and Glider Pilot Regiment, 160 of 1 Polish Parachute Brigade and 75 of 4 Dorsets, had been collected south of the river and en route for NIJMEGEN. It had not been possible to bring the wounded, but it was known that the Germans had been treating wounded prisoners well and they continued to do so under the energetic and firm "supervision" of ADMS, 1 British Airborne Division.

D + 9 (26 Sep)

94. The weather on 26 September improved and by the afternoon it was fairly good. 209 C.47's of IX USTCC carried out a most successful operation by landing the British Airborne Forward Delivery Airfield Group (AFDAG) and most of the personnel (but not their Bofors guns as the weather was not good enough for gliders) of 2 Light Anti-Aircraft Battery. These aircraft all landed at OUD KEENT airfield, 5854, unloaded, picked up American glider pilots to be evacuated, and took off in 3 hours and 50 minutes; a rate of nearly 55 per hour on one strip. The aircraft arrived by groups of approximately 52 each at one hour's interval; the timing was extraordinarily accurate and left nothing to spare. As they arrived over the airfield and until they had taken off again they were controlled by one Pathfinder team of IX USTCC, who had flown in with their wireless in one C.47 the day before; the wireless was for airfield control only and did not communicate with the air base in England. As regards the marking of the airfield the pathfinder team were assisted by Chief Engineer British Airborne Corps and by British glider pilots under their Regimental Commander; the latter also assisted in the control of the aircraft on the ground, but particularly in the organization for unloading them. The whole operation was a very fine example of what can be done with very limited resources by an air force experienced in such matters and with the assistance on the ground of troops used to their ways. There were no abortive planes and no losses; the nearest enemy forces were some 9 miles distant.

95. Escort was furnished by 182 fighters of ADGB and 100 fighters of Eighth American Air Force. The former encountered no enemy and had no losses; the latter engaged 50 Messerschmidt 109's. and Fonke Wulf 190's in combat, claiming 32 destroyed for a loss of 2 of their own.

96. 101 American Airborne Division, in conjunction with 50 Infantry Division from the south, reopened the main axis road this day. 506 Parachute RCT resumed their attack soon after daylight; by 0900 hrs. they had driven the enemy north of the road and made contact with 501 Parachute RCT on the right, near EERDE. 50 Infantry Division joined up from the south. At 1300 hrs. 506 Parachute RCT was ordered back to UDEN and this move was completed by 1700 hrs. 501 Parachute RCT and 327 Glider Infantry RCT remained at EERDE and VEGHEL respectively, each repelling minor enemy attacks. 502 Parachute RCT remained at ST OEDENRODE.

97. 82 American Airborne Division continued to hold their positions and generally dominated their immediate front although the enemy was obviously building up his strength in FORST REICHSWALD. 325 Glider Infantry RCT attacked southeast from MOOK and improved their positions on the ridge in that area; at a later date this RCT pressed home a gallant and successful attack to clear this area for 43 Infantry Division.

98. Airborne Corps continued with the same general operational tasks as before. The arrival of more troops of the "seaborne element" of 52 (L) Division, known in future as 157 Brigade, enabled patrolling and reconnaissance westwards between R's MAAS and WAAL to be more thorough and small pockets of German resistance were cleaned up.

The great event of the day was the arrival of AFDAG, as described above. This formed the organisation for receiving airlanded supplies and evacuating casualties. It was fully established during the evening and night and was ready to receive supplies next day.

At 1130 hrs. permission was received from Second Army for 1 British Airborne Division to be flown home to England when ready. During the day they were rested and nominal rolls checked, while arrangements were made for their movement to a concentration area at DIEST, in Belgium, en route to the BRUSSELS airfield for personnel and the prefabricated port at ARROMANCHES in Normandy for vehicles. These vehicles belonged to the Division's seaborne tail which had previously arrived at NIJMEGEN.

1 Polish Parachute Brigade moved to the area of RAVENSTEIN 5657, where they came under the orders of 157 Brigade while reorganizing.

99. 30 Corps spent the day improving and consolidating their positions between R's WAAL and NEDER RIJN, and in bringing up much needed ammunition and supplies along their now-open lines of communication.

D + 10 Onwards (27 Sep)

100. D + 9, 26 September, was really the close of operation MARKET, as, apart from a little small-scale resupply airlanded for 82 and 101 American Airborne Divisions, no more airborne operations took place. Operation GARDEN, the ground operations, did however continue and formations of the Airborne Corps remained for varying periods.

101. 1 British Airborne Division left NIJMEGEN on 28 September en route for England; their strength now was 2163 all ranks, including 422 glider pilots. 1 Polish Parachute Brigade, after a few quiet days spent in guarding the western approaches to GRAVE and the bridges over the MAAS-WAAL canal, left for England on 7 October.

102. Until 9 October HQ Airborne Corps remained at NIJMEGEN and generally relieved 30 Corps of operational responsibility south of R WAAL. Various formations and units came under command from time to time, particularly 3 Infantry Division from 0001 hrs. 2 October until 5 October in the MOOK area, and 100 Anti-Aircraft Brigade for a short period for the defence of the NIJMEGEN bridges.

At 0450 hrs. on 27 September information was received from Second Army that owing to the reinforcement of the Luftwaffe in the area it had been ruled that C.47 aircraft could not fly into OUD KEENT airfield. This was a very great disappointment as supplies and ammunition of all kinds were short, the AFDAG was ready to receive them and everything was ready in England. It was hoped that this would be a temporary ruling as the requirement for airlanded stores made the risk of reasonable casualties to aircraft acceptable, escort could be provided from England and the airfield was exceptionally well guarded with anti-aircraft guns. Hopes were dashed, however, when information was received at 1930 hrs. on 27 September that the airfield would be taken over immediately by 83 Group RAF, belonging to 2 TAF, owing to the necessity for advanced fighter bases. This, of course, had to be accepted but it is of interest to note that at no time did 83 Group or TAF communicate with or visit Airborne Corps, nor did they reply to Airborne Corps offer to make them a fighter strip or strips. AFDAG was removed from the airfield and later dispersed within Second Army for normal ground duties; the whole effort of collecting them, training them, making them airportable and flying them in had been wasted except for the experience gained. Also it is at least open to doubt that C.47's landing at OUD KEENT would have suffered a rate of casualties that would be uneconomic compared with the stores landed and the wounded personnel evacuated.

Under the circumstances 878 Airborne Aviation Engineer Battalion and the guns of 2 Light Anti-Aircraft Battery were not brought in.

103. Field Marshal Sir Bernard L. Montgomery, KCB, DSO visited HQ Airborne Corps on 29 September and held a conference with Commanders, Second Army, 30 Corps and Airborne Corps.

104. By 9 October 8 and 12 Corps had closed up from south, there was little requirement for a fourth Corps HQ in the area and there were rumours of further airborne operations. HQ Airborne Corps was therefore ordered to move back to England on 9 October. It was, however, an unpleasant experience for British Airborne Corps to leave in the field the two American Airborne Divisions who had landed under their command, although 30 Corps now knew them and understood their requirements.

105. The shortage of troops, particularly infantry, in the NIJMEGEN salient made it necessary for these two divisions to stay in operations much longer than had been hoped. It is an accepted

principle that airborne troops, because of their specialist training and equipment and the difficulty of replacing casualties, must be relieved from normal ground operations as soon as possible. It is also a fact that they cannot be released until the major tactical or strategical situation allows them to be spared or replaced by other troops. In this case there were no troops to replace these divisions for a long time and the enemy opposition was such that they could not be spared. Therefore, operating extremely well as normal infantry divisions, but backed up by artillery, tanks, and administrative services of 30 Corps, they stayed in the line, in the British area, for many weeks and saw considerable fighting.

82 American Airborne Division were withdrawn from the line, for the first time since 17 September, to a concentration area about OSS 4754 in the middle of November. Since the virtual close of airborne operations on 26 September, they had suffered a further 1912 casualties up to the 5 November 44.

101 American Airborne Division were withdrawn from the line, also for the first time since 17 September, on 23 November. Their casualties since 26 September were 1682.

Both these divisions maintained their magnificent record throughout the operations and fully upheld the prestige of the American Army. It is not possible to overrate the efficiency and friendly co-operation which they displayed towards their British Allies. This efficiency and this attitude could not but overcome any difference in national methods of command and administration, even though there were no American staff officers at British Airborne Corps HQ.

COMMENTS ON THE OPERATIONS AND REQUIREMENTS FOR THE FUTURE.

106. FACTORS PECULIAR TO THESE OPERATIONS.

There were certain factors in these operations all of which may not occur again simultaneously and therefore too many general conclusions should not be drawn. These possibly unusual factors were:-

(a) The very rapid advance over great distances of the ground troops and tactical air forces just prior to operation 'MARKET GARDEN'.

(b) The extreme difficulty of deployment from the single axis road along which the ground forces had to advance.

(c) The preponderance of formidable waterways in the battle area.

(d) The large intervening waterway (the Channel) between the Airborne Corps planning HQ and the ground troops planning HQ, and subsequently between HQ First Allied Airborne Army and the ground troops.

(e) The extremity of range at which the airborne operations were carried out.

107. STRENGTH OF AIRBORNE FORCES REQUIRED.

From the moment that airborne troops land, they are faced with three conflicting tasks. These are, first, the accomplishing of the mission assigned to them, a task which becomes progressively more difficult as the enemy recovers from his initial surprise; second, the holding-off of enemy reserves moving up to interfere with their mission; third, the continual protection of some dropping or landing zones if there is to be any operational or administrative build-up by air.

The simultaneous execution of these tasks demands dispersion, which can only be compensated for by concentrating the full effort of large airborne forces upon a small number of tasks, particularly those which no one else can do. Dispersion of airborne troops is just as unsound as is the dispersion of effort of normal ground forces.

Therefore airborne troops must be used in mass and the rate at which they are built up must be extremely rapid.

108. THE TIME FACTOR.

This was the first large-scale airborne operation to be carried out in daylight by the Allies. It involved the flight for considerable distances over enemy territory of large numbers of vulnerable troop-carrying aircraft and gliders. Enemy flak before the operation started was known to be considerable and, from the point of view of distance from base if not in numbers, the enemy fighters had great advantages over those of the Allies. Yet casualties from flak and fighters for the first two lifts, on D day and D + 1, were negligible.

There is thus a period, in this case between 24 and 48 hours, when surprise can be achieved to such an extent that new enemy flak batteries cannot be deployed and enemy fighters cannot be

concentrated against the assault. This period can be calculated beforehand. Our own preliminary air support operations must be overwhelming but must start at the latest possible moment.

The maximum number of airborne troops must be dropped and landed before surprise is lost, quite regardless of fatigue and administrative difficulties. This force must be balanced and capable of fighting and maintaining itself even if subsequent lifts are delayed. Subsequent operations are likely to be expensive in casualties and in the air escort effort required. In these operations the forces of all three airborne divisions were balanced, even if those of 1 British and 82 American were insufficient, as was proved by their ability to continue fighting when subsequent air lifts were delayed.

109. THE WEATHER.

The weather, obviously, is of great importance in airborne operations. It has two main effects. First, if the airborne operation is essential to the operations as a whole, it must be accepted that the whole operations must be postponed if the weather is bad. Conversely, if the airborne part of the operation is not essential, it must be accepted that weather may cancel or delay the airborne assistance. Second, in case the weather breaks after the initial lifts, all airborne forces must at all times be properly balanced fighting formations with a reasonable adequacy of administrative resources.

It is of interest to note that in no single case up to date has any British combined sea, air and ground operation ever been postponed or cancelled owing to weather restrictions on airborne forces.

In these operations the weather did have a great effect. There is every reason to suppose that the whole operation would have been completely, instead of 90 per cent, successful if:-

(a) The weather had permitted 1 Polish Parachute Brigade and 325 Glider Infantry RCT to be dropped and landed on D + 2 as planned. The former would have provided invaluable reinforcements for 1 British Airborne Division attacking ARNHEM; the latter could have provided in time the essential extra infantry for operations against the NIJMEGEN bridges and north of R WAAL.

(b) The weather had permitted the normal scale of air support available and required by both 30 Corps and Airborne Corps.

(c) The weather had permitted the air supply as planned.

It follows that under North Western European climatic conditions, particularly in the winter, an airborne plan which relies on linking up airborne forces put down on D day by putting down additional forces on subsequent days is risky, since the weather may frustrate the plan. The operational circumstances existing at the time of 'MARKET GARDEN' caused the Commander-in-Chief to decide that big risks were to be taken; that this was justified is shown by the considerable success of the operations in spite of exceptionally unfavourable weather.

110. ACCURACY OF DROPPING AND LANDING.

Great Airborne forces can be dropped by parachute and landed by glider with great accuracy in daylight in good visibility. Aircrews and glider pilots must still be well trained in their particular task but the hazards and complications of getting large forces to the right place at the right time in night operations are immeasurably reduced.

Therefore until, if ever, the standard of training of all aircrews and glider pilots can be raised to the level now attained by comparatively few experts, and until pathfinder equipment can be provided for and used by all aircrews, considerable boldness is justified in choosing daylight rather than darkness for an airborne operation if, as in MARKET, the enemy is on the run and air supremacy complete.

111. STANDARD OF PERSONNEL.

The period of initial surprise is equally advantageous to the airborne forces on the ground as to the air forces, provided the utmost initiative and resource is shown from the outset. It is difficult for the enemy to estimate the strength of the airborne forces, particularly if dummy parachutists and other mystifying devices are used as well, and the effect on the enemy's morale may be devastating for a short period. Airborne troops put down in the wrong place, from whatever cause, also cause confusion by acting as offensively as possible.

Airborne formations cannot have all the advantages of heavy weapons enjoyed by ground formations, but frequently, almost invariably soon or later, they have to fight against an enemy so equipped. By that time, friendly ground forces may or may not have arrived but in any case airborne troops must be prepared to remain on their own for long periods.

The air effort required to carry and escort airborne troops is very great. The training and equipment of both the airmen and the airborne troops are expensive, and to a considerable extent expendable as in the case of a proportion of gliders and parachutes.

The conclusion is that airborne troops must be fit enough to stand severe training and arduous operations; they must be good enough to seize and maintain the initiative, to take full advantage of the temporary confusion to act vigorously at all times in accordance with a general directive in place of detailed orders. In fact, they must be worth the air effort involved.

112. CHOICE OF DROPPING AND LANDING ZONES.

Naturally, to achieve quick success and to reduce fatigue, dropping and landing zones will be chosen as close as possible to the objectives. Their distance away depends, however, on:-

(a) The ease with which the route to them can be found and followed.

(b) The suitability of the terrain itself.

(c) Range from base.

(d) Enemy flak and ground defences.

(e) The enemy fighter situation.

In this case the dropping and landing zones of 101 American Airborne Division were suitable and close to their objectives, except that EINDHOVEN had to be avoided owing to flak and ground defences. Those of 82 American Airborne Division were considerably affected by the flak and ground defences and by the terrain; according to information before the operation started, there was little chance of coup-de-main parties being able to land near the bridge objectives and the primary objective for the majority of the division was the dominating high ground roughly from GROESBEEK to NIJMEGEN. 1 British Airborne Division could not make their initial drops and landings closer than 8 miles to the ARNHEM road bridge, owing to terrain and flak; this meant that their leading troops could not arrive in ARNHEM town for 4 hours, by which time the defence scheme had been put into effect, but this delay was unavoidable.

113. GLIDER PILOT ORGANIZATION.

The British system of having Army Glider Pilots formed into the equivalent of Battalions, Companies and Platoons, disciplined and trained as high-class infantry, proved itself in this operation beyond all question.

It is hoped, naturally, that the ARNHEM operation will be an extreme exception in Airborne warfare. However, the stand made by the 1st Airborne Division, and their subsequent withdrawal across the NEDER RIJN, would have been impossible without the assistance given by the organization and fine fighting qualities of the 1200 Glider Pilots.

In the U.S. Airborne Divisions the Glider Pilots are still individual members of the Army Air Corps. Representations had previously been made by the American Airborne Divisional Commanders, as the result of their operations in SICILY, ITALY and NORMANDY, for the organization of their Glider Pilots on exactly the same basis as the British. As the result of operation "MARKET" their recommendations have been put even more emphatically.

101 Airborne Division report that, although a number of the Glider Pilots did excellent work individually and volunteered for combat missions, the majority were a severe liability. Especially was this so owing to the Division being necessarily strung out along a corridor, where control was of considerable difficulty. As the Glider Pilots had no organisation and no commanders the result was very unsatisfactory.

In 82 Airborne Division the situation on D + 1 would have been entirely altered if their 900 available Glider Pilots had been up to the British organizational standard. It can be said without hesitation that an organization such as the British Glider Pilot Regiment would most effectively have held a defensive position for the time being (for instance in the MOOK area) and would have released a whole Parachute R.C.T. from the REICHSWALD front on the evening of D + 1 to attack the NIJMEGEN bridge. This need have been only a temporary measure for 48 hours. The earlier capture of the NIJMEGEN bridge by 24 hours would have ensured the relief of the 1st British Airborne Division at ARNHEM.

It is fully agreed that Glider Pilots must be returned to base as early as possible, but their temporary availability as high-class fighting troops for even 48 hours may effect the whole course of the operation.

Although it has been proved in the past that the British organization is correct, and in fact essential, in Airborne operations, operation "MARKET" demonstrated that, if the United States organization had been as for the British, a very different story might have been told in the

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NIJMEGEN and ARNHEM battles. The Commanding General, First Allied Airborne Army, has now ordered that all American Glider Pilots shall receive broader and continuing ground combat training, so that after landing they can be not only self-protecting but trained to contribute to the offensive ability of the airborne troops.

Any RAF pilots loaned as glider pilots for British airborne troops must be similarly trained and commanded within the organization of the Glider Pilot Regiment, if they are to be worth taking to war.

114. LIAISON BETWEEN AIR FORCES IN THE BATTLE AREA.

While American Eighth Air Force fighters were escorting the various lifts of airborne troops and their supplies in the battle area, it was not possible for technical reasons, for aircraft of 2 TAF to operate there at the same time. Consequently available air effort was wasted and the troops on the ground could not receive the direct air support they required against normal ground targets; this was emphasized by the weather, as there were, in any case, only quite brief periods when any air force could operate. 1 British Airborne Division received practically no close support at all and the two American Airborne Divisions little more until all airborne operations were over. 83 Group of 2 TAF has provided very great assistance to all previous Second Army operations on the Continent and this restriction was, therefore, a serious operational handicap. It is essential that some alternative system should be devised, so that the ground forces, including airborne troops, are not deprived of air support at vital periods.

It is suggested that for the battle area this co-ordination can only be controlled by the local air commander. Therefore a senior representative of supporting long range air forces should be at the HQ of the local air commander; he should be provided with excellent communications so that he can implement the decisions made.

115. COMMUNICATIONS

Dropping zones and landing zones may have to be altered, after the first lift has landed, to suit the operations actually in progress. Relieving ground formations will require continued and up-to-date information from the airborne formations. The battle by the airborne forces must be controlled in the field as must any other battle.

In operation "MARKET" the almost total failure of wireless communication between Airborne Corps Main and 1 British Airborne Division prevented any control of the operations being carried out by that division and the serious situation of the battle on their front was not known until 48 hours too late; consequently no orders could be sent to them in time to influence their action. If communications had been adequate, they might, as an example, have been directed to move west to the area of RENKUM while such movement was still possible; in this area a good bridgehead could have been held over R NEDER RIJN and 30 Corps would have had a good opportunity to cross there comparatively unopposed.

Thus the signal resources of airborne forces are not at present adequate; great opportunities have been lost as a direct result of this and unnecessary casualties have been suffered. This is in spite of many previous representations on the subject by this HQ and no blame can be attached to the signal personnel actually taking part in the operation. Second Army also gave every assistance as soon as possible after the junction with the ground forces had been made. Immediate requirements to improve the situation as regards equipment have been submitted. A more detailed report and recommendations, already under favourable consideration at the War Office, is at Part III.

116. FORWARD SUPPLY AND REINFORCEMENT AIRFIELDS.

As described in the narrative, there was a conflict of interest between the provision of an airfield for forward supply, including reinforcement, and the requirements for fighter and fighter/bomber formations of the tactical air forces supporting the army. There is no doubt that this conflict is inevitable and changing conditions during the battle (e.g. in this case the strengthening of the Luftwaffe in the area) may upset pre-arranged priorities.

It is not agreed, however, that priority for all airfields everywhere must go to the tactical air forces on all occasions. The type of country is one ruling factor; there may be areas, as there were in this case, where fighter and supply strips can be made in sufficient numbers to accommodate both supply aircraft and fighters; equipment and labour for this construction may be available, as it was in this case. It is further suggested that the landing of supplies by vulnerable aircraft in forward areas should not be forbidden solely because casualties are expected; the scale of casualties should be balanced against the value of supplies imported and the decision should be a joint army/air force decision. Extra supplies and extra infantry in operation "MARKET GARDEN" in the forward area would have been worth a lot. The presence of a representative of the tactical air force concerned, at Airborne HQ in the early stages, might have made a considerable difference.

117. AIRBORNE RESUPPLY BY PARACHUTE AND GLIDER.

Supply dropping by parachute, as always, was wasteful and unreliable. It is unlikely that

it will ever become really satisfactory, although experiments continually in hand will undoubtedly improve matters. The high percentage of failure of supply dropping to 1 British Airborne Division should be regarded as exceptional, since it was due in the main to the unusually small perimeter held by the division and the intense flak very closely surrounding it.

Supplies landed by glider, if they arrive at all, are much easier to collect. It should be remembered, however, that gliders are more restricted by weather and range and, with their pilots, are more expensive, than parachutes.

There remains no doubt that airborne resupply must be replaced by airlanded and/or ground maintenance at the earliest possible moment. That is a platitude. But until that is practicable there is no alternative to airborne resupply.

118. PLANNING AND STAFF LIAISON.

The planning of the operation, as far as co-operation between the airborne and ground forces were concerned, was achieved by visits to Second Army of:

(a) The Commanders of the Airborne Corps and 101 American Airborne Division (who came under command 30 Corps direct on landing).

(b) Staff officers from Airborne Corps and 101 American Airborne Division.

(c) Representatives of First Allied Airborne Army and Troop Carrier Command.

In addition Liaison officers were attached from Airborne Corps to Second Army and 30 Corps, but they did not have their own means of communication. It would have been an advantage if staff officers of Airborne Corps had been attached to Second Army before the operations, so that each staff could know the problems, methods and personalities of the other more intimately.

A functioning staff from First Allied Airborne Army, attached to Second Army and provided with good communications to Airborne Corps (Rear) as well as to their own HQ, would also have been of considerable value. Fully aware of the ground plan as well as all details of the airborne and troop carrier plans, they could have functioned as a proper staff under the Commanding General, First Allied Airborne Army, and also advised and informed the Commander, Second Army, on the spot. They are required both during the planning and during the operation until the build-up by air has finished.

119. AIRBORNE CORPS HQ and CORPS SIGNALS.

During "MARKET GARDEN" Airborne Corps HQ was divided into three echelons; these were Advance (which with its signal detachment travelled in HORSA and WACO gliders on D day), Main (which came up by road with 30 Corps) and Rear (which controlled the Airborne Base and carried on with routine work and the command of 6 British Airborne Division and SAS Troops. (For details of composition of Advance, Main and Rear, see Appendix 'A' annexure 2). Operational command of all airborne formations was vested in Airborne Corps up to the time of take-off and with the exception of 101 American Airborne Division they remained under command throughout. In addition other formations including 3 Infantry Division, came under operational command from time to time.

Administration in the field except as regards airborne supply, was however, not the responsibility of Airborne Corps. It was taken over by 30 Corps and Second Army, as Airborne Corps have no ground administrative resources or normal Corps Troops. The Airborne Corps administrative staff and Services staffs assisted 30 Corps and Second Army staffs and advised them on requirements.

This system is probably the only practical one at the moment, in view of the general man-power shortage. It is recommended that it should be retained, subject to minor changes in details, for the time being. The administrative problems are discussed in more detail in Part II, Appendix 'J'.

Corps Signals in the field and at the Airborne Base were totally inadequate in personnel and equipment and training. A full description of their shortcomings is in Part III, Appendix 'K' together with very vital recommendations for the future.

120. SAS ACTIVITIES.

SAS activities directly concerned with "MARKET GARDEN" were confined to one information party of one Belgian officer and three Belgian other ranks, with wireless and cipher. As they are still operating details cannot be given. They were dropped by parachute a few days before the main parties and provided excellent information throughout. They have since done magnificent work in aiding, with the Dutch, the escape of many personnel of 1 British Airborne Division who were unable to withdraw on 25/26 September.

DIARY OF EVENTS

Date	
D day 17 Sep.	101 US Airborne Division landed north of EINDHOVEN. By last light ZON, ST OEDENRODE and VEGHEL had been captured and one battalion was fighting hard near BEST. All bridge objectives were held and intact except that over the WILHELMINA Canal. 82 US Airborne Division and HQ British Airborne Corps landed between GRAVE and NIJMEGEN. The Division seized intact the bridge over the MAAS at GRAVE and also the bridge over the MAAS-WAAL Canal. 1 British Airborne Division landed north of ARNHEM and moved on the ARNHEM road bridge. Railway bridge at ARNHEM blown by the enemy. 30 Corps advanced to WALKENSWAARD.
D + 1 18 Sep.	Second lift several hours late owing to weather. 101 US Airborne Division captured EINDHOVEN and linked up with 30 Corps. 82 US Airborne Division met considerable opposition in the town of NIJMEGEN. 1 British Airborne Division holding LZs and DZs but little progress made. Tps of 1 Para. Bde. holding northern end of ARNHEM road bridge. 30 Corps advanced to WILHELMINA Canal north of ZON.
D + 2 19 Sep.	Weather considerably reduced third lift. 101 US Airborne Division continued to hold road open. Repulsed an attack on ZON bridge. 82 US Airborne Division counter-attacked by enemy from FORST REICHSWALD. Unable to capture NIJMEGEN bridge. HQ British Airborne Corps moved to DE KLUIS. 30 Corps linked up with 82 US Airborne Div and HQ British Airborne Corps. 1 British Airborne Div still hold precariously the northern end of ARNHEM bridge.
D + 3 20 Sep.	Weather again bad. Resupply missions only. 101 US Airborne Division seized DINTHER. 82 US Airborne Division and Guards Armoured Division captured NIJMEGEN Bridge. HQ British Airborne Corps moved to outskirts of NIJMEGEN. 1 Division position serious though a small party still hold northern end of ARNHEM road bridge. Some delay to 30 Corps owing to main axis being cut for a few hours scuth of ZON.
D + 4 21 Sep.	Weather again bad. Resupply missions and two thirds of the parachute tps of 1 Polish Para. Bde. only arrived. Main part Airborne Corps joined Adv British Airborne Corps. CE made a recce of OUD KEENT airfield. 30 Corps endeavoured to push from NIJMEGEN to ARNHEM but were held up after very little progress. 64 Med Regt made good wireless communication with 1 Division. Control over ARNHEM Bridge and HEVEADORP Ferry lost by 1 Division.

D + 5
22 Sep.

Weather too bad for flying from England.

Enemy cut main axis between UDEN and VEGHEL and all traffic ceased soon after 1000 hrs.

43 Div of 30 Corps attacked towards ARNHEM but were held up outside ELST. Link-up with 1 Polish Para. Bde. was effected further west.

DUKWS found unsuitable to carry supplies over the NEDER-RIJN.

1 Airborne Division perimeter contracted slightly. Control over river crossings could not be regained.

D + 6
23 Sep.

Weather improved. Resupply, remainder Polish Para. Bde., 325 Glider Inf. RCT and troops for 101 US Airborne Division came in.

Main axis reopened though still under fire. 214 Inf Bde. fighting in ELST.

1 British Airborne Division not strong enough to clear northern bank of NEDER RIJN but withstood heavy and continuous attacks throughout the day.

D + 7
24 Sep.

Weather again bad. Only a few essential items dropped from bases in Belgium.

Main axis cut north of KOEVERING just before dark. Enemy built up a considerable force during the night.

30 Corps made every effort to relieve 1 British Airborne Division. 43 Div and Polish Para. Bde. made strenuous but unsuccessful efforts to cross the river.

1 Airborne Division beat off continuous attacks but effective strength was now down to 2000 and food, water and amn were very short.

D + 8
25 Sep.

Main axis remained closed all day.

Decision taken to withdraw 1 British Airborne Division and this began at 2200 hrs. Wounded had to be left behind. By first light on 26 Sep 2163 offrs. and men of 1 Airborne Division had been evacuated in addition 160 of Polish Para. Bde. and 73 of 1 Dorsets had reached south bank of River NEDER RIJN.

D + 9
26 Sep.

Weather much improved. AFDAG flown in to OUD KEENT.

Main axis reopened.

APPENDIX A

AIRBORNE UNITS UNDER COMMAND

1. 1 British Airborne Division
2. 82 American Airborne Division
3. 101 American Airborne Division
4. 1 Polish Parachute Brigade

X 5. Elements of British Airborne Base including RASC and RAOC (see Annexure 1 to Appendix 'A')

6. 878 US Airborne Aviation Engineer Battalion
7. 2nd Air Landing LAA Bty
8. G.C.I. Section R.A.F.
9. PHANTOM detachment
10. S.F.H.Q. 1 Detachment
11. Civil Affairs Detachments
12. Representative G-4 ("Q") Staff XVIII US Airborne Corps

@ 13. Airborne Forward Delivery Airfield Group consisting of :-

Two Airborne Control Sections
HQ 8 F.M.C.
One P1 93 Ccmp Coy RASC
165 Lt Ccmp Coy RASC
155 D.I.D.
277 Pioneer Coy
AFDAG Provost Coy (Two secs)
AFDAG Postal Unit RE (Part of 1 Airborne Div Postal Unit)
11 Salvage Cbllecting Centre
963 AEM Civil Labour Unit
50 F.M.S.S.
Det 13 Base Med Stores Depot
Det 1 Graves Registration Detachment
Det REME

\+ 14. 52(L) Division (Airportable)

NOTE: X Static units

/ Did not fly in

@ The strength of AFDAG is shown at Appendix ' '.

\+ Under command for the operation but not to be employed without definite orders from 21 Army Group. In fact only the "Seaborne Tail", which became known as "157 Inf Bde Gp", took part in the operation. 157 Inf Bde Gp consisted of:-

HQ 157 Inf Bde
157 Sig Sec (plus det)
157 Bde Def Pl
6 RLI
52 Div Recce Regt
'R' Sec 52 Div Sigs
52 Div Recce Regt LAD
79 Fd Regt RA
304 Bty 54 A Tk Regt RA
354 Bty 108 LAA Regt RA
157 Fd Amb (less two bearer sec plus 16 amb cars)

BRITISH AIRBORNE BASE

This Annexure does not deal with the provision of airfields, aircraft and airforce communications. These very important aspects are entirely an Air Force matter.

1. FUNCTIONS

There are five main functions:-

(a) Liaison at all levels with all the air forces concerned in carrying airborne troops to war and in training, and ensuring that all personnel of those air forces understand the military problems involved.

(b) Coordinating the availability of aircraft and gliders with army requirements, ensuring that planned allotments are properly arranged in fact, and, under the air force station commanders, ensuring that traffic and information arrangements for troops at airfields are efficient.

(c) Ensuring, with the air force and army representatives, that special airborne equipment, e.g. parachutes, containers, glider lashing gear, etc. are provided in the correct quantities where and when they are required.

(d) Providing the accommodation for tps near to take-off airfields. This is a War Office responsibility in U.K. and Transit Camps for up to 1,300 men each were provided near the British take-off airfields. To relieve fighting fmns as far as possible of admin responsibilities, small camp staffs were provided.

(e) Providing an organisation for maintenance of airborne forces by air. See part 2 (Notes on Administration), Appendix 'C'.

2. OBJECT

Thus, the army side of airborne base organisation is designed to relieve airborne commanders from as much as possible of the responsibility for despatching their formations by air; these commanders are left free to plan and fight the battle on the ground once they have settled their objectives, DZs and LZs, and order of flight. The airborne base organization serves as "movement control" but that is only a part of its duties.

3. COMMAND

While always under the direct command of the senior airborne formation (in this case, 1 British Airborne Corps), the whole staff and resources of the military side of the airborne base may be put temporarily at the disposal of a junior airborne formation, for example, if only one brigade is to do a particular operation, the airborne base will assist that brigade at all the airfields involved, either direct or through Corps HQ. Actual command must, however, remain in the hands of Corps HQ as the general policy and other possible airborne operations and training must be coordinated.

4. STAFF

The actual organisation of the army "G" staff is shown on the diagram attached. At present, some of this staff is "misappropriated" from the War Establishments of Airborne Divisions and some from other army and RAF organisations. The situation needs regularising and certain minor staff and vehicle additions are required; the whole subject is under discussion with the War Office but the principles have been proved correct in past operations. It is certain that all officers on the staff of the base must be very experienced in airborne operations and technique; their knowledge can only come with long practice and with the background of actual service with an airborne unit.

5. COMMUNICATIONS

Communications for the airborne base in ENGLAND have been provided mainly by a line system provided by the General Post Office. Some circuits have been common user Army-Air Force and some exclusive to the particular Service. In general, the necessity for a wireless system in addition has been unnecessary because of the large number of circuits available from Post Office sources.

Good quick communications are required for normal functioning, particularly when airfields are numerous and scattered, and are vital for the passing of urgent operational alterations and information.

In any future base area overseas, the available civil line circuits are likely to be very few. Most circuits will have to be built with local signal resources under the expert

supervision of experienced personnel who know the peculiar requirements for an airborne base involving common user circuits. The number of circuits it will be possible to build will be so few that it is likely that a considerable wireless network will be required in addition. A permanent Base Signals organisation, comprising the essential operating and administrative skeleton under Command of Corps HQ is required. This will require considerable additions from local resources.

6. STANDARD OPERATING PROCEDURE

Standard airborne operating procedure (SOP) has been agreed with the American Airborne Forces in First Allied Airborne Army and with both the RAF and IX US Troop Carrier Command. Adherence to, and a detailed knowledge of, that procedure is essential to the smooth working of the combined allied army and air forces involved. It has been issued in the pamphlet "Airborne Forces Standard Operating Procedure", and the duties of airborne base are described particularly in Sec II and Appendix "B".

HQ BRITISH AIRBORNE TROOPS

BGS

GSO I (Air))
GSO III (Air)) at HQ 38 Group RAF
(Staff)

ALO Sec at each airfield
of 38 and 46 Groups RAF.
Each Sec consists of:-

1	GSO III (ALO)	)
1	Clerk	) Increment to W.E. I/110/2
1	Batman	)
1	M/C	)
1	Sjt	)
1	Driver	)
2-4	Provost	) "Borrowed" from Airborne Establishments
1	Jeep	)
2-4	M/Cs	)
4	Glider Pilots	"Borrowed" from Glider Pilot Depot

(GSO I (Air)
at HQ IX USTCC (GSO III (Air)
((Staff)

ALO Sec at each airfield
of IX USTCC.

It should be noted that the whole of the airborne base organisation is always directly under command of HQ Airborne Troops and not under command of divisions or lower formations. Orders issued by any member of its staff are therefore on the authority of the Commander Airborne Troops. All official communications and requirements from Army units to Air Force units, and vice versa, must go through these channels.

In many ways the airborne base staff officers are in practice the staff officers of the Air Force Commander to whose HQ they are attached and they carry full responsibility as such.

Although finally commanded through 'G' channels the airborne base staff actually serve the 'Q' staff as well to any extent required.

BRITISH AIRBORNE CORPS HEADQUARTERS

Advanced HQ (Glider Borne)

GOC in C

ADC

PA

Bodyguard 1

Signaller 1

Batmen 2

Driver 2

'G'

BGS

Batman

Driver

G(O)

GSO II(O) 2

GSO III(O)

Clerks 9

Orderlies 2

Drivers 1

Dvr/Batman 1

G(I)

GSO III (I) – GSO II(I) owing to an accident flew in late

IC (Ia)

IO (Ib)

IO (Interrog)

Clerks 4

Dvr/Batman 1

Driver 1

Glider Loading

Glider 1

GOC in C
ADC
GSO II(O)
MO
4 OR
Jeep
Trailer
5 Bicycles

Glider 2

BGS
US LO
PA
GSO III(O)
3 OR
Jeep
Trailer
M/C
Bicycle

Glider 3

IO (Ia)
Polish LO
6 OR
Jeep
Trailer
4 Bicycles

Glider 4

GSO II(O)
IO (Ib)
4 OR
Jeep
Trailer
M/C
2 Bicycles

Glider 5

GSO III(I)
Capt Dutch Liaison Mission
6 OR
Jeep
Trailer
4 Bicycles

Glider 6

GSO II RA
SO Sigs (Security)
GSO III(I) (Glider Pilots)
3 OR
Jeep
Trailer
M/C

Designed		Actual owing to special circumstances		
RA				
GSO 1 RA				
GSO II RA		GSO II RA		GSO I was at 30 Corps arranging support
Clerks	2	Clerks	1	
Batman	1	Batman	1	
Driver	1	Driver	1	
RE	Nil			
CSO				
CSO				
ACSO				
SO R Sigs (SSO)				
SO R Sigs (Cipher)				
Clerks	1			
Dvr/Batman	2			
Draughtsman	1			
AQ				
SC (Q)				
Clerk	1			
S&T	Nil			
Med				
MO (Capt)				
Clerk	1			
Nursing Orderlies	3			
Driver	1			
Ord	Nil			
REME	Nil			
Camp				
Camp Commandant				
14 Other Ranks				

Glider Loading

Glider 7

Civil Affairs &
Dutch LOS
5 Offrs
4 OR
Jeep
2 M/C

Glider Loading

Glider 8

CSO
SO Sigs (Cipher)
3 OR
Jeep
Trailer
M/C
Bicycle

Glider 9

ACSO
6 OR

Glider 10

OC 2 Air Landing LAA Bty
Polish LO
IO (Interrog)
14 OR
3 M/Cs

Glider 11

Camp Commandant
2 OR
Jeep
Trailer
Trailer Water

Glider 12

GSO III SFHQ) Dutch
) Liaison
Capt (US)) Mission
Offr Wireless Operator
SC 'Q'
Lt GHQ Liaison Regt
2 OR
Jeep
Trailer
M/C

Glider Loading

Glider 13

Capt (GHQ Liaison Regt)
Lt (US Army Sigs)
6 OR
Jeep
M/C
3 Bicycles

Glider 14

Maj (GHQ Liaison Regt)
LO 82 US A/B Div
4 OR
Jeep
Trailer
M/C

Total Adv HQ :-

Offrs	38
OR	67
Jeeps	12
Trailers	9
Trailers Water	1
M/Cs	12
Bicycles	21

LOs

FAAA	Lt Col
101 US A/B Div	1st Lieut
82 US A/B Div	Capt
1st Polish Para Bde	Maj. Capt.

Dutch Liaison Mission

Capt (Dutch)
GSO III SFHQ
Capt (American)
1 OR

Civil Affairs

SMGO (Colonel)
ACMGO I
DACMGO II
2 Dutch Liaison Offrs
Clerks 2
Dvr/Batmen 2

HQ Glider Pilots

Adj

2 Air Landing LAA Bty

CC

GHQ Liaison Regt Det

Major
Capt
Lieut
Lieut (American)
Other ranks 8

MAIN HQ (SEABORNE)

G(O)

GSO III (O)

GSO II(O) later (Flew in)
GSO I later (Flew in)
GSO III(O) Joined with 30 Corps

G(I)

IO (Photos)
IO (Photos)
Clerk 1
Draughtsman 1
Dvr/Batman 1

APIS

Annexure 2 (contd)

RA

Driver	1
Clerk	1

RE

CE

SO 2

SO 3 (Stores)

SO 3 (Int)

Clerks	5
Draughtsmen	2
Dvr/Batman	2
Batman	1
Drivers	3

CSO

Clerk	1
Drivers	2

AQ

DA&QMG

AAG

DAQMG (O)

DAAG (O)

Clerks	3
Orderlies	1
Drivers	2
DRs	2
Dvr/Batman	1
Batmen	2

S&T

DDST

DADST

SC(T)

Clerks	4
Batmen	3
Drivers	3

Med

DDMS

DADMS

Corps Psychiatrist (Maj)

Clerks	3
Drivers	2
Batmen	2
Ord	
DDOS	
DADOS	
IOO	
Clerks	2
Dvr/Batman	1
Driver	1
REME	
DDME	
AIA (Lt)	
Clerks	2
Dvr/Batman	1
Driver	1
Camp	
Other ranks	26
Total Main HQ	
Offrs	25
OR	83

Rear HQ (Static)

G(O)	
GSO III (O)	2
GSO II (SD)	
GSO III (SD)	
Clerks	8
Orderlies	2
G(I)	
GSO III (I)	
Clerks	1
Draughtsman	1
Orderly	1
G(SAS)	
GSO I (SAS)	
GSO II (SAS)	
GSO III (SAS)	
Clerks	6
Orderly	1
RA	Nil
RE	Nil
CSO	
Clerks	3
Draughtsman	1
Orderly	1
AQ	
AQMG	
DAAG	
DAQMG	
SC 'A'	
Clerks	5
Orderly	1
S&T	
DADST	
SC (Sups)	
Clerks	4
Orderly	1
Batman/dvr	1
Catering Offrs	2
Clerk	1
Dvr/Batman	1

Med

Clerks 2

Ord

DADOS

Clerk 1

REME

DADME

Clerks 2

Batman 1

Camp

Asst Camp Commandant

Other ranks 73 (incl 52 attached)

INTELLIGENCE NOTES ON 'MARKET'

PART 1. I(a)

1. Airborne Corps was NOT able to carry out the detailed interrogation of PW normally carried out at Corps level, as there was no PW cage. The services of the interrogator who accompanied the HQ were NOT required by divisions nor other formations and was employed as an extra IO (Ia).

2. Airborne Corps has no special wireless section, as have other Corps.

3. Airborne Corps only source of original information was therefore the troops under command, and the Intelligence Branch acted as a sorting bureau only for this and the second-hand information received from the other Corps and Army. It also presented the intelligence picture to the Corps Commander.

4. During the first three days many offers of help were received from civilians who volunteered to obtain information from behind the enemy lines. These were made use of but as the front stabilised and passage became difficult they ceased. There is no doubt that if a section from the appropriate MI branch or from No.2 I.U. had been attached to the HQ a service of agents could have been established through the enemy lines which would have survived the stabilisation of the front. Such a service would have been invaluable in clearing up the doubt about the REICHWALD and in supplying information from close behind the enemy lines which PW from the hastily formed units encountered could not, in their ignorance, supply. It is suggested that in any future operation such a section accompany the HQ suitably equipped with funds, knowledge of services operating in the area, and good 'cover'.

PART II - I(b).

5. Detailed Counter-Intelligence work.

The CI work undertaken was of a most varied nature. The following tasks were the mos important:-

(a) Searching of CI targets in the operational area (e.g. HQ of Gestapo, Sicherheitsdienst, Sicherheitspolizei, NSDAP, etc. - all buildings occupied by German organisations likely to yield information of CI interest).

(b) Close watch on the reorganisation of Dutch civil administration.

(c) Search for, and arrest of, known enemy agents, etc.

(d) Arrest and investigation of German soldiers in civilian clothes, allied uniform, etc.

(e) Control of civilian movement - including control of all bridges over the waterways, all river traffic, the setting up of security control points and the canalising of all civilian movement on to them.

(f) Assisting with evacuation of civilians from combat zones.

(g) Vetting of civilian labour employed by the Allied Forces.

6. Lack of CI personnel in the first phase.

CI work in the first phase (searching of CI targets and the arrest of known CI suspects) was handicapped in the NIJMEGEN area by a shortage of personnel. Only six Counter-Intelligence Corps personnel of 82 US Airborne Division were available and they were more than fully occupied in the GROESBEEK area for several days. The result was that many opportunities of rounding up suspects in NIJMEGEN itself were lost. The arrival of Guards Armoured Division and 30 Corps FS Sections and later the attachment of an FSRD to Airborne Corps were too late to redress this position.

7. Controls

After the capture of the NIJMEGEN bridge, although a systematic search of target addresses continued, the main job of CI personnel was the supervising of the various controls. Control of civilian movement was particularly difficult, since the local civil authorities were quite incapable of implementing stand still orders etc, for some ten days. The main CI function had to be therefore the constant checking of the large amount of refugee traffic. This was done by canalising all civilian movement through security control points and by occasional snap

identity checks in which small built up areas were isolated with the help of the Underground and a thorough checking up of all persons caught within the cordon. In this work the FSRD attached to Corps HQ was especially useful.

8. Vetting

The vetting of civilian labour employed by Airborne Corps was another problem in which the help of the local police was not as good as had been expected - particularly after the first five or six days when the population of NIJMEGEN has so moved around the countryside that it was impossible for the local police to use their normal informants.

9. Informants.

The best CI informants were found to be the Roman Catholic priests, the doctors (especially hospital staffs) and he captured Abwehr and Sicherheitspolizei agents who seemed only too willing to implicate their associates.

10. Suspect and Target Lists

Although scores of CI suspects were dealt with in the NIJMEGEN area, little help was given by the SHAEF personality lists, which were frequently out of date and inaccurate - in one case a man listed as dangerous was arrested and after strong local representation was found to be one of the most reliable men in NIJMEGEN. The SHAEF Target lists, however, were most useful and on the whole accurate.

11. Sabotage

No cases of sabotage were reported to CI personnel.

12. Propaganda

There was the usual crop of rumours, but no evidence to prove that they were enemy inspired. It was clear, however, that many of them were given unnecessary currency by our own troops.

Operation "MARKET"

Comparison of planned and actual timings (excluding resupply)

F I R S T L I F T

	Planned		Actual	
	Day	Hour	Day	Hour
1 British Airborne Division				
Commence dropping or landing	17	1250	17	1240
Complete " " "		1402		1357
HQ British Airborne Corps				
Commence dropping or landing	17	1331	17	1357
Complete " " "		1341		1405
82 US Airborne Division				
Commence dropping or landing	17	1230	17	1230
Complete " " "		1407		1335
101 US Airborne Division				
Commence dropping or landing	17	1230	17	1301
Complete " " "		1420		1338

S E C O N D L I F T

	Planned		Actual	
	Day	Hour	Day	Hour
1 British Airborne Division				
Commence dropping or landing	18	1000	18	(a)1413
Complete " " "		1101		1513
82 US Airborne Division				
Commence dropping or landing	18	1017	18	(a)1403
Complete " " "		1132		1608
101 US Airborne Division				
Commence dropping or landing	18	1017	18	(a)1437
Complete " " "		1139		1557

THIRD LIFT

	Planned		Actual	
	Day	Hour	Day	Hour
1 Polish Parachute Brigade				
Commence dropping or landing	19	1000	19	(a) 1519
				1537
Complete " " "		1026	21	(a) 1705
				1730
			23	(a) 1650
				1717
82 US Airborne Division				
Commence dropping or landing	19	1000	23	(a) 1558
Complete " " "		1108		1717
101 US Airborne Division				
Commence dropping or landing	19	1000	19	(a) 1440
Complete " " "		1115		1625
			23	(a) 1635
				1640
878 Aviation Engineer Battalion, US				
Commence landing	19	1035	Did not	
Complete "		1115	fly in.	

FOURTH LIFT

	Planned		Actual	
	Day	Hour	Day	Hour
878 Aviation Engineer Battalion, US				
Commence landing	20	0900	Did not	
Complete "		0912	fly in	

FIFTH LIFT

	Planned		Actual	
	Day	Hour	Day	Hour
A F D A G				
Commence landing			26	1405
Complete "				1755
52 (L) Division				
Commence landing			Did not	
Complete "			fly in.	

APPENDIX F

ARTILLERY REPORT ON OPERATION 'MARKET'

Prior to the Operation.

Artillery Planning was carried out on a Divisional basis as the three divisions employed were separated geographically by too great a distance to make intersupporting fire plans possible.

From the Airborne Corps point of view the main problem was to arrange for 30 Corps, advancing North East, to be linked up successively to 101 US Airborne Division, 82 US Airborne Division and finally to 1 British Airborne Division in such a way that the fire power of 30 Corps could be used to support each Division in turn.

The plan decided upon was to allot three parties from 1 FOU RA, each consisting of an Officer, 2 Signallers and a No. 22 wireless set, to the three artillery regiments (two field and one medium) moving with the Guards Armoured Division, 30 Corps leading Division. OC 1 FOU RA with a 19 HP set and two signallers, controlling the net, was to be with CRA Guards Armoured Division. On this net was also to be one 694 American set at each of the Division Artillery HQs of 101 Division and 82 Division and all orders for fire support were to be passed to regiments from American OPs through their divisional artillery HQs and on the special net arranged to British regiments.

In addition, with each party from 1 FOU went an American artillery liaison officer and signaller, to assist in converting orders from American OPs, into British fire orders.

So far as the link up with 1 British Airborne Division was concerned, the plan envisaged a normal FOU layout and requires no comment.

Certain artillery conventions were agreed upon for the control of fire when the American Divisions were controlling British regiments or 30 Corps.

These were:-

(a) Initial request for support to include description of target and its map reference (or co-ordinates).

(b) The decision as to which Unit or Units engage the target to be taken by the control set (OC 1 FOU - representing CCRA 30 Corps).

(c) Guns to fire as soon as ready. Report that guns have fired to be made to Divisions (the word "SHOT" being sent), but observing officers to realize that owing to the number of retransmissions necessary, this report unlikely to reach them before the shells have landed.

(d) Unless otherwise ordered, ranging to be carried out by No. 1 gun (the right hand gun) in the case of medium or heavy batteries, or by right section salvoes in the case of 25-prs.

(e) Corrections, NOT deviations, to be sent by US Artillery Divisional HQs to the British sets.

(f) HE percussion only to be used.

(g) On receiving the order "Fire for effect", guns to fire for effect, the scale of engagement being decided by Control. If this was considered insufficient, the observing officers were to request a repeat.

CCRA 30 Corps allotted scales of ammunition for the support of each Division. Any increase over that scale was to be referred to him.

The Parties provided by 1 FOU consisted of those officers and signallers who were not already allotted to OPs in 1 British Airborne Division. There was no time available for them to train with the Americans to whom they were to work and the American LOs were only able to join them on D-1.

During the Operation.

(1) During the move up of 30 Corps to join 101 US Airborne Division and then 82 US Airborne Division, the FOU parties failed to gain contact with either Division. The ground join up was, however, rapid and successful and this signal failure did not affect the operations.

The failure was due to:-

(a) The lack of range of the type of sets used.

(b) The lack of previous practice between American and British operators.

(c) The parties from 1 FOU containing some of their least experienced personnel. This was unavoidable as these parties were already in France, having been sent there for a previous operation which was cancelled, and all others were already employed on tasks within 1 British Airborne Division.

Conclusions.

1. For a link up of this type, more powerful R/T sets must be provided. Speech communication must be perfect. The use of Canadian No. 9 sets or No. 52 sets should be considered for future operations. No. 22 sets are not suitable.

2. Previous wireless training must be carried out between the ground and airborne parties concerned. The training must be over full operational distances and through interference.

3. Provided (1) and (2) above are done, the layout arranged for operation 'MARKET' should require no change for future operations in which a British ground formation is required to support US Airborne Divisions.

(11) During the move up of 30 Corps to join 1 British Airborne Division once again communications proved the difficulty. Communication was eventually established at 0900 hrs. 22 September between OC 1 FOU and the Division, using 19 HP sets over a range of about 4 miles. No. 22 sets failed to establish communication. Fortunately, prior to this, communication had been established between RA 1 Airborne Division and 64 Medium Regiment, using 19 HP sets, over a distance of about 12 miles. Although interfering to some extent with the ordinary work on 64 Medium Regiment net, this link was retained throughout the remainder of 1 Airborne Division's operation and over it was controlled the fire of 64 Medium Regiment and 419 Heavy Battery, which proved invaluable.

Conclusion.

One wireless link using 19 HP sets was established. It appears that sets of at least this power or more powerful sets are required for the FOU in order to obtain reliable communication over the distances likely to be involved in an Airborne operation. No. 22 sets are of no use for this purpose.

After contact had been made.

When the join up with 82 US Airborne Division at NIJMEGEN had been completed, 30 Corps artillery was deployed in positions from which they could both support their own division advancing North to ARNHEM and cover 82 US Airborne Division front.

At times 30 Corps artillery was firing over an arc of 270 degrees. In order to be able efficiently to support 82 US Airborne Division, CCRA 30 Corps sent RA liaison officers to 82 Division Artillery HQ. The senior officer was a Regimental Commander. Communication between them and their regiments were provided by 30 Corps.

All demands for fire support from Infantry Regiments to 82 Division were sent in to 82 Division Artillery HQ and passed by the British LOs to their regiments. Observations were passed in the same way.

This system worked perfectly and 82 Division received very quick fire support throughout the remainder of the operation.

Conclusion.

When ground contact has been established between American and British forces, liaison officers with the necessary communications to their regiments, preferably line, must be sent at once to the American Divisional Artillery H.Q. If American forces are supporting the British, the Americans should send their liaison officers with their own communications to the HQ RA British Division or Corps.

Supply.

During the final supply drop made to 1 British Airborne Division, 75 mm. gun ammunition was dropped in lieu of 75 mm. pack how. ammunition.

Pending the results of a Court of Inquiry into the reasons for this mistake, no conclusions can be drawn except that every possible precaution must be taken to prevent a repetition of such a mistake.

APPENDIX G

AIR SUPPORT NOTES ON OPERATION "MARK

1. Prearranged Air Support.

(i) FAAA were responsible for arranging air support with the Air Forces concerned.

(ii) In general the arrangements were as follows:-

(a) By bombers of 8 USAAF were to engage German airfields and known FLAK positions on the routes in except those close to Dutch towns. This was to be done prior to H hour.

(b) FLAK positions close to DUTCH towns and other targets asked for by Divisions to be engaged by 2 TAF.

(c) 2 Gp were to engage special targets before H hour.

(d) Fighter cover for the fly-in on D day was to be provided by 8th USAAF, 9th USAAF and ADGB. Fighter cover for subsequent drops and for resupply was the responsibility of 8th USAAF.

(e) Fighter cover for the Airborne Forces when landed was to be provided by 2 TAF.

(f) Direct support after landing was to be provided by 2 TAF

Owing to bad flying weather, 2 TAF's representative did not arrive in time for the co-ordinating conference, with the result that 2 TAF did not know of commitment (b) above until very late on D-1 and had to rearrange their supporting programme completely at the last moment and all the targets asked for were not able to be engaged. No time was then available to make other arrangements.

Otherwise the plan was carried out as arranged.

2. Direct Air Support Communications Ground Net.

(i) In general

The communications Diagram is attached below. All were American 193 sets with American operating parties.

Sets and operating parties had been thrown together shortly before D day and had no opportunity of training together over distances or through interference comparable to that of the operation.

The result was that communications as planned failed.

(ii) In detail

1 British Airborne Division was only heard once, on D day, and never managed to establish communications with the rest of the net, though only 15 miles from 82 Division and British Airborne Corps.

British Airborne Corps sets landed safely and one was re-allotted immediately to 82 Div.

82 US Division sets were both damaged landing, one of them having been shot down in 101 US Airborne Division area. Both sets were later repaired and brought into use. In the meantime, the set re-allotted by Airborne Corps was used.

101 US Airborne Division's sets landed safely.

Communication was established between Airborne Corps, 82 and 101 US Airborne Divisions, but never satisfactorily with Second Army. The distance between Airborne Corps and Second Army was about 85 miles - later shortened to about 50 miles.

At 30 Corps was a British listening set. When it was apparent that communications as originally planned were not working, Second Army ordered this set to take over control of the Group. This was done, and until 29 Sep continued to do so, 30 Corps re-transmitting all demands to Second Army on a separate frequency on their ASSU link. This enabled demands to

be sent to Second Army but was not altogether satisfactory as it overloaded the 30 Corps - Second Army net which was already in use for other air support demands.

A few demands from 1 Airborne Division were received at Airborne Corps via an RA wireless link which had been established with 64 Med. Regt. and sent on to Second Army via 30 Corps. Other demands on 1 Airborne Division's behalf were submitted by Airborne Corps as a result of information received in messages from 1 Airborne Division and from other sources.

On 29 Sep., a British tentacle, with a Canadian No. 9 set, was sent by Second Army to Airborne Corps. From then onwards, communication from Airborne Corps to Second Army was extremely good and no trouble experienced. The American sets were then used on a local net, between Airborne Corps, 82 Division and 157 Infantry Brigade, 101 US Airborne Division not then being under command of Airborne Corps.

3. Communications - Ground to Air.

With each air support party was a 522 VHF set for working ground to air on 2 TAF common frequency.

Although FAAA had arranged that direct support aircraft should operate on 2 TAF common frequency and although continual efforts were made by the American air support parties, no contact was ever established with aircraft in the air.

G(Air) Second Army had no knowledge of the arrangements made by FAAA but, in a signal, confirmed that aircraft engaging targets demanded by Airborne forces were on 2 TAF common frequency. Still no contact was made. It seemed doubtful if, in fact, pilots were actually listening on the frequency arranged.

For two days an RAF contact car was attached to Airborne Corps. As, however, it had no authority to call up aircraft or to brief aircraft in the air, it could only be used for contacting Tac R aircraft. In point of fact, no information was obtained through this source, though several aircraft were contacted. Visibility was poor.

4. Direct Support.

Direct support provided by 83 Group 2 TAF was, until 23 Sep., negligible. This was mainly due to two causes:-

Bad weather preventing flying during most of the mornings.

A ruling that 83 Group were not allowed to fly over the Airborne area during resupply owing to the danger of getting mixed up with the 8th USAAF fighters.

This reduced flying to a very short period in the evenings on most days.

It was unfortunate that the bad weather was local in the 83 Group airfield area as the GAF, operating from East of the Rhine, was able to fly and 1 Airborne Division was strafed almost continuously. Whenever RAF fighters were over the area, the GAF withdrew, very seldom staying to fight it out.

After 23 Sep., the support provided was considerably improved and was effective, though the small number of Wings available restricted the number of targets engaged. In all, from 22 Sep. to 8 Oct. inclusive, 95 demands for targets on behalf of Airborne Corps, 1 Airborne Division and 82 US Airborne Division were submitted. Of these 49 were accepted. On several days, however, many more targets would have been asked for but as information had been received that either aircraft were not available or weather prevented flying, demands were not submitted.

The quickest time from demand to Time over Target was 1½ hours.

Difficulty was experienced in the wooded and enclosed country in which the Airborne Forces were operating in pinpointing targets for the Typhoon Wings. Unless given a 6-figure map reference, the RAF find difficulty in spotting and engaging a target. For this reason, they are unwilling to engage area targets.

In a few cases area targets, woods, etc., were engaged, and although from the pilot's point of view the results were disappointing as definite strikes and results could not be seen, ground forces in all cases reported that the results were excellent.

It was noticeable that whenever our aircraft were overhead, the Germans were reluctant to open fire with their artillery for fear of giving away their positions. This was the case whether or not the actual gun positions were being attacked.

All rocket attacks carried out by the Typhoons of 83 Group were extremely accurate. Several attacks were observed personally and there are no reports of a rocket more than about 50 yards

from the target. Pilots went right down to their targets despite fairly severe Light anti-aircraft fire and in no cases were our own troops hit although some targets were within 300 yards of them. The enormous moral effect of the engagement of targets close to our own forward troops may not yet be fully realised.

Coloured smoke was used to indicate targets within the bombline and proved satisfactory.

5. Tac R.

The Tac R broadcasts from Second Army were found most useful, but were only obtained after a British tentacle had been allotted to Airborne Corps.

General Tac R demands for each day were normally sent in the evening before and the results included in the Tac R broadcasts. Special demands were sent at any time and the results also included in the Tac R broadcasts. This was not altogether satisfactory as it took considerable time sorting out the information required, which was probably urgently required, from the mass of information in the broadcasts, and also was liable to be somewhat delayed as the broadcasts were hourly.

6. Conclusions and Recommendations.

(i) Planning.

It is absolutely essential that commitments are known to all the Air Forces concerned in time for adequate preparation and briefing. This seems obvious, but when planning is hurried the obvious is sometimes taken too much for granted.

(ii) Communications.

(a) Operators must have adequate practice working together as a group over full operational distances and through interference.

(b) Suitable sets, Canadian No. 9 and No. 52, must be mounted in jeeps to be gliderborne. Also RAF sets 1131 or 1143 for R/T to aircraft.

(c) An Airborne Corps should have its own Airborne Air Support Section as a part of Corps Signals. It should consist of two forward Control Posts (FCP's) for Airborne Corps HQ and sufficient suitable sets to allow a distribution of two sets to each of three Divisions, two to Army HQ, one of which might be allotted to the nearest ground Corps HQ, and one to RAF Group Control Centre.

Each FCP should contain one set on the normal ASSU net, one set for R/T communications to Divisions when the aircraft are to be briefed in the air, an RAF VHF set for communication to the aircraft and a set for communication to Group Control Centre for calling up aircraft.

Duplication is necessary in case of casualties during the landings.

Diagram of proposed communications is attached.

(iii) Staff

(a) Airborne Corps HQ War Establishment should include a GSOII(Air),

(b) During an operation an RAF Controller together with operators for two VHF sets and an ALO should fly in with Airborne Corps HQ.

(iv) Direct Support.

(a) Every effort should be made to provide continuous air cover over an Airborne Force. This will have the effect of keeping enemy artillery silent and restricting enemy movement.

(b) The great moral effect of attacks on enemy ground forces close to our own troops should be stressed and an increase in this type of attack made. Attacks on enemy trains and their L of C are of great value but have no immediate moral effects.

(c) If the air effort is sufficient, a "cab rank" should be provided.

(d) If full value from air support is to be obtained, the RAF must be prepared to take on area targets even though results may, to them, appear disappointing. To the ground forces they are invaluable.

(e) To counteract important airborne operations the enemy will probably have to move reserves from some distance, for example up to 50 miles. There will be no method of discovering these movements, and no method of delaying them, except by air reconnaissance and air attack. This air reconnaissance and air attack should be done on the initiative of the air forces and be continuous and quick. It should cover all likely routes and areas for at least 48 hours after landings.

(f) When gun ammunition supply is difficult, as it normally is with an Airborne Force, many targets must be taken on by the RAF which would normally be engaged by artillery.

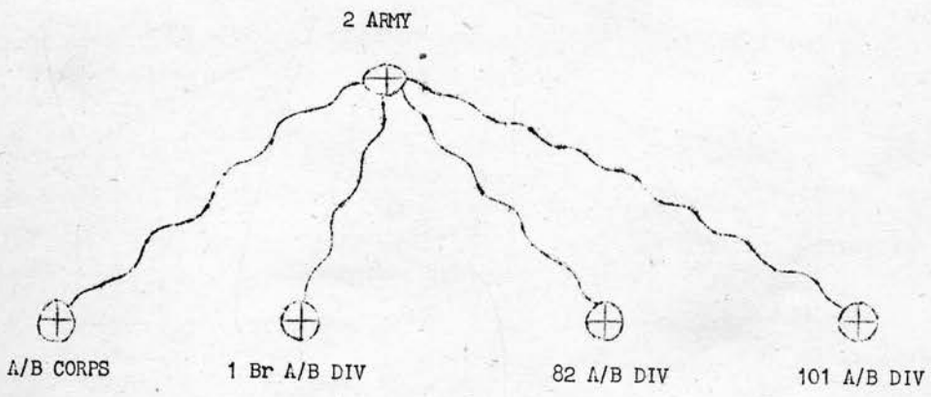
(g) Coloured smoke for 75 mm. pack hows is required for the indication of targets to the air. At present, coloured smoke is only available for 25 prs and hence can only be used when ground forces have joined up with the Airborne Forces.

(v) Tac R.

(a) When working with American sets, an additional receiver is required for receiving the Tac R broadcasts. This is already included in British tentacles.

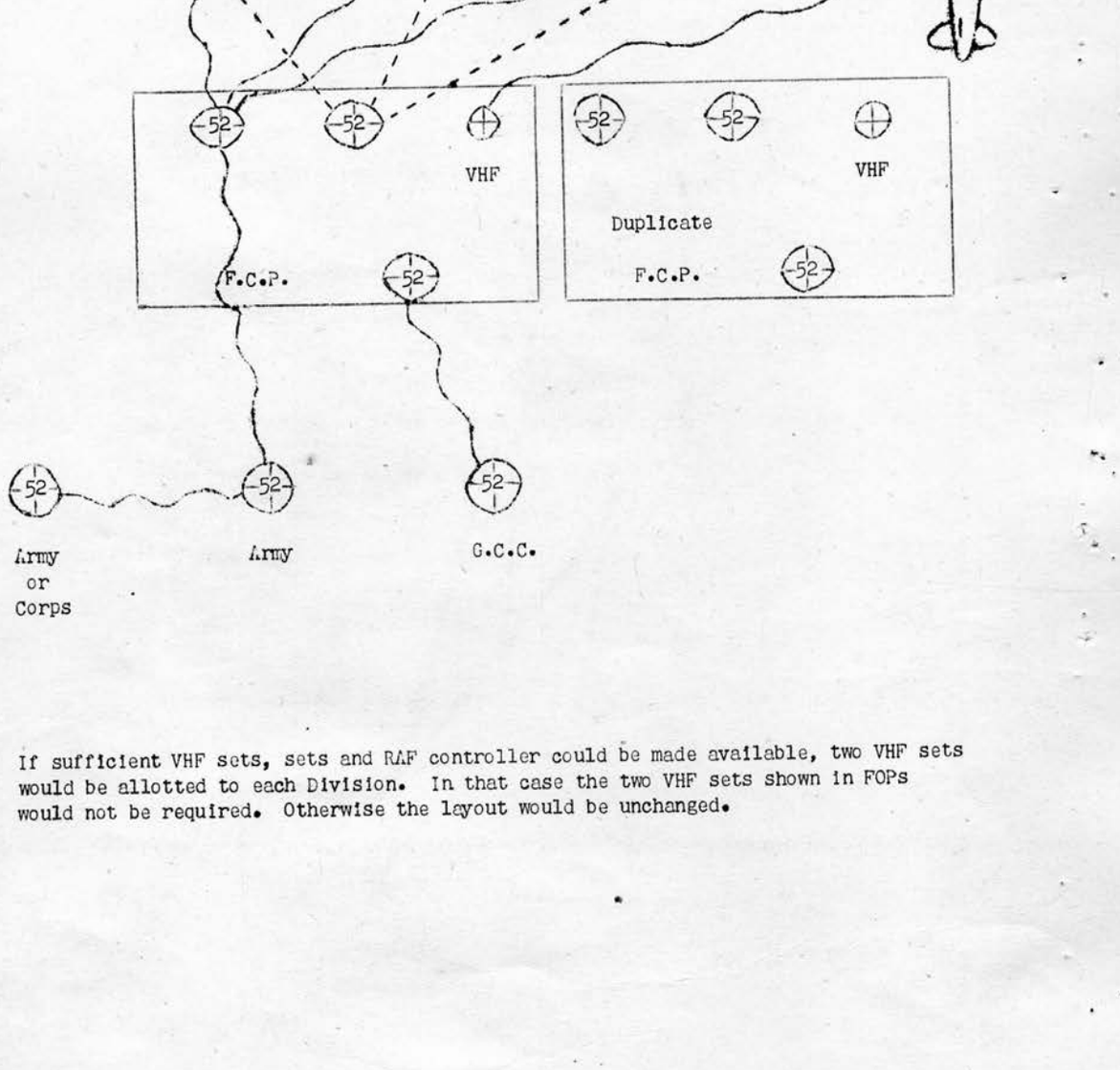
(b) When a special Tac R request is made, an individual reply should be sent to the originator of the request. The information could also be included in Tac R broadcasts for other formations.

Attached to Air Support
Notes on Operation 'MARKET'
Ref. Para. 3(1)



NOTE: Two sets were provided at each station to allow for casualties to equipment.

Attached to Air Support
Notes on Operation 'MARKET'
Ref Para 6 ii (c)



If sufficient VHF sets, sets and RAF controller could be made available, two VHF sets would be allotted to each Division. In that case the two VHF sets shown in FOPs would not be required. Otherwise the layout would be unchanged.

APPENDIX H

OPERATION "MARKET"

REPORT ON ENGINEERS ACTIVITIES

1. GENERAL.

This was the first airborne operation on a corps basis. There was therefore a lack of previous experience on which to plan. The operation was laid on in a few days and this factor together with the resultant lack of detailed engineer intelligence did not make the selection of tasks and briefing an easy matter, so that the engineers were committed on very general tasks and at full strength, which is wasteful.

If airborne formations are retained in the line for any length of time after the link up with ground forces, the need for additional tools, equipment and vehicles to bring the airborne engineers up to the standard of ground engineers was very clearly shown on this operation.

2. ORDER OF BATTLE.

(a) Initially

HQ 1 British Airborne Corps

CE and normal staff.

1 Airborne Division

HQ RE

1 Parachute Squadron RE

4 Parachute Squadron RE

9 Field Company (Airlanding)

261 Field Park Company (Airlanding)

82 US Airborne Division

307 Engineer Battalion

101 US Airborne Division

326 Engineer Battalion

Corps Troops

878 US Airborne Aviation Engineer Battalion

(b) In addition after link up with ground forces

4 GHQ Troops RE

with under command

P1 477 Tipper Company RASC

Sec 1 Mechanical Equipment Company

One Pioneer Company

3. PLANNED TASKS.

The primary planning put the divisional engineers under command to their parent formations for the tasks of:-

(a) removing all demolition charges from captured bridges

(b) Repairing as far as possible from local resources any damage that might have been caused to these bridges.

(c) in the event of the demolition of any bridge prior to capture, the collection of barges and other river craft to form ferries.

(d) combat and administrative services to the divisions.

The aviation engineers were retained on airfields in England pending the seizure of DEELEN airfield NORTH of ARNHEM, when they would fly in by glider in order to mend the airfield for transport aircraft to a capacity of 35 aircraft per hour.

The remaining corps troops, in the planning stage, were not under command though it was known that additional engineers would be supplied from the ground troops, after the link up had taken place.

4. EXECUTIONS OF TASKS.

In all cases the primary task of removing demolition charges from the captured bridges was successfully carried out. Firing leads were first cut, girder charges then removed and finally mine charges located and removed. Explosives removed were dumped into the river to prevent the enemy rapidly replacing them in the event of recapture. Barges and boats were also collected wherever available and subsequently handed over to the ground troops for their use. Apart from these tasks during the first week the story of the airborne engineers is one of continuous fighting as infantry in which they acquitted themselves with distinction and gallantry. 82 and 101 Divisional Engineers, after the link up with the ground troops and the general easing of the situation, were withdrawn from the firing line and used on normal engineer tasks such as water supply, minelaying and clearance, road repairs and sign posting. The engineers of 82 Division were also employed as crews of the assault boats used by the Division in their opposed crossing of the River WAAL at NIJMEGEN.

As DEELEN airfield was never captured and all the other airfields in the allied lines were taken over for operational use by fighter groups, the aviation engineers battalion was not flown in.

5. STORES SUPPLY.

As planned, the supply of engineers stores was divided into three main phases:-

(a) Taken in with the troops at the time of their airlanding.

(b) Subsequent supply by automatic air drop.

(c) From ground dumps after link up with ground troops.

The amount that could be taken in under (a) above was very small owing to limited availability of aircraft and gliders. The automatic resupply by air was based on a total of 11 tons per division per day or 1 ton per Troop/Section or equivalent per day. Owing to enemy action the resupply largely fell into areas occupied by the enemy or was not able to come in at all, and therefore no opinion as to the correctness of either these figures of consumption or details of the breakdown of the totals can be made. Since Second Army had made a very rapid advance over a long distance from its main dumps in NORMANDY, supply of engineer stores from ground sources proved non-existent and such stores as were used were obtained locally from civilian or captured enemy dumps. In future operation of this nature it is considered that a much higher proportion of engineer stores should be taken in during the initial landing, even though it may entail a decrease in the number of engineers airlanded, for and engineer without tools or stores is as useless as a gunner without ammunition.

6. ORGANISATION AIRBORNE ENGINEERS.

Engineer organisation both of the US and British Divisions could be considerably altered with benefit. It was clearly shown that great flexibility is required and that to this end the engineer units must be similar to each other in their organisation. The Engineer Commander can then mass his strength where the engineer work is likely to be heaviest and not be hampered because a particular unit is too weak in strength or equipment to carry out a given task, though tactically it is the one best positioned. This particularly applies to the engineer parachute units which are very lightly equipped with tools and transport. Apart from "coup de main" tasks, their knowledge and skill are often useless for work because of shortage of equipment. It is recommended that the basic Airborne Engineer Company should be in strength and effectiveness of equipment equivalent to the corresponding Infantry Division Engineer Company. A proportion, if tactical engineer tasks demand it, must be capable of arriving by parachute. As much of the remainder, as is permitted by the size and nature of its equipment should be glider borne, and the rest should be always part of the non-airborne "follow-up" of the Division.

The need for airborne engineers to be at the disposal of the Corps Engineer was also demonstrated. Considerable engineer assistance could have been given to Divisions, especially in the improvement of defences, routes, strips for air operations, collection of stores, etc., had

corps troops been available. Basically they would be similar in organisation to the divisional engineers.

7. FIELD DEFENCES.

Lack of stores and tools in the initial stages prevented any large scale field defences being undertaken by the engineers. However their knowledge and skill is available and the use of companies of engineers as infantry is open to question. It is for consideration whether the better policy would not be to distribute engineer sub units throughout the firing line during a hard defensive battle, where they can fight as infantry under infantry commanders when this becomes more urgent, than preparation of field defences in the line.

8. BRIDGING.

As the Airborne Divisions have no bridging equipment all bridging was executed by the ground engineers. However it is essential that airborne engineers should be thoroughly trained in the use of standard bridging equipments, as their assistance on several occasions would have been invaluable. In addition there is no doubt that light rafting equipment sufficient to take divisional loads is necessary for airborne divisions in any operation near to rivers or canals.

9. DEMOLITIONS, MINES and BOMB DISPOSAL.

No demolitions calling for special note were carried out. It is considered that as soon as the tactical situation permits a second complete and thorough search of a captured bridge should be made to ensure that no charge, that might be fired by a saboteur, shell fire or a near miss of a bomb, remains.

Outstanding feature of mine warfare was the indiscriminate and uncontrolled laying of mines by all arms. It is essential that not only shall a firm policy regarding mine laying be laid down prior to an operation, as was done in this case, but that all subordinate commanders ensure that the policy is faithfully obeyed. Experience once again showed that it is only engineers who can produce accurate minefield records and that minefields should not normally be laid except under their supervision.

There were a few calls for assistance in bomb disposal which were answered in all cases by the bomb disposal section of the ground troops. As it may well be that the unexploaded bomb is in some vital site such as a bridge approach held by airborne forces prior to the link up, airborne engineers must contain trained bomb disposal personnel.

10. AIRFIELDS.

Owing to various tactical difficulties airborne aviation engineers were not flown in and therefore airfield construction was not undertaken, However a strip for air OPs was built by local civilian labour and an enemy grass airfield marked out for use. As it may well happen that aviation engineers in future operations are not available in the battle area it is essential that airborne divisional engineers be trained and equipped to reconnoitre, prepare and mark strips for air OPs., Transport and Fighter aircraft. Such tasks cannot entail extensive works and should only include the movement of the barest minimum of earth. They must also be prepared to put into use captured airfields to provide a strip on to which aviation engineers can be flown. The closest liaison will be necessary between the Airborne Corps and the ground forces as to the use of such strips after their completion.

11. ROADS.

In the early stages of an airborne attack in a civilised country road work is likely to be confined only to the repair of craters or construction of short deviations for the very light Airborne Divisional traffic, but even so it is most desirable that traffic circuits, including the imposition of one way restrictions, be laid down as early as possible. Then on the arrival of ground troops the minimum of unnecessary wear on the road system will be imposed. Airborne engineers must realize that they are responsible for making the task of the ground engineers as easy as possible after they join up and therefore, even if they have neither the equipment or men to carry out tasks, they must reconnoitre and make all preparations so that ground engineer units can go straight onto the job.

12. MECHANICAL EQUIPMENT.

The only limiting factor to the employment of mechanical equipment with airborne engineers is weight and size. The small air tractors proved very useful but are no good for serious earth moving jobs. Normal mechanical equipment for the use of the airborne engineers to be brought in with the relieving forces, should always be provided, preferably as part of the airborne corps troops.

13. WATER SUPPLY.

In civilised countries too much reliance may be put by airborne engineers on obtaining

water from existing civilian sources. It must be borne in mind that landing zones and dropping zones are likely to be away from towns and villages whose supplies, when captured, may be ineffective either by enemy action, lack of fuel or power. Standard water supply equipment may often prove unsuitable for use in deep bore-hole wells.

Preliminary planning therefore should always cater for the provision of water supply from rivers, lakes and similar natural sources. These will need purification and clarification.

14. INTER-COMMUNICATIONS.

In the early stages of an airborne attack good ratio communications between engineer units is essential to maintain control. Provision on a scale not less than that of ordinary divisional engineer net is necessary, including links to the Corps Engineers.

REPORT ON ACTIVITIES OF THE BRITISH GLIDER PILOT REGIMENT IN OPERATION 'MARKET GARDEN'

PART I

AIR OPERATIONS

THE FIRST LIFT.

1. TAKE OFF:

The take off of the first lift on Operation "MARKET" from 0945 hrs. onwards on Sunday the 17th was highly successful; only one glider failed to become airborne. This was due to an unfortunate accident which damaged it before arrival at a tow line. The load was transferred, however, and became successfull airborne on the Second lift. One other combination was forced to return to base with engine trouble; it took off for the second time but was again forced to return. This combination was successful on the Second lift.

2. THE FLIGHT:

The flight falls naturally into three categories - over England - The Sea crossing, and the flight across Holland.

The weather over England was far from ideal; the cloud base ranged from 500 ft to 2000 ft., with 6/10 strata-cumulus. Otherwise flying conditions were fairly comfortable, but before the English coast had been crossed, of the three hundred and fifty eight combinations that should have taken off, some twenty-three had forced landed in England: one had crashed badly, crew and passengers being killed.

One glider load was damaged on landing, but the remainder returned to base and took off again on the Second lift.

Over the sea, conditions improved rapidly until the sky was clear of cloud, and flying conditions excellent. There was, however, the usual trouble from slip-stream, and engine failure. Four gliders were forced to ditch, two having broken ropes and two being forced down by engine failure. A fifth glider was forced to release by tug engine failure, to land on the island of SCHOUWEN, off the Dutch coast.

3. AIR SEA RESCUE.

Launches were visible at intervals, and it is worthy of note that all British glider crews were safely retrieved; in fact one glider was shelled for two hours by coastal guns, the launch coming alongside under fire.

4. NIJMEGEN. (Airborne Corps HQ)

Cloud was again encountered over the Dutch coast, but the base had lifted to some 2,200 ft.

On the NIJMEGEN route, little evidence of lift could be seen at all.

The flight across Holland was quite uneventful until reaching the L.Z., which stood out clearly and was easily recognised, despite the lack of ground aids. One glider was unfortunately lost through a broken tow rope, but a good forced landing was made some miles from the L.Z. The stream was fired on by light and medium flak from GROESBEEK and OUIJ; although it caused some slight damage to a few gliders, the flak did not seriously interfere with the landing. The sortie landed thirty five of the original thirty eight gliders which took off, losing one over England, one ditched, and one over Holland. Two pilots were injured on landing - one seriously. All loads were safely delivered.

5. ARNHEM: (1 British Airborne Division)

The leading combinations encountered several bursts of light flak from a barge as they crossed the Dutch coast, and heavier opposition from gun positions on the mainland. The barge at least was attacked and silenced by fighter aircraft, and thereafter only occasional bursts of small arms fire troubled pilots during the flight from the coast to the RV.

From the R.V. onwards there appears to have been considerable slipstream trouble; in all, on this route, eight gliders were lost. As the stream approached ARNHEM from the South West, they met flak of all types, which as at NIJMEGEN, did not seriously interfere with the landings.

Glider pilots had no difficulty in discerning their L.Z's., chiefly because of the outstanding topographical features - the singular shape of the woods, the railway and the minor recognition points of roads and houses. The Independent Parachute Company had fulfilled the tasks which they had been set, and it is abundantly clear that the Verey light signals assisted many combinations in making an advantageous approach. Pilots also report that the Smoke Candles were of value.

The wind at ground level was almost negligible, and, with a release height of 2,500 ft., there was a tendency amongst a number of pilots to approach at speeds well above normal, and consequently overshoot. Very few, however, seriously damaged their aircraft or their loads.

6. UNLOADING.

Opposition on the first day was slight - some scattered rifle and M.G. fire from the South Western corner of L.Z. "S", and rifle fire from the West of L.Z. "Z", which did not seriously affect the unloadir .

As on Neptune it was found that various unforeseen difficulties occurred. The number of cases where the bolts connecting the tail of the glider were stated to be "immovable" were fewer, no doubt owing to the greater experience of pilots and passengers alike. Difficulty was, however, experienced in moving the troughs from under the jeeps, there were a few cases where the fabric had not been completely severed around the bulkhead - and for this the pilots must take responsibility, for no check could have been made before the take off. It is apparent, however, that the average time for unloading heavy equipment was thirty minutes.

7. SURFACE:

The surface of the L.Z. was in parts, softer than had been anticipated, and in consequence, two Hamilcars overturned on landing. The first pilots were killed, and both second pilots injured, but the passengers were more lucky, escaping with only slight injuries which did not incapacitate them. The cause of these mishaps was undoubtedly the piling up of earth beneath the nose of the gliders as their under carriages sank into the soft ground, the resulting effect being that of striking a high bank at speed. Both loads - 17 pr. guns were unfortunately lost.

8. SUMMARY:

Some 39 gliders of the 358 which took off on this lift failed to arrive. Of these one crashed on take off; twenty four forced landed in England, (all loads taking off on the Second lift), five were lost over the Channel, and nine over Holland.

In all, therefore, some 319 glider loads were delivered to the L.Z's. Exact figures of the number of loads lost or damaged on landing are not available, but it is certain that the vast majority were unloaded and in action very shortly after landing.

SECOND LIFT TO ARNHEM.

9. TAKE OFF AND FLIGHT.

The Second Lift, carrying the remainder of 1 British Airborne Division, took off at 1120 hrs. on Monday 18th after a delay of some hours due to the weather. One glider crashed on take off but without injury to the crew, who were successful on the Third lift. Conditions were by no means good at the time and gliders encountered patches of low stratus and rain whilst over England. The visibility in general was fair with 5/10 to 8/10 cloud at 2000 to 3000ft broken cloud below. Some combinations were forced to fly through the lower patches however, and in all seven gliders forced landed before reaching the Channel. It should be recollected that they took off again on the Third Lift.

Once again, over the Channel flying conditions eased. There was a slight haze, but the cloud base lifted, and only two gliders were forced to ditch. One was seen to break up on impact, but the other remained intact.

Heavy flak was observed, as the stream crossed the Dutch coast, from gun positions identified as just South of track; no casualties were reported. Along the route flak opposition was stiffer than on the previous day, with frequent bursts of light flak. Heavier calibre guns were noted at HERTOGENBOSCH where strikes were made on several gliders. Thirteen gliders were known to have been lost on this lift over Holland; there are no reports available from a further two. Of the thirteen, three tow ropes were severed by flak, one glider was shot down and a further three combinations were forced to release because of flak damage. The remainder were lost through normal causes - engine failure and rope breakage.

Whilst running in to the ARNHEM L.Z's. glider pilots observed considerable activity in the air over NIJMEGEN, and watched continuous heavy flak. This was undoubtedly the American Second Lift going into L.Z. "N" under heavy fire.

By this time, the Independent Parachute Company were encountering sufficient opposition on the ground to seriously interfere with their setting out of prearranged ground aids. But the

L.Z. stood out very clearly as the streams approached it, and if further check was required, the gliders on the ground supplied it.

That afternoon the gliders released in heavy and medium flak, and flew down to find the landing area covered by small arms fire. It would appear that whilst no determined or concentrated effort was made by the enemy to interfere with unloading they relied on sniping, occasional mortaring, and M.G's. sited generally in the S.W. area of the L.Z's.

10. UNLOADING.

This fire is reported to have been inaccurate and although making the thirty minutes of the unloading of heavy equipment unpleasant, did not prevent the majority of glider crews from unloading their aircraft.

A few gliders landing near enemy positions were wrecked, and the loads destroyed, either on landing, by enemy fire or to prevent their falling into enemy hands.

11. SUMMARY:

Of the 297 combinations which took off 273 reached the L.Z. and released their gliders. The 24 loads which were not delivered were lost; 7 over England - (which took off again in the Third Lift), two over the Channel amd thirteen over Holland, there are no reports available from the remaining two. Exact figures are not available of the number of loads, or personnel who, after making successful forced landings in Holland, linked with the Dutch Underground or made their way independently to NIJMEGEN, or even, in some cases, to ARNHEM. It is known that at least two glider crews were successful in rejoining units of the Regiment.

THIRD LIFT TO ARNHEM.

12. TAKE OFF AND FLIGHT.

The Third Lift, for 1 Polish Parachute Brigade and the repititions for 1 British Airborne Division, was again delayed by weather until after noon. This time the cloud base across England and the Channel was 1000 to 1300 ft. and flying conditions were uncomfortable.

On this lift nine, in all, previously successful gliders took off again for L.Z. "X" with the thirty five for L.Z. "L"; these crews found that air and ground opposition had stiffened in proportion to the day of their arrival.

One combination was forced to return to base as the glider load had shifted, and the aircraft was rapidly becoming uncontrollable; another because of tug engine failure. For the same reason a third glider was forced to land in England just short of the coast.

Over the Channel conditions, as before, grew steadily better, but not before three tow ropes had broken, and one had been severed by flak off the coast so ditching four gliders.

Perhaps because of the weather or the comparative size of this lift, the flak encountered over the coast was not serious, but during the flight up to the R.V. several glider crews reported light and medium flak, in quantity. One combination appears to have been selected as a special target for flak positions North of the Escaut Canal; and another glider was shot down, crashing out of control at TRU. Six others forced landed in Belgium and Holland owing to broken ropes, and in one case, to the late arrival of the combination, and the consequent lack of fighter cover.

The remainder again noted activity at NIJMEGEN, but out of range. As they neared the L.Z's., however, flak was particularly heavy and ground reports state that tugs were either badly damaged or shot down.

Glider pilots had no difficulty in recognising the two L.Z's. - but once down were subjected to concentrated ground fire, more especially on L.Z. "L". (Reports show that the Independent Parachute Company had again been successful in producing smoke, Verey Lights and white panels for this L.Z.)

13. UNLOADING:

Those crews who flew in on this Third Lift, and were safely evacuated seem to have no undue difficulties in coping with enemy action whilst unloading.

Ground reports, however, clea ly state that some of the screws who reached the Division from the L.Z's. were forced to leave e loads in the gliders which were already burning. No safe estimate can be made.

14. SUMMARY.

On the Third Lift 44 combinati took off. Thirty were successful. The losses were:

three over England, four ditched in the Channel, one shot down, and the remainder forced landed in Holland. Fourteen out of 44 gliders gives a high percentage loss, but there is no doubt that the conditions on this lift were worse than those encountered on the previous days.

15. 111 Officers and 1227 NCO's of the Regiment took part in the operations. Casualties as known on 8 November were 64 Officers and 561 NCO's, but the greater majority of these are listed as missing and many more may eventually rejoin. 666 gliders were flown; of these only 44 were totally abortive, although a further 33 were unsuccessful at the first attempt.

PART II

GROUND OPERATIONS

16. Generally speaking, No. 1 Wing (less one flight) of the Regiment piloted the gliders carrying the divisional troops and HQ of 1 British Airborne Division to the L.Z's. north of the railway ARNHEM - UTRECHT. No. 2 Wing (with one flight of No. 1 Wing under command) piloted the gliders of 1 Airlanding Brigade of 1 Division to the L.Z's. south of the same railway and those of British Airborne Corps HQ to the L.Z. south east of NIJMEGEN.

17. The outline ground plan was that pilots should remain during the first phase of the operations with the loads they carried; during this phase, also, they would be responsible for the defence of Corps, Divisional and Brigade HQ's.

Immediately the situation had stabilised, the pilots were to be withdrawn into reserve areas for use in emergency as brigade and divisional reserves until they could be withrawn altogether from action.

18. The principle was, and is, to get them back to the airborne base ready for further airborne operations, at the first opportunity. It has always been realised, however, that this may not be possible until considerable ground fighting has occurred and therefore all glider pilots are fully trained soldiers, properly organized into fighting units capable of operating as such. Any man untrained as a soldier is a liability on the ground and is also a wasted load in a glider. An incompletely trained soldier, capable only of self-defence is also a liability and a wasted load; he is not a useful part of a unit which can act offensively in emergency or defensively to release another unit.

19. The British Glider Pilot Regiment has, from its inception, been organized and trained so that it can fight in efficient units on the ground once its primary flying task has been accomplished. Its organization, particularly its allotment of transport, is not yet perfect and must be improved, but experience in SICILY, NORMANDY and now HOLLAND have proved the correctness of the principles behind that organization. The glider pilot must be the perfect airborne soldier, able to fly and fight with the best.

20. 1 British Airborne Division faught, isolated north of R NEDER RIJN, for nine days. Casualties reduced their effective strength from to about 2200, including glider pilots. Their task of capturing and holding the ARNHEM bridge was very nearly achieved and their action undoubtedly engaged sufficient enemy forces to make possible the capture of the NIJMEGEN bridge. There is little doubt that they could not have done this without the effective and organized assistance of the 1200 glider pilots under their command; nor would the figure of 730 glider pilot casualties have been materially reduced if they had not taken an active part in the ground fighting, as they would still have been subject to shelling, mortaring and enemy attacks on a very small perimeter.

21. At ARNHEM both Wings of the Regiment were concentrated as units as much and as soon as possible, No. 1 Wing particularly having in the meantime rendered considerable assistance to the gun teams they had carried. The glider pilots with Airborne Corps HQ quickly provided the only immediate defence available for Corps HQ and continued in that role until evacuated to the airborne base on 6 October.

PART II

OPERATION 'MARKET'

Notes on Administration.

1. Composition of Force.

The inclusion of 82 and 101 American Airborne Divs with 1 British Airborne Div in the same Corps on a British L of C required special administrative arrangements to be made for the operation.

The plan was in two parts:-

(a) Maintenance by air

(b) Ground maintenance

The plan will be described in more detail below, but before doing so it is necessary to record the conditions under which these plans were made and certain factors that affected them.

2. Factors affecting the administrative plan.

(a) Time available for preparation.

The decision to include the two American Divs in the operation was taken on or about 9 Sep and planning on this basis did not start until 10 Sep. As "D" day was to be 17 Sep only a very short time was available for administrative preparation.

(b) Period before relief by ground formations.

(i) 1 Airborne Div

The period before relief was uncertain but arrangements were made for automatic maintenance by air for four days, and for longer if necessary.

(ii) 82 and 101 US Airborne Divs.

The original intention was to withdraw the two American Divs as soon as the link-up with Second Army had taken place. A very quick relief (48 hours) would have demanded practically no ground supply arrangements for the US Divs, as air supply might be expected to meet most requirements. But as soon as planning started it became clear that this night not be possible owing to the shortage of Divs available for protection of the L of C and the NIJMEGEN area, and so arrangements for ground maintenance were initiated. The longer period now expected before relief demanded a fairly complete administrative set-up to meet the particular needs of the US Divs, e.g. Medical arrangements, amn supply and later, supplies of ordnance and PX stores.

(c) Location of Seaborne Echelons.

(i) 1 Airborne Div.

The Seaborne echelon of this Div pre-loaded with amn and some ord stores and supplies was in France ready to join its Div, as required.

(ii) 52 (L) Div

It was intended ultimately to fly 52 (L) Div in to the airfield near ARNHEM. With an operation of this sort in mind the seaborne echelon of 52 Div was already in France. The two Bde Tpt coys included in this echelon became available for use as required until 52 Div came in by air. These coys were an invaluable asset to 30 Corps on whom the burden of maintaining the airborne divs mainly fell.

(iii) 82 and 101 US Divs.

It was stated that the seaborne echelon of 101 Div would be able to move overseas on D day and that of 82 Div on D + 4. This would result in the US Divs being very short of tpt for some days following their landing.

(d) Maintenance by air.

(i) The difference in Brit and US amn and stores entailed an entirely separate organization for packing and transporting supplies to be dropped from the air. For this reason both American Divs would have to make their demands direct on HQ 18 US Corps in England, and 1 Airborne Div would demand direct on HQ Brit Airborne Corps (Rear), also in UK. These HQ would then set in motion their own existing machinery for dropping the pre-packed stores. (For British system see Appx. C).

(ii) It was the intention to fly in to the ARNHEM airfield the Airborne Forward Delivery Airfield Group (AFDAG) to handle such stores as could thereafter be flown in to supplement those sent up the L of C. This organization of which details are shown at Appx 'A' was standing by in England.

3. Administrative Plan.

(a) Maintenance by Air.

As it was evident that relief of airborne divs might be delayed arrangements were made for automatic supply of 1 Airborne Div for 4 days and thereafter at call.

Similar arrangements were asked for the American Divs.

Availability of aircraft was such that on D + 1 only 35 Stirlings would be available for 1 Airborne Div while both the US Divs would have to rely on Fortresses. Thereafter, sufficient Stirlings and Dakotas would be available to meet the requirements of 1 Airborne Div, and Dakotas and gliders for the two American Divs.

To insure against the effects of bad weather and any other unforeseen difficulties 1 Airborne Div arranged for three preloaded Hamilcar Gliders carrying composite loads of amn and stores to be flown in with the second lift. In addition an extra box of compo was put into each glider. These stores proved invaluable later.

Results of Maintenance by Air are shown at Appendix 'B' and annexures 1 - 3.

(b) Ground Maintenance.

1 Airborne Div

As explained above, until junction with ground fmns had been made at ARNHEM, 1 Airborne Div was to rely entirely on maintenance by air. The division's Seaborne echelon was to be so placed in the 30 Corps column that it would reach the Div as soon as the tactical situation allowed. As the Seaborne echelon contained a Second line refill of amn, 1½ days rations and other stores it would be able to sustain the Div until arrangements could be made to draw from an FMC to be established by 30 Corps in either the ARNHEM or NIJMEGEN areas. If the establishment of this FMC was delayed, as was considered possible, maintenance by air would be continued, aircraft being landed and unloaded by the AFDAG organization.

It was always quite clear that once a firm junction with 30 Corps had been made, the Division would have to be administered entirely by 30 Corps as, except for the AFDAG organization, Airborne Corps had no administrative resources of any kind. To this end a close A/Q and Service liaison with 30 Corps had been established during the week preceeding the operation.

In addition to the above, arrangements were made for forwarding up the L of C 110 tons of ordnance stores divided into three equal 'bricks'. These 'bricks' were intended to meet the requirements of 1 Airborne Div and to avoid placing what might well be a heavy and unforeseen demand on the ord resources of 30 Corps or Second Army. On the medical side a special consignment of 1000 stretchers and 2600 blankets was to be flown in with the AFDAG organization and using these, casualties were to be evacuated by air from the ARNHEM Airfield.

82 and 101 US Divs

The only items which the two US Divs could use in common with the British Second Army were as follows:-

75 mm. guns and amn (Brit Air Div only)

9 mm. amn.

6 pdr. guns and amn.

Compo rations

POL

Jeeps

Apart from these special arrangements had to be made as follows:-

Transport and amn.

Until the arrival of the seaborne echelon which could not be expected at the earliest before D + 5 in the case of 101 Div and D + 9 in the case of 82 Div, both divs would be very short of transport. Even then there would be no second line available.

On 10 Sep 21 Army Group was asked to arrange for two US Truck Coys to be pre-loaded with amn by Comn Zone and despatched to the Second Army area as soon as possible. Comn. Zone however arranged for four such Coys to be provided, and for a steady supply of American amn to be delivered thereafter to 161 FMC (30 Corps) at BOURG LEOPOLD J28. After first delivery to the Divs the truck coys would continue to run daily between 161 FMC and the two US Divs, the distance being about 45 miles in the case of 101 Div and 70 miles in the case of 82 Div.

Ordnance Stores.

As it was not considered likely that the US Divs would remain in the line for very long, only very small consignments of Ordnance stores were to be provided. Major items to be met on demand.

4. Narrative of principal events which affected the administrative situation.

Various events occurred which resulted in changes in the administrative plan as described above. These events are shown below with their effects:-

(a) The failure to relieve 1 Airborne Div.

(i) So far as 1 Airborne Div was concerned, the failure of Second Army to reach ARNHEM resulted from the administrative point of view in maintenance being entirely by air, (except for the ferrying of certain medical stores across the LEK by agreement with the Germans).

The fact that the Divisional perimeter was tending to decrease in size, that the German flak was increasing, and that the weather was unfavourable for flying either in England or Holland for much of the period made maintenance by air extremely difficult. Fairly heavy aircraft casualties were suffered (See Appx 'B' annexure 1) and few supplies reached the troops.

(ii) The second result was that the ARNHEM airfield was not secured and so arrangements were made to fly in the AFDAG to GRAVE airfield: this was done on D + 9 (26 Sep), and the organization was ready to receive supplies on the following day.

(iii) The third effect was that the sups, amn and POL contained in 1 Div Seaborne Echelon were not required by that Div. As the amn included over 2,000 rounds of 75 mm, 500 rounds was allotted to 82 US Div on 22 Sep and the rest on 26 Sep. This bridged an awkward gap during which 82 Div would have been short of arty amn due to L of C road being cut at VEGHEL on 22 Sep and again from 24 - 26 Sep.

(b) The build up of German fighter strength in the NIJMEGEN area.

The effect of the build up of the German fighter force was that 83 Gp RAF had to take over the GRAVE airfield for two wings of fighters. This was done on 28 Sep, and as no other airfield was available and as a ban was placed on flying C47s NORTH of BRUSSELS, the AFDAG was unable to function at all, and was largely disbanded. In view of the somewhat insecure administrative situation of the two US Divs it was unfortunate that additional stores could not be flown in to GRAVE.

(c) The retention of 82 and 101 US Divs in the line.

The decision to retain the two American Divs in the line resulted in Special arrangements having to be made for supplies of Ordnance stores to be forwarded from US Comn Zone to the Second Army area, no provision having been made during the planning period.

As a result of losses in battle and from other sources 101 US Div had by 29 Sep a serious deficiency in weapons, vehicles and wireless sets which unless replaced would affect seriously the fighting efficiency of the Div. Only a part of these requirements had arrived in Second Army area by 8 Oct.

In addition no arrangements had been considered necessary for provision of PX stores and their production proved difficult to arrange at short notice. NAAFI packs were therefore issued to bridge the gap until PX stores could be provided.

(d) Use of captured supplies.

A recce of NIJMEGEN disclosed a stock of German Army Barrack stores and supplies which proved invaluable to the Airborne troops in the area.

Divs of 30 Corps had started the operation with 8 days sups whereas Airborne Divs had only two.

The difficulty of getting supplies forward up the long and vulnerable road was considerable and the captured supplies at NIJMEGEN and at OSS (some 15 miles west of NIJMEGEN) tided the airborne troops over a period which might otherwise have been somewhat critical. The stocks discovered were 'unbalanced', in that they included no bulk food such as biscuit or potatoes, and no such essential items as suger, milk or tea; but arrangements were made with Dutch bakers to bake 12,000 kgms. of bread a day with captured German flour, and milk was obtained through the Food Controller at NIJMEGEN for British and US hospitals and CCSs. Payment for these services was made in captured flour and meat respectively.

Rationing could have been continued satisfactorily for 14 days or more on captured food, if balancing items such as teas, coffee, sugar and milk could have been delivered to GRAVE Airfield, or brought up by road after the L of C was restored. Potatoes and fruit were available for local purchase after the first few days.

5. Medical.

1. 1 British Airborne Division.

In the initial stage Dressing Stations were established by Field Ambulances in Brigade areas. The Dressing Station of 16 Parachute Field Ambulance in St. Elizabeth Hospital, ARNHEM was captured by the enemy on 19 Sep. Dressing Stations of 181 Airlanding Field Ambulance and 133 Parachute Field Ambulance moved from original sites to OOSTERBECK area (6978). These Dressing Stations were captured on the morning of 20 Sep. The enemy allowed British casualties to be taken through the lines to the captured Dressing Stations where the medical staff remained.

After the withdrawal of the Division the ADMS, Col. Warrack, was allowed by the enemy to establish a hospital in the barracks at APPELDORN where over 800 British casualties were treated by a staff of 24 officers, including 4 surgeons, and 200 OR of the medical services of the Division. As casualties became fit to travel they were moved in ambulance trains to Germany and were accompanied by RAMC personnel.

2. US Airborne Divisions.

(a) Prior to operations a platoon of a Field Hospital and two surgical teams had been attached to each US Division. The under-mentioned US medical units had been placed on the British L of C at BOURG LEOPOLD to assist in the evacuation and care of US casualties.

One Evacuation Hospital.

One Clearing Coy.

One Collecting Coy.

Two Ambulance Coys.

(b) 82 US Airborne Division.

A clearing station formed by 307 Medical Coy and the attached platoon of 50 (US) Hospital was established in a field 2 miles west of GROESBEEK (7254). On 20 Sep. this clearing station was moved to Buchmanuim College NIJMEGEN. This building had accommodation for 450 cases and the clearing station remained there throughout the operation.

Evacuation of casualties to 24 (US) Hospital commenced on D + 4, was interrupted from D + 6 to D + 10 owing to enemy action on the L of C, but from D + 10 continued without any difficulty. Details of cases admitted etc., are appended - Appendix "D".

(c) 101 US Airborne Division.

On 18 Sep. 326 Medical Coy established a clearing station at ZON (442257). The Field Hospital with one surgical team was established at VEGHEL (474374). Evacuation of VEGHEL casualties to 24 US Evacuation Hospital commenced on 19 Sep. On move of the Division to the NIJMEGEN area the Medical Coy established a clearing station in a school at NIJMEGEN (695606) - 150 beds.

The platoon of the Field Hospital formed a collecting station south of VALBURG (660690) for the Western Sector of the Divisional area. Evacuation of casualties to 24 US Evacuation Hospital continued from this area without interruption. Details are appended - Appendix "D".

3. Maintenance of Medical Units.

All medical units carried with them sufficient medical stores and equipment to deal with the estimated number of casualties for a minimum of 48 hours. In addition supplies were pre-packed for daily maintenance by air for five days while a further five days supply was carried in the medical transport with the seaborne tail. On contact being made with the supporting force it was the responsibility of medical services of that force to maintain the supply of medical stores.

In addition to the pre-packed supplies dropped to 1 Airborne Division, two half medical beach blocks were dropped when information was received as to the large number of casualties which had been sustained by this division. In spite of the large amount of medical stores and equipment which was dropped to 1 Airborne Division practically none was received by the medical units of the Division, due to the fact that it was impossible to collect them. After the withdrawal of the Division a certain amount of these stores which had been collected by the Dutch, and to a lesser extent by the enemy, were given to the medical services, and proved of great value.

In the case of the US Division, re-supply by air was insufficient to cover requirements owing to the wide area over which supplies were dropped, and the lack of transport. Once contact with the 24 (US) Evacuation Hospital was established, supplies were readily available in returning ambulances, though in the case of the 82 US Airborne Division the first convoy of ambulances which arrived at the clearing station from the Evacuation Hospital did not contain any medical stores.

No serious shortage of essential stores occurred and this was entirely due to the fact that in the case of the US Divisions a most generous allocation of gliders (67 for each Division) had been made to the medical services with the result that it was possible to fly in a very large quantity of medical stores and medical transport in the initial flights.

COMMENTS.

(a) The attachment of two surgical teams and a platoon of a Field Hospital to US Airborne Divisions ensured that an adequate and entirely self contained medical service was available in each division. It is suggested that these units might be incorporated in the basic organisation of the Divisional Medical Services.

(b) The US medical units on the L of C proved to be adequate and dealt efficiently with the large number of casualties which had to be evacuated from both divisions.

(c) Re-supply by air was inadequate but in the case of the US Divisions no serious shortage occurred owing to the large amount of stores which the medical services were able to to bring in by gliders in the initial flight. Serious shortage did occur in 1 British Airborne Division.

It is suggested that if the tactical situation permits a more generous allocation of gliders should be made to the medical services of British Divisions to ensure that adequate supplies of medical stores loaded on airborne medical transport are available. The shortage of stretchers and blankets which occurs can be overcome if all gliders carry one or two airborne stretchers and two blankets and all vehicles carry an airborne stretcher.

(d) Whenever the tactical situation permits each parachute medical unit should have an accompanying glider lift to carry medical transport and heavy medical stores.

6. Conclusions.

1. Maintenance of US Fmns on British L of C and vice versa.

(a) The administrative set-up must be complete and cover all requirements. To achieve this, adequate time is essential.

(b) When planning it must not be assumed that Airborne Fmns will be withdrawn quickly.

(c) A liberal supply of US liaison officers are required at the various HQ concerned on a British L of C, and vice versa. These liaison officers should be experienced, have their own tpt (including light aircraft if possible) and be provided with an administrative signal system of their own nationality along the L of C. Where American Airborne formations are

operating in a British sector, REME liaison officers are required with each R.C.T. to ensure that available British REME facilities are both understood and used.

2. Supply by Air.

(a) Build up of flak and enemy defences makes supply by air increasingly difficult as time goes on. It is therefore essential to take in maximum supplies with the first lift by air using also composite loaded gliders (Hamilcars) as the nucleus of a Div Maint area. A maximum re-supply should follow with the second lift.

(b) The perimeter into which stores are to be dropped should be big enough to ensure that they can be dropped within our own lines and to ensure that the supply dropping point is free at least from observed mortar and small arms fire.

(c) Landing gliders with supplies may be the best and least expensive method of delivery.

(d) It is essential to provide adequate men and transport to clear supply dropping points before the stores are lost, or stolen.

(e) Improvements in the technique of supply dropping are required.

3. Captured supplies.

Airborne formations should be given priority in making full use of captured food supplies, and be provided on demand with balancing items not available by local purchase. Considerable saving in maintenance tonnage by air or road may be made by this means.

Appendix A

COMPOSITION OF AFDAG

Unit	Personnel		Airborne Tpt		Seaborne Tpt			
	Offrs	OR	Jeeps	Trailers	MC	15-cwt	3-ton	Trailers
HQ [illegible] FMC	2	7	2	2	-	-	1	-
165 Lt Comp Coy RASC	15	309	49	72	12	-	-	-
One pl 93 Comp Coy RASC	1	70	40	40	8	-	-	-
155 DID	2	20	3	3	2	-	1	1(1 ton)
Med Det	1	2	1	1	-	-	-	-
13 Base Depot Med Stores	-	5	1	1	-	-	-	-
50 FMSS	1	13	12	12	-	-	-	-
Two pro secs (each) from 242, 244, 247 L of C Pro Coys.	1	16	5	5	9	-	-	-
277 Pnr Coy	6	272	4	4	1	2(1x8 cwt)	1	-
Det 1 Air Div Postal Unit	1	12	4	4	-	-	-	-
11 Salvage Collecting Centre	1	6	2	2	-	-	-	-
963 Adm Unit Civil Labour	2	5	1	1	-	-	-	-
Graves Regn	1	-	-	-	-	-	-	-
Reme Det	1	33	6	8	2	-	-	3
TOTAL	35	770	130	155	34	2	3	1

Results of Maintenance by Air

1. 1 British Airborne Div.

Details of loads dropped are shown at annexure 1, together with numbers and percentages of aircraft lost.

Totals were:-

Sorties	- 630
Aircraft unaccounted for	- 54
Percentage lost	- 8.5%
Air despatchers RASC killed or missing	- 222 (Subject to evaders still slowly coming in.
Gross tonnage of loads	- 2191 tons.

It is not known what percentage of the loads were recovered by the troops but an estimate is shown at annexure 1. The following facts are clear:-

(a) A large proportion of the supplies fell outside the Div perimeter which tended to contract as losses in men increased.

(b) However some containers and panniers were recovered often by the troops occupying positions adjacent to where the loads fell. The heavy mortar and shell fire which invariably accompanied a supply drop did much to prevent Div RASC from collecting these containers which fell within the perimeter.

(c) The supply dropping point was not easily recognised.

(d) flak was very heavy.

2. 101 US Div.

Although the enemy opposition to supply dropping was not on the same scale as that at ARNHEM, nevertheless aircraft had to pass over enemy positions to make their supply drop and casualties were inevitably sustained; some loads fell in country held by the enemy. Details of loads dropped are shown at annexure 2, together with percentages of aircraft lost.

3. 82 (US) Airborne Div.

Supply by air presented no problems from the point of view of interference by the enemy at or near the supply dropping point. The chief difficulty lay in the collection and distribution of stores. The whole available man power of the Division was engaged in holding the very extended divisional front, and the Seaborne echelon had not arrived. In those circumstances there were only three or four lorries and a few men available for clearing the supply dropping point. The Dutch however gave some assistance by providing farm carts, but the delay in collection resulted in many of the bundles being lost or stolen.

Supply drops fell over a very large area and due to this and to the inadequate facilities for collection an average of only 68% of the stores dropped was recovered.

Loads dropped are shown at annexure 3 together with percentages of aircraft lost.

ANNEXURE I

Op 'MARKET' - Maint by Air of I Airborne Div

Supplies dropped by parachute

DAY	Total A/C Despatched	Number of aircraft unaccounted for	Number damaged by flak	Number damaged by fighter	Net approx. tonnage of sups dropped	Gross tonnage (weight incl containers panniers and chutes)	Percentage Recovered x
D + 1 (18 S)	Stirling 33	2	14	0	87	144	14
D + 2 (19 Sep)	Stirling 101 C 47 64	6 7	54 43	0 0	266 126	439 161	5½
D + 3 (20 Sep)	Stirling 100 C 47 64	7 2	46 16	0 0	264 126	437 161	10½
D + 4 (21 Sep)	Stirling 64 C 47 53	13 10	18 13	4 3	168 105	280 132	4
D + 5 (22 Sep)	NO MISSION (Cancelled by Div)						
D + 6 (23 Sep)	Stirling 73 C 47 50	3 3	44 19	0 0	193 98	319 125	2½
D + 7 (24 Sep)	C 47 21 (46 Gp from BRUSSELS)	0	4	0	41	52	?
D + 8 (25 Sep)	C 47 7 (46 Gp from BRUSSELS)	1	3	0	14	17	Nil
TOTALS	630	54	274	7	1488	2267	x 6.4

NOTES:- x These are percentages estimated to have been recovered by Div RASC. Estimated approx further 100 tons dropped in unit lines, which makes the total percentage recovered 13.3%.

(a) In all drops loads were as follows:-

Stirling = 24 containers 4 panniers

C 47 = 16 panniers

(b) Panniers expended = 5628
Containers " = 8904
Parachutes " = 14532

(c) All drops automatic, although breakdown somewhat varied as result of messages from field.

(d) On D + 1 (18 Sep) 3 Hamilcars each loaded with 7 tons of sups were flown in. Approx 66 % was recovered.

Annexure No. 2

OPERATION "MARKET"

1. Supplies dropped by Parachute to 101 US Airborne Div.

Day	Air Force	A/C started	A/C aborted	Percentage Missing	Net tonnage dropped	Percentage recovered	Remarks
D		Nil					
D + 1	Eighth US	121	2	3 x	241	40	x Percentage missing on missions to 82 and 101 Divs. No figures available for each Div.
D + 2		Nil					
D + 3	IX TCC	35		Nil	17	31	Entirely rations and med.
D + 4	IX TCC	35		4 Ø	15	31	All rations.
D + 5		Nil					
D + 6		Nil					
D + 7		Nil					
D + 8	IX TCC	34		Nil	43	64	All amn.
TOTAL		215	2	1	316	42	

Ø Percentage missing on troop carrying and supply missions for 82 and 101 Divs. No separate figures available.

Percentage of sups recovered from drop by Fortresses - 40%
- do - Dakotas - 50%

2. Supplies landed by glider to 101 US Airborne Div.

Day	Number of gliders	Net tonnage carried	Percentage recovered	Remarks
D + 1	22	42	100	
D + 2	1	1.5	Nil	Glider lost
D + 3	Nil			
D + 6	10	18	92	Loss NOT due to loss of glider - probably due to pilferage.
TOTAL	33	61.5	95	

Annexure No. 3

OPERATION "MARKET"

1. Supplies dropped by Parachute to 82 US Airborne Div.

Day	Air Force	A/C started	A/C aborted	Percentage Missing	Net tonnage dropped	Percentage recovered	Remarks
D		Nil					
D + 1	Eighth US	131	4	3 x	264	60	x Percentage missing on missions to 82 and 101 Divs. No figures available for each Div.
D + 2	IX TCC	60	24	8 Ø	64	20	24 A/C returned owing to bad weather.
D + 3	IX TCC	317	6	Nil	445	80	
D + 4	IX TCC	33		4 Ø	8	23	Rack loads only
D + 5		Nil					
D + 6		Nil					
D + 7		Nil					
D + 8		Nil					
TOTAL		541	34	2	781	68	

Ø Percentage missing on troop carrying and supply missions for 82 and 101 Divs. No separate figures available.

Percentage of sups recovered from drop by Fortresses - 60%
- do - Dakotas - 72%

2. Supplies landed by glider to 82 US Airborne Div.

Day	Number of gliders	Net tonnage carried	Percentage recovered.
D + 1	Nil		
D + 2	Nil		
D + 3	1	1.5	100
D + 6	Nil		
TOTAL	1	1.5	100

Appendix C

Maintenance by Air of British Airborne Formations

1. GENERAL.

Maintenance of an airborne force by air can seldom replace normal methods of maintenance though it may be a valuable supplement to them. Air maintenance, however, must always be provided to cover the period from the time the airborne force lands until normal ground maintenance can be established.

Normal procedure for air maintenance of British Airborne troops is given below.

2. ORGANISATION AT BASE.

The War Office supply by air organisation under control of Comd Air Despatch Gp RASC holds, for Airborne Forces, a pre-determined number of prepacked containers and panniers of all supplies of RASC origin. An Ord Dump under control of DDOS Airborne Corps, in addition, contains a holding of prepacked and unpacked RE, Sigs, Med and Ord stores likely to be called for during an operation. The above holdings are based on the probable maintenance requirements of two Airborne Divs for five days each.

In addition, unpacked stores sufficient for a further five days for each Div are earmarked in convenient War Office Depots. Dumps are conveniently sited, within a few miles of supply loading airfields. Transport of the stores from dumps to airfields and provision of despatchers of stores from aircraft is the responsibility of the War Office air despatch organisation, supplemented, when necessary, by the loan of up to one 3-ton Coy RASC from each Div.

3. DEMANDS.

Prior to any operation it is decided by HQ Airborne Corps, in conjunction with the Div to be maintained and the RAF, the number of automatic re-supply drops required, these being subject to modification or cancellation by the Div from the field as the operational situation develops. Thereafter demands for maintenance by air are initiated by the formation concerned by wireless direct to Airborne Corps (Rear) at base. They may be by pre-arranged code word in clear in order to eliminate ciphering and de-ciphering time or in cipher in terms of a pre-arranged standard day giving plus or minus items, or in cipher for specific stores required. Demands must indicate the priority on which requirements are to be scaled down in the event of insufficient a/c being available to carry out the entire requirement in one mission.

4. SELECTION OF SDP.

SDP (or SDP's) are selected prior to any operation to cover at least the first two days automatic supply. These SDP's are subject to alteration by wireless from the Formation. In any future demands the formation gives, by six figure map ref., the SDP at which the sups are required and also the navigational aids that will be used.

As an additional safeguard against defective wireless communication it is sometimes arranged that a recce a/c will fly over the previous day's SDP at a pre-determined time each day. Should an SDP become unsuitable on account of enemy action or movement of the Force the formation concerned will inform Airborne Corps Rear by wireless of change of SDP and also in addition carry out the following procedure.

(i) An arrow will be displayed on the last SDP used pointing in the direction of the axis of advance.

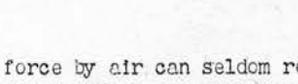
(ii) Arrows will be placed every two miles along the axis of advance 100 yds to the LEFT of the rd on some prominent feature. If the view from the air is likely to be obstructed (woods, buildings, etc) the arrow will be placed on the approach side of the obstruction.

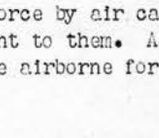
(iii) The last arrow will have a bar across the the tip denoting finish of indication.

(iv) The pilot will signify his having seen the arrow by firing two green Verey lights on passing the last arrow.

(v) All arrows will be double panel width and length with single panels forming the barbs of the arrow. They will be in position at a pre-determined time each day.

(vi) The new SDP will be marked as follows:

(a) Make next drop 

(b) Omit next drop 

If supplies are required, pilots of supply a/c will go to previous day's SDP and follow arrows until 'T' panel and Eureka indicate exact location.

5. A/C NORMALLY AVAILABLE FOR AIR MAINTENANCE

A/c normally allotted by RAF for maintenance are the Stirling, Halifax and Dakota (C47). The permissible pay load is:-

Type of A/C	Number of Containers/panniers	Net Load (Approx)	Gross Load (approx) (incl weight of containers parachutes, etc)
Stirling	24 containers) 4 panniers)	2.64 tons	4.37 tons
Halifax	16 containers	1.43 tons	2.5 tons
Dakota C47 (Brit) (using double track roller conveyor for despatching and the "daisy chain" method of dropping panniers)	16 panniers	1.97 tons	2.5 tons
	or	or	or
	10 panniers) 6 containers)	1.77 tons	2.5 tons

6. ACTION ON RECEIPT OF A DEMAND.

(a) Prior to the operation Airborne Corps 'Q' ascertains the a/c availability for automatic re-supply and allot the pay load to the Formation concerned. On receipt of the formation's requirements, the sups are broken down into containers, panniers and bundles (chiefly Med items) depending on type of a/c allotted. Orders are issued to S & T and Comd Air Despatch Gp giving details of loads, a/c, airfields and loading times.

(b) On receipt of a demand from the field Airborne Corps (Q), after having made a quick calculation of number of a/c required, ascertain the availability from the RAF by types. The sups requested are broken down into container or pannier loads in accordance with the type of a/c and Air Despatch Gp and the Ord Dump informed of details. RASC and Ord are informed of times of loading, number of a/c and airfields allotted as soon as received by Airborne Corps from RAF. Comd Air Despatch Gp is from then responsible for the transport of all containers and panniers c/w parachutes to the airfields, loading of a/c (under supervision of the RAF) and the detailing of despatchers RASC.

APPENDIX D

82 US Airborne Division - 17 Sep to 8 Oct 44

(i) Cases admitted to Clearing Station - 2974

(ii) Cases evacuated to 24 (US) Evacuation Hospital - 2141

101 (US) Airborne Division - 17 Sep to 8 Oct 44

(i) Cases admitted to Clearing Station - 2990

(ii) Cases evacuated to 24 (US) Evacuation Hospital - 2257

PART III INDEX A

OPERATION 'MARKET'

COMMUNICATION REPORT

PLANNING:

1. The Signal plan for operation 'MARKET', in addition to normal comn systems within 1 (Br), 82 (US) and 101 (US) Airborne Divs, was planned to provide comns as follows:-

(a) From SECOND ARMY and 30 CORPS to:-
Br Airborne Corps Main and Rear
101 (US) Airborne Div.

(b) From SECOND ARMY and 30 CORPS to:-
Br Airborne Corps
Each Airborne Div
for air support.

(c) From each Airborne Div and Br Airborne Corps to:-
Respective base resupply organization.

(d) From Br Airborne Corps to:-
Each Airborne Div.

(e) RA nets for providing outside artillery support for Airborne Divs.

(f) Guard and contact waves for the link up between airborne formations and ground formations.

The main wireless links planned are shown in Diagram. (see Signal Operation Order).

2. The signal plan was complicated by the following factors:-

(a) The small available Airborne Corps Signals had only just been formed and was completely untrained. It had been designed on a minimum basis for a small operation in BRITTANY, and had to be increased in size by hurried improvisation for the much larger operation MARKET.

(b) Comns had to be provided for a mixed Br - US force. Owing to the lack of training, and the lack of any suitable common Br - American airborne cipher, it was necessary to add a considerable US element to the Corps Signals. This element was provided hurridly and was untrained. In fact the standard of the attached Air Corps operators, who had not had time for intensive training, was not high enough for difficult wireless conditions.

(c) Owing to the lack of any British airborne tentacles and because the force was largely American, it was decided to use US Air Support parties. These were also hurridly improvised and the operators provided were inexperienced in difficult conditions of ground to ground wireless working.

(d) High Power wireless equipt for carrying by glider was not immediately available from British sources. A number of American sets were obtained at short notice for the British Airborne Corps Signals, but too late for training with them. British sets in command vehicles were obtained from 21 Army Gp to arrive by road as soon as possible for Corps Headquarters and 1 Airborne Div.

(e) Many of the important wireless links were over ranges of from 15 to 80 miles, the most difficult of all distances for wireless working. This was further aggravated by extreme frequency congestion and very difficult close country.

3. Very little time was available for making such a complicated signal plan. SECOND ARMY and 30 CORPS were in BELGIUM, Br Airborne Corps near LONDON and the Airborne Divisions in their normal localities in ENGLAND followed by moves to respective departure airfields. A very great deal of detailed information on frequencies, ciphers, code signs and codes had to be distributed widely both in ENGLAND and BELGIUM.

4. The use of American wireless equipt which could not be loaded in British gliders, necessitated the use of a few US gliders by Br Airborne Corps and 1 Br Airborne Div. In the former case 6 gliders took off from MANSTON in KENT while the remainder of the Corps Signals left from HARWELL near OXFORD. This arrangement very much complicated the distribution of signal orders.

AIRBORNE CORPS SIGNAL OPERATION ORDER

OPERATION 'MARKET'

INFORMATION: GENERAL.

1. HQ British Airborne Corps is to land ahead of the allied advance to seize certain strategic points in the general area NIJMEGEN - ARNHEM - GRAVE - EINUHOUEN to secure bridges along the line of advance of Second British Army.

OWN TROOPS.

2. HQ British Airborne Corps will have under Command:-

1 (Br) Airborne Division
52 (Br) Division
82 (US) Airborne Division
101 (US) Airborne Division
1 Polish Ind Para Bde Group
2 Airlanding Light AA Bty RA
878 US Airborne Engineer Bn
AFDAG

The Corps is under command 30 (Br) Corps. Command is likely to pass to an Army at a later stage.

WIRELESS COMMUNICATIONS.

3. ESTABLISHMENT.

Wireless communications will be established in accordance with phases of the operation as shown in Appendices 'A' and 'B'. Times of opening of Wireless nets will be as laid down in Appendix 'D'.

4. FREQUENCY ALLOTMENT.

Complete detailed frequency assignment for all airborne formations taking part in the operation is shown in Appendix 'D'. The numbers assigned to nets as shown in that Appendix refer to those shown on the wireless diagrams (Appendices 'A' and 'B').

The following order will be observed:-

(a) A frequency will not be used by a set of greater power than that for which it is graded.

(b) All control stations must be set up by a crystal controlled wavemeter.

(c) Under NO circumstances will a control station allow its net or link to work on other than the exact frequency allotted.

(d) Aerials should be reduced to a minimum compatible with reliable communication.

5. CHANGE OF FREQUENCY.

All changes of frequency from 'DAY' to 'NIGHT' where applicable will take place not on a time basis but upon receipt of instructions from the control stations of each group.

6. ATTACHMENT OF WIRELESS SETS AND CREWS.

To ensure that wireless sets between US and British formations are either all British or all US the following attachments of wireless/radio teams are necessary.

Wireless link	Type of Set	Attached to	Responsibility for Provision
C 1	22 (Set and team)	82 (US) Airborne Div	OC (Br) Airborne Corps Signals
C 2	76 (Set and team)	30 Corps	" " " " "
C 14	193 (Set and team)	30 Corps	Signal Officer 101 (US)Airborne Div.
C 5	499 (Radio team only)	101 (US) Airborne Div.	OC (Br) Airborne Corps Signals.

7. GUARD SET PROCEDURE.

On landing of airborne formations guard waves will be established as follows:-

(a) Corps Guard Wave (C10)

Corps will set up a guard set (C10) which will be used for communication between airborne corps and supporting ground formations until such time as the said ground formations are in a position to supply their own anchor sets.
This guard set will open on listening watch on instructions from CSO Airborne Corps.

(b) Divisional Guard Wave (C14)

A guard set will be provided by each Airborne Division. This set will be used to establish emergency lateral communications between flanking formations.
This divisional set will open on listening watch on orders by the Senior Signal Officer of Divisions.
Initial contact with flanking ground formations will immediately be reported to CSO Airborne Corps.
A code sign will be allotted by Div Signal Officers to the Guard Wave and included in extract.

AIR SUPPORT COMMUNICATIONS.

8. Air Support is being provided by 83 Group RAF. Communications will be established in accordance with wireless diagram (Appendix 'C').
Frequencies are allotted as shown in Appendix 'D'.

LINE COMMUNICATIONS.

9. As soon as the situation becomes stable every effort will be made by senior formation signal officers to augment existing wireless networks by the construction of field lines. Senior signal officers of Division will decide which wireless nets will close when firm line communication has been established. Main Corps line/wire arteries will be constructed as ordered by CSO Airborne Corps as soon as the situation permits.

10. DESTRUCTION OF EXISTING ENEMY LINE INSTALLATIONS

OsC Divisional Signals will ensure that destruction of enemy line equipment is carried out in a scientific manner. Wholesale destruction of exchanges and cutting of paper cored cables will NOT be carried out. To render exchange systems inoperative, whilst at the same time providing for quick re-connection for use by our own troops, the following procedure will be adopted:-

(a) Jumper wires will be cut
(b) Fuses will be broken
(c) Ringing machines will be put out of action
(d) Test points will be put out of action

On no account will batteries be destroyed or cable-heads interfered with.

No enemy cable circuits will be taken into use without prior sanction by CSO Airborne Corps.

PIGEONS.

11. Pigeons from Army lofts in the South of England are available for use by Airborne Corps. Allocation of pigeons, as necessary, will be made by CSO Airborne Corps on receipt of requests from Officers Commanding Divisional Signals.

D.R.L.S. (COURIER)

12. DRLS courier services will be run as early as possible on the ground. Div Signal Officers will detach one courier jeep to Corps HQ.

SIGNAL TIME.

13. The official time for operation MARKET will be British Summer Time (designation letter 'A'). Zone 'A' time (i.e. one hour in advance of GMT) comes into force at 0300 hrs 17 Sep 44.
Whenever possible time will be checked from BBC broadcasts. Time Signals are radiated every hour on the hour on a twenty-four hour schedule.
Frequency 6195 kcs.

CODES - GENERAL

14. (a) On the fly-in code signs and keys of Maplay and Slidex system will be held as follows:-

D to D + 4	Down to wireless sets and normal levels.
D + 5 to D + 10	Held by security officers (and by at least one other responsible officer) for ready distribution on the ground after initial consolidation
D + 11 to D + 21	Held as for above period except in the case of code signs. An extract of code signs, covering the period D + 11 to D + 21 will be prepared prior to the assault. The extract must NOT show any allocations to units and will not identify itself with the row register from which it is taken.

(b) All code signs and code keys will change daily at 0200B hours.

(c) Codes for use within formations of divisional level or below will be prepared by the OC Signals/Signal Officer concerned.

(d) Code signs and codes for use on rear links from division will be the responsibility of CSO (Br) Airborne Corps.

(e) Codes to be used in the operation and responsibility for their distribution are shown at Appendix 'E'.

(f) All formations, other than airborne, are using interservice and joint codes and ciphers and combined codes and ciphers.

(g) Codes for use on links between Airborne and non-Airborne formations will always be those of the Airborne Formations until the establishment of close liaison between Airborne and non-Airborne Formations.

(h) On and after D + 22 all formations will use the normal keys for the actual dates concerned for Code Signs, Maplay, Slidex and Authentication systems, pre-arranged message code and M209 settings.

15. CODE SIGNS.

(a) General.

CSO Second Army is arranging for supporting ground formations to hold copies of the code sign books, column sequence charts and row registers of all airborne forces taking part in the operation. In order that such distribution may be made all airborne formations will forward, as soon as possible, to HQ (Br) Airborne Corps copies of their row registers as shown in Appendix 'E'.

(b) The Airborne Division/Unit working on a link to a non-Airborne formation will always be the subordinate station on the link.

(c) Current code signs will be used.

(d) Formations/Units will prepare and issue, forthwith, code sign extracts on a monthly basis. When 'D' day is known code signs will be retained on the basis laid down in paragraph 14.

(e) The following documents will NOT be taken on the fly-in -

(1) A6773
(2) Monthly Column Sequence Charts (A6774)
(3) Column Sequence Allotment Tables
(4) Row Registers

16. MAPLAY.

(a) Maplay will be the standard map reference system within the limits normally laid down.

(b) Keys will be prepared and distributed as follows:-

(1) Divisions taking part in the assault will prepare and issue Maplay keys for use within their own formations.

(2) A Corps Maplay key will be used in rear of Divisions.

(c) Two Reserve Maplay keys will be prepared by the responsible officer of each formation.

(d) UNICODE will be used for map references within British units.

17. PRE-ARRANGED MESSAGE CODE (for US use only).

This code will be used by US formations within the limitations of issue as laid down in paragraph 14.

18. SLIDEX.

(a) Slidex RT code will be used for encoding RT messages on wireless links.

(b) Divisions will compile and issue keys for use within their own formation. Issue will be subject to the limitations laid down in paragraph 14.

(c) A Corps Slidex key will be used in rear of divisions.

(d) Two Reserve keys will be prepared by the responsible officer of each formation.

(e) Formations will hold American and British Slidex cards to enable lateral communication to be carried out using this system.

19. AIR SUPPORT CODES.

(a) The following codes will be used:-

(i) Request ------ Air Support Request Code (SHAEF special)
(ii) Acceptance & Refusal ------ BA 785/9
(iii) M209
(iv) Requests for Air Support will be sent in clear when the support is required within 1½ hours. If the time lag should be greater than 1½ hours the request will be sent using the SHAEF special code.

(b) Control station will call on the two separate frequencies (Channels 'A' and 'B') from 'h' hour. Subsequently control will decide the best frequency and all sets will be netted on that frequency. Set at Corps will listen during the initial stages of opening communications.

20. AUTHENTICATION.

(a) The Slidex authentication system will be used within British divisions and the US PLAYFAIR system within American divisions.

(b) Authentication on lateral divisional links and in rear of divisions will be effected by means of CCBP 0122. In order to ensure that a compromise of the Combined Authentication System by Airborne Forces does not involve the ground forces, an obsolete serial will be used for the fly-in. The obsolete serial will be replaced by the serial in use by the ground forces on receipt of an order from CSO Airborne Corps and copies will be distributed.
CCBP 0122 - serial A6 will be used by the Airborne forces. This series will not be in current use by the ground formations. CSO Second Army is arranging for ground formations supporting airborne forces to hold copies of series A6 in order that authentication may be carried out when ground formations contact airborne troops in the initial phases.

(c) The dates laid down in CCBP 0122 - A6 will be used.

(d) The limitations of issue of CCBP 0122 will be as laid down for code signs etc and series A6 will be divided into the portions D to D + 4, D + 5 to D + 10, D + 11 to D + 21.
All these portions must not be carried out by one person.

21. SECURITY.

(a) The absolute minimum extracts from code sign lists will be carried by individual stations of airborne forces.

(b) Full divisional code sign extracts will not be issued below regimental/brigade level.

(c) Airborne forces will NOT hold detailed extracts of supporting ground formations.

(d) All holders of code sign extracts will be equipped with the means of rapid destruction.

22. COMPROMISE.

(a) In the event of compromise of any code signs or keys, such compromise will be immediately reported to a responsible Officer and a signal sent back to a higher formation.

(b) If code signs are compromised in any number the signal/security officer will adjust such compromise as far as possible by issuing spare code signs. If the compromise is too widespread to allow of this being done, restoration of security will be effected by the preparation of a new code sign extract as quickly as possible.

23. CIPHERS - GENERAL.

(a) US ciphers will normally be used on US nets and BRITISH ciphers always on BRITISH and POLISH nets.

(b) The clear text of all messages to be passed in cipher will be in ENGLISH except below POLISH Para. Bde HQ.

(c) US code clerks will use code procedure. BRITISH and POLISH cipher operators will use BRITISH procedure.

(d) Rear HQ (Br) Airborne Corps (UK) will hold normal BRITISH and combined US - BRITISH ciphers.

24. US AIRBORNE CIPHERS.

(a) M209 cipher will be used on all US nets down to and including battalion level.

(b) During period D to D + 2 82 and 101 US Airborne Divs will use common special airborne M209 settings below divisional level. These settings will be prepared and distributed by Signal Officer 101 (US) Airborne Div. After D + 2 separate special airborne M209 settings will be used within 82 and 101 US Airborne Divs. These settings will be prepared and distributed by Signal Officers 82 and 101 US Airborne Divs respectively.

(c) Signal Communications Officer First Allied Airborne Army has prepared and distributed special airborne M209 settings for use between BRITISH Airborne Corps (Main) 82 and 101 US Airborne Divs and on nets C12 and C18.

(d) Normal US divisional ciphers will be introduced as soon as practicable after safe contact with ground forces has been established.

(e) Signal Communications Officer First Allied Airborne Army has prepared and distributed special airborne M209 settings for use on Air Support links.

25. BRITISH AIRBORNE CIPHERS.

(a) System of one-time pads will be used on all purely BRITISH nets.

(b) CCBP 0129-1 Combined Field Code (with special airborne supplement) will be used as the parent book with all one-time figure pads.

(c) One-time pads will be used exclusively on net C5.

(d) CSO Airborne Corps will promulgate all instructions and issue all equipment.

(e) No normal ciphers will be used until safe ground contact is established. Current normal ciphers will be issued to BRITISH Airborne formations under arrangements to be made by Staff Officer (Cipher) 21 Army Group but will NOT be brought into use until so ordered by CSO Airborne Corps.

26. AIRBORNE DIV LATERAL CIPHER COMMUNICATION.

(a) 82 and 101 US Airborne Divs will have two-way letter pad links with 1 (Br) Airborne Div.

(b) 82, 101 US and 1 (Br) Airborne Divs will have letter pad links with Gds Armd Div and also with one other ground div under comd 30 Corps to be chosen by CSO 30 Corps.

(c) 82, 101 US and 1 (Br) Airborne Divs will have letter pad links with 30 Corps and Second Army.

27. CIPHER COMMUNICATION BETWEEN BRITISH AIRBORNE CORPS AND US AIRBORNE DIVS.

There will be two-way letter pad links between

(a) BRITISH Airborne Corps and 82 (US) Airborne Div.
(b) BRITISH Airborne Corps and 101 (US) Airborne Div.

28. ATTACHMENT OF CODE CLERKS AND CIPHER PERSONNEL.

(a) Signal Communications Officer First Allied Airborne Army has arranged for 1 Officer and 6 US code clerks to be attached to HQ BRITISH Airborne Corps.

(b) CSO BRITISH Airborne Corps has arranged for two BRITISH Cipher Operators to be attached to HQ 101 (US) Airborne Division.

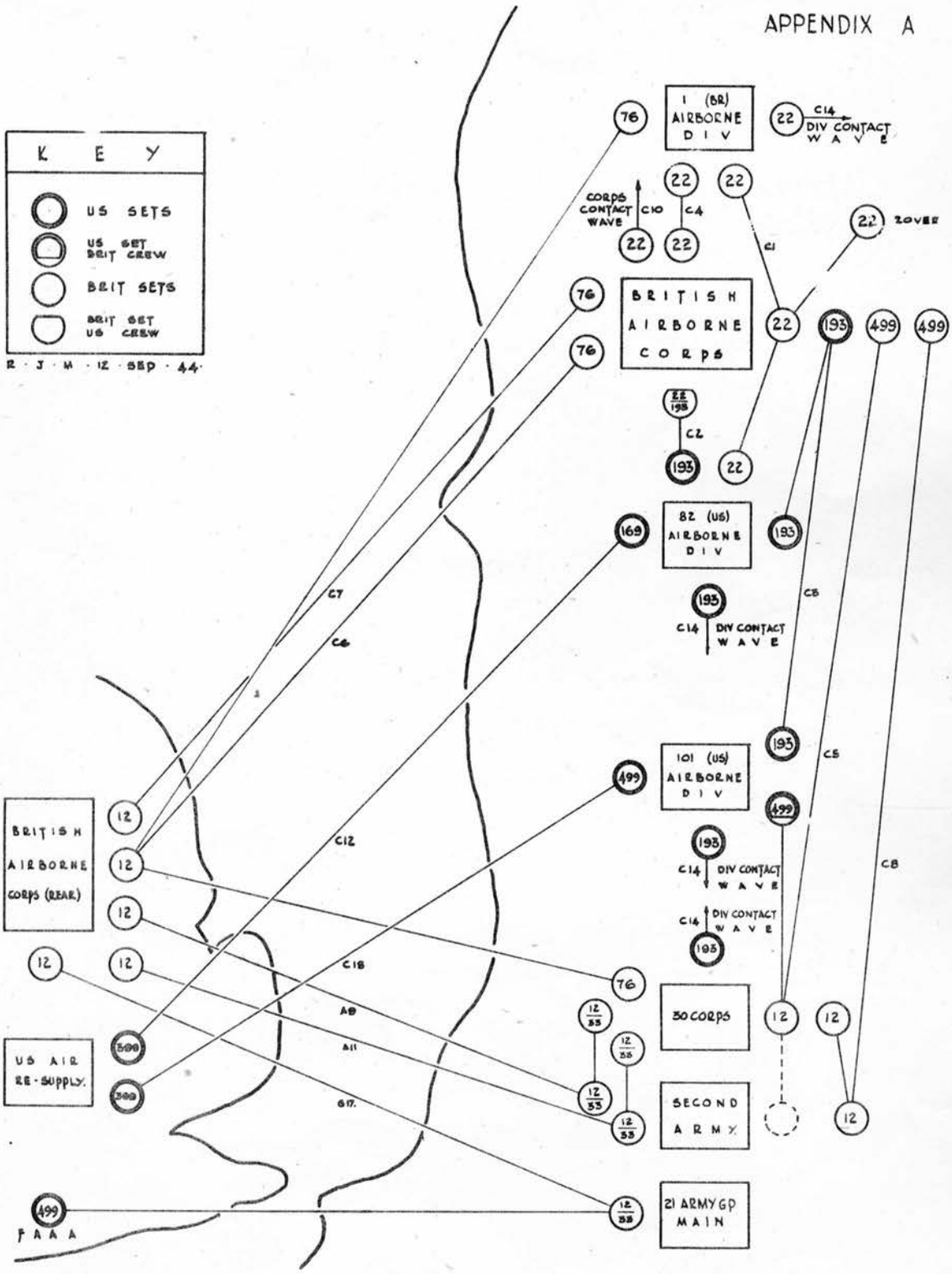
HQ Airborne Troops,
APO, ENGLAND.
12 Sept 44.
/RHP

Colonel
Chief Signal Officer,
HQ Airborne Troops,
(21 Army Group)

OPERATION "MARKET"

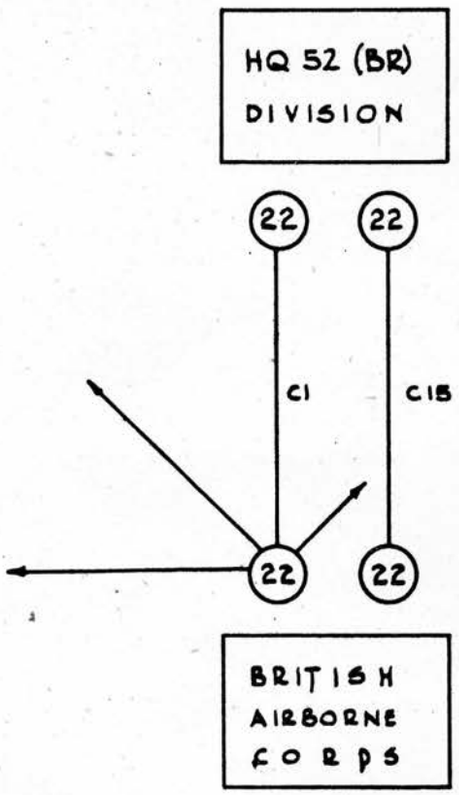
INDEX B

APPENDIX A

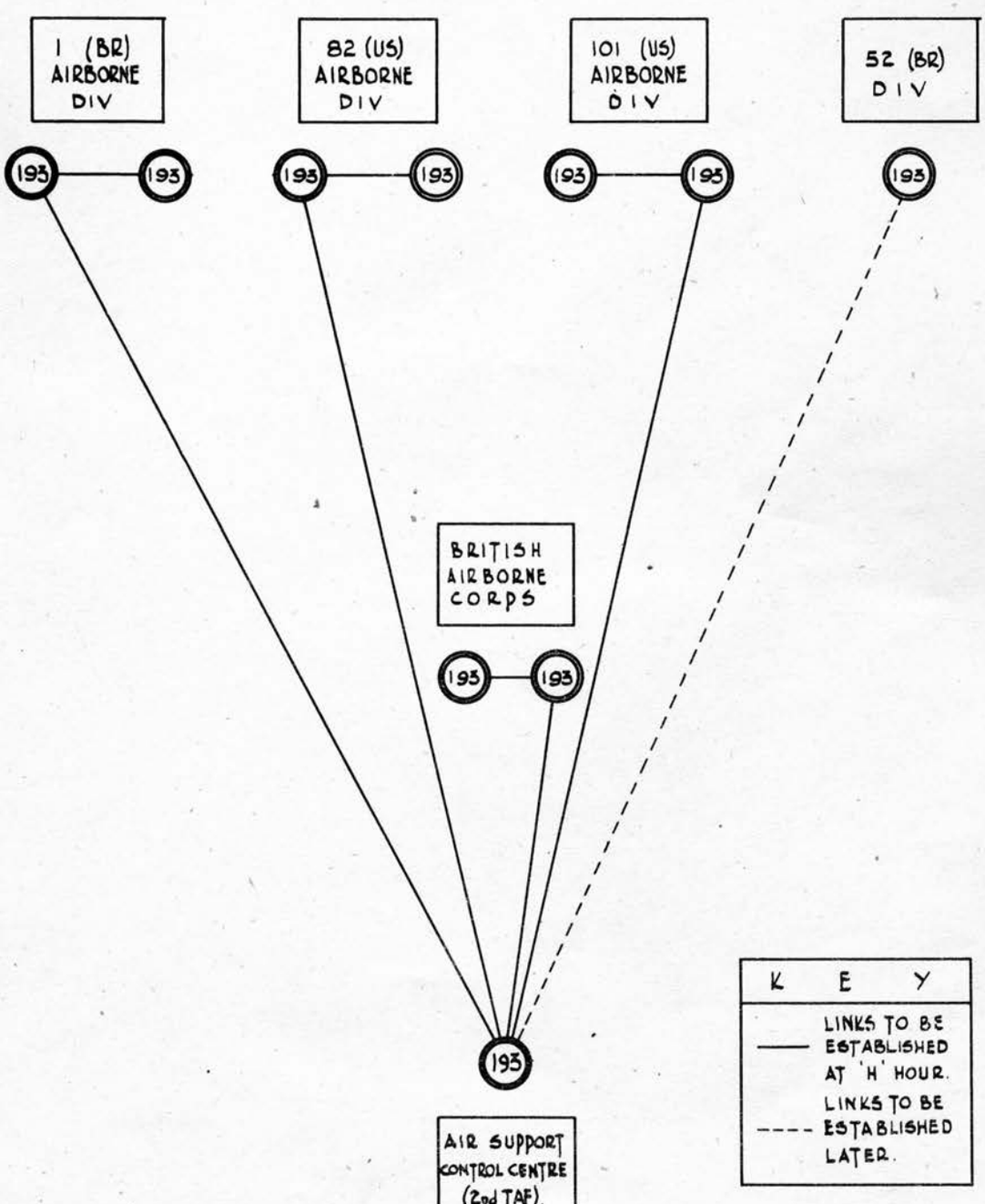


OPERATION 'MARKET' INDEX B

52 DIV COMNS ON FLY-IN APPENDIX B



OPERATION 'MARKET' INDEX B
AIR SUPPORT COMNS APPENDIX C



FREQUENCY ALLOTMENT - HQ AIRBORNE CORPS

Net No.	Net		Frequency	Control	Time of Opening	Remarks
C 17	21 Army Gp - Airborne Corps (Rear) 30 Corps - F A A A Wave	Night Day	2380 4255	21 Army Group		
A 9	Second Army - 30 Corps - Airborne Corps (Rear) Wave	Night Day	2900 4790	Second Army		
A 11	Second Army - 30 Corps - Airborne Corps (Rear) Wave	Night Day	1980 4460	Second Army		
C 1	Airborne Corps RT Command		2984	Airborne Corps	H - hour	
C 2	Airborne Corps WT Command - 82 (US)Airborne Div		2592	Airborne Corps	H - hour	
C 3	Airborne Corps WT Command - 101 (US) Airborne Div		1968	Airborne Corps	H - hour	
C 4	Airborne Corps WT Command - 1 (Br) Airborne Div		3560	Airborne Corps	H - hour	
C 5	30 Corps - Airborne Corps - 101 (US) Airborne Div Wave		2420	30 Corps	H - 30 mins	
C 6	Airborne Corps Base Wave 'A'	Night Day	3085 4595	Airborne Corps	H - 30 mins	Crystal Control.
C 7	Airborne Corps Base Wave 'B'	Night Day	2995 4885	Airborne Corps	H - 30 mins	Crystal Control.

Net No.	Net	Frequency	Control	Time of Opening	Remarks
C 8	Airborne Corps - Second Br Army - 30 Corps Wave	3435	Second Army	H - 30 mins	
C 10	Airborne Corps Guard Wave	4100	Airborne Corps	H - hour	
C 12	82 US Airborne Div - Night UK re-supply by Air Wave Day	2540 4915	82 US Airborne Div	As detailed by Sig Offr 82 US Airborne Div	
C 14	Divisional Contact Wave	4050	30 Corps	H - hour	
C 15	Airborne Corps - WT Command 52 (Br) Inf Div	To be allotted later	Airborne Corps	To be detailed later by CSO (Br) Airborne Corps according to plan.	
C 18	101 US Airborne Div - UK re-supply by air wave	3225	101 US Airborne Div		
-	Air Support Channel 'A'	2968	Air Support Control Centre	H - hour	
-	Air Support Channel 'B'	3968	- do -	H - hour	
-	Press Channel	3888			
-	Phantom Internal net (Corps-Divs)	2444		H - hour	
-	Phantom Rear Links Night Day	2165 4225		H - hour	
-	Div Arty Net	4160			
-	Med Arty Net	4130			

FREQUENCY ASSIGNMENT - 1 (BR) Airborne Div

1. Infantry Divisional List 'B' (less 4155 kc/s)

2. Plus the following additional frequencies:-

2236
2064
2604
3404
4310)
4930) from the Inf Div Common List.
5207.5)

FREQUENCY ASSIGNMENT - 52 (BR) INFANTRY DIVISION

1. Infantry Divisional List 'C' (less 3956 kc/s)

2. Plus the use of the complete Infantry Div Common List less:-

4050
5065
5335
5505
5515
4310
4930
5207.5

Sheet 4 to Appendix D

FREQUENCY ASSIGNMENT - 82 US AIRBORNE DIVISION

1. A M — The following frequencies are allotted

   1808 3956 4095 4165 4230 5065 5250 5505 5625

2. F M

   (a) All channels of the 300 series are available with the exception of channel 33 which will be reserved as 'general contact' channel.

   (b) All channels of the 600 series are available.

FREQUENCY ASSIGNMENT - 101 US AIRBORNE DIVISION

1. A M — The following frequencies are allotted:-

   1868 4010 4155 4185 4405 4465 5317 5335 5515 5770

2. F M

   (a) All channels of the 300 series are available with the exception of channel 33 which will be reserved as 'general contact' channel.

   (b) All channels of the 600 series are available.

Serial	Paragraph	Description	Responsibility for preparation	No. of copies	To be forwarded to	For final Distribution to
A	-	Signal Instruction/ SOI	1 (BR) Airborne Div 52 (BR) Div 82 (US) Airborne Div 101 (US) Airborne Div	3	CSO (BR) Airborne Corps	- - - - - - - - - - - -
B	14	Code Sign Extracts	1 (BR) Airborne Div 52 (BR) Div 82 (US) Airborne Div 101 (US) Airborne Div	20 each	CSO (Br) Airborne Corps	Distribution within Airborne Corps 12
C	18	Slidex Key Corps-Div	CSO (Br) Airborne Corps	50	- - - - - -	1 (Br) Airborne Div 5 52 (Br) Div 5 82 (US) Airborne Div 5 101 (US) Airborne Div 5 Airborne Troops Signals 5 Air Support Tentacles/Parties 10
D	18	Reserve Slidex Keys Corps-Div	CSO (Br) Airborne Corps	Numbers and distribution as for Serial 'C'		
E	18	Intra Div Slidex Key	1 (Br) Airborne Div 52 (Br) Div 82 (US) Airborne Div 101 (US) Airborne Div	30	CSO (Br) Airborne Corps	Distribution within Airborne Corps 16
F	18	Intra Div Reserve Slidex Keys	Responsibility etc. as for serial 'E'			
G	18	US Slidex Cards	CSO (Br) Airborne Corps	12 sets		1 (Br) Airborne Div 4 52 (Br) Div 4

Serial	Paragraph	Description	Responsibility for preparation	No. of copies	To be forwarded to	For final distribution to	
H	18	British Slidex Cards	CSO (Br) Airborne Corps	8 Sets	----------	82 US Airborne Div 101 US Airborne Div	4 4
I	16	Maplay Keys & Reserves Corps-Div	CSO (Br) Airborne Corps		Numbers and distribution as for Serial 'C'		
J	20	Authentication CCBP 0122-A6	CSO (Br) Airborne Corps	20	----------	Distribution within Airborne Corps	20
K	20	US Authentication PLAYFAIR	82 (US) Airborne Div 101 (US) Airborne Div	15	CSO (Br) Airborne Corps	1 (Br) Airborne Div 52 (Br) Div	5 3
L	19	Air Support Acceptance & Refusal Form (BX 785)	CSO (Br) Airborne Corps	10	----------	Air Support Control and Tentacles	10
M	24	M 209 settings for use at & in rear of Divs.	Signal Comn Officer First Allied Airborne Army.	20	CSO (Br) Airborne Corps	Base (NEWBURY US XVIII Corps British Airborne Corps 82 US Airborne Div 101 (US) Airborne Div 1 Br. Airborne Div.	2 3 6 3 3 3
N	24	M209 Settings for Air Support Links	Signal Comn Officer First Allied Airborne Army	18	CSO (Br) Airborne Corps	US XVIII Corps British Airborne Corps 82 (US) Airborne Div 101 (US) Airborne Div 1 (Br) Airborne Div	3 6 3 3 3

COURSE OF EVENTS (excl details within Divs)

17 SEP - D

Br Airborne Corps landed S.E. of GROESBEEK in 82 Airborne Div area. All signal equipment arrived except for two jeeps and part of a 499 wireless set. The Major on the CSO's staff and one attached US Signal officer also failed to arrive. The former eventually reached ARNHEM on D + 1 where he had to remain and the latter is known to have landed near TILBURG in enemy held territory.

At 1530 hrs Corps HQ was established in a wood and the two base links established communication with base (Rear Corps HQ) almost at once. The GHQ Liaison Regt det established comn with SECOND ARMY. No other wireless comn was established in this position.

At 1815 hrs. Corps HQ moved to a new area and established in a woodland clearing at dusk. It was found difficult to set up the heavier wireless equipment in the dark. Heavy interference was experienced on the base links.

At this stage wireless sets were opened as follows:-

(a) SCR 499s on each SECOND ARMY - 30 CORPS net.
(b) SCR 193s on each Air Sp net.
(c) WS 76 on each base net.
(d) Two WS 22 on RT comd net.
(e) Two WS 22 on 1 Airborne Div WT net.
(f) WS 22 on DIV CONTACT (GUARD) net.
(g) WS 22 on CORPS " " "
(h) SCR 193 on 82 Airborne Div WT net.
(i) SCR 193 on 101 Airborne Div WT net.
(j) WS 76 on SECOND ARMY PHANTOM net.

All spare nets were used as listening sets, except the one spare 76 Set which was lent to the GHQ Liaison Regt det who had lost theirs.

Comn was established with 82 Airborne Div in the immediate vicinity and wireless was shortly afterwards replaced by line in this case.

Comn was established with 30 Corps (C5) which could relay to SECOND ARMY.

101 Airborne Div could be heard on one air support net, and 1 Airborne Div was heard once.

Comn was established to base on both nets. On one of these nets 1 Airborne Div was due to open. They were worked by base for five minutes at 1920. They then closed until 2115. Base lost comn with them at 2230. The frequencies (day and night) on this net were suitable for long range working to base. Only the night frequency was suitable for direct working from Airborne Corps to 1 Airborne Div, and later this frequency was used throughout the 24 hrs.

No other wireless comn was established on D Day.

18 SEP - D + 1

During this day Corps HQ did not move.

Comn was established with 30 Corps on the second WT net (C8) in addition to C5. It was not possible to work SECOND ARMY direct on either link. The Phantom net remained through to SECOND ARMY.

The listening set at 30 Corps took control of one air support net. They were then able to work Airborne Corps and 101 Airborne Div. 30 Corps had to relay messages on to SECOND ARMY on their own air support net.

Both 82 Airborne Div air support sets had been damaged on landing, and in the evening the second set at Corps HQ was sent to that formation. Meanwhile the lower of the two air support frequencies had been chosen by control. Unfortunately 1 Airborne Div found difficulty in tuning their set on this frequency, and accordingly attempted to obtain contact on the other. During this day the second set at Corps remained open on this other frequency until it was sent to 82 Airborne Div in the evening. It is also presumed that the second set at SECOND ARMY remained open for some time in the hope of contacting 1 Airborne Div.

It had been previously arranged between CSO Airborne Corps and OC 1 Airborne Div Signals that in the event of difficulty priority would be given to the RT comd net. Accordingly great efforts were made on this net, and it was this net which was used for the special arrangements made on 20 Sep. An SCR 193 was tried as well as various 22 sets in different positions.

Meanwhile the base links remained through and 1 Airborne Div re-established comn with base at 0135. Thereafter comn was intermittent from 1 Airborne Div as that formation moved and a crystal failed on their base set at 1800 hrs. Later in the evening their 76 set also failed.

There were no other changes of comn.

19 SEP - D + 2

Corps HQ sent a party to establish in a new location during the morning, but on the appearance of Gds Armd Div in the area the location was changed to a place just S of NIJMEGEN.

Comn was established with SECOND ARMY on C5 and C8 in the new location, and 101 Airborne Div on C5 later in the day.

At 0800 hrs., in the old location, the first direct SITREP had been received from 1 Airborne Div on the base wave (C6). At 1215 Rear Corps was told to remain silent on that net.

It was hoped the new and more open location would improve comns to 1 Airborne Div. This was the case on C6, but direct working was still impossible on any other net except on a Phantom 22 set link. The latter was never good enough, however, to pass any traffic for Corps HQ when comn was difficult on C6.

20 SEP - D + 3

Corps HQ moved into NIJMEGEN and 30 Corps TAC arrived in the area and an extensive line system was begun.

There was no change in wireless comns. In the evening Major Holbrook of 1 Airborne Div Signals who had been attached to 30 Corps arrived with one L.C.V.

Later that night Major Holbrook visited Guards Armd Div and made a signal plan for a recce by Comd British Airborne Corps next day. Guards Armd Div (later 43 Div) 1 Airborne Div and the GOC's rover were to work to the newly arrived 19 HP set at Br Airborne Corps on C1. A second 22 set was to accompany the rover to work on a one to one link to Airborne Corps.

21 SEP - D + 4

The forward recce after postponement was eventually cancelled but meanwhile 1 Airborne Div were expecting to contact Guards Armd Div on the new wireless net arranged.

22 SEP - D + 5

The Plan for relief of 1 Airborne Div was changed and that formation was told early in the morning to expect 43 Div and not Guards Armd Div to contact them by wireless. Major Holbrook personally tried to get through to 1 Airborne Div on all their command frequencies but he heard nothing.

During the morning 1 Airborne Div established comn with Polish Para Bde. This one to one link later proved invaluable.

23 SEP - D + 6

Major Holbrook left to go forward with DDMS Airborne Corps to try and contact 1 Airborne Div. At 0800 hrs a point was reached a little less than a mile S of DRIEL, about 8 miles from Airborne Corps HQ and 2½ miles from 1 Airborne Div. With a 30 ft rod aerial fair comn was established with Airborne Corps for a time but later in the day after a short move comns deteriorated and eventually failed.

24 SEP - D + 7

Major Holbrook found the Polish set already working to 1 Airborne Div and after netting on this frequency he spoke to OC 1 Airborne Div Signals who ordered him to report to 130 Bde of 43 Div.

He reported the position to CSO Airborne Corps who despatched an officer with a newly arrived 19 HP set to act as a direct rear link from Major Holbrook to Airborne Corps which was successfully accomplished.

Two 12 HP sets arrived from SECOND ARMY to replace the American sets on C5 and C8. A 499 set was then put on to the 82 Airborne Div link from Airborne Corps and 101 Airborne Div was ordered to join the net. Previously direct comn with 101 Airborne Div had only been possible on C5.

25 SEP - D + 8

Late on this day 1 Airborne Div were withdrawn. Wounded signalmen who could not be evacuated volunteered to pass traffic to Major Holbrook at 130 Bde and to base, which they continued to do for five hours.

So ended the phase of the operation when signal resources were limited to what had been brought in by air.

Thereafter high powered wireless sets were available in heavy vehicles.

DETAILED CONSIDERATIONS

REAR LINK COMNS.

1. Details of rear link comns provided are given in Table 'A' attached. Base waves served two main purposes -

(a) For resupply

(b) For alternate routing of messages via base when direct working was not possible.

During this operation the scale of base links was not adequate for the situation resulting from failure of direct comns from Airborne Corps to 1 Airborne Div. The situation was further aggravated by a cipher block at MOOR PARK. (see under 'CIPHER').

2. S O-in-C 21 Army Gp has suggested, as a result of this experience, that each Airborne Div should have two base links and that Airborne Corps should have a set on one of these, so as to provide a sky-wave link via base in the event of failure of direct comns. Airborne Corps would have at least one exclusive base wave in addition.

3. This principle is agreed, but in practice it is considered doubtful if such a scale of comns could be provided for an Airborne Corps of three Divisions. Nor would it be necessary in those cases where Divs are situated close to Corps HQ. For these reasons it is recommended that Corps HQ should have at least 3 base waves (one of which might be closed subsequently if all went well) and that the Divisions should have the right to come up on one or more of these if necessary. This proposed plan will be much easier to adopt when Airborne Div rear link sets are available which do not depend absolutely on the availability of the correct crystals. Not only does the 76 set require a crystal to work at all, but owing to excessive crystal current it tends to destroy crystals.

4. During the operation CSO Airborne Corps considered opening a set at Corps HQ on one of the two base waves from SECOND ARMY to MOOR PARK. Owing to lack of sets suitable for the purpose this was found impossible. Had the standard Corps sets been all purpose high power sets instead of WS 22 and 76 this idea could have been carried into effect, so freeing C6 for exclusive working to 1 Airborne Div.

5. No provision of crystals had been made for a direct one to one link by 76 set from 1 Airborne Div to Airborne Corps, but it is doubtful in the light of experience if the power of the 76 set would have been sufficient for ground wave working over the particular distance (12 miles) in the difficult ARNHEM - NIJMEGEN country.

6. After considerable experience of No. 22 sets in the NIJMEGEN area, it can be stated that ground wave working was not reliable for more than 5 miles. The maximum range was 7 - 8 miles. This was found in the direction of GRAVE as well as towards ARNHEM. The only solution to this problem is believed to be the provision of sets of greater power. Normal Divisions have found it necessary to use WS 12 HP for rear link working. It is even more essential for and Airborne Division, which cannot obtain additional equipment by road from higher formation, to land by air suitable rear link equipment - i.e. the highest powered wireless sets that can conveniently be carried by air, subject to it being possible to dismount the sets into slit trenches.

7. Airborne Corps carried by air two SCR 499s, three SCR 193s and an additional two SCR 193s in 'Veeps' with the Air Support parties. The sets were obtained only just in time for the operation and as there was no time to train British operators, FIRST ALLIED AIRBORNE ARMY provided US Army Air Corps operators instead. No doubt very largely because the operators were not used to working wireless under very difficult conditions on the ground, results obtained were very poor. In fact no useful comn was ever established with an SCR 193 at Corps HQ, except for one of the air support nets. Even this net was very indifferently operated. This type of set was used with success within the American Airborne Divisions but they have certain disadvantages for use by British Airborne Formations. This is considered in more detail under "Airborne Wireless Equipment".

8. 1 Airborne Div had no sets of a higher power than the No. 22 or 76 set except for two WS 19 HP, intended as one and a spare for working on a CCRA's net, and two SCR 193s with the air support parties. The SCR 193s were not successful for two main reasons. First because the operators were not sufficiently trained, and second because the equipment cannot be dismounted into slit trenches. Both sets were irreparably damaged by enemy fire by D + 3. The two WS 19 HP were used with success, the one to a No. 22 set with 64 Medium Regt and the other to a 19 HP set with a FOO attached to 30 Corps by the Division.

9. There is little doubt that for ground wave working from ARNHEM to NIJMEGEN a set of at least the power of the WS 19 HP was necessary - i.e. 30 watts or more.

10. It is essential that in future British Airborne Corps and Divs are provided with a number of powerful airborne rear link sets. Exclusive of air support requirements the proposed scale is:-

(a)	Airborne Corps	13 (see Diagram I)
(b)	Airborne Div	
	Two links to Corps	2
	One link to Base	1
	One link to CCRA	1
	Control set FOO net	1
	100% reserve	5
	Total	10

11. The proposed scale for a separate Airborne Corps Air Support Section is:-

2 Tentacles per Div	4
2 Tentacles for Corps	2
2 Rear link sets at Army or Ground Corps	2
1 Rear link set for GCC	1
Sets for FCP (RT, WT and GCC)	3
Reserve FCP	3
Total	15

12. It appears very likely that the WS C52 may prove suitable (see Airborne Wireless Equipment.

TABLE A

SCALE OF REAR LINK COMMS PROVIDED

	Requirement	No. of links	When required	Remarks
(a)	Airborne Base to SECOND ARMY and 30 CORPS	2	Before operation for planning. During operation in early phases.	Owing to amount of traffic one net was found inadequate. Two nets, exclusive to Airborne Base (Airborne Corps Main before operation) and SECOND ARMY and 30 CORPS should have been provided earlier.
(b)	Airborne Corps on landing to SECOND ARMY and 30 CORPS	2	During operation.	It is not reasonable to plan for more than this scale for the early stages owing to the limit in numbers of suitable sets which can be carried by air. CSO SECOND ARMY had been informed that even these two nets depended on a reasonable number of glider-borne sets arriving. When more wireless sets arrived by road a third net from Airborne Corps to SECOND ARMY WAS OPENED.
(c)	Airborne Divs on landing to Airborne Base for resupply.	1 per Div	During operation.	In the case of 1 Airborne Div that formation worked on one of the Corps HQ base waves. Events proved that this was a mistake. A minimum scale of one exclusive base link per Airborne Div is essential.
(d)	Airborne Corps on landing to Airborne Base.	2	During operation.	This proved inadequate largely because of failure of direct comms to 1 Airborne Div which necessitated using one base link for working that formation. The remaining base link was insufficient for the traffic. A minimum scale of 3 exclusive base links is required for an Airborne Corps. Airborne Divs should be able to open on at least one of these in the event of failure of direct comms to Corps.

AIR SUPPORT and GROUND TO AIR SIGNALLING

AIR SUPPORT.

1. The British tentacle, consisting of a 15-cwt wireless house, cannot be carried by air. The American Veep, as used by American air support parties, can be carried in a WACO or HAMILCAR glider but not in a HORSA.

2. As British Airborne Divisions are equipped with WS 76 it was proposed and accepted before OVERLORD that a proportion of wireless crews should be trained in air support procedure so that Airborne Divisions could provide their own airborne tentacles.

3. This arrangement has been found unsatisfactory because:-

(a) The WS 76 depends on crystals which necessitates holding crystals for every possible air support frequency.

(b) One outstation on a net being crystal controlled necessitates the control station also having a crystal.

(c) A low powered set like the WS 76 on a group of higher powered sets is liable not to be heard unless the operator at control is very well trained.

(d) A special airborne air support net can be arranged, but Armies and Corps have not the necessary sets on establishment to provide their terminals.

(e) The WS 76 is in any case of too low a power for distances between 20 and 200 miles.

(f) In practice, with all other training commitments in an airborne unit, it is not possible to give wireless crews sufficient training in air support working.

4. The provision of air support comns for MARKET was made even more difficult because the force was mixed British and American, and time would not allow the training of any wireless crews in the hastily formed Corps Signals. Accordingly it was decided, as the only possible solution in the available time, to obtain from First Allied Airborne Army American air support teams, utilising Veeps which are fitted with 75 watt SCR 193s and VHF SCR 522s. The distance involved back to SECOND ARMY was of the order of 80 miles, decreasing during the operation. It was reasonable to suppose that the 75 watt SCR 193 would succeed where a 5 - 10 watt WS 76 might well fail.

5. The comns were in fact a failure. Whether or not the SCR 193 would have been successful in that particular country had it been better operated is not known, but it is significant that a British tentacle later attached to Airborne Corps HQ, and using a 20 watt WS C9, kept continuous comn with SECOND ARMY over a distance of 25 miles.

6. It is recommended that a decision should be made immediately as to how air support comns are to be provided for airborne operations so that training can begin without delay (see under Signal Organization).

GROUND TO AIR SIGNALLING.

7. There are two main requirements for Airborne Forces, comn with direct support aircraft and comn with parachute or tug aircraft in connection with DZs, LZs and resupply. These must be considered separately.

DIRECT SUPPORT AIRCRAFT.

8. No contact was ever established although continual efforts were made by the American air support parties. This is the subject of a separate and more detailed report.

9. It is believed that direct comn of this kind has been found to be a normal requirement within 21 Army Gp, and that the TR 1143 wireless set is used carried in a vehicle which cannot be airborne. Other than the American 'Veep' containing the SCR 522 no airborne or airportable VHF equipment is immediately available.

10. It is recommended that a decision regarding type of equipment to be adopted should be made immediately.

PARACHUTE OR TUG AIRCRAFT.

11. Experience in BURMA and at ARNHEM has shown the necessity for direct wireless comn from ground to air in certain cases in connection with supply dropping.

12. It is recommended that all possible methods, including Eureka, normal VHF, S phone and MF sets like WS 19 or 22 should be examined, and a procedure worked out with the RAF and IX US TCC.

13. In the case of airborne operations it would appear to be necessary for the RAF to accept the provision on the ground of Army wireless crews to work to aircraft. In practice the requirement would probably be for an Army Officer to speak on a limited number of occasions.

14. Whatever decisions are made regarding methods of providing comn both for air support and in connection with supply dropping, communications are doomed to failure unless adequate training has been carried out by all concerned, and in particular by the wireless operators.

AIRBORNE WIRELESS EQUIPMENT

1. Existing British equipment was a failure in the following cases:-

(a) Where the WS 22 was used for ranges of over 5 miles.

(b) In certain cases when the WS 68P went out of range.

2. The American SCR 193 was also a failure over distances from 12 to 50 miles in some cases although this may be partly attributed to bad operating.

3. The urgent immediate requirements for British Airborne formations to avoid a repetition of serious comn failure appear to be three:-

(a) A better set to replace the WS 22 for working within an Airborne Div, but small enough for mounting in a jeep.

(b) A much more powerful set than the WS 22 for rear link working from Airborne Div to Corps and from Airborne Corps to Army.

(c) A parachute pack set with a speech range of 15 miles.

4. Jeep Set.

The only British wireless sets which can replace the WS 22 in the near future are:-

(a) WS 19
(b) WS 62

The former is available now but it requires very large batteries and the performance is only slightly better than the No. 22.

The WS 62 is expected to be available early in 1945. It has a better performance than either the WS 19 or 22, is likely to be suitable as a pack set as well, but it is not known what snags will be encountered in early production models.

5. Rear Link Set.

The only possible types immediately available are:-

(a)	American SCR 399 (or 499)	400 watts
(b)	Canadian WS 52	25/100 watts
(c)	British WS 53	300 watts

(a) is very heavy, requires a generator, will not fit in the British Jeep trailer or the Horsa glider. Its fine performance is well proved.

(b) is lighter than (a), works from batteries, will fit in a British jeep trailer and Horsa glider, and is just small enough to dismount into a slit trench. Its performance is still under trial but is believed to be adequate.

(c) is equivalent to the SCR 399 and requires a generator continuously. It is likely to be rather too large and bulky but must be considered seriously if the WS C52 is found inadequate in performance. It is not yet available in numbers.

6. Parachute Pack Set.

The only possible types likely to be available in the near future are:-

(a) American SCR 694
(b) British WS 62.

(a) has the performance but requires operating by hand generator and has a very narrow frequency coverage.

(b) is not yet available in pack form but is expected to be early in 1945.

One or the other must be adopted until something better is available.

7. It is recommended that -

(a) The WS C52 be adopted subject to trials which have already begun.

(b) The WS 62 be adopted as soon as available.

(c) For the time being, and pending the trial of the WS 62 in pack form, a limited number of SCR 694s, modified as required be adopted.

(d) For the time being a limited number of WS 19 and 19 HP should be used (to be replaced as soon as possible by the WS 62 and C52).

SIGNAL ORGANIZATION

1. NEPTUNE and MARKET have revealed the necessity for minor alterations in the organisation of Airborne Div Signals and complete re-organisation of Airborne Corps Signals. These requirements are considered here in outline.

AIRBORNE DIV SIGNALS.

2. Heavy Wireless and Signals Vehicles.

It has been found essential to include in the seaborne tail of an Airborne Division command vehicles, wireless trucks, cipher vehicle and various load carrying vehicles for signal equipment. None of these vehicles are at present held on establishment and they have to be borrowed for operations.

3. Cable Dets.

The present establishment is too small. Dets should consist of 2 jeeps instead of 1.

4. RA Comns.

A R. Signals officer is required both for the CRA and the Light Regt. The former must be of the rank of Captain in order to advise the CRA, and to handle the artillery signal plan which now always involves supporting artillery. It is for consideration whether both the RA Signal Secs should not form part of 2 Coy rather than 1 Coy.

5. RE Comns.

RE Comns are at present inadequate and the provision of an N Section on the lines of an Inf Div Signals is recommended.

6. Armd Recce Regt - 6 Airborne Div.

It would appear essential to provide a special signal section for rear link signalling and maintenance of signal equipt in squadrons in accordance with normal practice.

7. Base Company.

It has not been found possible for OC 1 Coy, who is responsible for Airborne Training, to be responsible also for the base part of 1 Company. An extra Major to remain at base is already allowed on establishment. He should command a new base company to include wireless and signal office personnel etc remaining at Rear Div HQ during an operation. This is what in fact he does now. Adjustment is required in W.E. The Wireless Section should be self contained so that it can be detached to Airborne Corps or Airborne Base Signals when necessary.

8. Organisation of 1 Coy.

1 Coy should contain separate wireless, operating and line sections, and not a combined section as at present.

CORPS SIGNALS.

9. S O-in-C 21 Army Gp, CSO SECOND ARMY both agree with CSO Airborne Corps that a Corps Signals on standard lines is required for an Airborne Corps operation. For MARKET a very small unit was formed. This had been designed for another and smaller operation and provided a total of about 200 excluding personnel left at Rear Corps HQ. This total of 200, some of which went by air and some by sea, had to be stepped up to a total of 500 by improvised attachment.

The result was very unsatisfactory for several reasons i.e.

(a) Completely untrained collection of individuals.

(b) Administrative breakdown because the allowed establishment was not capable of administering so many attached personnel.

(c) The difficulty of attaching anything except standard sections. In this case all sorts of vehicles and tradesmen had to be collected and sent forward entailing hours of extra work for S O-in-C 21 Army Gp, CSO SECOND ARMY, CSO 30 CORPS,

CSO Airborne Troops amd OC Airborne Corps Signals. The whole arrangement was unsatisfactory for OC Airborne Corps Signals whose attention was continually diverted from comn requirements for reasons of administration, and for the units who had to do without the vehicles and men provided. OC Airborne Corps Signals had no Adjutant or Quartermaster and he had to leave his Administrative Officer at Rear HQ to look after the base camp.

(d) While the temporary attachment of a line section was very satisfactory, the lack of certain essentials, such as command vehicles, until the actual operation, completely prevented any training of the Airborne Corps Staff with the Corps Signals.

10. In the circumstances the results achieved by improvisation, apart from the failure of direct comn to 1 Airborne Div which must be attributed to their unsuitable rear link wireless equipment, were highly creditable.

11. As a result of MARKET the Director of Signals has decided to prepare a revised establishment for an Airborne Corps Signals based on the following principles:-

(a) To be capable of providing for command of three divisions as normal.

(b) To contain a permanent airportable element sufficient to provide the essential communications at the outset of operations following an airborne landing.

(c) Additional resources to be added from theatre reserves as required for each particular operation.

(d) The whole unit to be organised as far as possible on a pool basis rather than by tying it to any presumed normal employment of, for example, RA or RE.

12. Brigadier Crawford, who was CSO 30 Corps during MARKET, and CSO Airborne Corps have now prepared an outline establishment on these principles, based on the new "Light Corps Headquarters Signals" (XV/334/1). This proposed establishment, which is under consideration, consists of:-

(a) Airborne Corps Headquarters Signals.

Headquarters and HQ Coy.
Administrative Section.
Headquarters 1 Coy:- Parent Coy for attached secs.
Headquarters 2 Coy:- Airborne.
Cipher Sec and Cipher pool Sec.
A (Main Headquarters) Wireless Sec (normally seaborne).
B (Airborne) Wireless Sec.

Although based on the "Light Corps Headquarters Signals" this part of the proposed organisation differs slightly in detail where necessary.

(b) Permanently Attached Sections.

1 Technical Maintenance Sec R. Signals (Light) XV/335/1.
1 Line Section R . Signals (Light) XV/330/1.
1 Operating Section R. Signals (Light) XV/336/1.
1 Despatch Rider Section R. Signals III/268/1.

NOTE: DD Sigs (O) considers a complete Light Line Sec unnecessary. This is being examined.

(c) Temporarily Attached Sections in Theatre.

1 Line Section R. Signals III/23/4.
1 Operating Section R. Signals III/137/1.
1 Despatch Rider Section R. Signals III/268/1.

The establishment allows for one AFDAG and for adequate training of Corps HQ at Base. It does not allow for 'Base Signals' which, it is recommended, should take the form of an independent Coy which can be attached either to an Airborne Corps HQ or to any other formation in the base area. If this is agreed a small element may have to be added to Airborne Corps HQ Signals for Rear Corps HQ during an operation, if that HQ should be separate from the Airborne Base organisation.

13. Air Support Signal Section.

As 21 Army Gp state they can never make available tentacles for airborne operations there is no alternative except the formation of an Airborne Corps Air Support Unit or Section. The provision of a section as part of Corps Signals is more economical than the formation of a separate unit, especially as the proposed Airborne Corps HQ Signals is specifically designed to be able to administer attached sections. The requirements in communications are shown in Diagram II. This includes 15 WS C52 dets and 2 VHF dets.

AIRBORNE BASE SIGNALS.

14. It is considered that Airborne Base Signals must provide for:-

(a) The provision of an adequate army line and wireless comn system within the selected base area, including any transit camps or army accommodation at or near airfields. This may be partly an L of C commitment, but a skeleton organisation capable of expansion with assistance from L of C Signals would appear to be necessary.

(b) The provision of signal offices at the following places:-

1. Airborne Base Headquarters. This may or may not be Rear Airborne Corps.

2. Each Airborne Div or Airborne Bde Headquarters located at or near airfields just prior to the launching of an airborne operation. This might also be an L of C commitment provided the Airborne Base Signals held the skeleton organisation outlined in (a) above - e.g. a transit camp might have allotted one NCO operator and one Lineman permanently - to this would be added for a few days a small signal office staff if the particular camp was used by a Div or Bde HQ.

(c) An adequate army courier service both by air and by road within the airborne base. In any undeveloped country the air courier service would be absolutely essential and must be controlled by Airborne Base Signals.

(d) The provision of signal personnel for attachment to RAF or USAAF formations, responsible for lifting Airborne formations, to assist in handling army signal traffic.

BASE WIRELESS DETS.

15. It is considered that the establishment of Airborne Div Signals should continue to include 5 base wireless dets, but that these should be re-organised into an independent sec capable of attachment as and when required. The advantages of this system, rather than the wireless dets forming a permanent part of an Airborne Base Signals are:-

(a) An Airborne Div, when moved to a new theatre, arrives complete with trained base dets who know their opposite numbers who operate the airborne sets, and the special requirements for airborne operations.

(b) For Airborne Corps operations the number of base wireless nets varies with the number of Divisions employed. By this system the number of base sets varies automatically with the number of Divisions.

(c) The system allows OC Airborne Div Signals to retain within the unit good wireless operators who may have been slightly injured as a result of parachute jumping.

16. These wireless dets would normally be used for:-

(a) Links from Airborne Base to each Airborne Div and Airborne Corps during an operation. For an Airborne Corps of two Airborne Divs the total number of links is likely to be 5.

(b) Links from Airborne Base to Army Gp, or Army responsible for the airborne operation and to any co-operating ground Corps. The number of links in this case is likely to be 3.

(c) Link from Airborne Base to Transport Aircraft Headquarters.

17. It follows that sufficient wireless sets would not be available for links from Airborne Base HQ to ALOs on airfields or to Rear Airborne Div HQs.

18. In Army/Air Operations Pamphlet No. 6 (India) the following additional wireless links are shown in the Rear Airfield area.

(a) Each Rear Div HQ to Rear Force HQ (i.e. Airborne Base HQ).
(b) Each Rear Div HQ to Div LOs on airfields.
(c) Rear Force HQ to Force LOs on airfields.

Assuming all LOs belong to Airborne Base there still remains the commitment in an undeveloped country for the provision of direct wireless from Airborne Base HQ to each LO on airfields, and to each Rear Div HQ. Assuming 24 Airfields and 2 Airborne Divs this would amount to a requirement (max 5 stns on one net) for no less than 33 wireless dets. These wireless dets

cannot be provided from the resources of Airborne Divs. They must therefore either be included in the establishment of Airborne Base Signals or they must be provided in the theatre. They can only be dispensed with provided the line comns via airfield switchboards are adequate which is not likely to be the case outside U.K.

19. It is recommended that the requirements for communications for the airborne base be examined in the light of experience in ENGLAND, AFRICA, ITALY and INDIA, with a view to the provision of an adequate Signal establishment for an Airborne Base in any part of the world. Unless such an establishment is worked out and implemented early, the development of any new base for airborne operations is bound to be delayed while the comn system is improvised. The scale of airborne operations now possible, makes such improvisation very undesirable, as the essential resources may well not be available in the particular theatre, this because the number of airfields is likely to be so great.

SIGNAL SECURITY

CODE SIGNS

1. In order to preserve as great a measure of security as is possible in an airborne operation the distribution of code sign extracts on operation MARKET was kept as limited as possible. On the fly in, airborne forces held extracts of airborne units only.

Planning for the operation allowed for the distribution of all airborne extracts to supporting ground formations. This was necessitated by the Army Group policy that airborne forces should not possess, initially, information which, if captured by the enemy, would compromise the order of battle and Signals layout of ground forces destined to join up with airborne formations. In order to obviate the difficulty of establishing contact a guard set with a separate frequency and call sign was set up on divisional and corps level. It was envisualised that ground forces should contact airborne formations by this means.

As a result of the operation OC 1 Airborne Div Signals has proposed that airborne forces, on the fly-in, should hold code sign extracts and general signal data of ground formations involved in the operation, so that in the event of comn failure contact can be made on any selected ground formation wireless net.

AUTHENTICATION.

2. For the purpose of the operation a non-current serial of the Combined Authentication system was used to effect authentication between airborne and ground formations. The decision to use the system was based on the following reasons:-

(a) The system was familiar to ground troops.

(b) The serial used was already held by ground troops and thus obviated the difficult task of universal distribution.

From reports on the operation it appears that the system was effective for authentication, but, since airborne forces did not possess the code sign extracts of ground formations, it was not possible for airborne forces to identify the units when once authenticated.

It is understood that SHAEF are about to issue a new authentication system specifically designed for use on airborne operations. This system is based on the one time pad cipher - and since different pages of the pad would be issued to each formation, authentication would lead to identification.

SLIDEX RT CODE

3. The signal instruction for the operation stipulated that a special airborne corps key should be used for messages from division to airborne corps. Each division used a separate key for traffic from division to battalions. The airborne keys were distributed to ground forces and were used for all RT messages between airborne and ground forces.

The system worked well with one exception - delay only being caused by failure on the part of the ground forces to recognise the use of airborne keys. It was unfortunate that 43 Div apparently failed to distribute the airborne keys to bdes because 1 Airborne Div were unable to work to 130 Bde.

Consequent on the proposal to abolish the use of Airborne Double Transposition Cipher it will be necessary to introduce a special Slidex key for use, in emergency, between brigade and battalions.

MAPLAY.

4. Issue of Maplay keys was on the same basis as Slidex.

It appears, however, that map references were either sent in clear or by means of Slidex. Such use of Slidex cannot but lessen, by a great margin, the length of security slidex is able to provide.

SUMMARY.

5. The policy governing signal security for the operation was one based on the promise that certain of the airborne codes and code sign extracts were certain to be captured. It was therefore decided that compromise, arising from captured signal data must be localised as far as possible, and would not identify ground formations.

As against this insistence on signal security, airborne formations would have been able to establish contact more easily with forward brigades of ground formations, if code sign extracts of ground troops had been held.

There are, therefore, three courses open for airborne operations:-

(a) To fly in with documents relating to airborne forces only, and to rely on distribution of airborne signal data to supporting formations. This system made the contacting of 1 Airborne Div at ARNHEM difficult.

(b) To fly in with the full signal data of ground formations, thus facilitating the knitting up of ground and airborne forces, but perhaps imperilling the order of battle of the ground and airborne operation. It is doubtful if any Army Group or Army would agree to accept the risk involved.

(c) A compromise by allowing rather more information to be carried by air than was allowed on MARKET, but not so much as to endanger seriously the security of the complete order of battle and complete code sign extracts of the ground forces.

It is considered that in this connection the following should be examined.

(i) Distribution among airborne formations of certain of the ground frequencies but not the ground code signs.

(ii) The provision of contact link signs for each ground formation for use on airborne nets when establishing contact.

The lists of frequencies and contact link signs would be fairly widely distributed in pre-arranged order within the airborne formations. The corresponding list of formations would be very limited in distribution amongst selected officers.

(iii) The introduction of a system of periodical calling on contact waves.

It is recommended that course (iii) be examined immediately by all concerned.

CIPHER

O.T.P. CIPHER.

1. One time figure pad cipher was a great success on operation MARKET. It proved reasonably quick and the equipment is particularly suitable for carrying by air and distributing among a number of gliders. In some cases the number of cipher operators was insufficient.

2. In order to speed up cipher and to facilitate the handling of traffic in ground formations, the employment of machine cipher with special inserts and settings, has been suggested for airborne operations. It was hoped that the Mk. VI machine might be used but on examination this is considered insufficiently robust. Given the special inserts the Mk. II machine could, however, be used.

MACHINE CIPHER.

3. Mk. II machines would theoretically double the speed of ciphering and deciphering at least, but with the following disadvantages:-

(a) Each Corps or Div HQ would have to allot three gliders for three cipher jeeps and trailers.

(b) In the event of one glider only arriving only one operator could work on the particular machine at a time. Other operators would still have to use O.T.P. Cipher.

(c) Cover is essential for the machines.

(d) Machines are unsuitable for slit trenches.

(e) Security is less than with O.T.P. Cipher.

(f) Airborne typex could not be used to American formations.

D.T. CIPHER.

4. This cipher is never used in practice and its withdrawal has been recommended. It can be replaced in emergency within Bdes by a special use of SLIDEX (see under Security).

TRAFFIC.

5. 40,000 groups were cleared by Airborne Corps HQ in the field during the first 6 days without any requests for check and repeat. The full number of cipher operators, all of whom arrived, were just sufficient. 51,000 groups were cleared at Rear Corps HQ in ENGLAND during the first 3 days. In this case there was a cipher block and extra operators had to be obtained.

CIPHER OPERATORS.

6. Number of operators were:-

			Remarks
Main Corps HQ	By Air	8	Insufficient if all had not arrived.
" " "	By Sea	5	12 - 15 should be flown in according to the operation.
Rear Corps HQ		7	Insufficient for traffic. 4 extra had to be added.
Re-supply Airfield		4	
1 Airborne Div		6	3 were left at base. Insufficient. 9 should be flown in and in addition 3 left at base.

In some cases cipher operators are not up to the required standard. All operators must be of the highest possible standard in airborne formations so as to obtain the maximum results with whatever operators arrive.

7. It is recommended that:-

(a) Airborne Double Transposition Cipher should be abolished.

(b) The carriage of machine cipher by air, although not required for the initial stages of an airborne operation, may well be required in those operations where the subsequent build up is by transport aircraft or glider instead of by sea and road. Experiments and development must continue.

(c) All cipher establishments for airborne units be reviewed in order to ensure that sufficient cipher operators are available for the scales of comns now found essential.

NOTE: It is agreed that the scale of base links must be increased.

GENERAL CONCLUSIONS

1. An airborne corps must possess an adequately trained Corps Signals of adequate size and equipped with wireless equipment of sufficient power for the wireless ranges involved. In this case an absolute minimum of personnel was provided so late that only one small signal exercise was possible for the newly formed unit and this exercise could not include the attached US personnel because their equipment was not ready in time. British high power wireless equipment for carrying by glider was not available. American equipment was obtained instead, but too late for the operators to be trained to operate it proficiently.

2. Airborne Base Signals should be organized independently of Corps Signals, although it may be attached to it.

3. Air support communications must be provided by expert air support tentacles or parties, and British tentacles must be suitable for carrying by glider. In this case US air support parties were formed at the last moment but the Air Corps operators had not reached a reasonable standard of wireless operating.

4. Rear link communications between airborne formations and base, and cipher operators for working the slow airborne ciphers, must be provided on a generous scale. In this case there were insufficient cipher operators at Airborne Corps Main and Rear HQ at the beginning of the operation, and 1 Airborne Div should have had at least one base wave separate from those for Airborne Corps Main HQ.

5. British Airborne Divs require a number of high power rear link sets both for working to higher formation and on RA wireless nets. In this case 1 Airborne Div never established satisfactory rear link ground wave communications except with the two 19 HP sets they possessed.

6. So much attention was paid in planning to the necessity for preventing compromise of ground formations order of battle, code signs and frequencies, that 1 Airborne Divn carried by air too little information about those ground formations to allow for a flexible re-arrangement of comns in the event of failure.

7. On the other hand as the failure of comns can be attributed to equipment, Airborne Divisions must not in future carry all information regarding ground formations code signs and frequencies. This would be too great a risk. They must, however, carry more than that allowed for MARKET.

POSSIBLE PHASES OF AIRBORNE CORPS OPERATIONS

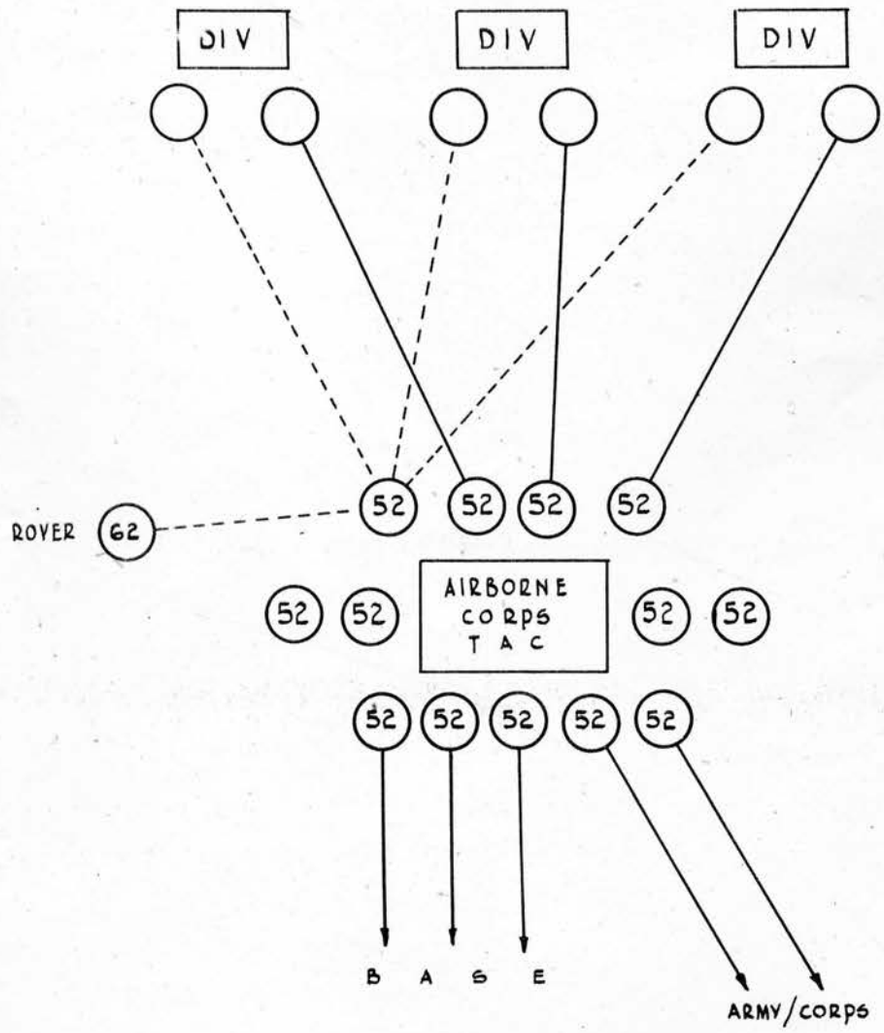
EXAMPLE 1.

DIAGRAM Nº 1

TAC HQ established first followed later by MAIN HQ

PHASE 1 (excl Air Sp)

TAC HQ



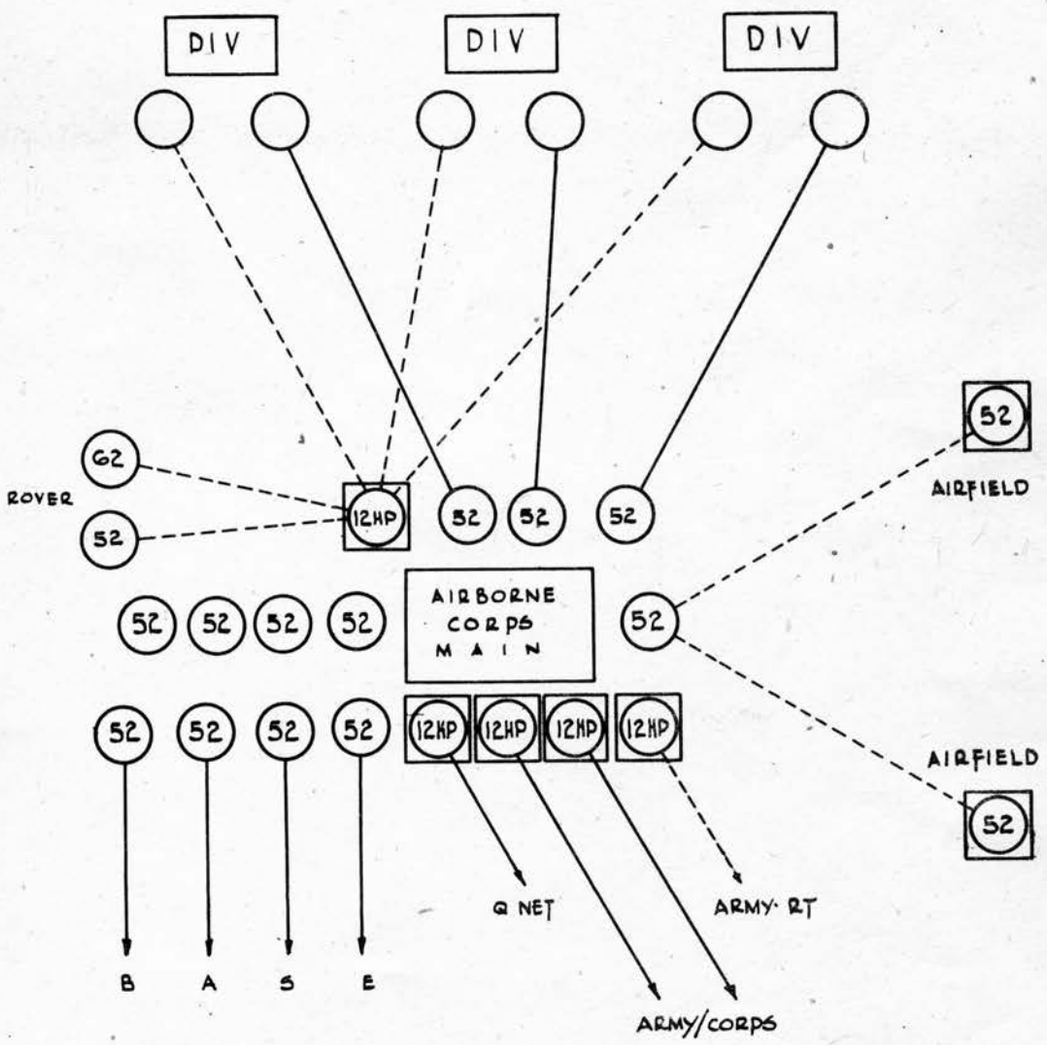
K E Y	
----	R T
——	W T

TOTAL SETS (Excl Divs)	
52 SETS	13
62 SETS	1

R · J · M · 3 · NOV · 44

PHASE 2

MAIN HQ incl TAC HQ (Excl Air Sp)



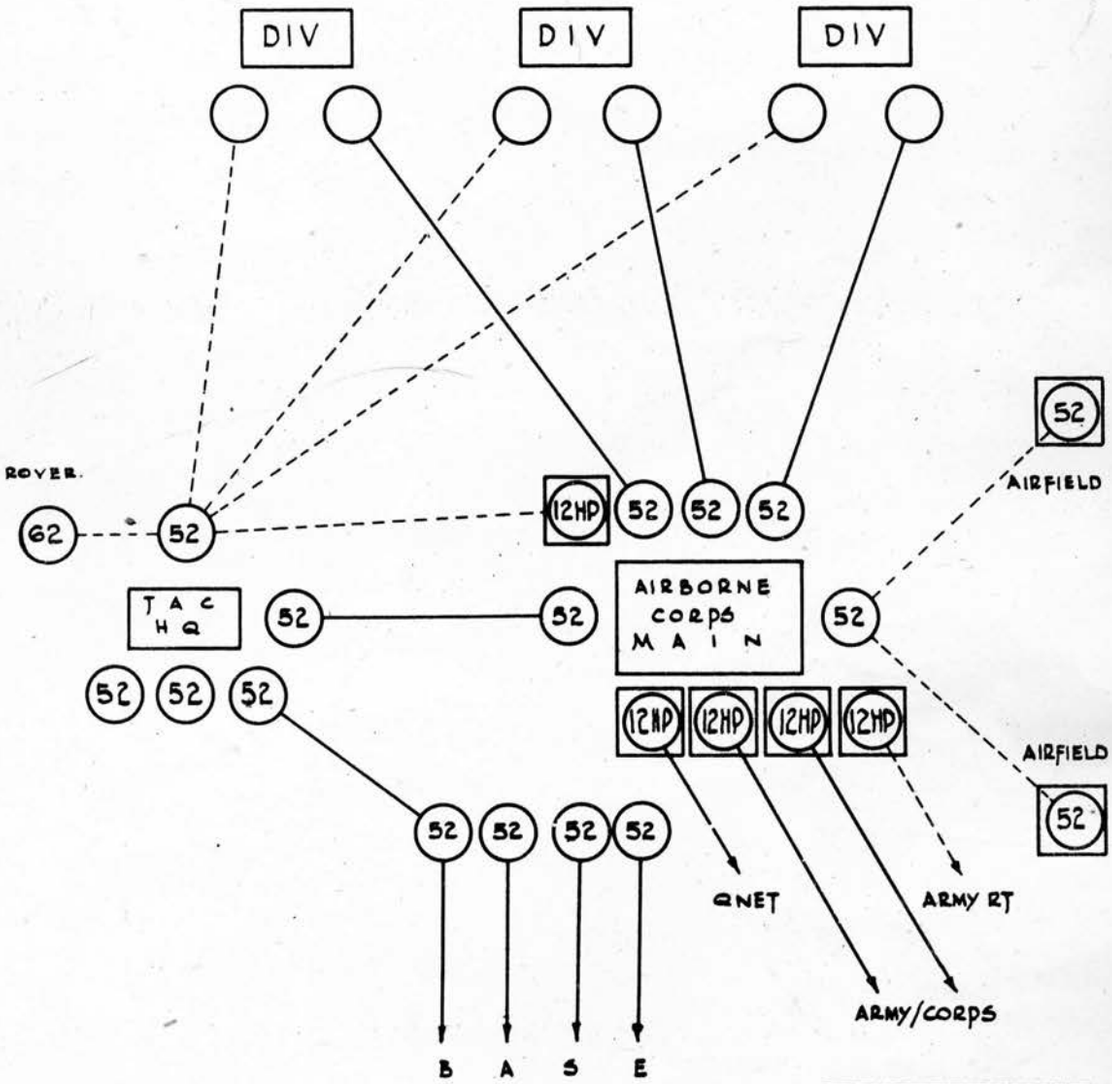
KEY	
----	R T
——	W T

TOTAL SETS (Excl Divs)	
HP LCVs	5
LP LCVs	2
52 SETS (Jeeps)	13
G2 SETS	1

R · J · M · 3 · NOV · 44

EXAMPLE 2

TAC HQ and MAIN HQ both established.
TAC by air
MAIN by road.



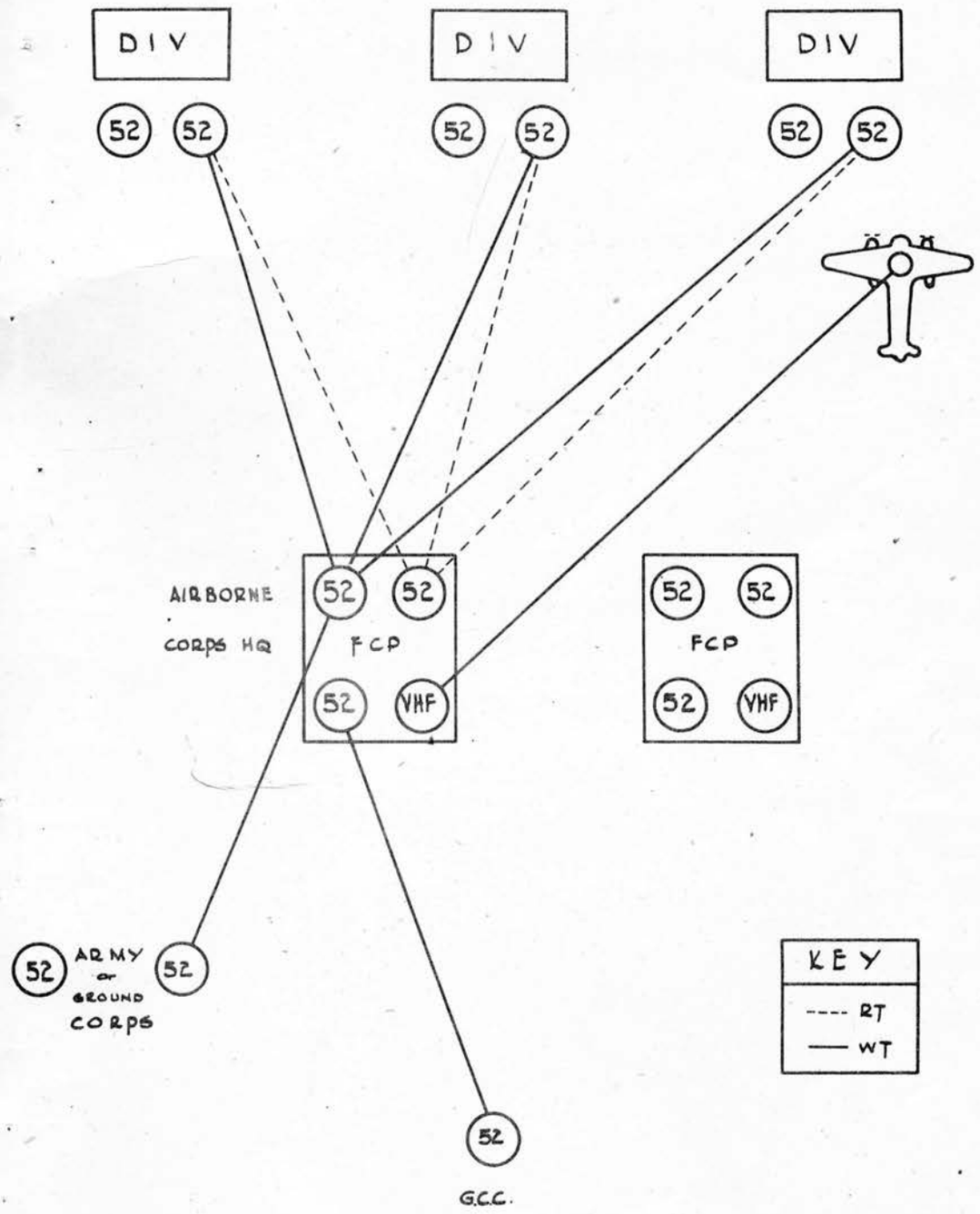
K E Y	
----	R T
——	W T

TOTAL SETS (excl Divs)	
HP LCVs	5
LP LCVs	2
52 SETS (Jeeps)	13
62 SETS	1

· R · J · M · 5 · NOV · 44 ·

SUGGESTED AIRBORNE CORPS AIR SUPPORT COMN SYSTEM.

DIAGRAM Nº II



HQ AIRTPS/TS/2561/G

OPERATION "MARKET"

OPERATION INSTRUCTION NO. 1

(Excluding all Appendices except Appendix A)

INFORMATION.

1. Enemy.

The enemy is fighting determinedly along the general line of ALBERT and ESCAUT canals from inclusive ANTWERP to inclusive MAASTRICHT. His line is held by the remnants of some good divisions, including Parachute Divisions, and by new arrivals from HOLLAND. They are fighting well but have very few reserves. The total armoured strength is probably not more than 50-100 tanks, mostly Mark IV. There is every sign of the enemy strengthening the defences of the river and canal lines through ARNHEM and NIJMEGEN, especially with flak, but the troops manning them are not numerous and many are of low category. The flak is sited for dual purpose role - both AA and ground.

2. Own Troops.

It is the intention of the Commander-in-Chief, 21 Army Group, to advance NORTH across the MAAS, WAAL and NEDER RIJN, form a strong bridgehead NORTH of ARNHEM and continue his operations NORTH into HOLLAND and EAST against the REICH. The main axis of the advance is EINDHOVEN - GRAVE - NIJMEGEN - ARNHEM, which is allotted to 30 Corps.

INTENTION.

3. Airborne Corps will capture and hold crossings over the canals and rivers on Second Army's main axis of advance, from about EINDHOVEN to inclusive ARNHEM.

ORDER OF BATTLE.

4. HQ British Airborne Corps
1 British Airborne Division
52 (L) Division (Airportable)
1 Polish Parachute Brigade
2 Airlanding Lt AA Bty
PHANTOM detachments on scale of one per Corps HQ and Division
878 US Airborne Aviation Engineer Bn
82 US Airborne Division
101 US Airborne Division
Such additional units as are provided by Second British Army to assist after the ground forces have joined up.
Liaison Missions provided by SFHQ
Civil Affairs Staff
Detachment NETHERLANDS Army Commandos

COMMAND

5. Command of the whole force will be exercised by 21 Army Group through Second Army. First Allied Airborne Army have accepted responsibility for the whole protection of the air flight, including arrangements for warning ALLIED AA and balloon defences and for air-sea rescue arrangements.

6. Lt.-General FAM BROWNING, CB, DSO, Commander British Airborne Corps has been designated commander of all airborne and airlanded troops together with, on arrival their seaborne elements.

7. 1 Polish Parachute Brigade is under command 1 Airborne Division for all purposes.

8. 878 Airborne Aviation Engineer Battalion is under direct control of CE British Airborne Corps for all operational purposes, except that for local protection and in emergency it will act on the orders of the Divisional Commander in whose area it is.

9. 2 Airlanding Light AA Battery remains under direct command of British Airborne Corps until it is known in which area it will be disposed.

10. A HQ Field Maintenance Centre is being provided to command all AFDAG units.

11. Any SAS troops employed will be under the direct command of British Airborne Corps

12. Brigadier J.D. RUSSELL, DSO, MC, Comd 157 Infantry Brigade will command all seaborne elements of British Airborne and Airportable formations. Lt.-Col. CURTIS, MC, will act as Deputy Commander and Airborne Corps Staff Officer.

Seaborne elements will be passed forward by 30 Corps as soon as the ground situation permits, and will revert under command their own formations or units on arrival.

TASKS

13. 1 British Airborne Division.

Will land to capture the ARNHEM Bridges, with sufficient bridgeheads to pass formations of Second Army through.

14. 82 US Airborne Division.

Will seize and hold the bridges at NIJMEGEN and GRAVE with the same object in view. The capture and retention of the high ground between NIJMEGEN and GROESBEEK is imperative in order to accomplish the Division's task.

15. 101 US Airborne Division.

Will seize bridges and defiles on 30 Corps' main axis of advance to ensure the speedy pass-through of that Corps to the GRAVE-NIJMEGEN and ARNHEM crossings. Definite locations will be notified shortly.

It is the intention to evacuate 82 and 101 US Airborne Divisions as soon as the ground situation permits.

16. 52 (L) Division.

Will be flown in NORTH of ARNHEM as soon as airstrips are available and will concentrate in reserve nearby, in accordance with orders which will be issued on landing. They will be prepared to fly-in their 'O' Group with the first wave of aircraft landing.

17. A summary of aircraft and gliders allotted is attached at Appendix "A".

18. Aircraft landing and returning to UK will be used for evacuation of casualties and glider pilots.

AIRLANDING OF TROOPS AND SUPPLIES.

19. 878 Airborne Aviation Engineer Battalion together with Airfield Control Unit will be flown in by glider as soon as the air and ground situation permits and will prepare a landing strip or strips as decided by Corps.

Location of such strips will be notified to IX TCCP at EASTCOTE via HQ British Airborne Troops (Rear) before 878 Airborne Aviation Engineer Bn take off. IX TCCP will also be notified when the first and subsequent airstrips will be ready for operating. If possible notice will be given 12 hours in advance.

20. If, at any time, it is unsafe for aircraft to land, red Verey lights or flares in the immediate vicinity of the airstrip concerned will be used to warn them. These Verey lights or flares will not be used without the agreement of the Air Force Commander on the airstrip, except in cases of extreme emergency.

DZs LZs and AIRSTRIPS.

21. As shown on trace at Appendix "B".

22. Gliders of 878 Airborne Aviation Engineer Bn, Airfield Control Units and 2 Airlanding Lt AA Bty will be landed as close as possible to the site of the airstrip.

AA DEFENCES.

23. 2 Airlanding Lt. AA Battery will be responsible for the AA defence of the first strip to be put in working order, under the orders of the Divisional Commander in whose area it is. Other strips cannot be provided with AA defence until the main ground forces arrive, except by fighters overhead at particular times. A recce party from the battery will accompany Corps HQ in the initial air move.

ARTILLERY.

24. 30 Corps are providing Artillery Support to all three Divisions wherever range permits. Liaison officers from 82 and 101 US Airborne Divisions and No. 1 FOU will be attached to RA 30 Corps for this purpose. Exact details of support available will be known later.

ENGINEERS.

25. 878 Airborne Aviation Engineer Bn will be responsible for construction or repair of landing strips under orders of CE HQ British Airborne Corps. They will be evacuated to UK and revert to command FAAA as soon as possible after their initial tasks are completed.

26. Divisional Commanders will give first priority of Engineer resources to the removal of charges from and repair and maintenance of any bridges within their areas which are likely to be required by 30 Corps in their advance. No bridges will be destroyed or prepared for destruction. Temporary minor rail cuts may be made for purposes of local defence.

27. AFDAG will include a Stores Section RE, under the direct control of 'Q' British Airborne Corps, but allotment of Engineer stores will be done by CE British Airborne Corps.

MINES.

28. (a) Mines will only be laid by engineers or under engineer supervision, to ensure accurate recording.

(b) Own and enemy minefields will be reported through normal channels to Corps HQ by the quickest possible means and also in the case of enemy fields to the nearest engineer unit.

DEMOLITIONS.

29. NO DEMOLITIONS OF ANY KIND AND NO DESTRUCTION OF SIGNAL COMMUNICATIONS (except GERMAN field cable) will be allowed except by the express permission of the Corps Commander. This is essential to the swift advance of the Allied Armies.

FERRIES, BARGES AND LOCKS.

30. All ferries, barges, etc., not actually in use by Airborne Divisions will be brought to the SOUTHERN banks of rivers or canals as soon as the situation permits in order that they are available for 30 Corps if required.

As far as possible canal locks will be kept in working order and normal water levels maintained.

AIR SUPPORT

31. (a) Direct Air Support will be provided by 83 Group RAF probably assisted by 84 Group RAF.

(b) The communication layout, frequencies, call signs and codes to be used are incorporated in a signal operation instruction.

(c) Two American Air Support Parties are allotted each to 1 Airborne Division, 82 and 101 US Airborne Divisions and HQ Airborne Corps. One party is allotted to 52 (L) Division.

(d) Requests for Air Support will be routed direct to Second Army from all Air Support Parties, requests from Divisions being monitored and priorities decided by Corps HQ only when necessary. On landing all sets will open up, only closing down on orders which will be given when any Division has more than one set in operation.

(e) Indications of our own positions will be by fluorescent panels, ground strip indicators or yellow smoke candles. Panels and ground strips will be kept displayed unless enemy aircraft are active.

(f) No coloured smoke for indication of targets will be available until the arrival of 52 (L) Division when red and blue may be used.

(g) The bomb line is shown at Appendix "G". Formations will report changes of location of units as soon as possible on the Air Support net in order that the bombline can be changed when necessary. Own locations may be sent in the Air Support Request code.

(h) Should it be necessary to engage a target inside the bomb line the formation requesting will indicate a temporary bombline to cover that one operation only.

GLIDER PILOTS.

32. Instructions regarding employment and evacuation are at Appendix "F".

ANTI-GAS.

33. Respirators will NOT be carried. British Troops will carry anti-gas capes.

RECOGNITION.

34. Divisions will ensure mutually that types of dress and equipment used by them are known to all other formations. US Glider Pilots will wear US parachute jerkins. British Glider Pilots have the same dress and equipment as other British Airborne Troops.

35. Yellow smoke or flares will be used to indicate positions of our own troops to friendly aircraft. Yellow celanese triangles will be used for ground to ground recognition. If available, fluorescent panels will be used to distinguish vehicles to the air.

36. Friendly DUTCH civilians properly enrolled for labour through the Civil Affairs Mission will be issued with orange armbands with the word ORANJE in black; they will be under the orders of Lt.-Col. Anthony B. HARRIS, U.S.A.A.C. at Corps HQ once they have been enrolled.

(a) Members of the Resistance are being instructed to wear armbands of any colour (orange if possible) with the word "ORANJE" on them. It is emphasised that the wearing of an armband is to satisfy the requirements of International Law and is NOT to be taken as a guarantee that the wearer is a genuine Resistor; the usual security precautions will be taken.

(b) If it is found necessary to enrol extra DUTCH police other than the present uniformed force, or if it is necessary to distinguish pro-Ally police from others who may be wearing police uniform, they will wear an armbrand of vertical alternate one-inch wide orange and white stripes with the letter "P" in black.

LIAISON.

37. (a) With the civil population for armed activities against the enemy or for labour through the SFHQ (DUTCH) Mission. (See Appendix "C" and "D").

(b) With the civil population for control of Civil Affairs, through the Civil Affairs Section, attached to Corps HQ. This will include control of labour, refugees, curfews, proclamations, etc.

(c) One Liaison Officer for Corps HQ will be provided by each Division. These liaison officers will travel with the Divisional HQ to the area of operations and will be provided with transport, jeep or motor-cycle, by Divisions. After landing they will, as soon as the situation allows, report to GSO1(Ops) at Corps HQ with the latest information of their divisions and remain at his disposal.

(d) The two Polish Liaison Officers now with Corps HQ will travel with and remain with Corps HQ.

(e) Lt.-Col. H.O. WRIGHT will be the liaison officer with HQ Second British Army. Capt. J.C. Bridgeman will be liaison officer with 30 Corps. Capt. MILLER will join corps HQ from Seaborne Elements as soon as they arrive in the area.

(f) In addition to the above, the following officers have been attached to HQ Airborne Cirps:-

From 18 US Airborne Corps	One 'Q' Officer. Two Engineer Officers One Sigs Officer One Medical Officer
From HQ 82 US Airborne Division	One 'G' Officer
From HQ 101 US Airborne Division	One 'G' Officer

ADMINISTRATION

38. Separate instructions being issued.

INTERCOMMUNICATION.

39. (a) Advance Corps HQ lands with first glider lift in area 82 US Division and moves to area alongside HQ 82 Division about 7454. Subsequent move, as soon as the situation allows will be to EAST of the Bridge over the MAAS-WAAL on the main axis GRAVES-NIJMEGEN.

(b) Main Corps HQ moves up from BRUSSELS area with 30 Corps and joins up as soon as possible.

40. Signals Layout at Appendix "E".

41. Instructions regarding frequencies and cipher to be used are being issued by CSO British Airborne Corps.

42. GHQ Liaison Regiment (PHANTOM) are providing a patrol with Corps HQ and each Division except 52 (L) Division. The patrol at Corps HQ will be in direct touch with 21 Army Group.

PASSWORDS.

43. NB: Not known to ground forces linking up with Airborne Corps.

As follows:-

H hour till 2359 hrs D day	Challenge Reply	RED BERET
2359 hr D Day till 2359 hrs D + 1	Challenge Reply	UNCLE SAM
2359 hrs D + 1 till 2359 hrs D + 2	Challenge Reply	CARRIER PIGEON
2359 hrs D + 2 till 2359 hrs D + 3	Challenge Reply	AIR BORNE
2359 hrs D + 3 till 2359 hrs D + 4	Challenge Reply	ROBERT BURNS
2359 hrs D + 4 till 2359 hrs D + 5	Challenge Reply	TROOP CARRIER

44. SAS Troops will be acting independently in the area and will use the codeword NANCY to establish their identity. This codeword is NOT known to ground forces linking up with Airborne Corps.

Special Resistance personnel will use password TELEPHONE when reporting with information to Division or Brigade intelligence staffs.

TIMING

45. D day will be Sunday, 17 September, 44.

46. There will be no briefing below battalion commander level on this operation before 14 Sep.

47. Troops will be sealed in camps or billets once general briefing has started and will NOT be released without permission from Corps HQ.

48. Gliders will be loaded on Friday, 15 Sep.

49. ACKNOWLEDGE.

A.P.O. ENGLAND.
13 September, 1944.
AGW/JA/FAB.

Brigadier G.S.
Headquarters, Airborne Corps,
(21 Army Group)

DISTRIBUTION:- See List Attached.

TIME OF SIGNATURE ..... hrs. ISSUED TO SIGNALS .....

"MARKET" UNCLASSIFIED

OPERATION INSTRUCTION NO. 2 - BRITISH AIRBORNE CORPS

HQ AirTps/TS/2561/G

NOTE: This operation instruction is in amplification of British Airborne Corps Operation Instruction No. 1 dated 13 Sep 44. The two should be read in conjunction.

TITLES AND FUNCTIONS OF HQ

1. To avoid further confusion regarding addresses, the following must be noted and used in future.

(a) British Airborne Corps (Adv) is that part of Corps HQ which goes by glider in the first lift. It consists of the Commander, most of the 'G' and 'I' staffs, a 'Q' rep, RA and Signals.

(b) British Airborne Corps (Main) is that part of Corps HQ which moves up by road with 30 Corps to join "Adv". It consists of most of the 'A', 'Q' and Services staffs. "Main" will have no communication system with UK, except through Second Army, until they join "Adv".

(c) British Airborne Corps (Rear) is that part of Corps HQ which remains at the airborne base in UK, being located at MOOR PARK. It will be in direct wireless touch with "Adv" and with Second Army (Main), and 21 Army Group Main at all times. Messages to and from "Adv" for First Allied Airborne Army (FAAA) and Troop Carrier Command Post will go through "Rear".

(d) 18 (US) Airborne Corps is also under command FAAA and normally 82 and 101 US Airborne Divisions are under its command. It must not be confused with British Airborne Corps, and the latter's national prefix is therefore necessary.

CODEWORDS

2. Codewords for Second Army and British Airborne Corps operations are as follows:-

MARKET - operation carried out by British Airborne Corps

GARDEN - operation carried out by Second Army

TIME

3. Zone 'A' time (i.e. one hour in advance of GMT) comes into force at 0300 hrs 17 Sep 44. One hour will therefore be subtracted from all timings already issued for incl 17 Sep onwards and all new timings issued having relation to incl 17 Sep onwards will be based on Zone 'A' time.

GROUPING

4. Guards Armoured Division will lead the advance of 30 Corps up the main axis. Other ground formations in 30 Corps are 50 (N) Division, 43 Division, 8 Armoured Brigade, ROYALS (Armoured Cars).

COMMAND

5. As already stated, except as follows:-

(a) For planning purposes and initial phase of operations.

101 US Airborne Division is under command 30 Corps for all ground tasks, remaining under British Airborne Corps for flight and air supply. (All communications between 101 US Airborne Division and 30 Corps will be through British Airborne Corps until operations have started).

(b) For the period after 30 Corps has passed through the corridor.

101 US Airborne Division reverts command British Airborne Corps at a time to be ordered by Second Army.

TIMING

6. (a) H hour, i.e. the time the first main drops or landings commence, is 1300 hrs 17 Sep Zone A. Other timings are at Appendix 'A' to this Operation Instruction.

(b) 30 Corps will be starting their advance soon after H hour, exact time to be notified.

POSTPONEMENT

7. (a) Will be for exactly 24 hours or multiples thereof.

(b) If Second Army require postponement, they have agreed to notify British Airborne Corps if possible by 0400 hrs Zone A D day and at latest by 0600 hrs Zone A D day.

(c) If weather requires a postponement, Second Army require notification to reach them from British Airborne Corps by at latest 0900 hrs Zone A D day. Second Army then inform 30 C by 1000 hrs Zone A D day.

(d) Messages regarding postponement will in all cases be marked "MOST IMMEDIATE" and will be kept short. NO other subjects will be contained in the same message. Two hours will be allowed for the message, including enciphering and deciphering.

ANTI-AIRCRAFT

8. (a) NO AA by day.

(b) NO AA by night except as specially authorised.

SEABORNE TAILS

9. (a) Seaborne tails of HQ British Airborne Corps, 1 British Airborne Division, 1 Polish Parachute Brigade, will move forward under 30 Corps, possibly arriving about 28 hours after its own formation starts dropping.

(b) Seaborne tail 52 (L) Division under command Second Army, moving forward as necessary.

(c) Decision re seaborne tails of 82 and 101 US Airborne Divisions and 878 Airborne Aviation Engineer Bn will be notified separately, when known.

TRAFFIC CONTROL

10. Initially by 30 Corps, then by Second Army.

PLACE CODE NAMES

11. Being issued separately by Second Army.

SIGNAL PRIORITIES

12. Franking of signals MOST IMMEDIATE will be confined to those officers entitled to use that priority and will only be used in cases of extreme importance, i.e. during the planning stage in case of postponement.

14 September, 1944.
A.P.O. ENGLAND.
AGW/FAE

Brigadier G.S.
Headquarters, British Airborne Corps.

APPX A
dated [illegible] Sep 44.

OPERATION MARKET

OF AIRCRAFT AS AT 121200B

SUMMA

	PARA A/C				TUG A/C		GLIDERS			GLIDER PILOT (CREWS)	
	38 Group	46 Group	IX TCC	38	roup	46 Group	IX TCC	HAM	HOR	CG4A	BRITISH	AMERICAN
FIRST LIFT												
1. 101 (US) Airborne Div			432				70			70		70
2. 82 (US) Airborne Div			480				50			50		50
3. 1 Airborne Div	12 PFF		143		90	130		13	307		320	
4. HQ Airborne Corps					38				32	6	38	
TOTAL FIRST LIFT	12		1055		28	130	120	13	339	126	358	120
SECOND LIFT												
1. 101 (US) Airborne Div							450			450		450
2. 82 (US) Airborne Div							450			450		450
3. 1 Airborne Div			126		6	110		15	237	4	256	
4. Polish Bde					0				10		10	
5. Resupply Br.	35					110	900					
TOTAL SECOND LIFT	35		126	156								
THIRD LIFT												
1. 101 (US) Airborne Div												
2. 82 (US) Airborne Div												
3. 878 (US) Engineer Avn Bn				10								
4. Airfield Control Units												
5. Polish Bde			114	35								
6. Resupply (Br)	100	66										
TOTAL THIRD LIFT	100	66	11[illegible]	45								