

Annexure

S

REPORT ON THE ORGANISATION AND EQUIPMENT OF AIRBORNE  
DIVISIONAL ENGINEERS.

by

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Part 1 .. .. Lessons from ARNHEM.  
Part 11 .. .. Recommendations for  
alterations to Orga-  
nisation and Equipment  
of Airborne Divisional  
Engineers.

PART 1

LESSONS FROM ARNHEM.

Introduction.

1. In the ARNHEM operation, the initial engineer tasks - there were few subsequent ones - can be considered under two headings -
  - (a) Specific, (previously planned). Recce and 'coup-de-main' tasks, either under command of bdes or of the CRE.
  - (b) Indefinite, (unplanned) Engineer tasks in support of bdes or of Div.

Specific Recce and 'Coup-de-Main' Tasks.

2. 1 Para Sqn RE - in attack on ARNHEM main road bridge.

1 Para Sqn RE complete was committed initially under command 1 Para Bde, to seize the ARNHEM main road bridge. For assisting the advance of this Bde on to the bridge, neutralising and removing the demolition charges, and for assisting in the subsequent defence of the bridge area, the Squadron was suitably equipped. The portable flame-throwers were useful in the house to house fighting, and all other weapons were used offensively or defensively.

But this Squadron had an unnecessary number of officers (12 out of an establishment of 17) and of valuable tradesmen (there are 35 rank and file Group A to D out of a total of 127 rank and file in a Squadron for this initial task. Many were called upon to pay the supreme sacrifice in the hard battle for the bridge. The remainder, in the area of the North end of the bridge which they gallantly held and blocked for two days, were subsequently annihilated, captured or forced into hiding to evade capture.

3. 9 Field Company RE (Airborne) - Coup-de-Main Party for ARNHEM main road bridge.

A mobile detachment of 9 Fd Coy RE, in 4 jeeps, was detached under command the Recce Sqn to go on ahead of 1 Para Bde independently, to seize the main ARNHEM bridge. This force was delayed on the landing zone in marshalling the parachute and gliderborne elements. When it did get away, it met too much opposition on its way to the bridge. It was eventually held up, and 1 Para Bde passed through it.

In order to provide transport to equip this mobile detachment of sappers some equipment had to be left at home, and two platoons of this company were temporarily deprived of some of their little transport for equipment and tools. In view of the early engineer commitments in this particular operation this was justifiable, as the equipment left behind could normally have been made available from re-supply by air, if it had been wanted. Such temporary adjustment and flexibility must be accepted to produce efficiency in the many situations necessarily different to those envisaged when drawing up the War Establishment.

An important lesson however, is that even in a relatively unopposed landing from the air, such as this was on 'D' day, unless at least sub-units and detachments destined for specific tasks arrive self-contained, all by parachute or all by glider, the time liable to be wasted by concentration may prove to be the cause of less of most of the surprise value and the subsequent failure of individual tasks.

In this particular case 9 Fd Coy RE detachment all travelled by glider, but not in the next flight serials to the Recce Sqn, who partly arrived by glider and partly by parachute, on different grounds.

/4. 9 Fd Coy RE - Railway Bridge.

4. 9 Field Company RE (Airborne - in attempt to seize railway bridge West of ARNHEM.)

A platoon of 9 Fd Coy RE was detailed, unaided, to seize the railway bridge just West of ARNHEM. With its own arms, its men on bicycles, and its tools in two jeeps and trailers (a platoon has three jeeps and trailers, one trailer being a compressor trailer which in this instance was left with Coy HQ, which it was calculated the surprise arrival had every chance of giving them. But the bridge was ready for demolition and was blown up in their faces. It is reported that this platoon, without specific instructions for any alternative task, subsequently fought its way unaided to the pontoon bridge a few hundred yards West of the main road bridge at ARNHEM, and that it actually held it for a short period before everyone was either annihilated or captured. But no one has yet escaped to give the full story.

In the planning for the ARNHEM operation no coup-de-main party was detailed to seize the railway bridge (third in priority in comparison with the other two bridges) because none was available. The CRE was given permission to have a go at it with one platoon not then earmarked. Risks, calculated on the probable strength and action of the enemy, have to be taken in planning airborne operations, more even than in other operations, and it is not considered any fault of engineer organisation or equipment which led to the failure of this particular task - the capture of the railway bridge intact.

The platoon was led by a particularly forceful and brave officer. All ranks knew the Divisional tasks and general plan. The platoon commander's decision to attempt to seize, without specific instructions, the pontoon bridge after having failed in his initial task, cannot be judged in the absence of all knowledge of the local situation.

Engineer Tasks in Support of Bdes.

5. One troop or platoon was put under comd of each bde. The platoon of 9 Fd Coy under comd 1 Airlanding Bde was used within the first 24 hrs to destroy a park of enemy field guns. But its tradesmen were never used. Subsequently it was used as ordinary infantry, and on the last day but one, the surviving officer and other ranks were lost in carrying out a tank hunting patrol.

Mines (Hawkins Grenades) road blocks were laid from time to time, usually by sappers, sometimes by a detachment from HQRE as the infantry were too pinned to the ground in fighting.

Normally the best part of a troop or platoon is required continuously in support of a bde which is engaged in a fluid battle such as is likely in the first few days of an airborne operation. Initially however few, if any tradesmen other than pioneers are required.

The deduction appears to be that tradesmen should be organised in self-contained increments to troops or platoons or as separate troops or platoons. (See para 6 below.)

6. 4 Parachute Squadron RE.

4 Para Sqn RE arrived with and temporarily all under commander, 4 Para Bde on D + 1. From the beginning (when heavy opposition was met near the landing Zone) to the end, it was used almost entirely in a fighting role. Alongside the Independent Para Coy it put up an excellent fight, and accounted for more than one SP gun and a tank with its PsiAT. It could have done its job equally well though, with fewer officers and with no tradesmen.

/Leg bags.....

Leg bags containing engineer stores and equipment were attached to many sappers as they came down. But, owing to enemy action, and the necessity of concentrating for battle at the utmost speed, few of these were collected off the dropping zone. Because of the lack of transport and in an attempt to equip the unit with the necessary engineer stores and tools, sappers were, without question, greatly overloaded.

This is no new lesson. Sappers can fight or they can do field engineering. They cannot do both simultaneously. This parachute sqn had, for months - almost years - been yearning for a fight. It got it, and it did magnificently - as fighters - but to the complete detriment of any capacity for engineer work. Fortunately in this operation it was not required of it.

The deduction is that pioneers, in the form of light assault sappers, with few tools only, should be committed with bdes initially, if they are likely to have to fight or join in the battle on arrival. Tradesmen and tools must arrive in transport by glider, as self-contained increments to sub-units or as separate sub-units when, and not unless, they are required.

A sub-unit consisting almost entirely of tradesmen is not an economical sub-unit for field engineering. Dilution with a proportion of pioneers is nearly always possible, and, in both training and operations, more economical so far as the employment of tradesmen is concerned.

The deduction is that troops or platoons should consist of assault sections with technical increments. The former should all be parachutists, normally with few tradesmen other than pioneers, and with few tools and no transport. But they must be prepared, should the tactical situation demand it, to travel in gliders. The self-contained technical increments, consisting mostly of tradesmen, with tools, engineer equipment and transport, should travel normally in gliders - sometimes in aircraft. When married up with the assault sections, they would make troops or sections economical for all field engineering. Technical increments should be encouraged to be capable of parachuting, so that assault parties can be reinforced with particular technical personnel, should the situation demand it.

#### Subsequent Engineer Work.

##### 7. Detachment of 9 Fd Coy in a support role.

On D+1 a detachment of 18 OR of 9 Fd Coy, under command of an NCO, as no officer was available owing to casualties, was put under command of OC 2 South Staffs, who were sent into ARNHEM to reinforce the battalion of 1 Para Bde held up in house to house fighting in its advance to the main bridge. The detachment reported at the rendez-vous complete with its bicycles, but as the S Staffs force was on foot, it was ordered to leave its bicycles behind. This was the last ever seen of these bicycles which, with the area where they were ordered to leave them, fell into enemy hands shortly afterwards.

The deduction seems to be that bicycles are a mixed blessing and not always required. They occupy valuable room in the gliders which sometimes could be filled better with more personnel.

This force was eventually stopped by the enemy north of the railway bridge at the Western end of ARNHEM. It could make no further headway. In the subsequent heavy and involved fighting, all but a handful of the sappers detachment became casualties. The survivors were eventually withdrawn to 9 Fd Coy HQ two days later, by which time the company itself was employed in an entirely infantry role holding a sector of the Divisional perimeter.

Again, lightly equipped assault engineers would have done the job equally well. Mobility, in the form of bicycles until a better alternative is available, is required as soon as proper field engineering develops. But until then bicycles, like tradesmen, are normally wasteful and uneconomical. Should an airborne division in the later stages of an operation take on an infantry div role, then the sappers must be given complete mobility. A transport platoon PASC is necessary for each RE unit. Until then a proportion of bicycles should be sufficient. It would normally be sufficient to provide bicycles on a scale of one for each sapper of the technical increments to troops or platoons. This should provide sufficient for the equipment of sections with them, should the necessity arise.

#### Divisional Tasks.

##### 8. Organisation of Heavy Ferries across the RHINE.

On D+2, 9 Fd Coy (elements of HQ only were available) subsequent to a preliminary recce by the CRE, carried out a detailed recce of the ferry across the RHINE, North of DRIEL, and of the barges moored in that area, with a view to marshalling them on the North bank of the river, to assist the expected crossing of 30 Corps later on. Here steam and diesel engine drivers would have come in useful, had we been able to develop work there. But there was only one steam barge which was not grounded, and the ferry was lost before that one barge could be brought within our bridgehead area.

Divisional Engineers must include a small proportion of tradesmen of all categories likely to be required to operate all types of prime movers and machinery of essential services. One or two of the following should be available for inclusion in assault sections - steam engine, (railway and barge), diesel, electric, (power station, maintenance and railway) operations.

##### 9. Night Recce Patrols.

On the night D+2/D+3 two recces were carried out, each by one officer, one sapper, and one Dutch patriot, one on each side of the demolished railway bridge West of ARNHEM. One was carried out by the Field Engineer, and the other by an officer of 9 Fd Coy RE.

There is no Field Engineer on the establishment of HQRE of an airborne division. Both for training and operations, one at least is always essential and should in future be provided.

##### 10. Improvised Ferrying across the RHINE.

On the night D+3/D+4 a small party of 9 Fd Coy RE under the Field Engineer attempted to get some of the Polish Para Bde from the South of the RHINE where they landed across into the bridgehead area. Three rafts were successfully constructed from jeep 10 cwt trailers. But, by means only of recce boats, the current proved to be too strong, and defeated all attempts to put a line across the river, and work eventually was stopped by the CRE just before dawn, when the enemy would have caught the party in the open and under direct observation.

On the following night a composite party of a dozen battle-weary sappers of 4 Para Sqn and 9 Fd Coy RE were taken out of the firing line, and with all the recce boats which could be mustered - four in number - rowed 60 Poles across. One strong officer, the Field Engineer, crossed the 100 yards fast-flowing river twenty-three times that night - a great feat of endurance after three nights out on operations.

It was not until the following night that assault boats were made available by a Bde of 43 Div which had by then advanced from NIJMEGEN to the South bank of the River. Three hundred and fifty Poles were got across under their own Bde arrangements. The whole Polish Para Bde could have been got across, if sappers, or even infantry trained in watermanship, had been available to act as rowers. (The less said about the watermanship of the Polish Bde the better). But no Airborne Div sappers could by then be withdrawn from the fighting positions they were holding, and none of 43 Div were then available.

Had the Airborne Div had 30 assault boats available two nights earlier, sufficient sappers could have been mustered to get the whole of the Polish Brigade across in one night. Had the sappers been equipped with a line rocket firing apparatus, (necessary for improvised ferrying across the broad rivers of Europe and for effectively making serial ropeways across the gorges of Burma and the Far East), many more Poles could have been got across. But in the planning of the operation it was envisaged that when the Poles would be dropped South of the river, we would have been in possession of the ARNHEM main bridge. Bad WT communication prevented any last minute alteration of their dropping area, and were then in possession of no area suitable for bringing in assault boats by glider.

Line rocket firing apparatus must be on the G 1098 of at least the Fd Pk Coy RE of an Airborne Division. And if the map shows any large rivers in the vicinity of operations, engineer equipment suitable for ferrying all required loads should be earmarked and ready with gliders at the base to cover any eventualities, as materialised in this case.

11. The Field Park Company RE.

A Det of one officer and 12 ORs with three jeeps and trailers (two of which were initially loaned to the Para Sqns to provide them with additional transport for a few tools and engineer equipment) and a D2 tractor arrived on D and D + 1, a part on each day. This detachment was taken with the object of organising an RE Dump from captured equipment and the tractor was for assisting clearing the landing zone of stuck vehicles, tasks for which they were never called upon because of the turn of events. The majority of the Field Park Company with all the rest of its equipment had by the time of the operation already been in France some time with the Non-Airborne Echelon of the Division, waiting to move up. In view of the uses to which it could have been put, it is felt that this small commitment fully justified the risk taken.

Had operations proceeded more satisfactorily, an early task given to the Div RE would have been the construction (or the clearance of an existing) airstrip. This will be a normal early engineer task, and it would be wrong to consider it an abnormal one. Whether an Airborne Division be operating in Europe, when the early requirement for an airstrip will be the necessary sequel to a successful operation, or whether it be operating in the Far East when not only strips, but jeep tracks will have to be made through jungle, swamp or boulder country, a bare minimum of earth-moving equipment should be provided as an increment to the Fd Pk Coy, and will normally be required in the early follow up glider loads, if not actually initially.

## 12. Headquarters R.E.

Since shortly after the formation of 1st Airborne Division, a Field Engineer has proved essential, not only for operations, but for training. A HQRE throughout has less Field Engineering liabilities than that of an Infantry or Armoured Division, by no means has none. In addition it has such other commitments as Glider and Aircraft Allotments, loading training and supervision for operations and the organisation of resupply. All tasks which the Adjutant and Intelligence officer cannot take on in addition to their normal work. At least one Field Engineer has been permanently attached to HQRE from one of the Divisional RE units since the formation of the Division.

## MISCELLANEOUS.

### 13. W.T.

WT intercommunication throughout the Division and to Corps (except for the RA and the low wavelength long distance sets of Public Relations and 'Phantom') was, to put it mildly, unreliable; and the RE link was no exception. The Divisional RE had only recently been issued with their sets which were manned by clerks, tradesman sappers and all sorts of people already with other primary tasks. Much more training by personnel whose sole job is WT is required in the future. A high standard of WT as well as RT is essential for times when conditions are bad and distance great. All RE sets must be capable of fifteen miles RT in normal country to ensure good reception under bad conditions and in bad terrain. A properly trained Royal Corps of Signals Section is necessary for Div RE link to units.

### 14. Non-Operational Tasks.

The non-airborne echelon of units will often leave the base before the airborne echelon goes on operations. After all operational echelons have left the base, none is left except sometimes a few first reinforcements who are liable to be called on for operations.

Unlike other formations an Airborne Division often returns to its base in the course of a campaign. Permanent personnel are necessary not only to assist the unit on to operations, when it is denuded of, part or all of its non-airborne echelon, (in particular of administrative personnel) but also to maintain the base. A few low category sappers and a low category officer would prove invaluable for this purpose, and are in the interests of economy, a necessity. The alternative can only be that operationally fit personnel are tied up in these duties, which have got to be done by someone.

### 15. RE Airborne Holding Unit.

It may not be out of place to add to this report the urgent need for an RE Airborne Holding Unit. Airborne sappers, even airlanding sappers, require considerable specialized training. Their equipment is different to that of normal Divisional Engineers, and they have much extra to learn, apart from the actual parachuting or loading of gliders.

There is no regularized system whereby casualties from RE units of Airborne Divisions are not lost sight of when they become fit for duty again. There is no regularized system for obtaining volunteers or reinforcements. A small holding unit of approximately one hundred all ranks is much needed. This unit could economically be incorporated with a wing of the Airborne Development Centre, where technical labour is continuously required.

CONCLUSION.

16. Although it would be unsound to base too many recommendations for modifications upon the lessons of this particular operation, certain weaknesses in organisation and equipment have definitely been brought to the surface.

In the ARNHEM operation no big engineer commitments ever materialised. Consequently technical personnel, both officers and men, were used, a few as pioneers, but mostly as infantry - as which it must in all fairness be said they fought gallantly and superbly. On the other hand, although they had a considerable number of technical tradesmen, neither of the Para Sqns would have been capable of intensive or extensive engineering because of their lack of tools, equipment and the means to transport them on the ground. While the Field Coy had too few officers, the Para Sqns had too many.

In the next operation there may be a heavy engineering commitment - not least the hasty construction of airstrips, the seizure and prevention of demolitions of and operation of essential services; or in the Far East, the construction of jeep tracks, aerial ropeways and water supply. The huge loss of technical officers and sappers due to enemy action (in comparison to the relatively few casualties in the Div RA) points to an uneconomical organisation incapable of adaption to what (anyhow for the first three days) was not an abnormal operation. Increased flexibility in organisation and equipment is necessary to that Airborne Div RE can be adapted to each operation without an unavoidable waste of men and equipment - either tied up unused or wastefully committed to battle.

The Airborne Divisional Engineers as constituted at present whilst they lack certain essentials, are also neither flexible nor economical.



## Part II

### Recommendations for alternation of Organisation and Equipment of Airborne Divisional Engineers.

#### Introduction

1. The Arnhem operation was, perhaps, in its later stages, exceptional but the recommendations in this report, although they owe their origin to this operation, are not necessarily nor solely based upon it. They are designed to meet all normal requirements of an Airborne Division operating within the next twelve months in Europe or in the Far East.

They are designed to avoid an actual increase in personnel; to achieve an economy in officers and in technical tradesmen; and to meet all normal demands for engineers operating with an Independent Airborne Brigade, Para Tps, Airlanding or Mixed, or with a whole Division. No request for any equipment has been made which would be either uneconomical or unobtainable. The recommendations are submitted as a result of the conclusion (in Part I of this report) that the Airborne Divisional Engineers as at present constituted, whilst they lack certain essentials, are also neither flexible nor economical.

#### Cause of Present Weaknesses of Organisation.

2. The weaknesses are neither obscure in their origin nor do they cast any shadow upon those who have overcome great difficulties in getting this organisation and equipment of Airborne Divisional Engineers to its present standard. It is only recently that Para Bdes have become more normally employed within a Division rather than as in Independent Bdes. Consequent upon the normal employment of Airborne Divisions committed as a whole into battle, Divisional RE require modification. This can be done without detriment to the provision of sufficient engineers for at least one Brigade of a Division at any time acting in an entirely independent role.

#### Airborne Echelons.

3. Every Divisional RE unit must be capable of division into three main echelons ( (a) (b) (c) below). The airborne echelon may consist of one or more elements, according to the unit and the circumstances.

- |                        |  |   |
|------------------------|--|---|
| <u>Operational Tps</u> | (a) <u>Airborne Echelon</u>                    | (i) Parachute Element<br>(ii) Gliderborne Element<br>(iii) Airtransportable Element |
|                        | (b) <u>Non-Airborne Echelon (or Echelons).</u> |   |

In MT whether or not seaborne in addition.

#### Non-operational Tps.

- |                    |   |
|--------------------|---|
| (c) Base Echelons  | Low category men for despatch duty and base maintenance.  |
| (d) Holding Units. | Reinforcements and "X" List personnel. (All potentially operational except for low category permanent staff.) |

Brigade Initial Requirements.

4. Each Airborne Brigade of whatsoever type it may be, and whether acting independently or within a division as soon as it is committed to battle, normally requires initially parts or all of a lightly equipped and self contained Assault Troop or Platoon RE of approximately two officers and twenty to thirty sappers, mostly pioneers. This Assault Troop or Platoon must all arrive by parachute or by gliders. If it arrives all by parachute it will have no transport other than one or two cycles or Lt M/Cs. If it all arrives by glider it can be provided with any necessary transport.

Brigade Subsequent Requirements.

5. As the battle become more static, Troops or Platoons in support of Brigades should be readily capable of adaption to more normal field engineering as compared with their initial assault, 'coup de main', or recce tasks, whether such tasks remain Brigade, or for reasons of economy become Divisional ones under the CRE. Each Troop or Platoon therefore requires a technical increment consisting of tradesmen tools, equipment and transport.

For this purpose a self contained gliderborne or air transportable increment of one officer and fifteen to twenty technical tradesmen with transport is required by each Troop or Platoon.

One unit of these Troops or Sections composed on the above lines would be capable of nearly all Brigade tasks, and would equally be capable of concentrating for engineer tasks under the CRE.

Divisional Requirements.

6. Although little more than recce tasks may sometimes be initially required, the reverse may often be the case. All forms of land and water transport, Docks and essential services may have to be immediately seized and operated. It may be possible and essential immediately to commence construction of improvised roads, airstrips or aerial ropeways.

Sooner or later all or some of these tasks are likely to materialise. The minimum normal requirement is therefore for one further RE Field Unit, which for economy, flexibility and control, should be identical to that already outlined.

To meet only abnormal requirements will an additional Corps Tps Unit capable of being airborne or airtransportable, be required for a Divisional Operation, in addition to the two Divisional Field Units. Such an eventuality might be when all three brigades of a Division are concurrently called upon to act in independent roles.

Field Park Company.

7. The operational part of the Field Park Company is correctly organised as at present, except that it should include an Airstrip Constructional increment (equally well capable of track clearance for MT).

HQRE

8. A Field Engineer should be added to the existing establishment.

All RE Units, including HQRE.

9. All Divisional Units require an officer to be in charge of Non-airborne echelons. They all require a few low category personnel and a vehicle for base maintenance during the temporary absence of the Division on operations. These personnel would be invaluable in assisting the units when in the stage of departing on an operation.

RE Holding Unit/

Part II

Sheet 3

WT.

11. Personnel must be specifically provided for WT duties; Drivers RE for links within units and preferable a R.Sigs Section for links from CRE to units. If a R.Sigs Section is not available, a special allotment of Drivers must be provided for this purpose.

12. Proposed detailed establishments or amendments to establishments have already been prepared in draft and will be completed as soon as these recommendations have been approved in principle.

The final establishments show no overall increase in operational personnel and a decrease in the overall strength of Officers and Technical Tradesmen.