Inches 1 2 3 4 5 6 7 8

Centimetres 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

Colour Chart #13

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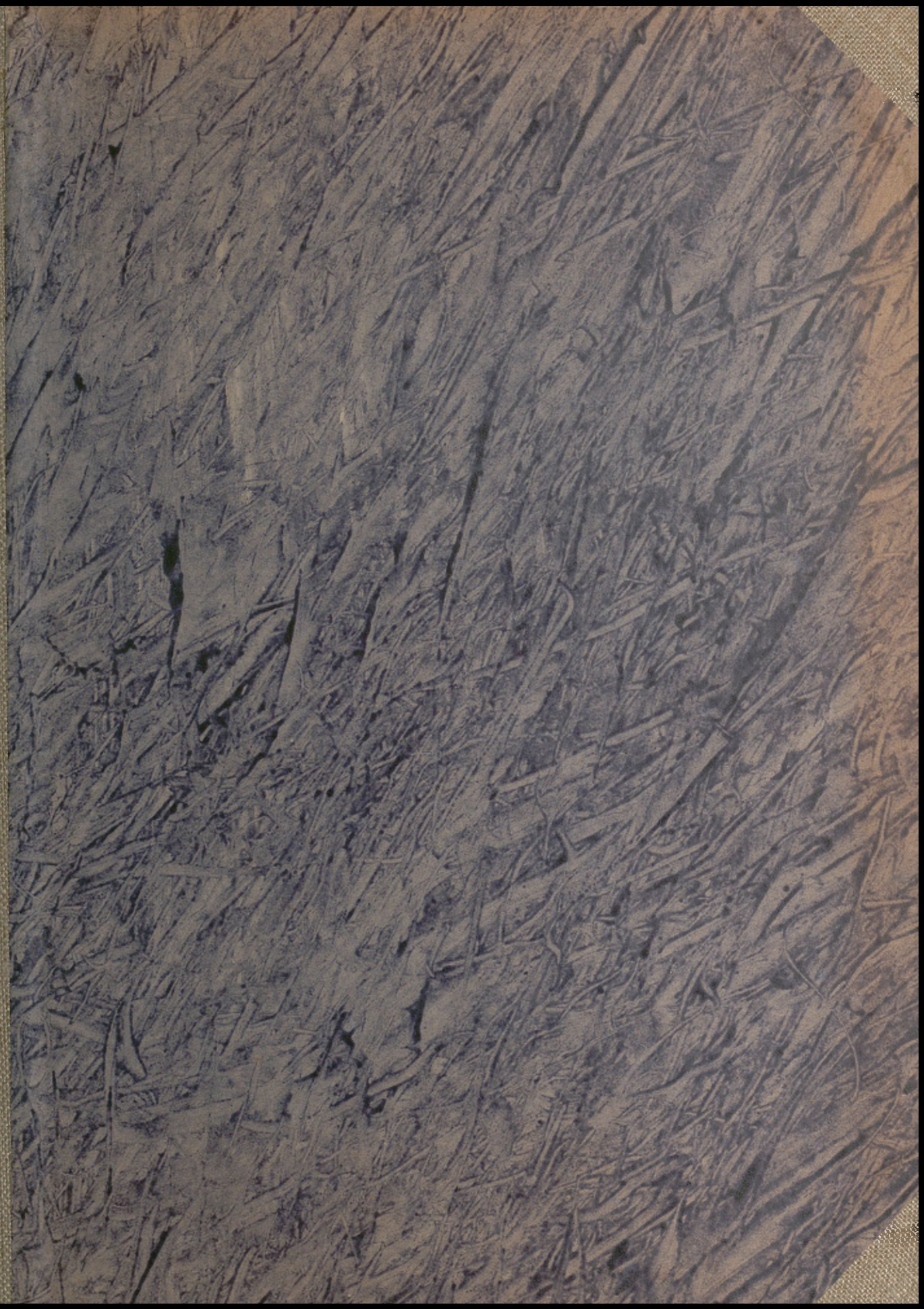
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LESSONS from OPERATIONS Oct. and Nov. 1942

XXVII.6.9

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— PART I —

NARRATIVE OF OPERATIONS

Ref. Maps 1 and 2

1. Introduction

At the end of the German 1942 summer offensive, the battle front was finally stabilised on an approximate North and South line from TEL EL EISA to HIMEIMAT.

During the latter part of July two attempts were made to dislodge the enemy but both failed chiefly through lack of men and weapons. At the beginning of August when General Montgomery assumed command of the EIGHTH ARMY it was decided not to attempt further attacks until we had built up a strong striking force, particularly armour.

But before this could take place it was appreciated that the enemy could attack. This he did at the end of August, breaking through the January—February minefields North of HIMEIMAT and moving N.E. up to the ALAM HALFA positions. 13 CORPS were given the task of stopping him without themselves incurring heavy casualties. This they did (with the help of the R.A.F.) chiefly destroying supply echelons.

When the enemy withdrew after some ten days' fighting he retained possession of the January—February minefields and the MUNASSIB locality. But it was appreciated that the casualties he had suffered made it very unlikely that he would be able to attack again for some considerable time, and preparations for our attack began at once, consisting of:—

(a) Formation of 10 CORPS (the new armoured striking force).

(b) Intensive training in breaking through minefields at night.

2. Plan

The grouping of the Eighth Army for the battle, enemy grouping and the break-in objectives are shown in Map 1.

The task was to break through defences which had been built up over the last three months. The minefields alone were known to be some 5,000 to 9,000 yards in depth.

The Army Commander's plan was to make his major attack in the NORTH with a subsidiary attack in the SOUTH.

Two gaps were to be made in the minefields in the North through which 10 Corps was to pass, the attack was then to swing South with the armour protecting the Western flank.

In the South one gap was to be made through which 7 Armd. Div. was to pass. The attack was then to swing North with the armour protecting the Western flank and attacking as opportunity offered. But the attack in the South was not to be pressed if heavy casualties were to result as it was likely that some of 13 Corps' infantry and armour would be required at a later stage to assist in the break-through in the North.

The real task of 13 Corps was to behave in such a way as to make the enemy think that a major attack was also to take place in the South, and so contain his forces (particularly 21 Armd. Div.) there.

3. The Break-in

With a full moon, the attack started at 2200 hrs. 23 Oct. along the whole front preceded by 20 minutes intense counter-battery fire (smoke was first put down on the F.D.L.s to ensure that the enemy gunners were manning their guns).

Some 800 guns were employed and as a very large number of enemy battery positions were known either by air photographs or flash-spotting, considerable damage must have been inflicted.

All our guns changed to prepared positions prior to the attack and the enemy's counter battery fire was ineffective.

At 2200 hrs. all guns switched on to the F.D.L.s for 7 minutes after which they were given back to Cs. R.A., and throughout the attack fired barrage, concentrations and counter-battery.

Northern Attack

(a) 23-24 *Oct.* In the North the attack went in on a four Divisional front between 299 and 287 Northing grids. The objective was the line of the MITEIRIYA RIDGE approximately 86702990-86802930-87802870. The objective was divided approximately as follows:—9 Aust. Div. South to 86702960, 51 (H.) Div. South to 87002920. 2 N.Z. Div. South to 87352896 and 1 S.A. Div. (who turned their right shoulder to conform with 2 N.Z. Div.) South to 87802870. 4 Ind. Div. also carried out raids along the 285 Northing grid and RUWEISAT RIDGE, and 24 Aust. Bde. did a feint attack (assisted by a barrage fired by the 4.2 inch mortars of a C.W. Coy.) between TELL EL EISA and the Coast. In conjunction with the main assault one Greek Brigade under command 50 Div. also carried out a successful raid South of the Ruweisat Ridge.

Sappers and infantry advanced together but only stopped to deal with A. Pers. mines. A. Tk. mines were dealt with by the minefield Task Forces following up in rear. These sappers also used Scorpions. (These only arrived a few days before the battle and owing to serious engine over-heating were only partially successful).

An R.E. officer with a telephone and sometimes a W/T set established himself at the entrance to the gap to be made in the minefield and was entirely responsible for the clearing of that gap, first to a width of 8 yards and later to a width of 24 yards.

Further Sappers following up behind marked the routes with coloured lights (generally coloured hurricane lamps placed in perforated petrol tins). Each Bn. had a different colour so that supporting arms, etc., following up behind had merely to follow their colour. Red was not used as a colour for marking the routes, this colour being given to T.Ps established along the routes, and if for any reason a column had to be stopped the red light was shown.

Lifts in the barrage (100x every 2 1-2 to 3 mins. with occasional longer stops on selected areas of resistance) were marked by smoke.

Direction was kept by compass and assisted by Bofors guns firing tracer on a flat trajectory down the flanks of Bdes. at every lift in the barrage. The position of forward troops was indicated by periodical bursts of Bren tracer fired vertically, and they in turn could tell their position by re-section on searchlights shining vertically placed at intervals along the front some 15 miles back.

Important W.T sets and 2-pr. A. Tk. guns were often towed by carriers to prevent their becoming stuck in the sand.

Although we gained complete surprise, fighting was very bitter, but by first light on the 24th the objective, with few exceptions, was taken (these exceptions were all made good by the 26th. See Map 1).

(b) 25 *Oct.* The armour which was to pass through (1 Armd. Div. in area of the «KIDNEY FEATURE», square 866295, and 10 Armd. Div. in the area of EL WHISKA, square 869291) arrived at the F.D.Ls between 0900 and 1000 hrs., but owing to further minefields and a strong A.Tk. gun screen with enemy armour in open country behind, it was not possible for our armour to get forward and it remained throughout the day on and behind the MITEIRIYA RIDGE, engaging enemy tanks and guns at long range.

On this day the enemy put in a number of armoured counter attacks in the area of the «KIDNEY FEATURE», all of which were repulsed.

(c) 25-26 *Oct.* The Northern flank of the Australians was bounded by high ground and on the night 25-26 26 Bde. (whose front had been taken over by 20 Bde. on the previous night) attacked and took Pt. 29 (868300) and the high ground running more or less due East from it.

10 Armd. Div. was to be employed with 1 Armd. Div. to exploit from the Northern gap so 24 Armd. Bde. came up on the left flank of 1 Armd. Div. and 8 Armd. Bde. with 133 Lorried Inf. Bde. moved into reserve. 9 Armd. Bde. remained with the New Zealanders on the MITEIRIYA RIDGE.

(d) 26 *Oct.* During the 26th 1 Armd. Div. with 24 Armd. Bde. operated offensively in the area of the «KIDNEY FEATURE» inflicting further casualties on enemy armour.

Up to now the main enemy striking force had not been met. 21 Armd. Div. and Ariete Armd. Div. were still in the South and 90 Lt. Div. remained on the coast. The enemy's failure to concentrate his mobile striking force enabled us in the first three days to drive a great salient into his defences with considerable losses to him in men and material, and also to inflict crippling casualties on his armour in the North.

Southern Attack

(e) 23-24 *Oct.* In the South, 44 Recce Bn. with a Bn. of 131 Bde. (1-7 Queens) were to make gaps in both the January and February minefields between the 258 and 256 Northing grids, through which 7 Armd. Div. (22 Armd. Bde. and 4 Lt. Armd. Bde.) was to pass. Simultaneously the 1 Free French Bde. was to attack HUNTER'S PLATEAU (the high ground to the West of HIMEIMAT).

The January minefield was penetrated but owing to some carriers of 44 Recce. Bn. running on to a mine-marsh some 1000x short of the February minefield, the sappers, thinking they had reached the February minefield, spent the remainder of the night clearing it and when dawn came they had not reached the February minefield.

Dawn found tanks, carriers and infantry between the two minefields, and their position was made extremely uncomfortable by the fact that the Fighting French attack on Hunter's Plateau, the high ground to their South, had failed.

The Free French attack came in from the South, an aerial smoke screen having been laid East and West just North of the Plateau to encourage the enemy to look in the wrong direction, but they were unable to get their A.Tk. guns on to the plateau owing to the very difficult going in the approach march, and when counter-attacked by tanks of the KIEL Group were forced to withdraw.

(f) 24-25 *Oct.* On the night 24-25 a further and successful attempt was made by 131 Bde. (44 Div.) to penetrate the February minefield. They established a bridgehead some 500 yards in front of the minefield but when 22 Armd. Bde. came through and deployed they not only ran on to another mine-marsh, but also met a strong A.Tk. screen.

It became apparent, however, that 22 Armd. Bde. could not push on without suffering heavy casualties and it was decided to call off the attack and withdraw the armour. The infantry consolidated their positions and improved the gaps in the minefields.

(g) 25-26 *Oct.* On the night 25-26 an attack was made on MUNASSIB by 69 Bde. (50 Div.) assisted by 4 Lt. Armd. Bde. but this was only partially successful, the infantry being driven off by mortar fire and the armour again running on to a mine-marsh.

Little else happened on the 13 CORPS front throughout the battle, but their main task of containing the enemy forces, particularly 21 Armd. Div., in the South had been successfully fulfilled as 21 Armd. Div. did not move North until the night 26-27.

4. Enemy Counter-attack, 27th October

A change now took place in the enemy's conduct of the battle. During the night 26-27 he concentrated his striking force, bringing 21 Armd. Div. up from the South and releasing 90 Lt. Div. from their coast defence duties.

On the 27th he launched a number of very heavy armoured counter attacks in the area of the «KIDNEY» feature, all of which were repulsed with heavy losses (2 R.B.—7 Mot. Bde.) alone claiming 57 tanks. Pt. 29 on 9 Aust. Div. front was also attacked, but this attack was also beaten off.

On the 28th he again prepared for a large scale armoured counter attack in the area of the «KIDNEY» feature but his tanks were so heavily bombed by the R.A.F. when they were concentrating for the attack that it never developed.

5. Change in Army Comd's. Plan—27th October to 31st October

Apart from the infantry continually improving their positions, the line of the MITEIRIYA RIDGE had remained stabilised from the 24th. The momentum of our attack was in danger of stopping and the armour was still not through. The Army Comd. therefore decided to abandon the plan of breaking through the MITEIRIYA RIDGE and driving South, and switched his attack Northwards. At the same time he concentrated a force for the final break-through Westwards.

(a) 27-28 *Oct.* On the night 27-28 2 N.Z. Div. and 9 Armd. Bde. came into reserve, their front being taken over by 1 S.A. Div. who in turn were relieved by 4 Ind. Div. 4 Ind. Div. passed to command 13 CORPS whose Northern boundary was then extended to the 290 grid. 7 Armd. Div. and 151 Bde. (50 Div.) came up from the South.

(b) 28-29 *Oct.* 152 Bde. (51 (H.) Div.) took over the front of 20 Aus. Bde. who, with 26 Aus. Bde., on the night 28-29 attacked successfully Northwards. Throughout the 29th the enemy launched numerous heavy counter attacks on the Australians with tanks and lorried infantry but all were beaten off and the final line reached ran roughly 86803040 96903040—86903020—87403000. The right was held up by very strong opposition and extremely extensive minefields in the area of THOMPSONS POST (square 871302).

(c) 29 *Oct.*-1 *Nov.* On the night 29-30 20 Aus. Bde. took over the front of 26 Aus. Bde. who on the night 30-31 resumed the attack in a N.E. direction, succeeded in crossing the road at 87083048 and pressed forward to the coast and Eastwards down the road. This attack trapped 125 Panzer Grenadiers (164 Div.) in the area of THOMPSONS POST and the enemy continued to launch furious attacks to free them. All these attacks were repulsed but owing to lack of numbers the Australians were forced to consolidate on the line 86803040 — 87083048—87103010—878403000 and the majority of 125 Panzer Grenadiers managed to slip out between them and the coast. The 9 Aus. Div. put up a magnificent effort, fighting both themselves and the enemy to a standstill. On the night 31 Oct.-1 Nov. 24 Aus. Bde. who had remained in their original F.D.Ls. on the coast, changed places with 26 Aus. Bde.

6. The Break-out

The enemy appears now to have appreciated that we intended to drive up the road and he moved 21 Armd. Div. from the area of TEL EL AQQAQIR and positioned them together with 90 Lt. Div. in the North. In the area vacated by 21 Armd. Div. he put his last reserve, the Trieste Div. Whilst he was thus fully extended, and, obliged to concentrate his forces to counter the serious threat in the North, we resumed our attack in a Westerly direction further South.

(a) 1-2 *Nov.* On the night 1-2 Nov. 151 Bde. (50 Div.) and 152 Bde. (51 (H.) Div.), both under command 2 N.Z. Div., attacked between the 301 and 297 Northing grids, with the objective the 863 Easting grid. 28 Maori Bn. co-operated in the North by attacking North West to gain the line 86803020—86603010 and so maintain touch with 20 Aus. Bde. on their right. 133 Lorried Inf. Bde. co-operated in the South by attacking South West to gain the line 86602960—86502970.

9 Armd. Bde. were to pass through and form a bridgehead across the RAHMAN TRACK through which 1 Armd. Div. and 7 Armd. Div. were to pass.

The infantry gained their objective before first light and some of the Royals (Armd. C's.) passed through and carried out raids on enemy communications and supply echelons in the area South of DABA. 9 Armd. Bde., however, soon ran into an extremely formidable A/Tk. gun screen which ran approximately from 865302 West to RAHMAN TRACK—down RAHMAN TRACK to TEL EL AQQAQIR—S.E. to 863295 and consisted of some 20—25 88mms. supported by a vast number of smaller guns. All available artillery had been employed to support the infantry attack and F.O.Os. coming forward after that attack could not find the R.V. with 9 Armd. Bde. in the dark. Consequently 9 Armd. Bde. went forward unsupported by artillery. Throughout the 2 Nov. 9 Armd. Bde., handicapped by the loss of many sqn. comds. early in the battle, fought a gallant action against the screen and enemy armour which attacked from the West and North. Although they lost 98 out of their 133 tanks, they inflicted very heavy casualties on the enemy's tanks and A/Tk. guns.

(b) 2-3 *Nov.* In the afternoon of the 2nd, 51 (H.) Div. broadened our salient as far SOUTH as the 295 Northing grid.

On the night 2-3 Nov., 7 Mot. Bde. tried to extend our salient WEST of the RAHMAN TRACK, but the only objective which was held was the TEL EL AQQAQIR feature (2 K.R.R.C.), the other objectives to the North, although captured during the night and had to be abandoned as the positions were untenable by day.

On this night also there were definite signs of the enemy preparing to withdraw along the whole front, although by morning the anti-tank gun screen, pushed back a little at its Southern end, was still in position. Our armour was still not through and 1 Armd. Div. and 8 Armd. Bde. (8 Armd. Bde. having relieved 24 Armd. Bde. on night 28-29) continued to press the enemy frontally throughout the day.

(c) 3-4 *Nov.* On the night 3-4 the direction of our attack was swung South West in order to outflank the enemy anti-tank gun screen, and the RAHMAN TRACK was taken as far South as 85932910. This latter objective was taken by 5 Ind. Inf. Bde. (4 Ind. Div.); the other positions South of TEL EL AQQAQIR by 51 (H.) Div.

The Indian Bde. attack was laid on in a great hurry and they had a particularly difficult time. They had to move from their positions on the MITEIRIYA RIDGE in the area of 875289 to their Forming-Up Point (866296) during the afternoon, but by the time they arrived it was dark and Bn. Commanders had great difficulty in collecting their battalions, and owing to darkness, clouds of powdered sand stirred up by vehicles and a confusion of tracks and minefields, only 1 1/2 battalions arrived in the start line even after zero had been put off an hour. But the Brigade Commander (Brig. Russell) went through the 8,000 yard attack and the objective was captured by first light.

(d) 4 *Nov. onwards.* On the morning of the 4th the enemy anti-tank gun screen had moved North-West to approximately SIDI ABD EL RAHMAN—860303—West to 850 Easting grid, and 1 Armd. Div., 7 Armd. Div. and 2 N.Z. Div. crossed the RAHMAN TRACK into open country and the chase was on (see Map 2).

2 N.Z. Div. and 4 Lt. Armd. Bde. went to FUKA and prevented the enemy making a stand there, while 1 Armd. Div. and the remainder of 7 Armd. Div. were directed on MATRUH. Here we had our first stroke of real bad luck; it rained so heavily that our armour became badly bogged and was unable to reach MATRUH in time to cut off the enemy.

In the South the four Italian Divisions had been left by the Germans with no transport and little food and water. 13 CORPS formed their relatively few troops into mobile columns and drove through the Italians as far as the pipeline track meeting very little opposition; there they turned about and rounded them up.

Part II—GENERAL LESSONS

Sec. 1	—	Introduction
2	—	Training
3	—	Co-operation
4	—	Initiative
5	—	Concentration—Dominance of Artillery
6	—	Influence of Minefields
7	—	Camouflage
8	—	Regrouping
9	—	Move Forward of Armoured Division
10	—	Control of Road Movement
11	—	Army-Air Co-operation

Appendix C	—	Diagram No. 1	— Divisional Minefield Gaps.
Appendix D	—	Diagram No. 2	— Control Arrangements for Move of Armoured Divisions Through Minefield Gaps.

— PART II —

GENERAL LESSONS

1. INTRODUCTION

1. The lessons in this memorandum are drawn from experiences gained in one specific type of operation, planned in great detail, much of it rehearsed, and designed to meet one particular set of conditions.

2. The operation consisted of an initial full scale infantry «break-in» attack with limited army tank support, against prepared enemy defences heavily mined but by normal standards not strongly wired, with the object of opening up a gap for the move forward of armoured formations, and at the same time creating for them the opportunity for decisive action in the open country beyond.

This initial attack was followed by a period of ten days «dog fight», comprising a series of highly co-ordinated infantry attacks on narrow fronts, occasionally with army tank support, widening and extending the initial gap, until such time as the enemy prepared minefield area had been secured, and the way opened for the break through battle by armoured and mobile formations.

All infantry attacks were made by night in moonlight under the strongest possible artillery support.

3. The above factors and the particular conditions of this desert battle as outlined below should therefore be borne in mind when reading this memorandum.

(a) The opposing forces had been in contact for a period of approximately 4 months.

(b) The featureless nature of the country and entire lack of cover and landmarks.

(c) The mass of known and unknown minefields.

(d) The initial restriction of all wheeled and track movement to narrow track gaps through these minefields, and the physical difficulties of such movement.

(e) The unrestricted movement of wheeled and tracked vehicles when clear of minefields.

4. The problem of the forcing of an obstacle, and subsequent passage of armoured formations will, however, re-occur in varying forms whenever

(a) two opposing forces remain in contact for any period.
and
(b) flanks are secure.

and, whether this obstacle is the minefield encountered in the desert, or the natural obstacle supplemented by minefields which will undoubtedly be met in Europe, the problem is fundamentally the same and can be divided into the following phases:—

(a) Initial bridgehead attack.

(b) The gapping or bridging of the obstacle, or both. Marking routes. Move forward of essential infantry support weapons and vehicles.

(c) In the case of a defensive system of any depth, the controlled co-ordinated «dog fight»; the wearing down of the defender, widening and deepening the bridgehead.

(d) Move forward of the mobile striking force—deployment beyond the obstacle.

(e) Launching of the mobile striking force.

Many of the lessons from this desert battle bearing on the above problems are therefore applicable to a similar operation in normal country, and the diagram in this memorandum should be studied in conjunction with those in Military Training Pamphlet No. 23, Pt. VIII, 1942, «The Infantry and Armoured Divisions in the opposed crossing of a Water Obstacle».

4. Finally this operation shows that even with the introduction of new weapons, and new technique, that between two equally armed opponents the brunt of the fighting will still normally be borne by infantry formations, and, as was found at ALAMEIN, against a stubborn co-ordinated defence, there will seldom be enough infantry for all demands.

The launching of the armoured formations supported by other mobile troops of all arms remains the decisive act of battle, but it would seem that in the majority of cases with the present predominance of minefields and the ever increasing number and weight of anti-tank guns, this opportunity must first be created by the action of infantry divisions.

2. TRAINING

5. All formations from Headquarters to sub-units trained systematically for this operation, and to this must be attributed a large measure of the success obtained.

6. A description of the training carried out is a story in itself, briefly training took the following forms:—

(a) A forceful training directive from the Commander indicating his intention, aim of training and standard to be achieved. This is always the first essential.

(b) Model discussions on the handling of respective formations in the attack under conditions in which the battle would be subsequently fought, and formulation of battle drills to meet the particular problems.

(c) Training Exercises following on from the above discussions and T.E.W.T.S. developing and perfecting the technique of battle drills.

(d) Use of scale models of the ground over which the battle would be fought and explanation, demonstration and discussions of actual attack plans.

(e) Full scale training rehearsals of the actual attack with live ammunition.

3. CO-OPERATION

7. The successful co-operation between the three Services, and within the Army itself is self evident.

The former was the result of intimate planning and the closest possible liaison between Commanders and the respective Staffs.

The latter was due to the intensive training carried out before the battle.

4. INITIATIVE

8. The following extract is from Eighth Army Training Memorandum No. 1.

«Strive always to gain and keep the initiative. Given the initiative you can make the enemy dance to your tune.»

9. This is well exemplified in the course of the battle, and is a major reason for the success of the operation.

10. The enemy was deceived as to the actual time and place of the attack. This initial successful break-in was followed by a number of powerful highly co-ordinated attacks on varying axes, but all inter-related, aimed at clearing the minefield zone, crippling the enemy and preparing the way for the final blow.

11. The enemy was therefore never allowed to recover from the initial set-back of the break-in, and for this reason his stage-management of the battle was at fault throughout. His troops fought stubbornly as they always will, but he was thus forced continually to parry blows, seldom to initiate them.

12. It would seem that he maintained and fought in mixed battle groups long after their usefulness had ended. His counter attacks were piecemeal and bore no resemblance to his massed effort of the past, and he was in fact forced to repeat many of our faults of certain earlier operations.

13. This lesson of the power of the initiative and planning ahead — both are complementary—cannot be too highly stressed. It has been given much lip service in the past, but seldom has it been put into effect in practice.

5. DOMINANCE OF ARTILLERY

14. Artillery correctly handled is a battle winning factor of first importance. It dominated the ALAMEIN battle.

15. Artillery should always be centralised under the highest Commander possible, usually the C.C.R.A. and never below the C.R.A. In the initial break-in attack it was the former. In the later attack during the «dog fight» period it was normally the C.R.A.

16. As an example of the concentration and flexibility of the artillery arm, the following points are interesting:—

(a) The attack of 26 Inf. Bde 9 Aus. Div. northwards across the railway and main road on night 30-31 Oct. was supported by Field artillery of three infantry divisions plus one field regiment, one armoured division and three medium regiments, with an approximate total of 360 guns.

(b) The attack of 151 and 152 Inf. Bdes. under command N.Z. Div. on night 1-2 Nov. was covered by field artillery of two infantry divisions plus one field regiment, two armoured divisions and two medium regiments—with an approximate total of 320 guns.

(c) The attack of 5 Ind. Inf. Bde. on night 3-4 Nov. was covered by ten field and two medium regiments. with total of 270 guns.

17. This intensive employment of artillery obviously demands a very high standard of training and physical fitness on the part of all ranks.

6. INFLUENCE OF MINEFIELD

18. The minefield at present exerts a dominating influence on operations. It controls the method and form of attack.

19. The problem is dealt with in detail later under sections dealing with the various arms. The following general points should be noted.

(a) The minefield problem is fundamentally the same as the river crossing except that in the latter the forward edge of the obstacle is definite and known. In the former it is not. This uncertainty adds considerably to the problem.

(b) The forcing of this obstacle is a task of the first magnitude and requires:—

(i) The most careful planning, and the issue of detailed orders.

Arrangements must be thorough and flexible. The plan may cater for four gaps. There may be only one usable when the time comes, and arrangements must be such that the move goes on with only one. Centralised control is necessary.

(ii) High standard of staff duties in corps, divisions and brigade, particularly in the complicated moves of formations and transport to assembly areas and forward to forming up area. Good preliminary arrangements inspire confidence, and a bad start may jeopardise the whole operation.

(iii) A rigid drill for the gapping, marking and lighting of gaps. For the organisation of a minefield task force see Part III, Sec. 4, paragraph 11.

(iv) A rigid system of traffic control and drill for movement through the gaps and action beyond.

The first problem is the move and «marrying up» of infantry support weapons and essential fighting vehicles. This phase may be repeated several times as infantry formations fight their way through the enemy minefield zone.

The second is the move forward and deployment of armoured formations.

All must be carefully marshalled, formed up in the order in which they are required in action.

(v) Constant practice.

(c) Appendix «C» shows in diagrammatic form the gaps made on one infantry division front—others were similar.

Appendix «D» shows in diagrammatic form the control arrangements for move of armoured formations of 10 Corps through minefield gaps.

(d) There are two possible methods of getting through an organised minefield defence.

(i) The first is by forcing an initial infantry bridgehead, followed by the clearing of definite gaps by hand through which tanks and vehicles can be brought.

This proved successful at ALAMEIN due mainly to the density of artillery supporting fire; the fighting spirit of the troops; the high state of training of infantry in night attack and Engineers in mine gapping; the relatively small number of anti-personnel mines and thinness of the enemy wire.

But, against a position thickly wired and extensively anti-personnel mined, this form of attack might prove extremely difficult. The problem is then similar to 1918 except that the tank is in its turn mastered by the mine and the anti-tank gun.

(ii) The second, and at present untried method is by use of scorpions in large numbers followed directly by armoured or infantry formations. Definite maintenance gaps will then be cleared and marked as in the first method.

This overcomes the problem of the anti-personnel mine, but at present the scorpion is unable to «thrash» in high wire. It is also problematical whether armoured formations unaided would be able to overcome a strong anti-tank gun defence.

It is obvious therefore that the problem of forcing a minefield is as yet in its infancy. The enemy is also studying the lessons of this battle and, being the loser, will be the first to change his tactical methods. It is certain that for our next major attack a new technique will be required.

The experiences gained at ALAMEIN are invaluable, but only as a basis for further study and development of new technique.

(e) In the last war we invariably attacked at dawn. During the last 4 months the problem of lifting mines has lead inevitably to a moonlight infantry attack. This has obvious advantages. It has many disadvantages, the main one being rigidity. The enemy now expects us to attack with the moon.

Other methods must be tried. A dawn attack is impossible when dealing with minefields. A night attack without the moon should be possible with a sufficiently high standard of training and in reasonably open country. The attack in the late afternoon under cover of smoke and strong artillery support timed to reach the objective at last light should also be feasible and limits the scope of enemy counter attack and gives the whole night for clearing gaps and movement of essential support weapons and transport.

(f) All arms must be capable of lifting mines.

(g) Finally experience has shown that against organised minefield defence a silent attack has no hope of success.

7. CAMOUFLAGE

20. Schemes of operational camouflage formed a large and integral part of the deception plan. They were successful, and the true direction, weight and date of the offensive was concealed from the enemy.

21. For security reasons, detail of the plan cannot be published. Technical information as regards methods employed will be distributed at a later date, through D. Cam. as an «Officer Only» document.

22. To produce an appreciable effect by comparison with the size of the real concentrations and operations it was necessary to employ very considerable resources in manpower, materials and transport.

No revolutionary principles of camouflage were applied. Certain new, simple and most effective methods were devised for hiding concentrations, dumps and weapons, and for creating «Phantoms» on a very large scale. These were a normal part of the technical camouflage planning to meet existing conditions; they were not of themselves the decisive factor.

23. The new and decisive feature was the thoroughness with which the camouflage schemes were co-ordinated by the General Staff, knit into the main plan of battle from the very start and set in motion as a military operation. The excellent liaison and co-operation with all Planning and Provision Staffs, Services and with Formations and Units of All Arms also had good results.

It is worth quoting the conditions which are described in Middle East Training Pamphlet No. 8 (Part IV) as being indispensible to the efficient operational employment of camouflage.

«Whether attempting the camouflage of new installations at Base, or defence lines in areas not yet operational, or schemes of operational camouflage close to the battle, the best results will be achieved by fulfilling as far as possible the following order of events:—

(a) The Commander makes known his camouflage intention as far ahead as possible.

(b) The Camouflage Officer reconnoitres by air and on the ground.

(c) The Camouflage Officer writes and submits his appreciation and plan.

(d) A conference called by «Plans» or «Operations» makes the necessary adjustments. G.(O.) hold the balance through knowledge of Operational necessities.

(e) G.(O.) decides priorities, allocates resources, and issues orders.

(f) G. (Camouflage) arranges Technical supervision of Execution and Maintenance».

24. Unit and Individual Camouflage.

Besides the Army schemes much excellent work of concealment and deception was carried out in the Forward Defended Locality areas by subordinate formations and units for themselves. Final positions were prepared in very forward localities under ground observation. In some cases troops had to occupy these positions and remain motionless for many hours of daylight.

Some units displayed a high standard of skill and intelligence and of camouflage discipline in these tasks. It was noticeable, however, that the standard was highest in those formations which had taken trouble to employ their own Camouflage Staff Officers and Camouflage Training Units to the best advantage and applied them to suitable tasks during both training and operational periods. The advantage which formations can derive from careful and energetic employment of their own Camouflage Staffs and Training Units can not be too strongly stated.

25. Camouflage Units.

The main tasks of camouflage companies were (a) the manufacture of large quantities of devices and special equipment in the field and (b) subsequently, in supervising non-technical work parties and units employed on the erection and maintenance of the schemes.

The Camouflage Companies were indispensible as were certain Camouflage Training Units borrowed from their parent command or formation and employed on small operational tasks.

It was also found necessary to establish and man a special camouflage store at railhead to handle the large volume of special materials and equipment manufactured, used and subsequently recovered.

8. RE-GROUPING

26. The view is often expressed that although infantry and armoured brigades must be able to fight under other divisions when required, the best results will only be obtained when they operate under the commander and staff who trained them, and that when this policy is departed from, longer time must be allowed so that detailed preparation can be made to counter possible confusion through lack of mutual understanding.

27. This is undoubtedly true. Divisions should be fought as divisions under their own commander and staff, and if divisional components are taken away for a specific task, they must be returned to the parent division immediately this task is completed.

But, the question of lack of «mutual understanding» when a formation is placed under a command other than its own is in itself an admission of weakness in our training. The problem should be one only of a personal nature and not in the method of fighting.

28. The essence of handling modern formations is to regroup and balance the right type of formations in the right proportion for each specific task, and although the aim always is to fight divisions as divisions this regrouping is essential and inevitable on occasion, particularly during the period of the «dog fight».

29. The standard of training therefore within the Army must be such that this regrouping is possible with the minimum of dislocation and loss of efficiency. The basic training essentials are:—

(a) A common military language.

(b) A common and accepted tactical doctrine on all matters.

(c) A common method of approach to all tactical problems.

30. These have never been strong points of the Army in the past, and the aim of future training must be to rectify this handicap.

9. MOVE FORWARD OF ARMOURED DIVISIONS

31. The armoured divisions should not be called forward until it is known that a gap has been made through the enemy minefield and an adequate bridgehead established.

32. This obviously lessens the measure of surprise and may give the enemy time to patch up his defence, put down a further anti-tank screen and, if necessary, re-position his armour. But if called forward too early, the armoured divisions may be embroiled in local «dog fights», or caught by the enemy air or artillery hemmed in between minefields and hopelessly congested.

This does not apply to tanks of Army Tank Brigades pushed forward in support of the infantry attack and reorganisation. These should go forward early, and this tank must have a good gun equal to that of tanks of the Armoured Division.

33. The need for well organised liaison between infantry and armoured divisions, good communications and forward positioning of commanders is self obvious if no time is to be lost between establishing the bridgehead and launching of the armoured formations.

10. CONTROL OF ROAD MOVEMENT

34. The importance of control of road movement in rear areas by formation staffs is again stressed.

35. The Eighth Army advanced much more rapidly than the railway, which meant that 3rd line maintenance convoys were called upon to cover ever-increasing mileages from railheads and sea-heads. It is readily apparent that the distance which a force can operate in front of railhead or sea-head is controlled by:—

(a) The 3rd line transport available.

(b) The time taken for the transport turn round.

The former is normally constant and the latter becomes the controlling factor.

36. During the pursuit with railhead lagging behind, the range of advance of the Army was increased by lengthening the daily mileage covered by 3rd line General Transport Companies. This mileage was governed mostly by the hours of daylight so that speed of movement on the road became the dominant factor. It was found that maintenance transport was much obstructed by other slow-moving administrative units and formations of a non-operational priority. For example, on one occasion an urgent maintenance convoy took 9 hours to cover 80 miles from MATRUH to BARRANI. This was at a time when 3rd line General Transport Companies had been ordered to cover 120 miles a day regularly, which at the rate of progress imposed meant 13 1-2 hours' driving time which, of course, exceeded all the daylight hours.

37. The successful advance of modern mobile forces depends to a large degree on the rapid move forward of maintenance transport. This entails a rigid control of all road movement by formation staffs and the careful consideration and allotment of priorities of movement. Roads system must be controlled in exactly the same way as any rail system, and the fewer the roads the greater the need for this high degree of centralised control.

38. This problem of movement in forward and rear areas must be studied by all formation staffs.

11. ARMY-AIR CO-OPERATION

39. General.

Although a further great advance has been made towards the complete co-ordination of both services, a certain lack of confidence still exists in some formations. This confidence must be bred of knowledge and mutual understanding of each other's problems and methods. No opportunity should be missed to acquire this knowledge.

40. Siting of Headquarters.

Main Army and Air headquarters were always combined. The control of air forces will usually be centralised under the Air Officer Commanding and his headquarters must, whenever possible, be with the main headquarters of the force commander. A tactical headquarters was held forward to be accessible to corps and the Air Officer Commanding was able to live there or make frequent visits. In the meantime all information was collated and distributed to both services from main headquarters.

41. Liaison and Information.

At Army headquarters the vehicles of G.Ops., G.S.I. and Air Support Control were all adjacent and formed a quadrangle in which a master map was kept. G.Ops., Air Support Control and Air Operations were in constant touch. Air Support Control was responsible for keeping subordinate R.A.F. formations in the military picture. This was done by frequent visits of Air Liaison Officers, passing cipher signals, target and bombline information over Air Support Control links and distributing corps sitreps.

42. Reconnaissance.

(a) *General.* A reconnaissance wing was formed which controlled the activities of Ph. R., Strat. R. and Survey, and was able to co-ordinate the demands of the two corps Tac. R. squadrons and those from Army Headquarters.

(b) *Tac. R.* Corps reconnaissance did not always go deep enough behind the enemy line. Army therefore demanded additional sorties in order to locate the enemy armoured reserves. This was done through the reconnaissance wing. In this connection it should be realised that a Tac. R. pilot cannot be asked to fly over a wide area to identify armour.

Either he can cover an area reporting and assessing groups of motor transport and/or tanks, or he can fly low along a specified course or to a pinpoint and identify armour from motor transport. He cannot do both in the same sortie.

Tac. R. sorties were therefore of two types:—

(i) the «area sortie» asking for «general information only», carried out at about 5,000 feet.

(ii) the «mission sortie» requiring detailed information of one specific locality, carried out at very low altitude.

In some types of country movement is not easy to detect from the air and can only be judged by comparing the results of different sorties.

Reports were telephoned to corps and broadcast in clear from the squadron, the Air Liaison Officer having been briefed by corps as to what information it was necessary to conceal. This method gave a wide and quick distribution to forward units. The broadcast was usually ready about 40 minutes after the pilot landed, any vital target information having already been signalled to Air Support Control. It has not been the practice for Tac. R. pilots to broadcast when airborne, although this is by no means impracticable. The main reasons being firstly that the pilot remaining «on receive» can be warned by his escort or by fighter control of approaching enemy fighters, and secondly the difficulty of ground observation from, and the speed of, the modern fighter make it difficult for the observer to read off and write down accurate map references and at the same time fully observe the area.

The pilot marks the observation direct onto a reconnaissance map which can be checked on return, before the information is circulated.

(c) *Ph. R.* Information from air photographs and defence overprints was reliable and extremely valuable, particularly for counter battery work. An early plan must be made to allow for bad weather conditions and inevitable last minute demands. In an advance into unsurveyed enemy territory overprints must be understood to be defence sketches until the necessary ground control or survey photography is available to make them into accurate maps. Army-Air Photographic Interpretation Unit interpreters should be available at divisions and photographs should be issued with interpretations down to battalions.

(d) *Arty. R.* The value of air observed artillery shoots on located hostile batteries is considerable. Even given the need for fighter escort, this type of shoot against a dug-in position may be more effective than many attacks by fighter bombers. More use could be made of the training which Tac. R. pilots receive in artillery shoots.

43. Direct Air Support.

Direct support formed a very important part of the plan, by day and by night, in every phase of the operations. The weight of attack was on a scale hitherto unknown. If this increasing air effort available in support of the army is to be used to the best advantage, constant attention must be given to it by all commanders. Air support should no more be left out of the plan than artillery support. Too often a plan is completed and the question then arises, «how can the R.A.F. help ? », and as often as not they are only called on in the last resort when things are going wrong. At the same time it must be realised that the timing and weight of air support is at the mercy of factors which do not prevent supporting fire from artillery, such as weather conditions and enemy air attack on Landing Grounds, etc. Senior staff officers at air headquarters are always available and anxious to help in the planning of any operation.

(a) *Information.* The air effort cannot be properly applied without the latest information of (i) enemy movement, (ii) position of own troops. These can be sent over the tentacle system in the form of target demands, information messages and bomblines. Any ground to air recognition signals (coloured smoke and Aldis lamps are the best) should be used whenever practical to identify forward troops but these signals can more quickly be copied by the enemy than changed by us and are only supplementary to good information sent back.

Reports of enemy air activity are extremely valuable. Care must be taken that reports of hostile action are not exaggerated. The formation or individual attacked is always liable to describe the attack as intense whereas in fact it may only have been a series of «nuisance» raids by fighter bombers. These, though unpleasant enough for the recipient, may have no bearing on the general course of the battle and the result of an unconsidered report may be the switching of a part of the available air striking force from offensive to defensive operations.

Reports from observation posts of our own air attacks should be made at once to Air Support Control as the planning of further attacks may be based on them and they are a great stimulas to the air crews taking part in the attacks.

To keep all air matters constantly in view and to make the best use of the tentacle, it has been found necessary to earmark a staff officer at divisional headquarters and even at times at brigades.

(b) *Types of Target.* By day the forming up areas of armoured formations for counter attacks were bombed with good effect and on several occasions an impending attack failed to develop.

Hostile battery areas can be neutralised by air attack in conjunction with artillery fire and timed in relation to an attack, but bombing of individual dug-in gun positions is uneconomical. Whenever possible, artillery should endeavour to assist the bombers by engaging enemy forward anti-aircraft sites during the bombing attacks. Apart from the obvious assistance rendered, this practice is a great aid to inter-service confidence and co-operation.

By night harbours are the best targets particularly in open warfare when the enemy is forced to close harbour. Last light ground to air reconnaissance should be directed to locating these harbours.

An enemy night attack can be disorganised effectively by bombing when he is bunched in contact with our minefields.

Bombing and straffing of enemy harbour areas on successive nights has a great effect on his fighting efficiency. In fact, it cannot be over emphasised that the effect on morale of day or night air attack is out of all proportion to the material damage done, great though that may be.

Conversely, our troops have for so long enjoyed comparative immunity that they are very easily disorganised by even a light scale of air attack. They must be trained to realise that air attack is just as normal a hazard of war as artillery fire and that even a large force turned from an offensive to a defensive role to protect them cannot guarantee immunity from casual attack.

(c) *Smoke Screens.* Can be laid with a fair degree of accuracy by day or night from light bombers provided that weather conditions are suitable and that the ground organisation of putting out markers is foolproof. But by day aircraft laying a screen over enemy lines will be very vulnerable to small arms and light anti-aircraft.

(d) *Landmarks.* In featureless country artificial landmarks are necessary to help pilots to pinpoint themselves. All formations must be prepared to put out permanent landmarks such as letters of the alphabet. These should be at least 50 yards long and contrasting with the surrounding country. Impromptu landmarks may be made with ground strips or any available material for a particular operation such as attacking a close target, dropping supplies or messages. Coloured smoke and lamp signals should be used in conjunction with impromptu landmarks to make them more easily recognisable.

Night landmarks are essential if targets are to be engaged in the battle area with safety to our own troops.

(e) *Air Sentries.* Are not properly trained and are seldom used. Every headquarters should always have a sentry on duty trained in recognition of aircraft and equipped with the necessary smoke candles, Aldis lamp and ground strips for communication ground to air. This is NOT the duty of a tentacle crew who may happen to be attached to the headquarters.

(f) *Allotment of Air Support Control Tentacles.* Tentacles should be allotted to all Corps and divisional headquarters, to leading brigades of divisions and to all independent forces and large columns. In an armoured division brigade tentacles are difficult to work to because of their constant movement. Unless all brigades have tentacles the information has to be repeated on the divisional forward control. Experience has shown that requests for support normally come from an armoured division headquarters and not from the brigades.

(g) *Reconnaissance and Clearing of Landing Grounds.* The extent to which pressure can be maintained from the air on a withdrawing enemy will depend on the speed with which fighter squadrons can occupy forward landing grounds.

Before an advance a list of landing grounds required in order of priority must be obtained from the R.A.F. to save unnecessary work on landing grounds which it is not intended to use.

Suitable reconnaissance parties, including R.A.F. personnel if possible, must then be held well forward and plans made for the necessary clearing demolitions and removal of mines. The development of air transport may make the clearing of landing grounds and not the road movement or supply problem the limiting factor in the move of leading R.A.F. elements.

(h) *Supply by Air and Evacuation of Wounded.* Considerable and increasing facilities exist for supply by air. The latest developments in this must be constantly studied.

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— PART III —

LESSONS BY ARMS

1. SOME LESSONS—ALL ARMS

1. Security.

It is vital that every officer and man should be told what his part is in the battle. Without this, intelligent anticipation and action cannot be expected and the full fighting power of an army can never be developed.

It is difficult, however, to balance this need against that of security. A working compromise is also necessary to enable essential reconnaissances and training to be carried out. Also the moment intensive training starts it is obvious to the men that something is on.

In this operation both were achieved. The regimental officer and man knew what was expected of him and security was assured. The principal measures of safeguarding the latter were:—

(a) The various dates on which relevant parts of the plan could be developed were on a sliding scale.

(b) All leave was cancelled before the outline of the plan was generally known on the unit command level.

(c) Once the plan was generally known no contact with civilians, Base and Lines of Communication Units, etc., was permitted.

(d) Need for secrecy was impressed on the men, who justified the confidence placed in them.

2. Commands—Location of Headquarters.

(a) The value of siting Headquarters of every level well forward was constantly borne out throughout the operations. It allowed of easy physical contact between commanders, or rapid receipt of information, and it encouraged the troops.

(b) Rear Divisional Headquarters should be as close to Main as conditions permit, and the distance should never exceed the range of speech on R/T. Rear Division must always be in easy reach of second-line R.A.S.C. Companies to ensure that daily replenishment is properly co-ordinated.

The location of second-line R.A.S.C. Companies is also governed by the position of Corps Field Maintenance Centres and proper wireless communication within the Services would enable Rear Division to function efficiently at a greater distance from second-line companies than has been possible in the past.

(c) There was a tendency of some commands to go forward unescorted in order to get up-to-date information. This is foolish. There is always a danger particularly in open warfare , of capture, e.g., General Von Thoma.

3. Intelligence.

(a) The collection and interpretation of intelligence data from all sources is vital to any plan. The value of patrol reports covering the frontage of attack up to the last moment is great, but patrols should not be carried out by troops whose presence in the line is to remain secret.

(b) Full information of enemy dispositions is necessary before artillery fire can be applied with maximum effect, since plans can then be made for the bombardment of enemy strong points. Such information also gives our infantry an opportunity of planning details of an attack. The value of air photographs from which overprints can be prepared is considerable.

(c) Intelligence concerning enemy defences must be issued right down to the individual soldier by sketches and similar means. He is then prepared, as far as possible, for what he will actually encounter during the attack and will understand how he is expected to overcome resistance.

(d) The information from patrols of the type of mines to be expected and the method of laying them was good throughout. The extent and position of minefields as shown on the defence overprint was only generally accurate.

(e) The reports from patrols as to the location of enemy position can rarely be accepted in the desert unless confirmed by air photographs. Their reports were, however, invaluable in deciding whether known localities were or were not occupied by the enemy by night.

4. Co-ordination between Units and Formations.

It is important that co-ordination and liaison should be carried out on each level when an attack by a battalion is to be made on the front of another. There were several cases of battalions arriving in a sector already held, to carry out an attack, about which the division and brigade holding the sector knew nothing.

2. ARMOURED

(i) Employment of Armour—General

1. Close Co-operation with Infantry.

23 Armd. Bde. (Valentines) was employed in an Army Tank role in close co-operation with the four infantry divisions of 30 Corps during the break-in battle. The normal allotment was one Army Tank battalion to one Infantry Battalion.

These units operated in this way throughout the period 23 Oct. to 2 Nov., 1942, though not always with the same Division. The main lessons are dealt with later.

2. Mobile Role.

The 10 Corps (1, 10 and later 7 Armd. Divs.) were employed in the break through battle on the front of 9 Aus. Div. and 51 (Highland) Div.

The 9 Armd. Bde. operated with and under command of 2 N.Z. Div. in a similar role.

The eventual aim of these armoured formations was the destruction of the enemy armour.

These formations (less 7 Armd. Div.) followed closely behind the first infantry attacks on the night 23-24 Oct. and parts passed through the forward defended localities on the objective at first light on 24 Oct. They found themselves, however, not in open country as intended but faced by more minefields, and further bodies of the enemy supported by anti-tank guns and backed up by armoured battle groups. After five days of mixed fighting they were withdrawn to re-organise.

A second full scale infantry operation was then staged on the front of 2 N.Z. Div. Again the armoured troops passed through the forward defended localities on the objectives about first light, and found themselves clear of the minefields, but faced by a considerable array of anti-tank guns, dug in and prepared. These and the armoured counter attacks were worn down and defeated after two days of hard slogging and eventually the armoured divisions passed through the gap into open country.

Once this was achieved the whole enemy line South of the break in collapsed with the loss of its complete garrison, whilst in the North the pursuit began of the remnants of the enemy armoured and motorised formations. The weather was largely responsible for our failure to make wholesale captures in this region.

The main lessons are also set out below.

(ii) Lessons—Armour in Close Co-operation with Infantry

3. Training.

The vital importance of close co-operation and team work between tanks, infantry, and other supporting arms in the combined tank and infantry battle has often been emphasised in the past, but seldom practised.

This co-operation cannot be laid on at the last minute before battle. It must be developed by intensive training previous to battle. Battle drills must be prepared, tried out and perfected.

To be effective it must be intimate and personal right down through the various unit levels to the Troop leader and Troop sergeant and Platoon commander and Platoon sergeant.

This was done very thoroughly between units of the 23 Armd. Bde. and Infantry Divisions of 30 Corps prior to the battle, and with excellent results.

Rehearsals were also carried out over ground similar to the attack. This should always be done when conditions allow.

4. Method of Attack—General.

(a) Experience has shown that when opposed by minefields, our present tank and infantry attack doctrine with the first echelon of tanks leading the attack at tank speed is not practicable.

When faced with mines, tanks cannot lead the infantry assault. They must wait until a bridgehead is secured by infantry, gaps cleared, and then move forward either to support infantry reorganisation, or preparatory to continuing the attack in areas beyond the enemy minefield belt.

(b) With the improvement of armoured mechanised devices for destroying mines, then it may again be possible for army tanks to accompany the infantry attack.

(c) If the area of attack is clear of mines, then by consensus of opinion, the following outline method is recommended:—

(i) Attack should be carried out in the proportion of one Tank Battalion and one Infantry Battalion.

(ii) Average frontage by day to be 800 yards with equal depth, by night 400 yards with same depth.

(iii) Leading echelon of tanks should move at tank speed with infantry carriers in support.

The second echelon of tanks should move beind the leading infantry companies at infantry speed, ready to give them immediate support.

(iv) Strongest possible artillery support should be co-ordinated with the attack of the leading echelon of tanks. If the weight of artillery allows, the barrage or concentrations or combination of both should be extended up to 400 to 500 yards on either side of the frontage of attack to neutralise long range anti-tank guns. The screening of the flanks by smoke is also useful.

(v) On arrival of the infantry on the objective, the first two echelons of tanks should rally in an area behind the leading companies of infantry, and be prepared to move forward to the assistance of the infantry should they be threatened by an enemy counter-attack.

It may often be advisable to position one troop of tanks on each flank of the objective in order to give warning of any threat from these areas. The reserve squadron, if not already used up, should remain in reserve with the reserve infantry company ready for use in any direction.

It will be necessary for the tanks to remain in the forward rally position until infantry are re-organised and have their anti-tank guns well dug in. As soon as that stage has been reached the majority of tanks should be released and returned to the rear rally.

(vi) The area selected for the rear rally should be under cover from ground observation by the enemy and should be in a position in which the crews can replenish with ammunition and fuel, rest and get some food. It should be in a position where a certain amount of maintenance can be carried out and where the unit fitters can get up to assist in this work. At the same time it must be an area from which the tanks can move quickly to the assistance of the forward infantry should this be necessary. As a guide this area should be somewhere near the reserve infantry battalion or brigade.

5. **Night Attacks.**

(a) Several night attacks with infantry and army tanks were carried out, and with the increasing strength of the anti-tank gun defence, there may be a greater tendency towards this form of attack in the future.

(b) The following points should, however, be taken into consideration when considering these combined night attacks.

(i) If there is any possibility of enemy mines, then tanks cannot lead the infantry, and the normal process of securing an infantry bridgehead as described in paragraph 4 must again be resorted to.

(ii) Experience has also shown that on moonlight nights, or in half light, the tank is no match for the anti-tank gun, particularly if the latter is well dug in.

(iii) If the area is clear of mines then the combined night infantry and tank attack still holds every hope of success. But the vulnerability of the tank to anti-tank gunfire and determined enemy tank-hunting infantry remains, and for these reasons there is a strong feeling from those who took part in these combined night attacks that the attack should be at infantry speed with infantry leading and tanks following the infantry for close support as required, and paired off squadron to company and troop to platoon to ensure intimate co-operation and team work.

(c) Other points gained from experience of these combined attacks are:—

(i) Attack must be on a narrow frontage and with limited depth owing to the difficulty of control. Frontages should not exceed 800 yards on a moonlight night for the Tank Battalion and Infantry Battalion, or 400 yards for squadrons and companies. On a starlight night these should be reduced to 400 to 500 yards and 200 to 250 yards respectively.

Depth of attack should not exceed 1500 yards.

(ii) The tank and infantry must work on the same axis, and tanks should be under infantry command.

(iii) Half moon gives the best lighting conditions. The ideal being when the moon is behind the attackers but not so low that they are silhouetted against it.

(iv) Pinpoint tail lights of different colours are useful as an indication of location and direction of movements of tanks, and to differentiate between squadrons and troops.

(v) Light signals must be arranged between tanks and infantry.

(vi) Finally the plan must be simple, based on a detailed reconnaissance, preparation and a common drill.

6. The Assembly of Tanks.

All tanks, prior to the battle, should if possible be assembled in a suitable area some 5 to 7 miles behind their forming up position some three or four hours before it is time for them to move to their forming up position. This is necessary in order to refuel and give the men a meal and a little rest before going into battle. The area selected should allow good disposition and as much cover from ground and air observation as possible. Vehicles must be camouflaged and as little movement as possible permitted during daylight. Fitters' lorry, charging vehicles and petrol vehicles, etc., should accompany the unit to this area.

7. Marrying Up of Infantry and Tanks

(a) The attacking tanks and infantry should «marry up» in the F.U.P.

With units that had trained and practiced together, this could be done, and was done in actual battle, in ten minutes. If training has not reached this standard then one hour should be allowed.

(b) It is obviously quite impossible for all tank units to train with all infantry units, and although it is possible for certain tank and infantry units to practice together for the initial attack, it is more than likely that before the attack is over tank battalions will find themselves paired with strange infantry, and vice versa.

To overcome this problem a drill common to all tank and infantry units of the formation is essential. With this common drill the intricate business of marrying up prior to the attack can be carried out simply and effectively by units that are complete strangers to one another, as was done successfully in this battle.

(c) It is advisable for the tanks to assemble first in the F.U.P. The infantry then forms up on the tanks.

8. Marking of Start Line.

(a) White tape in strips of 20 yards parallel to the objective, supplemented by lights, proved satisfactory. This is preferable to one continuous line which may be carried away by one tank.

(b) Lights marking the centre line at 50 yard intervals and on each flank of the lines were found adequate.

9. Tank Support During Infantry Re-organisation.

The material and moral effect of tanks within sight of infantry during the delicate period of reorganisation and consolidation has been continually emphasised by those who took part in the recent operations, and the need for this form of support appears frequently in one form or another in this memorandum.

It should be remembered, however, that tanks so positioned may draw the concentrated fire of all enemy weapons, and this may lead to heavy casualties both in men and material. It is also tiring for tank crews who must remain in closed tanks for some considerable time. It also prevents maintenance.

For these reasons it is recommended that a small percentage of tanks only should remain in hull down positions within the infantry F.D.L. area. The remainder should be held back under cover, but ready and prepared to act in immediate support of the infantry.

The decision and the proportion of tanks to be held forward depends largely on the nature of the ground and the armament of the tank. If the tank is armed with a good H.E. gun, then it may not in certain areas of ground be necessary to have any forward in the F.D.L. area. Each case must be judged on its merits.

10. Carriage of Infantry on Tanks in the Attack.

This was tried out on several occasions during the «dog fight» period. It was not successful. Reasons were:—

(a) Individual tanks or sections are often forced to deviate temporarily from the main axis of the attack, to avoid obstacles or enemy anti-tank gun fire; to engage enemy targets from a flank, to make the best use of ground. The result from the infantry point of view is that the tank-borne infantry are soon dispersed in small packets and all control and cohesion within sub-units is lost.

(b) The main weight of aimed fire of all calibres is inevitably directed against tanks, and this caused big infantry casualties.

(c) A night attack may lessen the dangers in sub-paragraph (b) above, but the danger of running on to mines and the resultant dispersion of the infantry still remains.

As a general rule, the carriage of infantry on tanks should be confined to the approach, and much time can often be saved in this way. But tank-borne infantry should dismount for the attack and follow the accompanying infantry carriers into action.

11. Tank Support During Mopping Up.

It was found that small detachments of tanks were extremely useful in daylight operating with infantry mopping up elements.

12. Communications.

Difficulty was again experienced in recognition and communications between tanks and infantry subordinate comds. On the unit level the R-T link between the two respective comds. worked well but once this failed communications were usually lost.

The main difficulty is on the lower levels. This is an old problem and is still unsolved, yet an effective system for the exchange of information between the two components is very essential.

The following extracts from formation and unit reports after the battle are of interest.

(a) Communications between tank and infantry comd. were maintained through R/T. liaison and personal contact. Squadron leader should be near Company Headquarters. This also applies to troop and platoon comds.

Communication between infantry comd. and tank comd. was found to be particularly good. It is best achieved by giving the tank comd. a set netted to the same frequency as the infantry No. 11.

While this comd.-to-comd. radio link is working, orders and requests for support can be relayed quickly and efficiently to individual tanks. Once this channel breaks down communication is virtually impossible. Tanks draw fire wherever they go. If they stop near an infantry headquarters they quickly become an embarrassment. Officers or runners approaching them invariably come under heavy fire. A duplicate comd.-to-comd. radio link may be the remedy.

Difficulty was experienced in communications between sub-units of infantry and of tanks. This might be remedied by companies having a direct liaison with squadrons and a series of pre-arranged plans and signals.

Company comds. equipped with a jeep in which was a R/T set on the Squadron comds. link would also be a remedy.

Communication between squadron and company comds. may be achieved in some cases by having a No. 18 set on the battalion frequency in or near the rear link tank. No helpful suggestion can be made as to intercommunication on lower levels.

(b) The only satisfactory communications are when the tanks can leave a link with the comds. concerned. This can seldom be done below the battalion. If armoured wireless vehicles are not available it may be necessary to take tanks from one squadron to ensure communications down to company comds., otherwise the comds. must be sufficiently close for direct contact.

Difficulty with communications was experienced, though this was mainly due to the comd. leaving his tank to investigate the situation on foot.

(c) The best means between the Infantry and Tank unit comds. is by No. 19 set, one of which should be fitted in the infantry comds. vehicle in which his 18 set is. Failing this the tanks should provide a scout car for the infantry comd.—this is what was actually done.

Between companies and squadrons and platoons and troops the only satisfactory means is by word of mouth.

(d) Great difficulties were always experienced in communication between the infantry and tank commanders. The best method up to the regimental level is verbally. The infantry battalion commander had a scout car or vehicle always in touch with him on the regimental frequency.

Considerable difficulty was experienced in communication between the individual tanks and the infantry. A partial remedy, under some conditions. is the use of a bell on the back of the tank and a speaking tube trailing near the ground behind the tank.

Infantry headquarters should be marked with a sign or flag so that it can be recognised at least 200 yards away.

(e) Difficulty was experienced by the tank squadron leaders in maintaining communication with the infantry company comd. when the latter was in a defensive position. The infantry comd. should be able to recognise the tank comd. by the pennant on the W/T mast and should therefore be able to make contact. Some form of marking is required at company headquarters to assist the tank comd. This should either be distinguishable carrier, vehicle, flag screen or board, which is visible at least 200 yards away. One suggestion is that the Army Tank Battalions should carry sets of flags to give to infantry with meaning of flag stamped on the handle. Another is that a coloured screen should be constructed with two poles, so that one pole can be removed and the screen flown from vehicle as a flag. At night a coloured light should be used.

(iii) Lessons—Armour in a Mobile Role

13. Confusion in Battle.

Confusion during the armoured battle is very great. This is caused mainly by noise, smoke, including that from burning vehicles, dust, danger, casualties to crews and wireless, etc., a great deal of which are normally absent in training.

To reduce confusion to a minimum plans must be simple to a point of absurdity and everybody must know exactly what he has to do from beginning to the end, so that when he can neither see his friends nor hear his wireless he will peg away at what he knows is his job and IN THE RIGHT DIRECTION, engaging whatever targets come his way.

More attempt must be made during training to reproduce at least some of the stage effects of actual battle.

14. Assembly and Move Through Minefield Gaps.

The major points have already been outlined in Part II Section 6 and Appendix «D», Diagram No. 2. Further points of detail are:—

(a) Plan cannot be too detailed. It must, however, be flexible to cater for «friction» and unforeseen incidents.

(b) Assembly areas for Armoured Divisions must be sufficiently far from F.D.Ls. not to interfere with the divisions making the initial break-in. They must be chosen with a view to cover and suitable routes forward.

(c) Armoured Divisions with all troops under their command should form up complete within assembly area in the order in which they are to move forward. Attempts to marry up components after the move forward commences is fraught with difficulties in spite of the most foolproof arrangements.

For this reason the artillery of an armoured division should not, if possible, be used in the initial fire plan. If, however, this is unavoidable then it should be superimposed so that it can be taken away when required without prejudicing the fire plan.

(d) Armoured division must be responsible and in control of all arrangements for passing troops through defiles or minefield gaps. A divisional minefield Task Force must move immediately behind the attacking infantry and in direct liaison with the controlling headquarters, and be responsible for clearing and marking gaps, lighting routes, establishing communications, traffic control and possibly for flank protection for passage of armoured division.

(e) Centralised control was successfully carried out from an A.C.V. located in the area of our own F.D.L.s.

(f) The ground of the approaches to, through, and from a gap is liable to cut up badly and arrangements must be laid on for the towing of wheeled vehicles which become bogged. Rec. vehicles are also required at each gap.

(g) Provost detachments should be located at each gap to guide transport echelons forward.

15. Calling Forward of Armoured Formations.

The armoured formation should not be called forward until it is known that an adequate bridgehead is established and gaps are clear (see Part II, Section 9).

16. Forming Up Beyond Minefield Bridgehead.

(a) *Forming up area.* The bridgehead must be large and deep enough to enable armour to deploy for the ensuing advance.

Owing to the size of the armoured division the forming up area will often extend beyond the foremost infantry.

It is essential therefore that armoured divisions should establish their own protective screen as early as possible to hold enemy counter attacks and also to prevent him establishing a further anti-tank screen. See also paragraph 17 below.

This screen must stay in position until the advance begins, and should therefore, if possible, come from the reserve elements.

The forming up area will have to be planned from a map, and from a close study of air photographs.

(b) *Formation of protective screen.* The provisional plan must be made off the map. Reconnaissance parties from Anti-tank units with R/T communications must be well forward. Anti-tank guns must also be well forward in the advance, and armoured regiments may have to protect these guns temporarily until motor infantry can take over.

(c) *Flank protection.* The infantry objective will normally be of a limited nature, armoured divisions must be capable of looking after their own flanks.

17. Enemy Anti-Tank Screens.

The German is adept at establishing quickly an anti-tank screen, and there is always a probability that even after a gap has been secured by infantry and cleared, the enemy will have concentrated fresh anti-tank guns opposite this gap before the armoured formations can move through.

Armour must be prepared to deal with this problem with their own resources. The first aim is to prevent the enemy establishing the screen by the offensive use of medium machine guns and anti-tank guns of the division, and by the rapid engagements of targets by F.O.Os.

If this fails then the problem must be tackled systematically, and, with a properly laid on plan, co-ordinated artillery support, and co-operation between all elements of the armoured division, and fire and movements between the tank units themselves using their own H.E. firing guns. Armoured formations can and must deal with these quickly established enemy anti-tank screens from within their own resources. Smoke and S.P. artillery will obviously play an important part in these quickly staged but co-ordinated attacks. See also Section 3 paragraph 4.

If time is vital and the risk balanced and justifiable, then a Balaclava charge may be necessary (for example the gallant action of 9 Armd. Bde. at EL AQQAQIR on 2 Nov.). But this must be costly in lives and material.

In either case the support troops, infantry, anti-tank guns etc., must be close up, to mop up and take over the ground and form a firm base for the next stage.

18. Artillery Support—O.Ps.

Artillery O.Ps from Field Regiments supporting tanks must be given the thickest and most reliable armour to ensure as far as possible that they will be at the right place when required.

On many occasions armoured O.Ps with leading troops were knocked out, with the result that artillery support became ineffective. Possible remedies are:—

(a) Every squadron headquarters should have one of its tanks on the frequency of the supporting artillery, so that, should the O.P. be put out of action the R.A. officer has a second vehicle ready.

(b) Should the R.A. officer himself become a casualty one of the squadron headquarters' officers can take over the artillery observation. For this purpose at least one officer of squadron headquarters should be trained in observation and correction of artillery fire.

19. Holding Ground.

A suitable method for holding ridges hull down is with individual tanks about 50 yards apart, 100-150 yards between troops and with one tank per troops observing till all were called up for fire action. This method also avoids casualties from heavy artillery concentrations directed at the ridges.

20. Concentration of Armour.

This is an old cry, but cannot be repeated too often. There were periods, however, during the earlier attempts at the break through when a really heavy concentrated attack by enemy armour would have caught us unduly dispersed, and with results which might have been disagreeable.

21. Necessity of Continuous Reconnaissance.

It is wrong to order an armoured unit or formation to advance into ground unreconnoitred, and known or suspected to be occupied by anti-tank guns and artillery in positions. The bulk of an armoured unit should wait while the area up to the next suitable fire position is reconnoitred.

22. Unsuspected Minefields.

If, during the break through periods armoured formations run onto unsuspected minefields which cannot be by-passed, then they must be prepared to clear gaps with their own resources.

If weakly held by the enemy this can be done by day under cover of smoke.

If this is not practicable then a proper attack must be laid on by night using the Motor or Lorried Infantry Brigade, and gaps cleared.

If the task is too strong for the Motor Brigade then a pause must be called, and a full scale infantry attack repeated to let the armour through.

23. Regimental Groups.

In the Middle East there was at one time a tendency to extreme decentralisation and small columns of all arms were used to excess, resulting in dispersion of effort, especially gun power. The pendulum has swung back, and the control of artillery is now given to the highest commander who can exercise it in any particular situation. It is accepted, however, that for some occasions a battle group of an armd. regt., a battery R.A. and a coy. Motor bn. is an essential detachment, and armoured formations should be trained to work in these groups if required. When an armoured brigade is expecting battle and moving with a regiment R.A. under command it is usual for a battery to move grouped with and *in support* of each armd. regt. The regiment can then obtain the fire of its supporting battery almost instantaneously, and at the same time the arty. regt. comd. is in a position to concentrate the fire of the whole regt. within a very few minutes if required. Periods of training in regt. groups are essential for ensuring the personal contacts between officers of the different arms which alone make this flexibility possible, and for giving armd. regt. comds. experience in handling all arms.

24. Reconnaissance Troops.

Reconnaissance troops proved their worth on many occasions. They were successfully employed for finding minefields, and for reconnaissance ahead of troops for locating enemy anti-tank guns. In several instances these located anti-tank guns were put out of action by H.E. shelling from Shermans.

25. Indirect Fire.

Indirect shooting at enemy tanks with A.P. was practised by one squadron with a considerable measure of success. The tank commander had his tank some way back from a low ridge and he himself stood on the top of the tank so that he could see the target. He then engaged the target giving fire orders in the same way as for H.E. shooting. In this way five German tanks were knocked out and burnt in the course of one afternoon for an average of about six rounds per tank. During this fight his own tank was not liable to enemy fire.

The introduction of a sight clinometer would also assist for this type of shooting.

It is necessary for all tank commanders to be able to observe and identify enemy anti-tank guns in position. Once these have been located which is not always easy, they can be knocked out by the H.E. of the 75 mm. at ranges beyond those at which the anti-tank gun can itself hit the tank. This has proved of very great value on several occasions.

Further, the necessity for accurate gunnery and the daily T. and A. of sights has been proved conclusively. The Sherman 75 mm. gun is as good or better than any German tank gun and with good gunners there is nothing to be feared from the German tanks. Much practice can be obtained from firing with sub-calibre weapons and during training this practice should be carried out incessantly.

3. ARTILLERY

1. Command and Control of Artillery.

A C.C.R.A. or C.R.A. should normally always be with his Corps or Divisional Comd. He cannot, however, produce the detailed orders and tracings necessary for a fire plan and maintain control without his staff and communications. Comds. must realise, therefore, that either the Artillery Comd. must be allowed to have the bulk of his staff at Tac. Headquarters or must return to Main Headquarters to issue his orders. Further, an Artillery Comd. must fight the battle from the Headquarters to which his line communications, if any, are laid.

2. Concentration of Fire.

The success of attacks against prepared positions, held by determined and experienced German infantry was very largely due to the very heavy concentrations of artillery fire which were put down. Only when artillery is centrally controlled can the maximum value of such fire be obtained. This will enable infantry unsupported by armour to gain its objective without undue casualties. Centralised control of artillery cannot be quickly regained if artillery units and sub-units are placed under command of infantry or armoured units. In such circumstances if it is suddenly desired to centralise artillery for some operation, it must be realised that the mere issue of an order reverting artillery units to C.R.A., etc., is not ipso facto sufficient. Before the fire of such units can be concentrated some of the following preparations may be necessary:—

(a) Deployment of more O.Ps.
(b) Movement of regiments and/or batteries.
(c) Starting fresh survey.
(d) Organising new communication.
(e) Arrangements for the dumping of ammunition for the fire plan.

All such operations take time and with the artillery under his command the C.R.A. can, with the exercise of forethought, materially reduce the time required for preparation.

3. Artillery Concentration on A.F.Vs.

Although in general H.E. does not penetrate A.F.Vs. at long ranges, it was found that when really heavy concentrations of artillery fire were put down on enemy A.F.Vs. they either withdrew or changed direction. This fire invariably makes enemy tanks close down and also prevents them from refuelling and replenishing ammunition.

4. **Support of Armour Against Enemy Anti-Tank Guns.**

(a) The problem of dealing with enemy anti-tank guns met with varying success. Where such guns had been in action for some time and had been located by air photographs, etc., they were generally successfully neutralised by counter battery concentrations.

In the infantry attacks, some anti-tank guns were hit by the barrage or concentrations, and all guns were invariably overrun. The lesson of this would seem to be that anti-tank guns should have alternative positions to mislead the enemy and should also pay great attention to concealment.

(b) As the enemy's position was being penetrated he was very quick to put out new anti-tank gun protection and the presence of these guns only became known when our tanks moved forward. Such guns presented very difficult targets for the artillery, for even if they could be located, owing to the lack of suitable ground from which to observe, it was very difficult to range accurately. Although faced with this type of opposition, on few, if any occasions, did armoured formations attempt to advance under a pre-arranged fire plan, such as those which were so successful in the purely infantry attacks, nor was smoke asked for or used. It would seem that if armoured formations are to act as more than weapons of pursuit and are to get forward in face of even hastily organised and weak anti-tank gun opposition, they must study the use of smoke and rapid fire plans consisting of heavy concentrations of artillery fire, designed to neautralise the enemy detachments whilst the tanks either alone or in co-operation with the infantry of armoured formations move forward to positions from which they can themselves neutralise the detachments with machine gun fire prior to and whilst closing with the guns.

5. **Support of Infantry.**

(a) The co-ordination of the artillery plan and the infantry assault requires special attention in the featureless desert. The barrage should, as far as possible, be kept at right angles to the line of infantry advance throughout. As the artillery programme for a barrage virtually controls the movement of the infantry, it should be issued in simple form down to sub-unit commanders in sufficient time for it to be explained in full to the individual soldier.

An artillery trace showing fire plan, infantry start line, objectives, boundaries and timings for a Divisional attack in the opening stages is at Appendix «E». The attack was 95 per cent. successful.

(b) When the exact position of the enemy foremost posts is unknown, infantry may be withdrawn from the F.D.Ls. just prior to the attack, so that the artillery barrage can be put down immediately in front of our F.D.Ls., thus ensuring that no portion of the enemy defences escapes bombardment.

(c) Artillery fire can be of considerable assistance in helping infantry to maintain its direction and position. Examples used successfully in practice are as follows:—

(i) Rounds of smoke on inter-divisional and brigade boundaries at regular intervals.

(ii) Rounds of smoke shell to indicate pauses and lifts in the barrage.

(iii) Tracer from Bofors firing along inter-division, brigade or battalion boundaries.

(iv) Indicating the line of the objective by line of smoke at a fixed known distance beyond it.

(d) In several attacks where there was no clearly defined start line, the barrage was maintained on the opening line for sufficient length of time to enable the attacking infantry.—

(i) to close up to it;

(ii) Form up in right direction and facing the right way.

This worked most successfully.

(e) On more than one occasion owing to a hold up in an attack, the supporting barrage was stopped whilst it was being fired and was restarted on a previous lift at an agreed new zero hour.

In the last war this was not possible, but now, with the close liaison resulting from the use of No. 18 sets, with which both infantry and artillery are equipped, and by R/T in general, this can be done. It is not recommended, however, that this should be attempted in anything larger than a brigade attack.

(f) In featureless country it was very difficult for forward units to do any accurate map reading. Artillery can be of great assistance to them in this since it is able to put down rounds on prominent features and give their map references by shooting. In addition, if smoke is put down on two such features a compass resection can be made which will give the position of the forward unit itself.

A further method is for forward troops to fire at dusk two or three flares or rockets. These can be resected by the flash spotters and accurate positions obtained.

6. Counter Battery Fire.

Intensive counter battery fire was brought down immediately prior to the initial attack.

Counter battery fire cannot, however, be produced unless the location of heavy batteries are known. It is the duty of all arms to report immediately details of enemy shelling. The form of such reports is laid down in Field Service Pocket Book Pamphlet 3, Section 12.

7. Artillery Information.

Owing to difficulties of accurate map reading in the desert, information brought in by patrols, especially by night, as to enemy dispositions is often misleading. Air photographs of the same area give accurate locations, and the information from the patrols corroborates whether the posts are occupied or not. Such information is valuable for the production of fire plans.

8. Co-ordination of Anti-Tank Lay-out.

Infantry have now eight anti-tank guns in each battalion. These are often deployed on a company or a platoon basis and considerable re-adjustment is necessary after deployment. There is, however, no special co-ordinating authority within the infantry brigade to do this and the task of anti-tank regimental commanders is very difficult. It would seem, therefore, that there is a need for a brigade anti-tank officer with duties similar to those of the former Brigade Machine Gun officer.

A.A. and C.D. ARTILLERY

1. Training.

(a) Owing to the limited A.A. resources it will be normal for units to be grouped for a particular operation from less important theatres. These units may be drawn from theatres that have been comparatively «static» in character or where conditions have been of different character to those in the theatre of contemplated operation.

(b) It therefore follows that A.A. units should be given pre-battle training as necessary to fit them for the theatre of operation in which they may be employed.

(c) Basic training points common to all operations are:—

(i) *M.T.*—A very high standard of driving and maintenance is required.

(ii) *Fire Discipline.*—«Killing» ranges must be fully realised and tendencies to open fire at targets out of range eradicated. This latter fault may become infectious and result in considerable waste of ammunition.

(iii) *Digging.*—Unless suitable gun pits are dug at the earliest opportunity unnecessary casualties may result.

(iv) *Secondary role.*—A/Tk. defence, engagements, of seaborne targets, long range ground targets, harassing fire, etc.

(v) *Identification.*—Must be brought to the highest standard of excellence practicable

(vi) *Handling of mines.*—On the line of G.H.Q. Middle East Training letter 42410/MT1, of 5 Jan., 1943.

(vii) *Technical.*—Any special technical training needed for the theatre of operations, e.g., use of special filling for buffer and recuperator systems; effect of high altitudes on gunnery; manhandling of equipment in mountainous sites, etc.

2. Movements.

(a) *Routes* for movements of A.A. Units must be carefully reconnoitred, especially with regard to the «going», to minefields, water, etc. Information obtained by all Arms and Units should be made available to A.A. as far as practicable. A.A. Units should be given training in mine detection and mine lifting.

(b) R.A.F. Units covering L.Gs. CAN be put in support of individual Wings and Sqns., moves being made in conjunction with their A parties on a general scale of 75 per cent. of the A.A. resources, the remaining 25 per cent. moving when 15 per cent. aircraft are left on the original L.Gs.

3. Early Warning.

(a) Div. L.A.A. have to rely solely on the vigilence of their own air sentries. In this connection it has been found that «Listening Sentries» sitting in gun pits or dugouts are frequently able to give warning before targets are picked up by visual sentries, who necessarily have to stand in positions exposed to the wind and extraneous noises. Hence many units regularly post a «Listening Sentry» to supplement the usual air sentry. The latter, of course, can never be dispensed with even when a gun is manned by a full or skeleton detachment.

(b) The Light Warning Sets (Radiolocation) now in production should prove of great value.

4. Communications.

(a) Line communications should, where possible, in static periods of operations, be established between C.R.A., H.Q. L.A.A. Regt. and H.Q. Btys. and tps.

(b) W/T in the main, the normal method of communication. In recent operations the W/T sections of certain L.A.A. Regts. were taken over by C's C.R.A. to supplement their own resources with corresponding hampering of control and administration of L.A.A. units concerned.

5. Tasks.

(a) *Normal* tasks are protection of:—

Forward Troops
Field Artillery Areas
Landing Grounds
H.Qs.
«B» Echelons.

(b) *Defiles.* Leading formations should not remove the A.A. cover of defiles as soon as they themselves have passed. Co-ordination of such defence by the highest formation, practicable is most desirable.

(c) *Heavy A.A.*, if available, is most useful in forward (Div.) areas.

(d) *Special* tasks of marking the axis of advance by tracer fired from Bofors proved of great value.

(e) *Miscellaneous.* The use of «decoy» areas (e.g., Dummy L.Gs., railheads, etc.), partially covered by A.A. fire, has proved of considerable value.

6. Command.

On occasions it will often be very desirable for A.A. Defence provided by Div. L.A.A. Units and Corps A.A. Units to be co-ordinated by and placed under command of C.C.R.A.

7. Coast Artillery.

The need for rapid installation of C.A. Defence at captured ports was evident and the high degree of «mobility» that can be acquired by this branch of the Artillery was well exemplified.

4. ENGINEERS

(i) General Points

1. Organisation and Employment of Royal Engineers in Divisions and Corps.

(a) The reversion of R.E. Field Units from Brigade control to Divisional Troops under their own C.R.E. has proved to be fundamentally sound, economical and efficient and is the correct normal procedure.

(b) The addition of the second Field Squadron to the Armoured Division Engineers has proved its worth and gives a sound working organisation.

(c) In addition to the Corps Field Park Company in Corps Troops Engineers it has been found that three Army Field Companies are essential. There is always work for that number.

(d) The new War Establishment for Headquarters Armoured Division (ME/672/2), in so far as the C.R.E. is concerned is a great improvement. He is now in A.C.V.6 where «Q» also has a seat. This enables touch to be maintained with R.E. «Q» problems such as water. The C.R.E. is now in direct contact with his Divisional Commander and «C» and also able to control his Squadrons by R/T on his own net.

(e) The 15 cwt. F.W.D. Armoured Truck has proved quite invaluable as the R.E. armoured vehicle, and answers many problems. In conjunction with the Daimler Scout Car (Dingo) it is now possible to organise adequate R.E. parties for Engineer reconnaissance, tank busting. etc., in company with armoured formations. The size of the party detached for such a role and put under command of the Brigade or Regiment, depends on the scale of the operation and the probability of employment.

(f) Deliberate operations in desert country are apt to be rendered much more difficult than elsewhere owing to lack of recognisable landmarks. The major difficulties being doubt as to exact location, inability to pinpoint centres of enemy resistance, difficulty of fixing gun positions. It is considered essential that R.E. Survey detachments should work well forward with Divisions, particularly armoured, in order to fix landmarks and establish local pattern conventional beacons.

(g) The need for an established working section in the Field Park Unit, both squadron and company, has again been evident and has had to be improvised to meet requirements.

2. Training of Royal Engineer Units.

(a) The results achieved more than amply repay the creation of the Eighth Army Mine Clearance School, which was used for intensive training before the battle.

(b) The biggest difficulty encountered in training prior to the battle can be summed as the quite unavoidable late arrival of essential equipments such as the 15 cwt. armoured truck, No. 18 W/T Sets for Field Squadrons, Mine Detectors, «gapping» stores, etc. But little time was available after their arrival for training with them prior to the opening of the battle. The fact remains that the Divisional R.E. went into battle equipped as never before.

(c) Training of Divisional Engineers, whether armoured or otherwise, must be retained under the hand of the C.R.E., squadrons and companies being affiliated to brigades for combined training as and when necessary.

(d) Thorough training and rehearsal is required before a deliberate operation of forcing a passage through a defended minefield and the following points require attention:—

(i) The operation is an All Arms one. Therefore combined training and rehearsal by day and by night are essential.

(ii) R.E. units and personnel concerned will require both individual and collective refresher training before such combined training can commence.

(iii) Complete overhaul and maintenance of all «gapping» stores and equipment.

3. Communications.

(a) *Armoured Divisional Engineers.*

(i) *The C.R.E's Net,* No. 9 or 19 Sets manned by Royal Signals, worked well and it is quite invaluable, adding greatly to the efficiency of the Divisional Engineers.

(ii) *The Squadron Commander's Net* was met by an issue of No. 18 Sets to be manned by R.E. personnel. They are not of long enough range for this purpose, and are too liable to come off net if used in a vehicle as they must normally be. Further, they cannot be placed on or listen-in to the W/T Net of the brigade to which the squadron may be affiliated. Better W/T provision is an urgent operational necessity.

(iii) *The Field Park Squadron* has no net of its own and the need has arisen in operations. It is considered that three sets (as opposed to five in the Field Squadron) are required.

(b) *Infantry Divisional Engineers.*

(i) *The C.R.E's Net* is a most urgent requirement on the same lines as that in the Armoured Division.

(ii) *The Company Commander's Net* is also required, the more so in the new type Division which contains one Armoured Brigade.

(c) *Corps Troops Engineers.* Battle conditions have shown that the C.R.E. Corps Troops cannot effectively command and control his Companies without W/T, and a C.R.E's Net manned by Royal Signals is essential.

4. Royal Engineers in the Advance.

(a) In an advance over very great distances in the face of a thorough and ingenious enemy, the demands on sapper field units far exceed the capacity of the normal formation allotments of R.E.

Well executed demolitions, the sowing of roads, tracks and landing grounds with anti-tank mines, anti-personnel mines and booby taps, the destruction and contamination of water sources, all call for immediate R.E. action. The maintenance of a long line of communications. the repair of pipelines, further clearing and wiring of minefields, the temporary repairs of ports and installations, the development of lines of communication water sources, all make heavy demands on R.E. units.

In operations of this type, a generous allotment of R.E. units to Army Troops is essential.

(b) Repair of roads, aerodromes and defences all involve heavy demands on mechanical equipment. The shortage of both earth-moving machinery and trained operators in the forward areas has been acutely felt.

Steps had to be taken early to combat the mine laid on the road verge, too many vehicle casualties were resulting. Advancing West from GAZALA on BENGAZI it was found essential that the first person in the brigade column should be an R.E. officer in a Daimler Scout Car, he could very often spot the mines which personnel manning tanks or armoured cars could not.

(i) If the enemy was not contesting the advance he was followed by a 15 cwt. F.W.D. armoured truck with a detachment of five sappers and a detector.

(ii) If lightly contested he was closely followed by a tank or armoured car and then his 15 cwt. F.W.D. armoured.

(iii) When heavily contested the order of march was—
R.E. officer in Daimler Scout Car
Tank
Infantry Carriers
R.E., 15 cwt. F.W.D. armoured.

(c) To provide R.E. personnel and detectors for the clearing of captured landing grounds. This task makes heavy demands at a time when road and track clearance was also urgent.

5. Equipment.

(a) *Tank Busting.* The 15 lb. made-up charge has been found to be the best method, with with the charge laid under the gun against the turret. The importance of destroying immediately, captured A.F.Vs or equipments if they are likely to be re-captured or recovered by the enemy is now met by having standardised R.E. parties. The provision of these is greatly assisted by the addition of the 15 cwt. F.W.D. Armoured Truck. A normal R.E. party is a combination of the Daimler Scout Car with one or more 15 cwt. F.W.D. Armoured Trucks.

(b) *The 15 cwt. American F.W.D. Armoured Truck* has proved admirable for R.E. purposes, but its armour protection has not been designed to counter the anti-tank mine, to which it and its occupants are as vulnerable as in any soft skinned vehicle.

Recommended modifications are —

(i) Armour Plate under the engine sump.

(ii) Better armouring under floor of body of truck.

(iii) Glass cup in fuel system to be replaced by a metal cup.

(iv) Add to vehicle equipment 4ft. 1in. crowbar.

From the R.E. point of view at any rate protective measures against anti-tank mines are essential.

(c) *Mechanical Equipment* has once more proved a life saver and every Angledozer available has more calls made on it than can ever be met. Our Division and Corps Field Park Squadrons and Companies have now on their War Establishment, angledozers and the transport to lift them. The complete issue is 100% operationally essential, but it has not so far been able to complete issue; the provision of the heavy load carrying transport presenting an almost insuperable obstacle. This transport must allow quick on and off loading of Angledozers. Principal uses were improving communications and digging in the gunners, vehicles and Headquarters.

6. Summary.

There is no doubt that the success achieved was due to two main factors in so far as the R.E. were concerned.

(a) Repeated combined rehearsals of All Arms both by day and night under conditions approximating as nearly as possible to those anticipated in battle, preceded by the individual and collective training of the Sapper Units.

(b) The reversion of the R.E. Squadrons and Companies to Divisional Troops and thereby to C.R.E's control. By this means economy of effort and concentration of force at the place or places in accordance with the Divisional plan could be achieved and sappers were not needlessly frittered away in small parties under command of Regiments and Battalions just «in case they might be wanted».

(ii) Passage of Minefields

7. Location of Minefields.

The greatest difficulty lies in locating the front edge of minefields or suspect areas. These are often unmarked and even if one mine is encountered it is not known whether a proper minefield exists, or whether there is a wide depth of scattered mines before the minebelt starts. Apart from such information as may have been obtained from patrols or aerial photographs, the following methods have been used:—

(a) By «wheelbarrow» or «pram» detectors. This equipment consists of a search loop approximately 8ft. wide mounted on and in front of two bicycle wheels. The necessary batteries, valves, etc., being housed in a compartment in the rear of the aerial and wheels. The whole being mounted on a suitable tubular frame, so designed to maintain the minimum height from the ground.

These detectors are pushed by the operator, who, if necessary, can operate in a crawl or crouched position.

At the moment these detectors have certain limitations. Development is being continued with a search coil approximately 8ft. 6in. by 2ft.. particularly for strip clearance to deal with mines in road verges and aerodromes. It can also be used for deliberate minefield clearance.

(b) Pilot vehicles. Following experiments have been tried:—

(i) Lorries, especially protected on the floor-boards with sandbags, working in echelon were successfully employed by one Division. Diesel oil is carried in these lorries and allowed to drip out at the rear thus marking the width of the searched track for troops following behind. This method is known as the «Snail».

(ii) Concrete filled spiked rollers attached to arms on the sides of a lorry have been found to be the best locator so far. Four rollers suitably spaced and mounted in front of wheeled or track vehicles have been found suitable. In order to avoid bridging of mines, the spikes, which are approximately 3in. long and made of a high tensile steel, should be placed in a spiral form.

(iii) Fowler Rollers have been tried but experience shows that they are unreliable as they will often bridge mines.

Other methods of locating minefields could be devised but whatever device is used it must be capable of moving over the ground at a pace which will not hold up the operation.

Pilot vehicles are definitely required for detection of miscellaneous patches of mines; to establish the edge of a minefield proper and occasionally to «prove» a lane through a minefield. Various devices are now being tried of which a modified form of the Fowler Roller may be useful. Scorpions should not be used on this role.

8. Methods of Clearing Mines.

Having located a minefield the actual gapping can be done by:—

(a) R.E. parties using Detectors. This has proved itself the most reliable answer to the problem, and is likely to remain so until armoured mechanical devices for destroying mines will have reached a higher stage of development than at present (see sub-paragraph (c) below).

The Polish type hand detector has proved efficient and satisfactory and is the best available. A proportion of short arms should always be held in reserve. The supply of detectors, all types, has never been able to meet demand. Actually Eighth Army started the battle with 500 detectors of all sorts. Handy, robust, well fitted and padded boxes are quite essential for the transport of Detectors in motor transport under desert conditions.

(b) Royal Engineers and infantry probing for mines with bayonets.

(c) Mechanical means such as a Scorpion.

The Scorpion consists of a Matilda tank mounting two steel fabricated arms projecting in front and on either side of the tank tracks. These arms support a circular steel drum to which are attached lengths of S.W.R. terminating in short lengths of heavy steel linked chain.

Mounted on the side of the tank is a Ford V8 commercial truck engine, suitably housed in an armour plated compartment, which drives the drum through a propeller shaft at approximately 110 r.p.m.

The action is for the revolving S.W.R. and chains to thrash the ground covered by the Scorpion and thus detonate the mines in the area covered.

The Scorpions were built in a hurry from designs not fully tried out and suffered from teething troubles, mainly over-heating due to the dense clouds of dust raised by the thrashing. In spite of this they had considerable success which was warranted further development and improvement. Valuable tactical experience was gained and one of the lessons learnt was that Scorpions should not be used singly but in troops of three or four, so that a gap of reasonable width can be made on one sweep.

9. Essentials in Minefield Gapping.

The essential points to ensure success are:—

(a) Co-operation and training of all arms.

(b) A well defined drill for clearing and marking of gaps.

(c) Ample provision of the special engineer stores required.

(d) Careful control of troops and vehicles moving into and through the gaps.

10. Co-operation and Training.

The operation MUST be previously rehearsed under conditions as closely approximating to reality as possible. It is not possible for R.E. parties to clear gaps under direct close range small arms fire. It follows that infantry must provide a bridgehead and must also be prepared to mop up and to protect the R.E. clearing parties. The bridgehead infantry must be capable of clearing its own way through enemy wire and booby traps.

Every sapper in a mine clearance detachment must be able to operate a detector with confidence.

11. Eighth Army Mine Clearance Drill.

(a) *Number of Gaps.*—Experience has shown that an infantry division can be passed through a number of 8 yard gaps, although 16 yards is preferable. An armoured division requires 16 yard gaps minimum. All these gaps will later be widened to 40 yards or more.

(b) *R.E. Mine Clearance party.*—Comprises:—

(i) Reconnaissance party

(ii) Tape party

(iii) Detector party

(iv) Disarming and lifting party

(v) Gap marking party

(vi) Control party

(vii) Reserve party.

(i) The reconnaissance party follows close behind the leading infantry to determine the extent of the minefield, and fix the forward start point of the proposed gap.

(ii) On the completion of the reconnaissance, the tape laying party goes forward and lays tape for an 8 yard gap.

(iii) A detector party then moves forward to clear the gap. It consists of three operators working in echelon, each sweeping 9 feet. and thus ensuring (by their overlap) that the 8 yard gap is fully searched. Each detector operator is accompanied by a mine marker who marks the position of every located mine with a metal cone.

For unusually deep minefields an additional detector party as above is taken into the field to start working forward simultaneously from about two-thirds of the way through so as to gain time.

(iv) The disarming and lifting party follow 50 yards behind the detector parties so as to avoid putting the latter out of action should a mine be inadvertently exploded. The lifted mines are placed just outside the tapes.

(v) The gap marking party start marking the gap up to the point to which mines have been lifted. (See (c) below).

(vi) The control party takes up its position throughout at the entrance of the gap, and is prepared to carry out minor repairs to detectors or to send up reserve detectors, etc., as required

(vii) Reserve men are held in readiness near the rear of gap to replace casualties in any of the parties as above; by day 50 per cent. of spare detectors should be held; this should be increased to 100 per cent. by night owing to the impossibility of effecting repairs.

Should detectors not be available, or the fire be too heavy for the operators to work effectively standing upright, approximately the same drill as above is used, substituting prodding with bayonets for searching with detectors, but the results are far less sure.

The form of drill is also shown in diagrammatic form at Appendix «F».

(c) *Marking of Gaps.* The original 8 yard gap is marked by day by a standard gap marking sign at intervals of 25 yards on either side of the gap. At night, coloured lights are clipped to these signs at intervals of 50 yards. The widened gap is similarly marked and the inner markers are, of course, removed. The standard gap marking sign is similar to a sign-post, painted half white and half red on both sides. White is used on the pointed half which points into the clearing. For night lighting the standard lamp, electric No. 1, is used, with a special cowl and coloured glasses. A green light is clipped on the safe side of sign, and an amber light to the danger portion. Red lights are not used to avoid confusion with tail lamps.

After the initial operation the electric lamp should be replaced by suitable oil lamps in petrol tins. Small holes can be punched in the tin for any suitable and distinctive track sign.

This marking is shown in diagrammatic form at Appendix «G».

(d) *Timing.* As an indication, it may be taken that it requires two hours to clear a 16 yard gap under average operational conditions, through a 400 yards minefield. The timing is greatly affected by the degree of immunity from fire secured by the progress of the bridge-head troops.

One section R.E. or one troop, can clear a 16 yard gap to a depth of 400 yards in two hours. A detector operator cannot work for more than 20 to 30 minutes under operational conditions; he should be changed with the mine marker at the end of this time, the two working as a team and relieving each other.

12. Stores.

As a guide to the stores required, the following were issued to one army corps engaged in the initial break-through of the enemy defences in the Battle of Egypt:—

Mine detectors—202.

Minefield lamps—4870.

6in. tape—370 reels each 500 yards long.

The above figures include provision for special training for the operation.

The equipment required for this task must have first priority in the order of march along the axis of advance, and the Sapper Comd. should maintain the closest possible liaison with the attacking formation he is supporting.

13. Control.

In order to avoid traffic congestion, the importance of marking approaches clearly by day, and illuminating them by night cannot be over emphasised. All transport, including tanks, should be halted at a control point some 500 yards short of the gap. The controlling officer at the gap should be connected by telephone to the control point, and should call forward troops, guns and vehicles, in accordance with the prepared plan, as soon as the gap is clear. Provost parties should ensure that vehicles move forward in the right order. Liaison officers with W/T sets should also be stationed at the gaps for the purpose of keeping the higher command informed of the progress being made through the gap. Special W/T provision must be made to give the C.R.E. effective communications with his unit officers controlling the gaps.

5. INFANTRY

1. Night Attacks—General.

(a) The value of well-trained infantry, capable of attacking by night with the bayonet against any form of defence, was again fully proved.

This is the difference at present between our own and the German infantry. Owing to the success of blitz tactics the German infantry appear to have become weapon holders and «tank followers» by daylight.

(b) The infantry plan must be simple. A direct straightforward advance only is possible. Every aid must be provided to assist in maintaining direction and communications. These are the major problems.

(c) Notes on a battalion night attack drill which proved successful in action are at Appendix «H». All Brigades had their drills and although minor points of detail varied between brigades, the majority took this form.

2. Objective and Depth of Advance.

(a) The depth of Brigade attacks in the initial break-in varied between 5000 to 7000 yards, with between 2000 yards to 3000 yards per infantry battalion.

These distances were mainly dictated by the estimated depth of the known enemy minefield belts. They were possible under the particular conditions of the battle only because—

(i) Country was flat and open.

(ii) It was a moonlight night.

(iii) Troops were highly trained for this task and had rehearsed these attacks.

(b) An average Brigade frontage with two battalions up was 2000 yards, opening out to 4000 yards on the final objective. The average for infantry battalion attacks was 400 to 600 yards. Although the moon was bright, dust and smoke from the barrage restricted visibility and any greater frontage would lead to loss of control.

(c) Pauses varied from 15 minutes check pause, to 30 or 60 minutes pause on objectives and leap-frogging of battalions. The latter requires much practice and again is easier in open flat country than in enclosed.

3. Killing Effect of Artillery Fire.

(a) Several formations have reported that considering the density of the artillery support during the various attacks, the number of enemy dead and wounded found by the leading troops was surprisingly light, and that enemy automatic weapons quickly opened up when the barrage or concentration had passed.

(b) Similar experiences were encountered in the last war. All attacking arms should realise that except in the case of a controlled shoot by F.O.O. against a known centre of resistance, the killing power of artillery barrages or concentrations against well dug-in infantry is often slight.

(c) The purpose of artillery support in an attack is primarily to shake the enemy's morale temporarily to stupify him (as was done on most occasions in the last break in battle) to enable the attacker to reach the objective with the minimum of casualties. The killing or capture of the enemy then follows.

(d) The lessons to be drawn from this in order to take full advantage of the devastating temporary effect of artillery concentrations are:—

(i) The attacker must follow the artillery barrage or concentration as closely as possible—so that they can complete the destruction of the enemy before he has time to recover.

(ii) The attackers must reach the objective as fresh as possible. In the case of attacking infantry they must be well hardened and carry minimum weight of equipment.

(iii) The attack should be carried through to the greatest depth with minimum pauses compatiable with control, endurance of troops and the state of the enemy defences.

(iv) There must be a carefully organised system of «mopping up» in rear of the leading attack elements.

4. Patrols.

(a) *Before the attack.* Fighting patrols are necessary to gain and maintain control of «no man's land» and for information. Aggressiveness is essential, but their activities must be controlled by Brigade headquarters and the possible effect and enemy reaction balanced against other factors.

For example, in one area where an attack was contemplated, strong patrol activity forced the enemy to take counter measures in the nature of strengthening the wire, and laying booby traps in the areas where patrol penetration had been made, and placing strong counter patrols ahead of his own wire.

This considerably increased the difficulties of engineer minefield reconnaissance, and the subsequent infantry attack.

(b) *After the attack.* Fighting patrols from reserve elements should be used to exploit systematically up to 1,000 yards if possible beyond the final objectives in order to:—

(i) take advantage of the initial confusion and elimate enemy posts close to the new F.D.Ls. which will cause much trouble at first light;

(ii) cover reorganisation and digging in of forward companies. These fighting patrols should be relieved by reconnaissance patrols from the forward companies before first light to enable them to prepare their own defensive positions.

5. Battalion Organisation for Attack Through Minefield.

(a) The attack across minefields has created a special infantry problem. The nature of the attack divides the battalion into two groups:—

(i) The assault group, i.e., Rifle companies at full strength, approximately 20 officers and 400 Other Ranks.

(ii) The support group, i.e., Mortar, carriers. anti-tank platoons, etc., at full strength, approximately 15 officers and 320 Other Ranks.

The former bear the brunt of every attacck over minefields, and as a rule suffer the heavier casualties.

The latter must as a whole wait until the gaps are clear and vehicles can move forward. In certain formations a proportion of support weapons were man-handled, in others all were kept in vehicles in the F.U.P. area until gaps were open.

(b) The drain on the assault group may therefore be disproportionately heavy in this type of fighting, and will soon cripple a weak battalion as an attacking force, and everything possible must be done to conserve their strength.

(c) In open country the objective can by day be best held by weapons, i.e., light machine guns, medium machine guns, mortars, anti-tank guns, supported by field artillery and whenever possible a small number of tanks in depth. Spare riflemen should, whenever possible, be drawn into reserve, and rested. At night they will again be required to protect these weapons, and for patrolling.

(d) The move forward of the support weapons and the «marrying-up» with sub-units on the objectives require detailed consideration and a well tried drill.

In most cases these support groups moved forward to the F.U.P. area under brigade control, and forward of this area under battalion control, moving along the battalion centre line and gap.

(e) The average battalion minefield gap was 8 yards. This was found sufficient for move of infantry vehicles. 40 yard gap is required for armoured formations.

(f) The essential minimum vehicles required with the support group varied slightly in Brigades. As an average it totalled 45 vehicles made up of:—

Carriers	—	14 plus 7 mortar.
Trucks, etc.	—	21 to 24.

6. Barrage and Timed Concentrations—Rate of Advance.

(a) The rate of advance of infantry and timing barrage lifts, must vary in each particular case according to the problems, nature of the ground and extent of the enemy's defences. The average timings of the infantry advance in this battle were:—

(i) Earlier stages from F.U.P. to approximate line of enemy fire	—	75 yards in 1 minute.
(ii) Later stages	—	100 yards in 3 minutes.

Most reports indicate that the infantry had no difficulty in maintaining 100 yards in 3 minutes and that in fact troops were inclined to walk faster in the actual attack.

(b) All advances were made close up to the barrage, distances varying from 50 yards in one case to 150 yards in another. Some losses from our own fire were experienced, but these must be expected.

Troops advancing behind timed concentrations as opposed to barrage could not maintain these close distances. 150 yards to 200 yards were averages.

(c) See also Section 3, paragraph 5.

7. Assembly.

(a) *Lying-up* by assaulting troops in confined slit-trenches during day before attack should be avoided if at all possible—bad for morale and medically undesirable since men are excited and need to move about. This need for movement if men are to give of their best later makes static lying-up of whole units hard to enforce.

(b) *Secrecy.* In several cases large numbers of motor transport and tanks were assembled close behind F.D.L.s before zero without arousing enemy suspicions. Vehicles must move slowly. Normal activity, such as artillery harassing fire, should continue up to zero.

(c) *Support arms* can move long distances (10-15 miles) in short time in moonlight along good route, and make last-minute concentration within two hours after last light.

8. Mopping Up.

Mopping up can be carried out by the reserve platoons of each company, or by reserve company, or as was done in one case by the reserve battalion of a brigade attacking on a two battalion front. The choice depending on the frontage and depth of attack and extent of enemy defences. It is, however, usually simpler if conditions allow for the leading companies to go straight through behind the barrage to the battalion objective.

Whichever system is used, mopping up must be systematically organised, otherwise minefield gapping, track marking and move of support group will be delayed or even impossible, and the situation of the forward companies after first light may soon become precarious.

Other points brought out during the battle were:—

(a) If a forward platoon strikes opposition it must go straight in, and, if necessary, the reserve platoon must take its place forward. The general practice in night patrolling of going to ground when fired on and sending men forward to investigate is bad training for the attack, and must be eliminated in prior training and rehearsal.

(b) It is very necessary to mop up on the flanks of an advance and ahead of the objective as described in paragraph 4 (b).

(c) Carriers were invaluable after first light for general mopping up of and forward of the battalion battlefield.

9. Re-organisation.

Experiences over the last six months have shown that it is easier to capture an objective by night in open country given sufficient weight of artillery, than it is to hold this objective the following day against the inevitable German counter-attacks.

The essentials for a successful infantry defence are:—

(a) That the infantry should reach the objective in sufficient time to allow the digging-in of weapons and all preparation to be completed by first light. A minimum of two hours is required for this, three hours is preferable. This factor, combined with the distance to be covered, fixes zero.

(b) That all brigades and battalions have a well-tried battle drill covering reorganisation, and the move forward of infantry support weapons, particularly anti-tank guns, mines and essential fighting vehicles.

(c) That anti-tank mines or a proportion of Army tanks are available to strengthen the infantry defences against enemy armoured counter-attack.

The Hawkins grenade has proved most effective when used as an anti-tank mine. It can be easily laid, and has a considerable effect on the morale of the defender. In one battalion, half the available men were employed initially in laying and digging in their grenades.

Mines should be recorded and location reported. They should be lifted or clearly marked before the advance is resumed.

The disadvantage of mines is that they restrict the movement of our own tanks in cases when the original objective becomes a base for a subsequent advance. In one instance the attack of a squadron of Army tanks was completely held up by the infantry's own Hawkins minefield.

If for this reason it is impracticable to lay mines, then a small number of tanks should be held forward to assist the infantry reorganisation and defence.

(d) A flexible pre-arranged artillery fire plan, which caters for concentration of the whole divisional artillery on any threatened point on the divisional front.

(e) The account of a highly successful battalion defensive action maintained throughout 24 hours without artillery or direct armoured support is given at Appendix «J.»

10. Medium Machine Guns.

(a) The call has been, as in every other operation, for more medium machine-guns. We can never have too many. The Bren is a very good infantry short range weapon for the purpose for which it was designed. It is not, and can never be, a substitute for the medium machine-gun.

(b) There is still too great a tendency to decentralise machine-gun platoons to infantry battalions as a matter of course. As in the case of other support weapons, when time allows, centralised control within medium machine-gun company and battalions will lead to more effective and economical employment.

(c) The tactical combination and employment of anti-tank gun and medium machine-gun teams requires further study. In open country these two weapons are complementary. and such teams, proportioned according to the task, have many possible uses, for example:—

(i) Formation of an immediate anti-tank screen either to the front or flank.

(ii) As mobile reserve to prevent enemy tank and infantry infiltration.

(iii) To link up gaps between units and formations during reorganisation.

(iv) Close support of an armoured attack, preferably from a flank.

(v) To deal with enemy hull-down tanks standing back from. and beyond range of, infantry localities, vide paragraph 13.

(d) During the night attack medium machine-gun sub-units must move forward to the objective early with other infantry support groups, but unlike other weapons they should not, if possible, be committed to positions and dug in until first light if full use is to be made of their additional range. This will also ensure that they are used where most required and on one plan.

11. Wire Obstacles.

A single dannert fence proved no obstacle if tackled resolutely.

12. Dug-in Enemy Tanks.

(a) Dug-in tanks did not present any real problem to determined infantry. They were successfully dealt with by S.T. and 36 grenades.

(b) Greater trouble was, however, experienced from enemy tanks in hull-down positions engaging our F.D.Ls. from just outside the range of infantry weapons (less medium machine guns). It has been suggested that nothing less than medium artillery fire is effective against this type of opposition.

13. Equipment.

(a) *Anti-tank guns.*

(i) The 6-pr. has proved itself as a first class weapon. In particular, see report at Appendix «J».

(ii) The 2-pr. is still a good killing weapon if used correctly, that is, in enfilade, and fired within its range. It is fully capable of destroying German Mark III and Mark IV tanks under these conditions. In this respect the following extract from a troop's letter is not out of place.

> «Then I heard a report from one of our guns which seemed pretty close, so I had a peep round. There was a 2-pr. anti-tank gun right handy, and it was mighty lucky for us they were. They were as cool as cucumbers. Just waited for the tanks to come over the ridge about two or three hundred yards away, and then let fly. They got four, cold as mutton, and cursed because the fifth got away. It gave the boys, including myself, quite a lot of confidence I can tell you, especially as someone had spread a yarn that the 2-pr. wouldn't stop a scooter. They sure stopped them tanks.» (19th October, 1942.)

(b) *Carriers.* Have again proved their worth. Their tasks have ranged from reconnaissance to the carrying of tools, etc., in night attacks, and water, food and ammunition to companies in exposed positions. The result has been, as in every operation since this war started, that the carrier is hopelessly overworked, and wastage rate very high.

(c) *Use of Grapnel for removing enemy wire.* Experiments have been carried out both with the carrier and firing out of a 3-in. mortar.

The carrier is not entirely successful owing to the danger of mines scattered in front of the wire. A common German practice.

The 3-in. mortar has greater possibilities provided sufficient range can be obtained. A 400 yards throw is considered to be the minimum. Results warrant further trial.

(d) *2-in. Mortar.* Contrary to experiences in previous desert battle, the 2-in. mortar was found invaluable, particularly for firing smoke.

As an infantry platoon close support weapon it is extremely useful, particularly in less open country, and it is considered that the normal scale of one per infantry platoon should be maintained.

(e) *Equipment carried on the man in the attack.* The average equipment carried within battalions during the attack was:—

(i) S.A.A.—100 to 150 rounds per man.

(ii) Grenades.—Six 36 grenades per section. In certain cases a small number of 69 grenades were carried.

(iii) One pick or shovel per man. In one formation the handles of both were shortened to approximately 18 inches, and carried vertically in the cross-braces of the equipment on the back of the man. This proved very successful.

(iv) Three or four sandbags per man.

6. INTERCOMMUNICATION

1. General.

The lessons arising out of Crusader operations 1941/42 given in Middle East Training Memorandum No. 5 still apply. Little that was new was brought out in recent operations, but emphasis was again laid on certain cardinal points, and it was found that such developments as had taken place as the result of the previous lessons were fully justified.

2. The fact that few new lessons came to light does not mean that the old ones need not be repeated. The paragraphs that follow cover some old ground, but arising as they do from a different sort of circumstances, lend emphasis to what transpired in previous operations.

3. Training, Organisation and Command.

It cannot be over-stressed that the basis of all efficient intermoccunication is co-operation between, and combined training of, users and intercommunication personnel. Widespread use of wireless, for example, necessitates practice on the part of more officers than ever before. The writing of messages still leaves much to be desired. The necessity for all users to appreciate the capabilities and limitations of the various means of communication still exists. The issue as far as resources permitted of A.C.Vs. and L.C.Vs. has brought staff officers and signal personnel into closer contact with increased efficiency.

4. Improvement has taken place in the service of battle information, although there is still a tendency automatically to place the blame for the absence of information on failure of communications, whereas frequently that absence arose from the simple fact that no information had been provided. In some cases where staff and regimental officers had become used to radio telephony they were inclined to consider that communications had failed when speech had become impossible, although telegraphy was still practicable.

5. Signals require early and accurate information on which to organise the inter-communication system, and staff officers must always recognise this fact and act accordingly. Early information is particularly necessary where a comprehensive line system has to be laid out and cable on a considerable scale buried, in the case of the transfer of units and formations and with regard to moves of headquarters.

6. Within Signals themselves there was frequently failure to keep the signal unit of higher and lower formations informed of moves or other factors affecting inter-communication.

7. There is still a need for more consultation with Signals regarding moves, the siting of headquarters, location of administrative establishments and echelons with a view to the best possible inter-communication system. The necessity for keeping headquarters well forward and for reducing the distance between Main and Rear to a minimum was simply demonstrated throughout all stages of of the operations.

8. Signal units of formations are sufficient only to provide for a headquarters split into two principal parts; in addition, a commander's reconnaissance is allowed for. Fresh orders will shortly be issued laying down the standard sub-division of headquarters. Dispersion of headquarters demands the adoption of standard lay-outs, and steps must be taken to light signal offices and routes to main wireless sets at night. Otherwise considerable delay in handling of messages will be caused.

9. Situation reports from the forward troops transmitted through normal channels inevitably take a long time to reach the higher headquarters. The interception of signals of the forward troops themselves can produce information at the higher headquarters sufficiently quickly to assist the commander in gaining a picture of the situation on the whole front, to be useful to the R.A.F., and to help the commander in deciding on the relative merits of demands for support made through normal system of air support control. This interception was organised on a wide scale, and became known as «J.» Very valuable results were obtained, and the organisation will be a regular feature in future. Details of the service have been issued separately.

10. Wireless.

10. As soon as the break through occured and the pursuit began, wireless inevitably became the primary means of communication.

There is still a need for a long-range R/T set and for a wireless set which will ensure communication up to 100 miles under all conditions. Beyond 100 miles the difficulties are not as great. In this connection it is not always appreciated that a set which can work at 100 miles may fail at shorter ranges from 40 miles upwards. On some occasions a system of step-up sets was employed, but such system interferes considerably with the smooth working of a wireless group, and leads to long delays. A supply of American sets has recently been received which it is hoped will solve the problem.

11. High-speed wireless links were successfully established between General Headquarters and Main and Rear Army. These proved invaluable for the disposal of traffic, although the attendant difficulties of adequate provision for cipher have yet to be overcome.

12. With the large concentration of formations in a comparatively small area, frequency congestion was inevitable. This was kept to a minimum by careful pre-allotment, but there is still a tendency for frequency «piracy.» The practice of searching for a blank space in the ether and not sticking to the allotment made it dangerous, and must be avoided. The frequency so found may be one which is being specifically reserved for some important operational link of which the «pirates» are unaware, and it may interfere with vital R.A.F. communications, including those connected with air support.

13. The No. 18 set generally proved its value, particularly where adequate practice and training had taken place. The set was handicapped, as battle batteries were not available, and in desert country the signaller carrying the set is still very conspicuous.

14. No. 18 sets were issued to anti-tank batteries with armoured formations, and proved of considerable value. An extension of this issue to all anti-tank batteries is under consideration.

15. A limited issue of 18 sets was also made to Field Squadrons in armoured formations. These were of value, but have not got sufficient range. They will be replaced as soon as possible by No. 19 sets in the case of armoured formations, and by No. 11 or No. 21 sets in the case of others.

16. The 18 set with batalions of Lorried Infantry Brigades proved inadequate, and will be replaced by No. 11 sets.

17. Action is in hand to produce a form of 18 set homing loop with a view to assisting the maintenance of direction of an advance at night.

18. The «bread van» type of wireless vehicle has finally proved to be too heavy and unsuitable for desert conditions. F.W.D. trucks will be provided as they become available. The supply of suitable armoured vehicles for commander's reconnaissances and as headquarter's wireless vehicles in forward units and formations, does not meet demands, but it is hoped that more will shortly become available.

19. Demands for additional wireless communication are continually received. Every service tries to get its own system. The time has come when such demands can no longer be met owing to the factors of frequency congestion, lack of personnel and shortage of equipment and facilities for charging batteries. More attention must be given to joint staff and signals organisation of wireless facilities on a pool basis where special services do not exist.

20. Lines.

20. The relative merits of wireless and line communication are not always fully appreciated. At certain stages, particularly when movement is rapid, wireless becomes the primary means, but line communication must be established whenever possible. This applies to armoured formations as well as others. For the deliberate attack when time is available, line communications on a large scale are essential. To protect these lines against damage by enemy shell fire or bombing and, moreover, by our own armoured vehicles, resort must be made to burying, and the buried system must be in continuation of the permanent line layout. The latter should be pushed as far forward as possible having regard to the degree of enemy bombardment likely to be experienced. Duplicate lines by alternate routes must be provided, and special attention paid to artillery communications. This was done for the Alamein battle, and the control of large artillery concentrations was thereby made possible. The buried system also provided for the elaborate traffic control system which was required for the assembly and advance of armoured formations through the British minefields.

21. All available types of cable were used in the buried system. There were no stocks or properly armoured cable but a «protected» type of 7 and 14 pair was utilised for the main routes. D.8 was successfully buried. American cable is less suitable for burying as it is liable to damage owing to its soft cover. It also quickly becomes unserviceable in the presence of damp or any form of chemical in the ground.

Both mechanical means and manual labour were used. The only machines available were not entirely satisfactory as they could not bury cable deeper than 18 inches even in suitable ground, but without them the work could not have been completed in time. Where there was rock, great difficulty was experienced and the pressure of traffic frequently led to damage to the cable as its covering became worn away between wheels or tracks and loose stones.

22. For efficiency and economy in any buried system, two factors are of especial importance:—

(a) Early information as to the siting of headquarters and units, and

(b) Centralised co-ordination in designing and executing the work.

Without this co-ordination cable trenches have to be dug along the same route more than once, the necessary records regarding circuits are lacking and in extreme cases—which actually occurred—subsequent work by the mechanical digger ploughed up and cut previously buried cables.

Finally, in any buried system, a liberal allowance for spares must be made to provide for last minute additions and alterations.

23. There inevitably comes a stage at which further burying is impossible. Every means must then be devised of laying cable in the open in such places where damage by vehicles will be minimised. For example, just inside minefields, by putting the cable up on short poles across salt pans or marshes, by tying it inside the bulge of railway metals and by using water pipes at track crossings. Even in difficult conditions laying of lines is always worth while provided distances are not too great.

24. In any line system the necessity for attention to detail requires to be stressed. Difficulties occurred where records were incomplete, where handing over was skimped and where personnel at test points were not provided with full information regarding the build-up of circuits and the routes the cables took.

25. Permanent line where it was practicable again proved its value. When it came to extending the main routes when the advance took place, a great deal of excellent work was done. There were cases, however, where delay was caused and avoidable trouble experienced through indifferent line reconnaissance. There were also cases where the energy and devotion to duty of line personnel were offset by overkeenness to maintain a high pace of restoration or reconstruction and by poor technical work. This can only be overcome by adequate training and meticulous supervision.

26. The value and efficiency of multi-channel equipment was once more demonstrated. Steps must be taken to increase the number of men trained in the maintenance of carrier systems and repeaters.

27. In the forward areas a need was apparent for some form of light assault cable. This is in hand and a cable of this nature is being produced.

28. Visual Signalling.

28. Visual was little used although one division established a central visual station for the Alamein attack. It did not go into action as line communication held, but it is important that every available alternative means of communication is provided for use in case of necessity.

29. Pigeon Service.

29. A series of pigeon lofts had been established and pigeons were distributed to forward units and headquarters. Here again little use was made of them owing to other means of communication proving adequate. Circumstances, however, might easily have arisen where pigeons would have been valuable.

30-31. Security.

30. There is no doubt that security in general has improved but the difference between the use of R/T by the experienced and practiced and by the inexperienced and untrained remains very evident. The proper employment of R/T codes and the intelligent mixture of plain language, jargon and code, still requires more attention. There is a tendency in some quarters to doubt the danger of indiscretion and subsequent interception. Sufficient concrete proof of these dangers has been obtained and in particular administrative wireless links were prone to present the enemy with information which they could not otherwise have obtained.

R/T codes are still in their infancy and steps are in hand to simplify and improve them.

31. As already stated the cipher bottle neck still exists. It is hoped to make an increased issue of Typex machines but not until adequate spare machines and component parts are immediately available. In connection with cipher messages, much delay and confusion was caused at times by the despatch by Express Letter Service of large batches of cryptograms. Steps must be taken to ensure that when circumstances make it necessary to use Express Letter Service for the transmission of messages previously intended for wireless, clear copies only are sent.

32. Mine Clearing.

32. Signal personnel, especially those employed on line work, must be trained in mine finding and mine clearing.

33. Supply and Maintenance of Equipment.

33. The supply and repair of signal equipment showed considerable improvement. This was due partly to the fact that more equipment was available, but more to the institution of a system of demand and supply through Signal channels, to the establishment of signal parks and to an increase by R.E.M.E. of mobile repair facilities.

34. FINALLY, THERE CANNOT BE TO MUCH INSISTENCE ON TRAINING, BOTH TACTICALLY AND TECHNICALLY IN THE ORGANISATION, HANDLING AND WORKING OF EVERY FORM OF INTERCOMMUNICATION.

7. GENERAL ADMINISTRATIVE LESSONS

1. Reinforcements.

The peculiar situation of Eighth Army (with a long slender Line of Communications rapidly extending during the battle, and erratic and often slow signal communications) greatly affects the process of reinforcements. The lessons to be drawn are:—

(a) Eighth Army formed, during the withdrawal in June, a Control Post which checked all reinforcements and directed them forward. It was under the direction of an «A» staff officer from the Army. It was originally located at AMIRYA and moved forward slightly behind Rear Headquarters. This procedure has proved of value as it is found impracticable to rely on Transit Camps carrying out written or signalled orders.

(b) At times there were cases of attempts of formations or units to accelerate the flow of reinforcements, cutting across the normal procedure, either by by-passing the normal channels of forward movement or by departmental action. These attempts in nearly all cases did not achieve their object and often actually caused delays.

(c) In the special conditions, careful control of priorities of demands for reinforcements and of their move forward, is essential. If not so controlled, the forward machinery is clogged with personnel not urgently required.

(d) With a very long Line of Communications there will necessarily be great delays unless a pool of reinforcements is held forward, particularly for the main fighting arms. Unless this pool is properly controlled and provided with training and administrative staff, efficiency of officers and men deteriorates greatly before they actually reach units.

(e) It is essential that Base Depots only despatch properly trained reinforcements unless the situation is such that Army agreed to the provision of personnel below the normal standard of efficiency. This may at times be necessary if the man-power situation is critical. A case in which this principle was abandoned occurred with a party of nearly 200 motor reinforcements which units did not accept and which, therefore, had been nearly 2 months in transit camps losing training and wasting valuable space in these camps.

(f) Eighth Army used the staffs of two transit camps leap-frogging forward as the advance continued. These two units formed three camps, two in action and one ready to move forward and take over until the camp in rear was able to move. It is just possible for a transit camp staff to throw off such an advance party but efficiency would be increased by having a special unit for this purpose.

(g) The forward transit camp should be sited near the F.M.Cs. supplying the fighting troops, otherwise it is difficult to move reinforcements forward to units.

(h) F.M.Cs. should be provided with the necessary administrative staff to provide moves over night for men en route to units. They frequently have to wait at least one night before transport is available for them to go forward.

(j) A land Line of Communications such as that from the DELTA to BENGHAZI which is not entirely rail served, can only carry a very limited number of personnel unless transport is plentiful, and it is unlikely at any time. If rail movement is not possible, then the risks and difficulties of sea movement will have to be considered if appreciable numbers have to be moved.

(k) The attachment of liaison officers from 2nd Echelon to Army Headquarters is necessary to avoid 2nd Echelon losing control.

2. Left Out of Battle.

(a) It is clear that there is a misunderstanding in regard to the practice of earmarking certain personnel in units and formations to be «left out of battle» in active operations. These personnel are commonly referred to as «L.O.Bs». They have, in certain cases, been kept for long periods in rear areas completely out of touch with their units, with a consequent deterioration in their training. Furthermore, they have been difficult to locate and control by higher authority dealing with reinforcements. In such circumstances they are not available to be used to the furtherance of the success of the operations in hand.

(b) The main object of having L.O.B. personnel is to ensure that a unit or formation will have *readily available* immediately after a stiff fight, either in attack or defence, where severe casualties are probable, a nucleus of experienced officers and O.Rs. on which it can rebuild or strengthen itself without delay and thereby become thoroughly battleworthy again. Subsidiary objects, as for example an assurance against the total extinction of a unit in battle, must not be permitted to overshadow the main reason for their existence.

(c) It follows, therefore, that L.O.Bs. must be located in close proximity to their parent unit—ideally somewhere in its area so that they can rejoin their sub-units or be available for reposting to other sub-units at the earliest moment. The length of time they may remain «withdrawn» from their unit or sub-units is not a fixed period—it depends on the duration of the actual fight—it might vary from as little as twenty-four hours to a probable maximum of a week, this latter being as long a period as a unit is likely to be actively engaged in a single operation.

It is obvious that no hard and fast rules can be laid down in connection with their location. For ease of administration in the case of a set piece attack or protracted defence by a div. or bde., it may be decided to concentrate these personnel on a bde. or div. basis; in the case of a smaller fight, personnel might be sent to the transport area of the units concerned.

If a higher formation decides to concentrate L.O.Bs. further back than the areas visualized above, arrangements must be made to ensure that this does not defeat the main purpose for which they have been withdrawn.

(d) The strength and composition of L.O.Bs. require consideration. It is not practicable to lay down hard and fast quotas. A balance has to be struck between the necessity to have efficient sub-units correctly balanced and able to work as a team and the desirability of reserving a nucleus on which to rebuild after the fight. Formations and units should have a standard composition as a guide to work on. Suggestions are given in Appendix «M».

(e) It will be seen from the foregoing that there is a great difference between «L.O.Bs.» and «reinforcements». It is thought that part of the misunderstanding in regard to the use of the former has arisen because the distinction was not clearly understood.

3. Tank Reorganisation Group.

Just before operations started the reinforcements unit held about 120 R.A.C. reinforcements, not part of the 1st reinforcements of any formation in the Army area. On the 20th Oct. units sent back «unwanted» men in excess of W.E. (they had during the training period received a proportion of their first reinforcements for training) numbering nearly 600 by 22nd Oct.

The rendering of returns by that unit was not satisfactory and it was difficult to discover the R.A.C. reinforcements picture.

As the above reinforcements had only recently arrived in the M.E. they were not good enough to go forward again as reinforcement trained crews, and when crews were wanted sub-units from regiments temporarily disarmed were sent forward. This broke up unit organisation and tended to a repetition of the mixture of units which had occurred in June, 1942.

In the early part of the operations reinforcements unit was near AMIRYA. As the battle moved forward the Tank Reorganisation Group and T.D.R. moved forward but the reinforcements unit did not do so.

Many trained crews who had gone back or remained back with damaged vehicles took a long time to collect and send forward again owing to the great distances. They returned by degrees, and many units soon found that they did not need as many reinforcements as they had demanded.

The lessons which arise are:—

(a) A Branch of Army Headquarters and not A.F.V. Branch should control the reinforcements unit.

(b) Reinforcements unit ought to be close to Army Control Post and Tank Reorganisation Group.

(c) Despatch to rear of reinforcements previously held with units for training purposes may involve loss of security.

(d) All reinforcements held in the reinforcements unit of Tank Reorganisation Group must be really well trained and therefore acceptable as replacement crews.

(e) Daily personnel returns, from the various parts of the Tank Reorganisation Group are necessary.

4. Graves.

(a) Action by formations to concentrate their burials into Divisional or similar cemeteries, greatly assists the work at later stages of G.R. and E. units. It has also considerable effect on morale in giving officers and men an indication that permanent care of the graves of their comrades is being considered from the first.

(b) The work of the G.R. and E. Service would be greatly assisted by their being permitted to operate well forward at an early stage.

5. Welfare.

(a) The ability of the Welfare organisation to start operations quickly, and therefore at a time when such activities are most valuable, depends on the provision of transport by the Army to its Welfare officers.

(b) The use of transit camps to ensure that all convoys proceeding forward take with them welfare comforts, forms one method of getting over in some part the lack of specific transport for welfare.

(c) *Mobile canteens*, both E.F.I. and from philanthropic bodies, form the first practicable method of getting welfare goods to troops. Machinery for moving forward bulk supplies for these canteens to avoid their having to return to the base and refit, is not very satisfactory.

(d) *Mobile cinemas* form what is possibly the most popular form of welfare in the forward areas. There were several cases of breakdowns of vehicles and apparatus. More liberal provision is the only method of getting over this.

(e) *Newspapers* were carried forward by air to provide distribution of 4,500 per corps. If it is at all possible, they should be carried by air to the neighbourhood of F.M.Cs. so that units may receive the previous day's paper with their rations. Method of packing bulk supplies of newspapers to avoid them being damaged in transit, still requires improvement.

6. Provost.

(a) With a lengthy Line of Communications, C.M.P. Check Posts, or at any rate the more important ones, can function with greatly increased efficiency if they are provided with wireless.

(b) Jeeps are the ideal vehicle for C.M.P. Road Patrols. The provision of 2 for each section appears suitable. Motor-cycle combinations are of very much greater value than solos in Line of Communication areas.

(c) There is always an urgent demand for increased supplies of track marking and sign writing equipment but the difficulties of transport are considerable. Much equipment is lost in an advance in desert country. A satisfactory lamp for traffic marking by night has not yet been designed; an electric lamp would be most suitable except for the difficulties of the provision of batteries.

7. Traffic Discipline.

Owing to the long period of hibernation in the desert, it was found necessary to enforce certain rules of the road. As these rules vary in different parts of the world, they are quoted for information on proving satisfactory:—

(a) Do not halt on the road.

(b) When halting, get at least six yards off the road.

(c) If you break down, get off the road as quickly as possible. Until you can do this, make certain that traffic is properly waved on.

(d) Keep at least 100 yards between vehicles.

(e) Transporters, and similar heavy vehicles may be passed, otherwise no overtaking is allowed except by:—

(i) Officers in cars, 8-cwt. and 15-cwt. trucks.

(ii) Ambulances.

(f) Lorries will maintain normal convoy speed of 30 m.p.h. as far as possible.

(g) All drivers must know route and destination.

One copy of the above rules should be stuck on each vehicle where it can be seen by the driver.

8. Traffic Posts.

Traffic control has been a serious problem in all operations in the Middle East particularly in Greece where roads were few and defiles and bridges were heavily bombed.

The provision of traffic control personnel has been a serious drain on the fighting formations, but there are no traffic control companies in the Middle East and difficulty must be accepted.

All Royal Artillery Regiments, Motor Battalions and Infantry will train and maintain two Traffic Posts for employment when called for.

9. Despatch of Kit of Casualties from Forward Areas

Considerable difficulty and confusion has been caused in the past over the matter. The following procedure which is now in force has proved successful:—

To prevent losses, damage and pilferage to surplus kit of casualties and deceased's effects, despatched from the forward area to Base Depots and 2nd Echelon, the following instructions will be strictly observed:—

(a) Units will ensure that kits are securely packed, tied up and correctly labelled (sandbags should be used).

(b) Money and valuables will be sent separately in small parcels by registered post.

(c) Arms, binoculars and compasses, the property of the public will not be despatched with kit but handed in to unit stores.

(d) Unit representatives will accompany the kit to the nearest F.M.C. and hand it to the M.F.Os. representative, or other person detailed for this duty. They will take a receipt for the number of packages only.

(e) Officers Commanding F.M.Cs. will be responsible for all kits received at their centres. They will ensure that:—

(i) In the absence of a representative of the M.F.O. a member of their staff is detailed for the reception of kits.

(ii) The kit is protected from pilferage and the weather.

(iii) The kit is despatched at least once per week to the M.F.O. at Road Head of Rail Head.

(iv) The kit is accompanied and guarded throughout the journey by a representative of the M.F.O. if available.

(v) In the event of a representative of the M.F.O. not being available, Officer Commanding F.M.C. will detail a suitable N.C.O. to accompany the kit. This N.C.O. will take receipts for all packages handed over to the M.F.O. or next F.M.C. as the case may be, and will return with them to the Officer Commanding the forwarding F.M.C.

(f) Officers Commanding R.A.S.C. Transport Companies will co-operate by assisting in the provision of a N.C.O. when no M.F.O. N.C.O. is available and by carefully «Receipting In» and «Receipting Out» kit entrusted to their custody. They will also take steps to ensure that damage and pilferage does not take place.

10. Looting.

In spite of all orders issued on the subject, looting of crock tanks and aircraft and senseless cannabilisation of vehicles was prevalent. Whenever possible crews were left with crock tanks, but in many cases this was not possible owing to the proximity of the enemy.

Many of the tanks left on the battlefield without a crew were almost completely stripped of tools, water tins, etc., and in some cases of wireless sets and telescopes. Several cases of looting occurred after the Recovery Officer had located and seen the tank: by the time the recovery vehicle had reached the tank, a few hours later, the looting had taken place.

The following principles for the safeguarding of A.F.V's must be applied when possible:

(a) All tanks and armoured cars in transit, or left unattended, will be closed and padlocked.

(b) Instructions for the fitting of hasps, provision of padlocks and the disposal of keys will be issued by headquarters of Armies, formations or areas.

(c) Any individual discovering an abandoned A.F.V. will close it up and report the W.D. number of the vehicle, map reference and date found to the unit concerned or R.E.M.E./R.A.O.C. by the quickest possible means.

(d) Brigade Recovery Officers, Brigade E.M.E's and Unit E.M.E's will be issued with padlocks. On locating a crock tank they will then have some means of securing tool boxes, turret flaps, etc., which may deter the would-be looter to a certain extent.

It must be strictly impressed on all ranks that the looting of captured material is a serious offence and may deny the Allies use of valuable equipment. Any case discovered must be reported, and the necessary disciplinary action taken. The threat of disciplinary action is not sufficient to maintain discipline in such matters.

11. Tyres.

The seriousness of the tyre situation is not realised. Tyres littered the desert. Pressures continue to be erratic.

Certain tyre pressures were laid down by General Headquarters (General Order 1222 of 1942 and Appendix refer) and are almost impossible to enforce. The bad state of the roads make personnel extremely uncomfortable, and even causes danger at times, which makes men very tired over long distances. Pressures are in consequence lowered in order to get better riding. The result is that they are not lowered to a reasonable limit but far too low, and damage which the recommended tyre pressures sought to avoid is becoming more emphasised.

This matter can only receive the attention it is due if Comds. take a personal interest by enforcing reasonable tyre pressures, organising tyre maintenance courses and by insisting on economical driving.

12. Removal of Bodies from Tanks.

Before battle personnel from Field Hygiene Sections must be attached to an armoured unit for the purpose of removing bodies, often dead for several days, from the tanks—a task it is unwise to ask tank crews to perform. See also Section 10 paragraph 3, and Section 11 paragraph 2 (d).

13. Petrol.

Very conservative estimates must be made of petrol requirements. One Division moved out of Alamein with approximately 180 miles of petrol. This proved sufficient for only 100 miles. Factors causing high petrol consumption were operations, slow movement in darkness over bad going, and wet and muddy conditions. With the non-returnable containers leakage proved high particularly when they had to be transported over rough country. Much leakage can be avoided with this type of container if properly dunnaged or secured from movement in the vehicles in which they are transported.

14. Water.

(a) The leakage of water carried in non-returnable tins which cannot be properly sealed is very great, on occasions up to 33 1-3%. This often means that units are very short.

A robust container of the Jerrycan type, as a general issue, is essential for the carriage of water and petrol unless units are to continue to live in danger of acute shortage.

(b) It was found possible to carry a 40 gallon drum of water on each troop-carrying lorry, and this should be carried whenever drums are available. Should units be ordered to occupy a defensive position at short notice, these drums can be put straight into platoon positions together with the 3 days' reserve of rations.

15. Supplies.

(a) Great inconvenience was caused to units, chiefly Royal Artillery units, who were placed under command at the last moment because no warning of their having been put under command was given to the second line transport company. It is possible with existing transport to hold a small reserve against such an eventuality and this should be done.

(b) Much time could be saved by Brigades informing second line companies direct of the required location for the next day's Supply Point. Brigade R.A.S.C. officer should pass this information as from Brigade Headquarters.

(c) All «Q» officers would have felt happier had units been carrying three days' battle scale rations in reserve for all personnel. This would have given a useful margin in everything.

(d) Attached troop carrying transport frequently arrived from some other formation without reserves of any description. This is a serious matter as it means a considerable delay in getting the transport refuelled and replenished before units can move. If units are holding the reserves recommended this situation can be got under control quickly. otherwise it means sending back to the harassed second line Company for the necessary commodities.

16. Replenishment.

The following system of replenishment of first-line vehicles during an advance proved satisfactory:—

(a) Necessary ration, water and P.O.L. vehicles remain in area from which fighting troops have moved forward.

(b) Second-line vehicles replenish first-line near this area as early as possible in the morning.

(c) First-line vehicles then move off to join fighting troops.

This enables unit supply vehicles to find their way in daylight. Under this system unit supply vehicles should be properly organised as Brigade or Divisional groups and commanded by an officer. This will facilitate, where necessary, the provision of protection and will also prevent individual unit vehicles becoming lost.

17. Transport.

It was found practicable to bring up hot meals every night to forward troops up to a distance of 18 miles. This enables «B» echelon vehicles to be kept far away from F.D.L's by day.

18. Railways.

There are no new lessons in railway operating but following points on restoring the railway track during the advance are of interest:—

(a) *Materials.* A complete construction train was provided, but the nature of enemy demolitions had been such that it was possible to proceed with temporary repairs to the track considerably ahead of the train. It was therefore necessary to haul rails, over short distances with small-tracked tractors, and over longer distances in tank transporters; sleepers were brought forward by motor transport. Where sleepers had been freed by demolitions it was found that they had been taken by troops. probably for firewood. It is important that no material should be removed from railways which it is proposed to re-open.

(b) *Demolitions.* The enemy had in most cases placed his demolition charges on the rail joints, where they destroyed the fish-plates, damaged the ends of the two rails, and destroyed usually not more than two sleepers. Repairs in such cases were quickly effected: the damaged rails could be cut short and a short insert made to fill the gap.

Where the enemy had placed his demolition charge in the centre of the track, opposite rail-joints, the damage necessitated much heavier repairs because four rails were dislodged and damaged and a number of sleepers destroyed.

8. R.A.S.C.

1. Wireless Communications.

The operations have shown that in the fast moving modern battle an efficient and flexible system of wireless inter-communication is an essential part of the «S.T.» organisation of modern forces.

After the break-through, the advance was so rapid that line communication could not be maintained. Many detailed orders concerning troop-lifting from rear to front, rapid despatch of petrol, ammunition and supplies to newly-opened areas, changed requirements for operating Corps, etc., have to be notified to Supply and Transport terminal points quickly and the importance to an advancing army of the Supply and Transport wireless link cannot be over-stressed.

During this forward move the control of all maintenance convoys working forward from railheads and seaheads was entirely by Line of Communication Transport Column wireless sets linked to S.T. Rear Army Headquarters. The distances to be covered by wireless were at times so great that an Headquarters Line of Communication Transport column had to be put into an intermediate position solely for the purpose of relaying wireless messages. An example of this was when Maintenance Convoys were leaving MERSA MATRUH for BENGHAZI and Rear Army Headquarters were at MRASSUS. The Transport Column at MATRUH was unable to notify the Column at BENGHAZI of time of despatch, E.T.A. and load carried by maintenance columns going forward, so relaying links were put in at BARDIA and MRASSUS.

Difficulty was experienced over the maintenance of S. and T. wireless sets, mainly in connection with the failure of the portable battery charging sets and partly due to the inexperience of operators in diagnosing and rectifying faults. One set was out of operation for three days during a critical period because the operator could not diagnose the trouble. When Signals sent a skilled man the trouble was found to be due to faulty headphones and was rapidly rectified. It is considered that with eight wireless sets operating under S. and T. a skilled technician should be made available to deal at once with any troubles of a technical nature.

2. Administrative Codes.

A simple administrative code, other than Sheetex, to cover all Service needs appears essential to avoid delays in decoding and encoding.

The volume of traffic carried by S.T. wireless during the advance was very great and the time taken up by encoding in Sheetex Code caused great delay. So much so that a large number of signals had perforce to be sent in clear at the risk of enemy interception.

9. MEDICAL

1. Field Surgical Units.

These units are now on firm War Establishments with their own I.1248 and G.1098. Eight units were fully employed during the operation with M.D.S's. Light Sections, C.C.S's, and an Army Medical Centre, GHARBANIYAT. Undoubtedly many lives were saved by early surgical intervention, more especially cases of abdominal and chest wounds, and severe multiple injuries.

2. Light Field Ambulance.

The weaker Light Field Ambulance of an Armoured Brigade, which forms an integral part of a division upon the new establishment, raises problems which require careful consideration. In an attack such as that on 23 Oct. the weaker Light Field Ambulance, A.D.S's and M.D.S's cannot cope with the number of casualties from an infantry brigade, which means that field ambulances are no longer interchangeable. It is doubtful whether a Light Field Ambulance is any more mobile than our present Field Ambulance. The solution to this problem has yet to be found.

3. Mobile C.C.S.

The value of mobile C.C.S. was fully proved during the rapid advance. Had such units not been available there is no doubt that the early treatment of casualties would have broken down. Two units were available with 10 Corps and by a series of leap-frogging, one unit was always close behind the advancing troops. One mobile C.C.S. must always be available for each Division when rapid long distance operations are in view.

It is considered, however, that in preliminary operations, as was experienced during the first few days at EL ALAMEIN, where a sudden rush of casualties may be expected, it is better not to split off the Light Section as this leaves the Heavy Section understaffed. The Light Sections should only be detached if the distance between M.D.S. and the C.C.S. becomes too long, or if, for any reason, the evacuation of casualties from M.D.S. to C.C.S. is unduly retarded.

In normal cases the Field Surgical Units should be able to cope with the very urgent cases that would not stand the journey back to the C.C.S.

4. Blood Transfusion.

Immediately prior to and during the battle 3220 bottles of Group 0/4 blood were despatched to Eighth Army by transport aeroplanes. The largest despatch in a single day being 366. All Field Medical Units were already supplied with plasma up to the authorised scale. 2961 bottles of plasma were sent forward during the battle period.

Demands for saline were high owing to the large number of successful abdominal cases treated in the forward areas. 5172 bottles were sent up during the period.

Blood and other supplies were taken by transport aeroplane and refrigerator truck to No. 3 Field Transfusion Unit situated at Medical Concentration Area; this unit arranged to supply all Field Transfusion Units. An extra refrigerator truck went forward to form an «Advanced Blood Bank». After the initial issue all blood and other requirements were issued in exchange for returned empties.

During the advance, No. 3 Field Transfusion Unit accompanied the Advanced Air Transport Centre and was supplied with blood from Base Transfusion Unit daily.

The first 300 cases transfused by Field Transfusion Units produced few reactions. Reports on 2500 bottles of blood used show an extremely low reaction rate.

5. Air Evacuation.

Evacuation of serious cases by air reached a further stage in its evolution. Over 2000 cases were evacuated to Base—the peak figure was 200 cases in one day, over a distance of 700 miles. Abdominal cases travel badly and should be retained at least four days before evacuation by air. Chest cases travelled with minimum discomfort at about 100 feet, as air transport vehicles, due to operational requirements, flew at this level.

Points of importance are:—

(a) All returning air transport aircraft should evacuate casualties as a duty, not as a courtesy.

(b) All transport aircraft should be fitted with stretchers. These require to be internationally standardised.

(c) Transport machines should land at an aerodrome which is either the same or adjacent to that from which the Air Transport Squadrons, serving forward areas operate.

(d) Formation of air evacuating centre adjacent to aerodromes mentioned in (c) above. This to be either M.R.S. (R.A.F.) or detached from a Field Ambulance and equipped to feed, treat and house casualties awaiting onward transmission by returning transport aircraft. Casualties must await aircraft, aircraft cannot await casualties.

(e) It is an advantage if these aerodromes be sited as near as possible to main Line of Communications road, so that severe cases coming down by road can be easily transferred to air.

(f) Telephone communication between Air Evacuating Centre and aerodromes.

(g) Competent medical authority be consulted as to whether any proposed Air Transport landing ground is appropriate for evacuation of casualties.

6. **Evacuation Drill.**

The following drill for collecting wounded at night during the gapping of minefield was carried out by one formation and proved satisfactory:—

(a) The R.A.F. of the leading battalion is sited just to rear of the start line, and casualties on the start line are cleared by R.A.F. ambulance car and cars from the A.D.S. which patrol up to the minefield.

(b) The R.A.F. moves through the gap as soon as it is clear, and establishes as close to brigade axis of advance as practicable.

(c) Half-an-hour later four cars from the A.D.S. go up to clear the R.A.P., the casualties being brought to the axis from the R.A.P.

(d) Other cases are collected by ambulances patrolling on the axis, instructions having been given for walking wounded to make their way along the marked routes.

(e) The same procedure is followed at each gap.

(f) The A.D.S. must be in communication by telephone with Brigade Headquarters so that information concerning gaps, etc., can be obtained.

7. **Unit Equipment—Armoured Regiments.**

The necessity for an armoured vehicle for removing casualties from the battlefield was again most distressingly obvious. The W.E. of Armoured Units should include a White Scout Car for this purpose. This vehicle will enable the medical orderly to go forward to damaged tanks with at least some degree of protection. A White Scout Car has now been adapted to carry two stretchers and is in use: it is not marked with a red cross as it is intended to evacuate casualties and marooned crews from the battlefield.

10. HYGIENE

1-3. Hygiene Problem.

The main hygiene problems which had to be faced during the period of preparation for the offensive were:—

(a) The concentration of large forces on a narrow front in late summer, the season of fly and mosquito borne diseases.

(b) The mass of Bedouins swept back behind ALAMEIN by the GERMAN advance.

(c) The slackening of unit hygiene discipline due to the July withdrawal.

(d) The disturbance caused to the hygiene organisation by the withdrawal.

2. The chief measures taken to overcome these problems, to prepare for the offensive and to safeguard the health of the Eighth Army were:—

(a) The hygiene organisation was revised, and in order to give greater flexibility Field Hygiene Sections and resources were initially centralised under Army and Corps control.

This centralisation, as with all other arms. led to greater economy of effort and ensured that Field Hygiene Sections were used to their best advantage, and sent where most required.

As an example. In 10 Corps during the break through, the pursuit period, detachments were decentralised to brigades. In 13 Corps, with problems involving less movement and dispersion, resources including all disinfectors and workshops remained pooled under Corps control.

(b) The organisation of a Fly Control Unit consisting of 5 officers and 300 men, to deal with the serious fly plague. This unit, by helping other units in clearing debris, refuse and dead bodies, materially reduced the plague of flies. As a measure to meet an unusual emergency its creation was more than justified.

(c) Measures were taken to ensure that typhus, desert sores, food deficiency diseases and burns in A.F.V.s would not cause avoidable losses during the battle and subsequent advance.

3. During the actual battle the main hygiene task was the cleansing of areas captured from the enemy, i.e., clearing of fouled ground, purifying water supplies, delousing Prisoners of War, pushing forward apparatus to future cleanliness of our troops, clearance of human remains from A.F.V.s, etc.

4. Battle Rations.

A new battle ration was produced including such items as sausages, cheese, jam, onions, and tinned fish, which gave about 3,100 calories per day, and its use was limited to an absolute maximum of 10 days.

As a result of these factors, no sign of food deficiency diseases has appeared in the present operations.

5. Distribution and Cooking of Food.

For armoured units a mobile cooker was evolved. It carries hot meals forward to the fighting crews, and in general during the recent operations it proved its worth. Some units, even in the worst battle conditions, were able to get hot meals right forward for their tank crews.

Vehicle cooking, on the other hand, was common, owing to the wide dispersal of units. The advantages of vehicle cooking are:—

(a) Vehicle crews use the «family atmosphere».

(b) It affords opportunity for the «brew-up», which is a stable factor of EIGHTH ARMY morale.

(c) Rivalry over cooking matters keep independence alive and affords a premium of interest in food, even when battle rations are poor.

(d) It maintains dispersion of personnel.

Its disadvantages are:—

(e) In place of well-cooked meals troops are inclined to feed casually «out of a tin».

(f) There is a wastage of rations.

(g) The debris from cooking and feeding is often carelessly scattered over camping areas.

(h) A.F.V. crews are often too tired to fend for themselves when in harbour, with the result that they go to sleep with nothing more than a biscuit or two inside them, and a mobile cooker is essential for forward armoured units.

(i) Petrol consumption is very high.

The question of cooking and distributing food still needs great improvement. Sub-unit cooking is most satisfactory. Units must see that they are provided with sufficient good cooks, proper cooking arrangements and a fully developed sense of cook-house hygiene and sanitation.

6. A.F.Vs.

(a) *Pack Rations.* A pack ration was supplied to A.F.Vs. for use in the case of long periods of isolation. Two-men and three-men one day rations have been tried and, in addition, most A.F.Vs. were supplied with half-gallon thermos containers for hot drinks. No final decision as to the composition and form of the pack has yet been made.

(b) *Cooling.* The experience of tank battles in June and July show that in the Middle East no special cooling arrangements are required. No cases of heat exhaustion and heat stroke were reported.

(c) *Burns.* Ordinary clothing goes far in protecting A.F.V. crews against burns, and recommendation for the wearing of long-sleeved shirts and slacks by such crews was made.

Whether this was done and what effect it had on the incidence of burns is not yet known.

7. Summary.

Though the enemy's hygiene organisation was far inferior to our own, and his defeat may in part be attributed to the resulting poor physical condition of his troops, full consideration must be given to all hygiene matters.

The following table of admission to C.C.S's. and Field Ambulances brings to light some interesting points. It should be noted that even in the period of the battle, admissions due to sickness were at least about 50 per cent. greater than those due to casualties.

1942	*Sick*	*Battle Casualties*	*Daily rate of admission per* 1,000
September	10417	1470	1.96
October	11144	7634	1.67
November	8698	3602	1.59

11. R.A.O.C.

1. Road Delivery Service.

The necessity for a special service for delivery of urgent fighting stores to units in the field has always been recognised. A form of Road Delivery Service has been in operation for some time. Immediately prior to the operation it was reorganised and placed on a proper footing, and divided into two echelons on an incremental basis. This service proved excellent, and it was possible to increase or decrease the Line of Communications vehicle and stores convoy unit or the Corps stores convoy units according to size of formation and distance from base.

2. Air Service.

This was run by an Air Stores Section included in the Lines of Communication Vehicle and Stores Convoy Unit. Considerably increased quantities were carried forward and were instrumental in keeping tanks and equipment in battle to a far greater degree than hitherto. It was suggested that an air pack should be prepared and sent forward daily on a type basis, i.e., first day for Shermans, second day for Grants, etc. Fast moving essential items to maintain equipment in the field are well known, and it should be possible to develop this idea. It would save considerable paper work on the part of the field packs, cut out time taken for indents to reach base, and is capable of ready adjustment should stocks build up. Experimental packs will be worked out, and it is suggested that they should be of 5 tons per corps owing to limited carrying capacity in R.A.F.

3. Indents for Motor Transport and Vote 9.

It was apparent that the method for speding up collection of indents for transmission to the base was an urgent necessity, and special arrangements were made by the Eighth Army, utilising the R.D.S. for daily collection. These were then despatched to base on returning aircraft. Stores for indents prepared on X day were despatched forward on X plus 1 day. The indents should be transmitted daily to base by air wherever possible, and special attention paid by D.Ds.O.S. of formations to ensure that no indents are held up in the forward area.

4. **Ordnance Field Parks.**

(a) *Ordnance Field Parks.* A modified Headquarters Corps Ordnance Field Park on War Establishment 1/24/1 was provided for each Corps to control the large number of Field Parks now in formations as the Corps staff is insufficient for this work. D.Ds.O.S. Corps, as a result, were enabled to watch scaling, divert urgent stores where necessary, and link up with the Road Delivery Service. A proper Headquarters Corps Ordnance Field Park establishment has been devised as a result of experiences gained in these operations, and should always be included, and is normally situated at Corps Headquarters.

(b) *Infantry or Armoured Troops Sub-Parks.* The new Middle East War Establishment for these parks proved very satisfactory, particularly as it contained an advanced section to reinforce Brigade Ordnance Field Park Sections in the Division. It was clear that the third echelon workshop to which this sub-park is affiliated must work on an area basis during an advance, but sub-parks must follow up the formations served. The sub-park, therefore, has to leave rear sections to serve workshops or a store section for third echelon workshop provided, and the war establishment of these sub-parks cut accordingly. Further experience is needed.

(c) *Divisional Troops Field Park Sections.* During these operations all formations needed a Divisional Troops Section as brigade sections were heavily overloaded. Where the advanced section of the Infantry or Armoured Troops Sub-Park was available, it was used to reinforce field parks within the Division, and was very satisfactory. Further reports are required to decide whether a separate Divisional Troops Section should be provided or continue with the advanced section of the Infantry or Armoured Troops Sub-Park.

(d) *Army Heavy Ordnance Field Parks.* One of these Ordnance Field Parks for tank assemblies and gun pieces was provided in static form for ten corps. It proved instrumental in putting many tanks back into battle which otherwise would have had to be evacuated. This should be a mobile holding of between thirty and forty lorries on the lines of a Mobile advanced portion of an Advanced Ordnance Depot, and is an essential where major tank battles are expected to be part of operations. It is not clear yet whether this should be included in the Field Park organisation or provided as suggested above, from Advanced Ordnance Depot, but it is definitely essential for similar operations in future.

(e) *Stores carried by Ordnance Field Parks.* There has been a tendency for Ordnance Field Parks to carry too many different types of stores. It has been found that an adequate holding of the most commonly required stores is far better than small stocks of a larger number of stores. Ordnance Field Parks scales are being revised in order to ensure that this policy is carried out.

5. **Delivery of A.F.Vs.**

All A.F.Vs. are now delivered through tank reorganisation group, and are passed by the A.F.V. Inspection and Servicing Unit. This organisation worked extremely well, and is the only satisfactory method of supplying replacement A.F.Vs.

Shortage of tank kits was considerable, as losses remained extremely high. In order to provide as many tanks with kits as possible, special battle scales of tank kits were worked out in conjunction with Eighth Army and were perfectly satisfactory. Every effort should be made to impress on units the necessity for passing tanks to workshops with their kits, and it appears that a reduction in the scale of tank kits is possible. All «A» vehicles should have a minimum scale of kit to make the vehicle fit for battle.

6. Evacuation of "B" Vehicles and Equipments.

Owing to the split between R.E.M.E. and R.A.O.C. a definition of responsibility for evacuation between R.E.M.E. and R.A.O.C. had to be laid down. R.A.O.C. are responsible for the evacuation of repairable vehicles and equipments which can be driven or towed. During these operations a considerable quantity of repairable vehicles and equipments built up in the rear army parks, and special arrangements had to be laid on for their evacuation.

In planning Ordnance Service for future operations this problem must always be borne in mind, and arrangements made for their evacuation as a combined plan between R.A.O.C. and R.E.M.E.

7. Field Maintenance Centres and Forward Dump Packs.

Special lists of stores to comprise these packs were worked out prior to operations, and proved an invaluable means of having a reserve of essential items at call. Similar packs in reserve, both in the Army and at base depots, should always be included when planning the Ordnance services for future operations.

12. R.E.M.E.

1. Field Workshops.

(a) *Brigade L.A.Ds.* During the initial static phase of recent operations, it was found that the brigading of L.A.Ds. in armoured brigades to form temporary 1st Echelon Repair Workshops was of the greatest value.

The workshops thus formed should be located, where convenient on the Brigade centre line, and all recovered tanks should pass through this workshop for repair or for superficial inspection before being taken back to brigade workshops. In this way the number of repairs effected by L.A.Ds. is largely increased, and the brigade workshops are relieved of a corresponding number of tanks requiring light repairs.

The decision to brigade L.A.Ds. must be taken by the Brigade E.M.E. in conjunction with the Brigade staff according to the operational situation. The brigading of L.A.Ds. in Motor and Infantry Brigades when the situation is favourable should probably prove as beneficial as in the case of Armoured Brigades.

(b) *Handling of 3rd Echelon Workshops.* Although these units are allotted on a basis of one per division, it will often be necessary to employ them on an area task. Each workshop should be employed as long as possible.

It will often be convenient for the 3rd Echelon workshops of a Corps to be divided into two groups, one of which is «leap-frogging» through the other.

Although nominally Corps troops, the command of these workshops must pass freely from Corps to Army, or vice-versa, according to the situation.

(c) *Tank Sand Shields.* Almost every tank recovered had one or both sand shields damaged. It is necessary that they should be repaired before the tank returns to the unit, otherwise the driver's vision is obscured by churned-up sand and dust.

The time spent in repairing or constructing new shields both at forward workshops and brigade workshops caused considerable delay in returning tanks to units.

A number of spare shields should be held at brigade workshops.

2. Recovery.

(a) *Reporting of Vehicle Casualties.* The reporting of vehicle casualties by units is still unsatisfactory. It is essential, in order to make the best use of our limited recovery resources, that all units should report as accurately as possible all vehicles and technical equipment requiring recovery. Such reports enable the Brigade E.M.E. to maintain an accurate picture of the recovery situation in his area, and calls for the closest liaison between Brigade E.M.Es. and Regiment or Battalion Technical officers.

(b) *Reconnaissance.* It is essential that Reconnaissance Officers should have an armoured vehicle in which to make a preliminary reconnaissance of the tanks to be recovered.

It is also unlikely that Army reconnaissance officers will ever receive an accurate picture of the vehicle casualties left behind by the advancing army. This is particularly true of «B» vehicles and enemy equipment. To overcome this a reconnaissance element attached to the Army Reconnaissance Company is badly needed.

(c) *Unit Recovery.* The importance of armoured regiments towing out damaged tanks whenever possible from immediate battles areas has previously been stressed. There is still, however, much need for improvement, and units must ensure that such first-line recovery is carried out whenever possible.

(d) *Removal of bodies and remains from* damaged vehicles. During the course of operations recovery sections have to deal with many tanks containing dead and mutilated crews. To help the recovery sections in dealing with such cases, personnel from Field Hygiene Sections have been attached, and have proved of the greatest value. This should always be done whenever possible.

(e) *«B»Echelon of Recovery Sections.* It was found 3rd and 4th Echelon Recovery Sections should be administratively self-contained for several days to enable them completely to clear an area without constant move of vehicles to collect rations, P.O.L. and water, often from a considerable distance.

The addition of administrative personnel and vehicles to the present War Establishment would therefore seem to be essential.

(f) *Recovery Vehicle Workshops.* The need for additional workshop facilities to deal with recovery vehicles at Headquarters Army Recovery Company was also felt. These additional facilities would also help the normal maintenance of these specialised types.

A great number of winch ropes needed repair during the operations. A stock of reserve winch ropes should be carried, and specialised personnel to carry out these repairs are also needed.

3. Medical Orderly.

It was found during operations that while the actual sickness rate of personnel decreased, a greatly increased number of workshop artisans suffer minor wounds and cuts at their work. If these all require treatment by a Medical Officer a great number of man hours is wasted daily, and the workshop output suffers accordingly. These wasted man hours can largely be saved by having a medical orderly at each workshop and recovery section. In one unit of approximately 250 men the medical orderly was dealing with 30-40 patients daily during operations, whilst an average of only three per day were reporting sick.

4. Communications.

The need for wireless communications has arisen in all previous operations, but was again most forcibly demonstrated. During the mobile battle it was impossible for D.Ds.M.E. to maintain control of or contact with units not equipped with wireless. It is essential that all workshops and recovery sections shall be on the R.E.M.E. W/T net.

Part IV—ENEMY METHODS

Appendix K .... Reconstructed German Infantry Battalion Defensive Locality.

Appendix L .... Reconstructed Italian Rifle Company Defensive Locality.

—PART IV—

ENEMY METHODS

1. As is to be expected from the course of events, this operation has not produced any new enemy tactical methods.

2. There are only two main points of interest:—

(a) The speed with which the enemy establishes an anti-tank screen, using all types of anti-tank weapons, including S.P. and 88 mms.

(b) Use of frontal field of fire for automatic weapons and anti-tank guns.
For many years the German has been the master of siting infantry weapons, and particularly medium machine guns in enfilade. But in many parts of his defensive position and particularly in the North Central and Northern sectors the large majority of automatic weapons and anti-tank guns were sited with frontal fields of fire.

3. The reconstructed layout of enemy defended localities are shown:—

(a) *Appendix «K.»* A German infantry battalion locality. It is presumed that the fourth locality with Battalion Headquarters is manned by headquarter's company. The forward position of supporting artillery is interesting.

(b) *Appendix «L.»* An Italian company locality. Although the position has been divided in the diagram into five platoon areas, it should be noted that the Italian assessment of the position is in terms of fire tasks made up into «fire centre.» In this company locality there are five such «fire centres.»

APPENDICES

Appendix A	—	Map No. 1	— Grouping of Troops and Break In.
Appendix B	—	Map No. 2	— Break-through.
Appendix C	—	Diagram No. 1	— Divisional Minefield Gap.
Appendix D	—	Diagram No. 2	— Control arrangements for move of Armoured Divisions through Minefield Gaps.
Appendix E	—	Diagram No. 3	— Artillery Trace for Support of Infantry Attack.
Appendix F	—	Diagram No. 4	— Mine Clearance Drill.
Appendix G	—	Diagram No. 5	— Gap Marking.
Appendix H	—	Notes on Infantry Battalion Night Attack Drill.	
Appendix J	—	Brief Account of Successful Motor Battalion Defensive Battle.	
Appendix K	—	Reconstruction German Infantry Battalion Defensive Locality.	
Appendix L	—	Reconstructed Italian Rifle Company Defensive Locality.	
Appendix M	—	Personnel Left Out of Battle.	

EGYPT 1:133,300 WESTERN DESERT

BATTLE OF ALAMEIN
GROUPING OF TROOPS AND "BREAK IN"

NOT TO BE PUBLISHED

APPX. "A" MAP No. I

LEGEND

OWN FDLs 23 OCT 42

23/24 OCT

25/26 OCT

26/27 OCT

28/29 OCT

1/2 NOV

2/3 NOV

4 NOV "BREAK THROUGH"

OBJECTIVE

GERMAN TPS=15 PZ DIV | ITALIAN TPS=TRIESTE

TRIESTE

ARABS GULF

90 Lt DIV

ELEMENTS BERSAGLIERI

15 PZ DIV

LITTORIO

9 AUS DIV

51 (H) DIV

164 DIV

TRENTO

2 NZ DIV

1 SA DIV

BOLOGNA

4 IND DIV

RAMCKE

BRESCIA

RAMCKE

50 DIV

PAVIA

21 PZ DIV

ARIETE

44 DIV

FOLGORE

7 ARMD DIV

33 RECCE

F FRENCH BDE

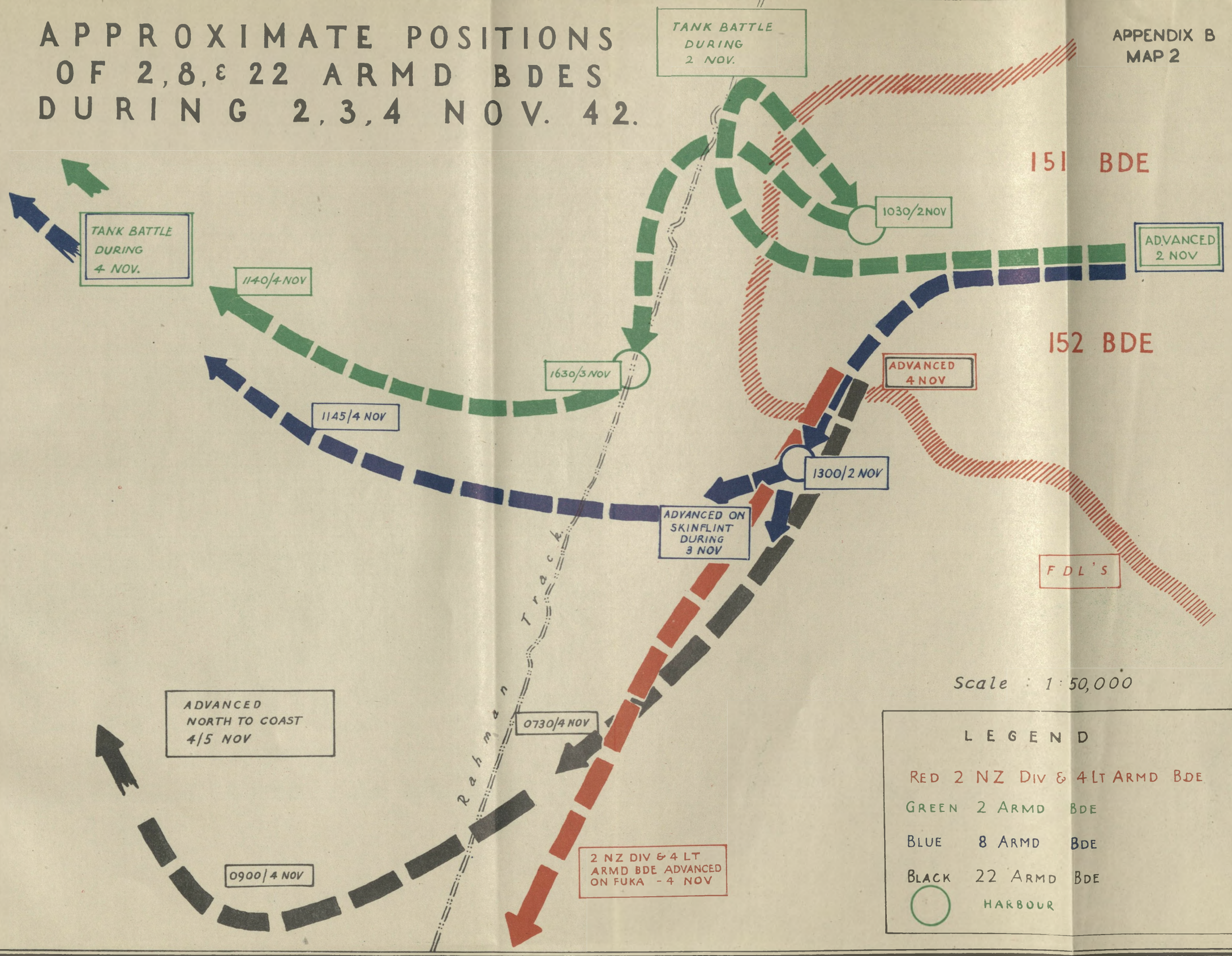
Scale 1: 133,300

0·4753 Inches = 1 Mile 1 Inch ~ 2·104 Miles

Reproduced by 512 Fd. Survey Coy., R.E., May, 1943.

APPROXIMATE POSITIONS OF 2, 8, & 22 ARMD BDES DURING 2, 3, 4 NOV. 42.

APPENDIX B
MAP 2



Scale : 1:50,000

LEGEND

RED 2 NZ DIV & 4 LT ARMD BDE

GREEN 2 ARMD BDE

BLUE 8 ARMD BDE

BLACK 22 ARMD BDE

HARBOUR

M.D.R. Misc./2138

APPENDIX C
DIAGRAM 1a

30 CORPS FRONT

FIRST LIGHT 23. OCT. 42

SHOWING DIV SECTORS ROUTES FORWARD AND ASSEMBLY AREAS 2 NZ DIV

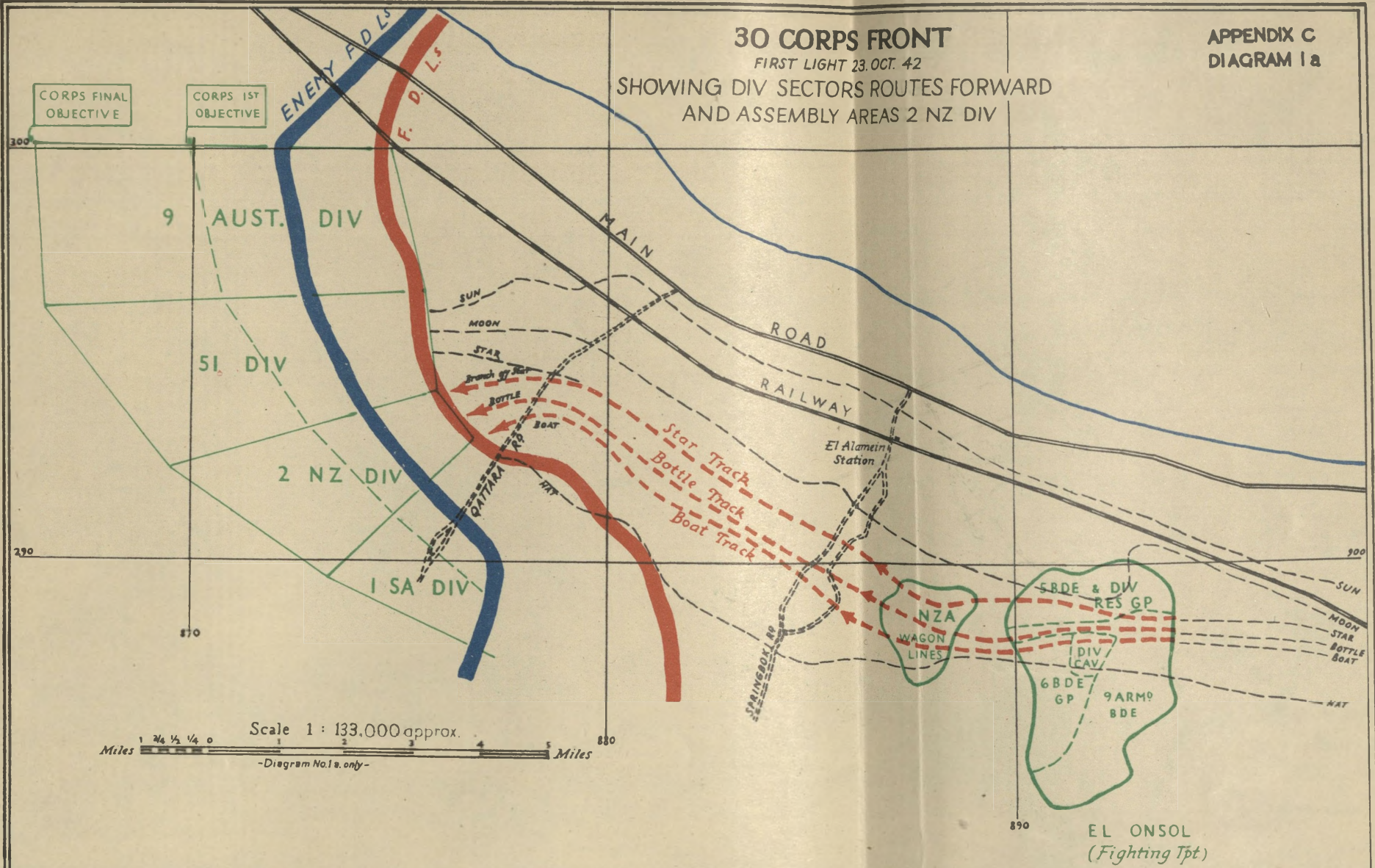


DIAGRAM 1b

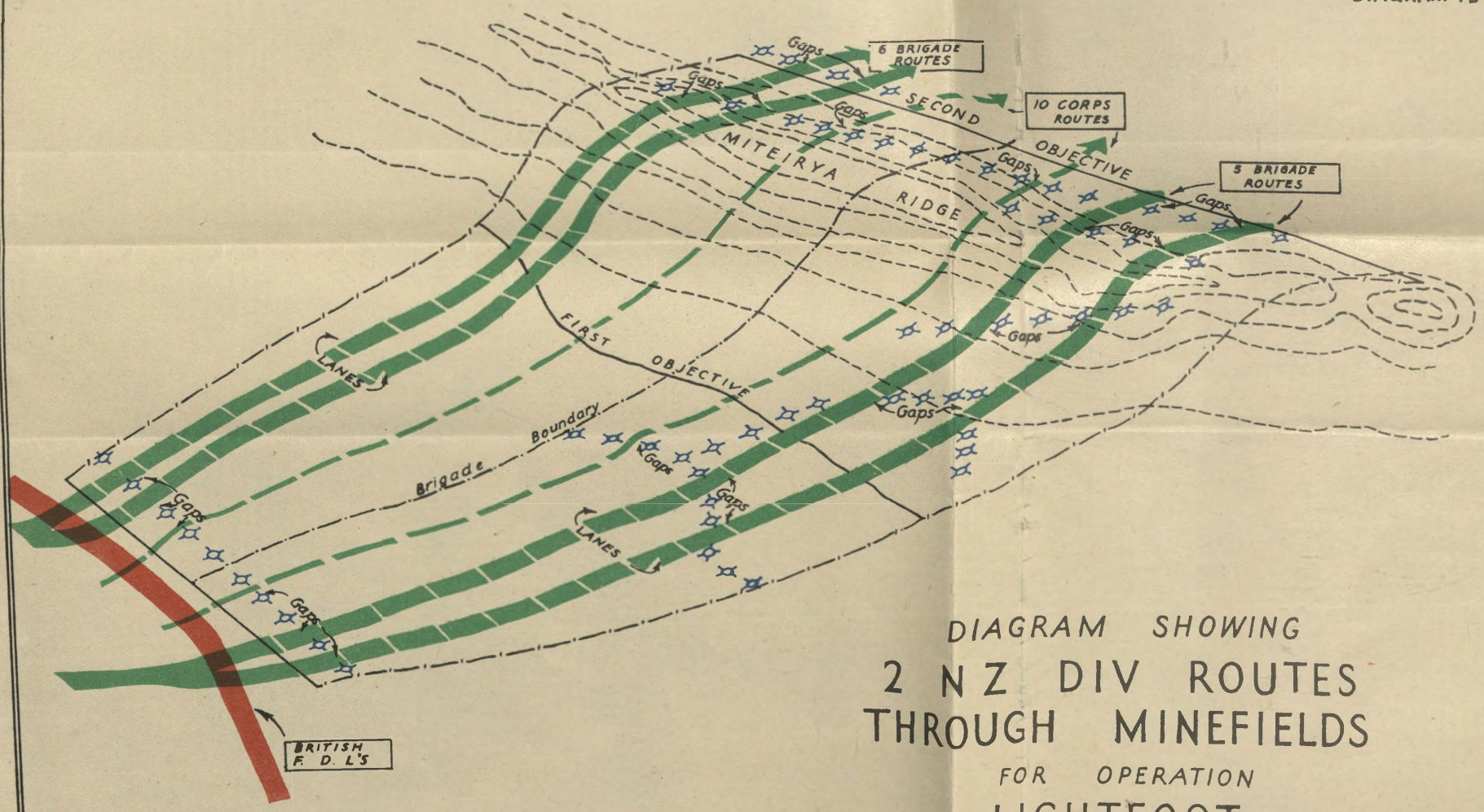
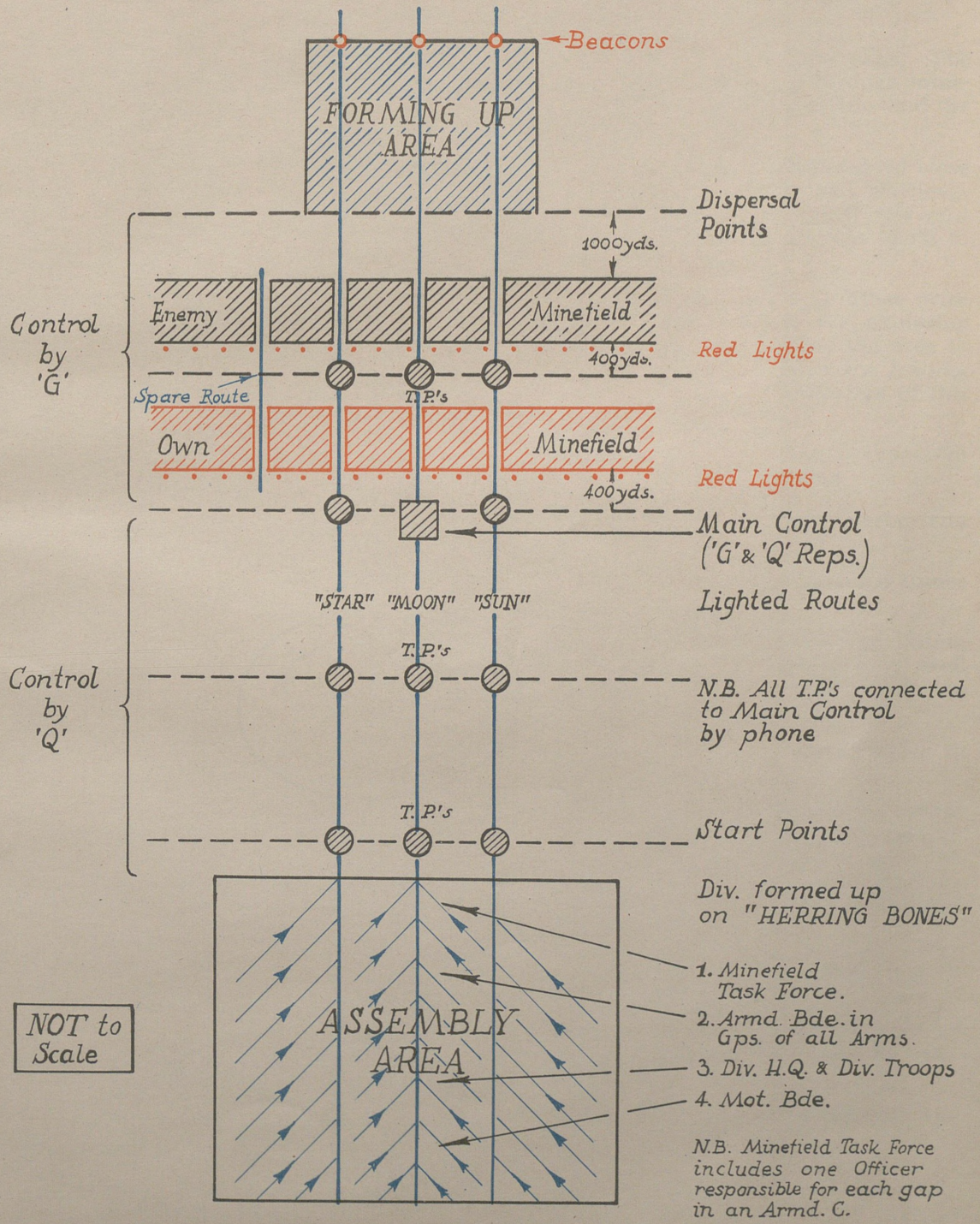


DIAGRAM SHOWING
2 NZ DIV ROUTES THROUGH MINEFIELDS
FOR OPERATION
LIGHTFOOT

M.D.R./MISC./2334

APPENDIX D
DIAGRAM 2

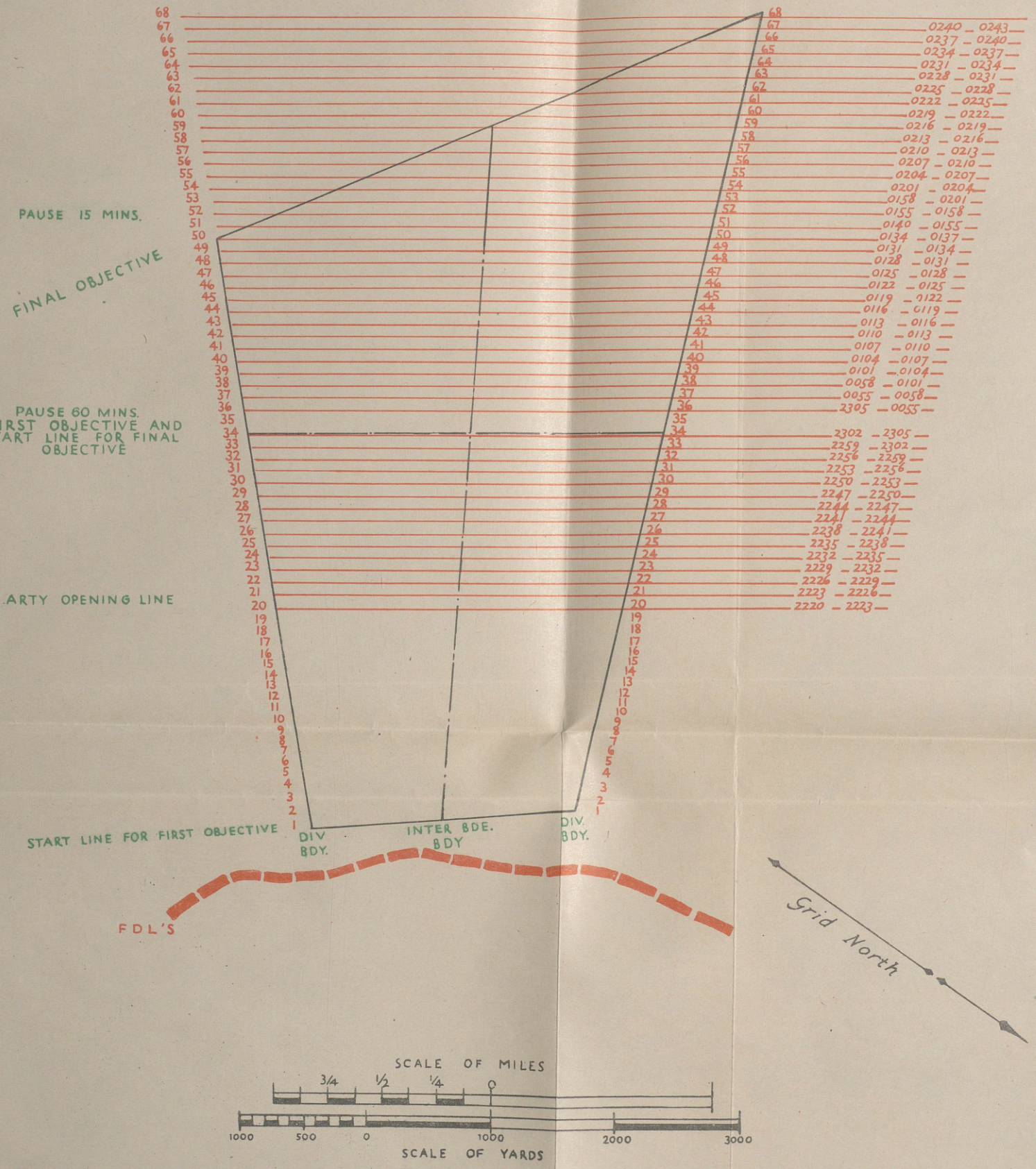
A SYSTEM EMPLOYED FOR MARKING, KEEPING OPEN & CONTROLLING GAPS THROUGH MINEFIELDS



APPENDIX E
DIAGRAM 3

TRACE AS ISSUED WITH OPERATION ORDER

SHOWING ARTY FIRE PLAN, INF START LINE, OBJECTIVES, BOUNDARIES, TIMINGS, FOR OPERATION LIGHTFOOT.



M.D.R. Misc. 2134

Appendix "F"

MINE-CLEARANCE DRILL

(Read with Diagram No. 4 attached)

1. In forming a mine-clearing squad the Field Company organisation was used. The section, totalling forty to forty-five men, was taken as the unit forcing a gap through minefields, as any greater number would only lead to congestion. This gave an officer and the required number of N.C.Os. with each group.

2. Four men (reconnaissance party) went forward along the axis and maintained close touch with the assaulting infantry. Their role was to search for minefields, and whenever possible, mount a blue light at the rear and forward edges of the field. Word was sent back to the main group following in rear, and at the same time every effort was made to locate and dismantle booby traps.

3. Eight men (Bangalore and tape men) to blow gaps in Dannert and other wire entanglements or fences with Bangalore torpedoes. Immediately following the explosion of the Bangalores these men ran out and pegged down marking tapes to define the area to be swept and searched. The tapes were kept 24 feet apart by tying together the leading men on each tape with a light piece of rope 24 feet in length, or some modification of this length, to ensure 24 feet between tapes.

4. Three men (sweepers) to sweep or operate the mine detectors. The sweepers in echelon and conveniently covered the lane with sufficient overlap in each case.

5. Three men (directors) to assist the operators, and direct them to ensure overlap and the thorough sweeping of all ground.

6. Three men (mine markers) carrying white markers to place beside detected mines or booby traps.

7. Three men (lifters) to follow some distance behind, dismantling and lifting or demolishing mines or traps. It was necessary that all other parties should keep well clear of these sappers so that the minimum casualties occurred in the event of the explosion of a mine or booby trap.

8. Eight or four men (light men) to distribute and drive pickets, and hang lights to mark the gap in the minefields.

9. Four drivers for the four vehicles which carry the men and mine-clearing stores and equipment. These vehicles have sandbagged floors ,and are also used as an aid to locating unmarked minefields. The vehicles are driven some 100 yards in rear of the walking sappers, and if the reconnaissance party, any pilot vehicle, and the main body of sappers all overrun a minefield, then it is almost certain that one of the four vehicles will explode a mine and thus disclose the presence of a minefield.

10. To prevent casualties from exploding mines, all vehicles are moved well clear of walking personnel.

11. Two men (Tommy-gun men) with grenades and Thompson sub-machine guns to provide local protection against any enemy pockets of resistance overrun by the leading infantry.

12. One or two men (detector maintenance), with some specialist knowledge and experience for quick repairs and maintenance of mine detectors.

13. Two leaders—one section officer and one section sergeant.

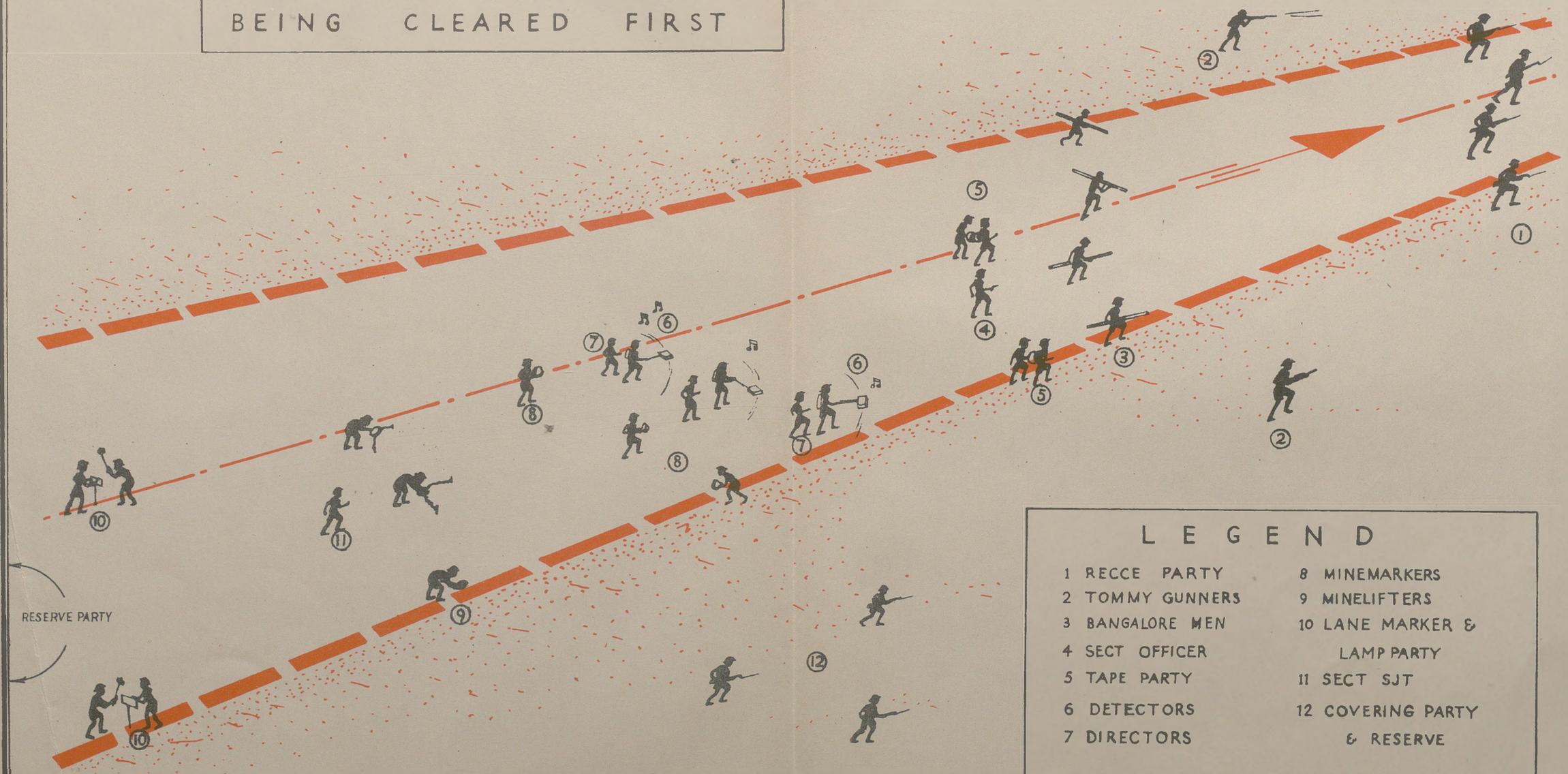
14. A reserve is not included in this example. It is not essential.

APPENDIX F
DIAGRAM 4

DIAGRAM ILLUSTRATING

ORGANISATION OF ENGINEERS FOR CLEARING A GAP

RIGHT HAND 8 YARD GAP
BEING CLEARED FIRST



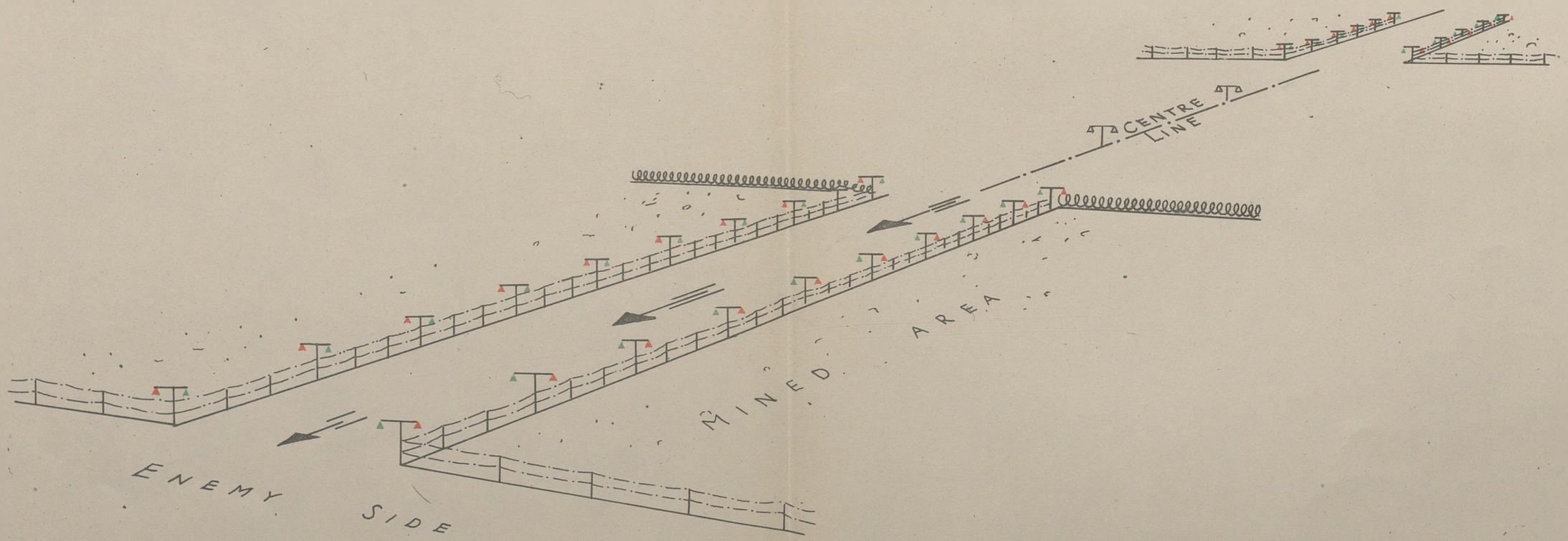
LEGEND

1 RECCE PARTY
2 TOMMY GUNNERS
3 BANGALORE MEN
4 SECT OFFICER
5 TAPE PARTY
6 DETECTORS
7 DIRECTORS
8 MINEMARKERS
9 MINELIFTERS
10 LANE MARKER & LAMP PARTY
11 SECT SJT
12 COVERING PARTY & RESERVE

M. D.R. Misc. 2144

APPENDIX G
DIAGRAM 5

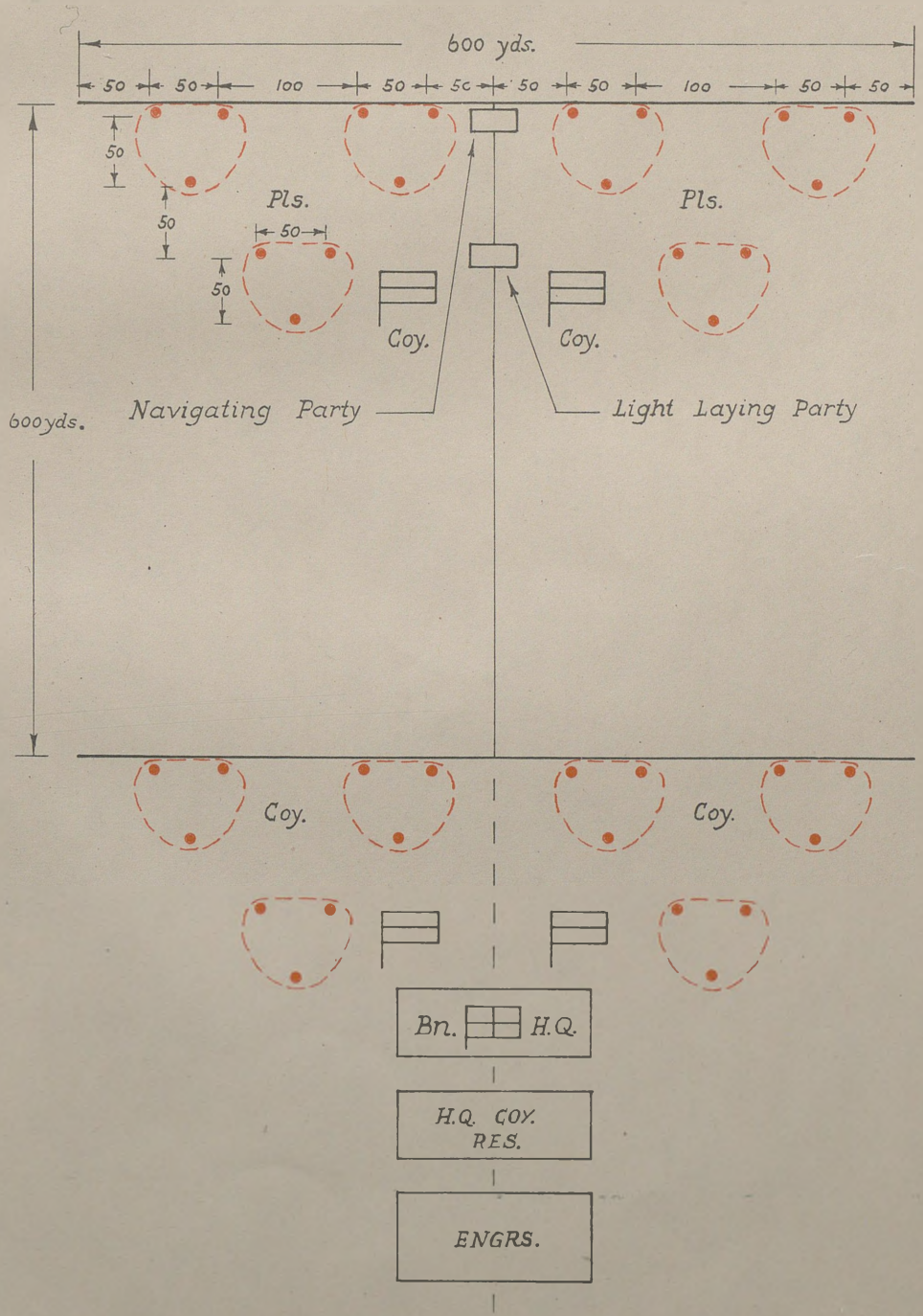
DIAGRAM SHOWING
GAP CLEARED AND MARKED
WITH LIGHTS



M.D.R. Misc 2143

APPENDIX H
DIAGRAM 6

DISPOSITION OF BN. AT FORMING UP POINT



Appendix "H"

NOTES ON BATTALION NIGHT ATTACK DRILL

1. Preparation of F.U.P.

(a) The responsibility of the Battalion I.O. and party, comprising:—

(i) Battalion I.O. and members of Intelligence Section.

(ii) 3 guides each forward company.

(iii) 2 guides each reserve company.

When the F.U.P. was forward of own F.D.Ls., a covering party was supplied by one of the forward rifle companies.

(b) F.U.P. was marked by tapes laid on a bearing at right-angles to the attack. Each company frontage was taped and, in addition, a centre-line on the same bearing as the axis of advance.

(c) Guides of forward companies were placed one on each flank of company frontage, and one returned to guide company into position. With reserve companies one guide was placed in a central company position on F.U.P., and one returned to lead company.

(d) Each flank of forward tape was marked with a screened green lamp.

(e) Tape was always measured and cut to correct lengths prior to leaving assembly area, then re-rolled and marked. This avoided delay in measuring and pacing when at the F.U.P.

2. Formation of Companies at F.U.P.

Many methods were experimented with. Final formation chosen was two companies forward and two in reserve, with Battalion Headquarters between and slightly to the rear of reserve companies, followed on the axis of advance by Headquarter's Company details and, finally, by engineers—see diagram attached.

3. Responsibility of Intelligence Officer.

(a) To mark and lay tapes on F.U.P., in accordance with paragraph 1 above.

(b) To maintain direction of battalion on axis of advance, using two «I» personnel with oil compasses in addition to his own.

(c) Pacing and noting of distance covered by battalion—three separate checks being maintained.

(d) Establishing Control Post on axis of advance at point nearest proposed position of Battalion Headquarters on objective.

(e) Intelligence officer's party was armed with Thompson sub-machine guns for own protection.

Rifle companies were responsible for keeping touch with the intelligence officer's party and checking bearings and distance.

4. Additional Aids for Keeping Direction.

Bofors gun in position at F.U.P. firing three tracer every minute along axis of advance. Normal observation of both ground features or stars were greatly obscured by dust and smoke of shells.

5. Timing Line.

After the capture of the initial objectives forward companies were halted on a «timing line» to allow them to mop up in their immediate vicinity, and also for reserve companies to catch up and pass through forward companies to the next objectives. As the rate of advance at this stage was 100 yards in 3 minutes, the pause at the timing line was 15 minutes, during which time the artillery continued to engage targets in that vicinity.

6. Lighting of Routes to Assembly Area or from Assembly Area to F.U.P.

The responsibility of T.O., using hurricane lamps inside petrol tins marked with unit signs and arrows. This is very necessary to avoid confusion if several units using same approach.

7. Lighting of Axis of Advance.

(a) The responsibility of Battalion Pioneer Officer.

(b) Pioneer officer and party moved directly behind Intelligence officers' party and placed lights as battalion moved forward.

(c) Lights were made from beer tins and torch batteries and were found more successful than ordinary torches, as reflection on the ground and glare were eliminated owing to the tubular nature of the tin. Further, these lights could not be observed from any direction but in the rear.

(d) Lights were coloured—one colour being used for each battalion.

(e) Lights were placed at intervals of not greater than 150 yards (owing to obscurity of vision from dust and smoke of shells).

(f) Maintenance of lights was found necessary (shell fire and faulty bulbs, etc.), and members of pioneer platoon were detailed, one to every three or four lights throughout route. Men were provided with spare lights and directed to switch off lights at daybreak —commencing at own F.D.Ls. and working forward and eventually rejoining company.

(g) Lights were re-lit on succeeding nights to guide ration trucks and personnel along route.

8. Control Points.

(a) Unit control points established at various positions along axis of advance. These are very necessary and assist in the control directing personnel and traffic.

(b) Each control point (with exception of C.O.) had telephone linked to main battalion line—reasons:—

(i) Relay of weak L/T messages (due to dry earth returns).

(ii) Quick locating and repair of cut lines (shell fire, etc.), between stations.

(iii) Passing of information with reference to minefields, objectives, state of shelling, etc.

(c) Each control point was marked with two red lights (unit colour) placed three feet apart.

9. **Minefield Gaps.**

(a) The lifting and marking of gaps in enemy minefield was the responsibility of engineers, using mine detectors. One «Scorpion» was held in reserve.

(b) Only one gap was made and found sufficient but arrangements had been made for further gaps were they found necessary.

(c) Gaps were marked with green and amber lights and layout of lighting according to normal drill—see Diagram 5, Appendix «G».

(d) Lights, tapes and stores necessary for gaps were supplied and carried by engineers.

(e) An allotment of engineers was also made to forward companies, and were responsible for locating and disarming booby traps or anti-personnel mines on the line of the company advance.

(f) Gaps initially made to 8 yards width and thereafter widened in 8 yards strips to 40 yards to allow free and ample passage for tanks.

10. **Rate of Advance and Timing.**

(a) Assembly area to F.U.P.—100 yards in 1 minute.

(b) From F.U.P. to enemy wire—75 yards in 1 minute—slower pace enables better contact to be maintained and allows for unexpected obstacles.

(c) Enemy wire onwards—100 yards in 3 minutes—allows time for companies to «mop up» and to deal with the unexpected (booby traps, etc.), as well as minor delays occasioned by casualties, prisoners, etc.

11. **Marking of Battalion and Company Headquarters on Objective.**

(a) Each company had a screened Lucas lamp directed towards the axis of advance. Different colour for each company.

Lamps flashed the company letter in morse every 10 seconds until arrival of company vehicles, thereafter every 2 or 3 minutes until ordered to cease by Battalion Headquarters.

(b) Battalion headquarters marking was a blue all round lamp.

12. **Distribution of Motor Transport and Carriers.**

(a) Carriers — once each company (ammunition)
one each mortar detachment
one for Commanding Officer (containing duplicate No. 11 W/T set to Brigade)
remainder Battalion reserve.

(b) «A» Echelon Vehicles — Commanding Officer's Jeep—(contains No. 11 W/T set to Brigade and No. 18 W/T set to companies).
Signals Jeep—used for line laying and carriage of immediate signal stores.
Signals store truck—one 30-cwt.
Battalion Intelligence Officer—light van.
Battalion Transport Officer—van. (Battalion Transport Officer controlled forward move of vehicles.)
Engineer Vehicles—loaded with spare signs, lamps, tapes, bangalores and mines.
Company stores vehicles—30-cwt. each company.
Anti-tank Portees.
Mortar.
Medium Machine Gun Platoon—one 30-cwt.
Battalion S.A.A. reserve—two 3-ton, 4-wheel drive.
R.A.P. and casualty van.
Spares.

(c) Although no vehicles were lost during attacks spare vehicles had been loaded and kept in reserve against emergency.

13. **Loads.**

(a) Individual man-loads were adopted a follows:—
100 rounds ammunition.
3 grenades (one 36, two 69).
2 sandbags each (tied on haversack or legs).
Gas cape.
Pick or shovel per man.
Bren gun and magazines (with spare magazines distributed amongst section).
Thompson Sub-Machine Gun and magazines (with spare magazines distributed amongst section).
Rations (emergency (chocolate) and 1 day's reserve together with following day's for consumption).
Shaving gear and water bottle.
Bangalore torpedoes (2 or 3 per company).
For Signaller—Wireless set, phone or equipment.
For Orderly—spare flare pistol.

(b) *Vehicle Loads*

One 30-cwt. and one carrier were each loaded with portion of company stores including company ammunition, tools, sandbags, wire, mines (Hawkins), spare signal cable, rations, water, and miscellaneous stores. Wire, mines or rations were not carried on the carrier. The object of using the carrier was to ensure having a vehicle capable of getting through any soft sand or small arms fire.

14. Medical.

(a) One S.B. moved with each platoon.

(b) R.A.P. was always established near axis of advance—enables quick location by wounded and assists in evacuation.

15. Communications.

(a) (i) Every effort was made to duplicate all possible means of communication and means employed necessitated the use of: W/T, Line, Lucas lamp, Runners, Control points, Verey pistols, and rockets.

(ii) W/T—Distribution of No. 18 sets was on a basis of one to each company and Battalion Headquarters—one carrier—one with transport officers—Commanding Officer's control set in Jeep and duplicate with walking signaller, No. 11 sets to Brigade—one in Commanding Officer's Jeep—one in Commanding Officer's carrier.

(iii) Line was laid on right of axis of advance as battalion moved forward. Vehicles moved on left of axis to avoid cutting of lines. Spare line carried by companies.

(b) *Success Signals*

(i) Notified by verey flares as well as rockets, and both repeated at short intervals to ensure recognition.

(ii) Duplicate verey pistols carried by companies and battalion headquarters.

(iii) Rocket and flares distributed between Commanding Officer's Jeep, carrier and ammunition vehicles.

(c) *S.O.S. Signals.*—Provided for by rockets.

(d) *Orderlies.*—Three runners from each each company reported to Battalion Headquarters immediately on capture of objective. Two remained—one returned guiding line-laying signals.

(e) *Establishment of Battalion Headquarters*

(i) Approximate area first chosen from air photographs and overprint map.

(ii) Adjutant, Signal Officer or R.S.M. (depending on circumstances) then selected suitable area off axis of advance but in rear vicinity to Control Point, established by Intelligence Officer. In each case the area previously selected from air photographs proved most suitable.

16. Reorganisation on Objective.

Every individual understood the need for rapid reorganisation. All diggings were completed before daylight and the battalion ready to repel any counter-attacks.

Appendix "J"

THE ACCOUNT OF A SUCCESSFUL BATTALION DEFENSIVE ACTION

GENERAL OPERATIONAL PICTURE

1. On 26th Oct. the Division was still trying to enlarge the bridgehead made during the initial operations and was directed on the SIDI ABD EL RAHMAN track with a view to taking up a battle position which would:—

(a) Cut the enemy's main lateral communication.

(b) Force him to attack us on ground of our own choosing.

2. Accordingly on 26th Oct., X Motor Brigade were ordered to stage a night attack through our own armour on to two enemy strong points. These positions were to be consolidated with all round defence as soon as possible, and at first light the armour was to move up— A Armoured Brigade protecting the Northern flank of the position and B Armoured Brigade was to protect the Southern flank. The armour would then be able to operate to the West, using the two battalion positions as firm bases.

PHASE I

3. **Night Attack—26/27 October.**

The attack by Y Battalion commenced at 2300 hours.

It met with little opposition, and the success signal was fired at about 0015 hours. This was the sign for all anti-tank guns and all soft skinned vehicles necessary to dump ammunition, food, water and defence stores in the battalion position, to move forward from the start line under the 2nd in Command Battalion.

The going was extremely bad with much soft sand, and as a result many vehicles stuck. Of the 27 anti-tank guns in the battalion group, only 19 (13 Y Battalion and 6 of B Anti-tank Battery) arrived at the position.

Consolidation with all-round defence proceeded rapidly, and sufficient ammunition for machine guns and rations for all in the positions were off-loaded successfully. All soft skinned vehicles (less Bantams) and the portees of the anti-tank guns were clear of the position by first light.

At about 0200 hours the carriers of «C» Company in the South-western sector moved forward to the Eastern edge of the position where much enemy movement was observed. In this enemy harbour there were both German and Italian tanks. There were also about 150 infantrymen standing in a group who appeared to be about to give themselves up. One enemy vehicle was set on fire by the small arms fire of this carrier platoon, but the glare made by the burning vehicle silhouetted the carriers who were then counter-attacked by enemy tanks and were forced to withdraw with the loss of one carrier.

Most of the infantry then ran away, but about 35 were captured and were later identified as belonging to the Engineer units of 15 Panzer Division and 164 Division.

There was also an enemy harbour about 1,000 yards North of the position. When the Southern enemy harbour was disturbed by the carriers it broke up. One Mark IV moved North-east into the battalion position and was set on fire by an anti-tank gun from 100 yards range. One 76.2-mm. S.P. gun was also destroyed, at about 300 yards range.

During the night about 70 prisoners were taken.

PHASE II

4. Action at First Light—27 October.

It was light enough to see at about 0600 hours. The gun positions sited during the night proved to be satisfactory and little alteration was necessary.

The two enemy harbours North and South-west of the battalion position moved slowly Westwards and both afforded excellent targets. 8 tanks and S.P. guns were destroyed in the North and 8 tanks were claimed as destroyed in the South and South-west.

It was now possible to see what the ground looked like. There was a lot of sand and scrub which made easy the digging in and camouflaging of the anti-tank gun positions. On the other hand, this ground enabled enemy tanks to take up hull down positions almost anywhere except on the ground to the South-west of the position.

Unfortunately the O.P., who was accompanying the battalion, got detached during the night and did not appear on the position. The loss of the O.P. was felt throughout the day as no replacement was able to move across the fire swept ground, and there were many good artillery targets on which an O.P. in the position could have directed fire with effect.

PHASE III

5. B. Armoured Brigade Action—27 October.

At about 0730 hours the leading tanks of B Armoured Brigade moved West towards the battalion position. At the same time, about 25—30 enemy tanks (mainly German) and some S.P. guns formed up in a hull down position. These were engaged by the battalion and one gun claimed to have set on fire 3 tanks.

The leading tanks of the Armoured Brigade moved right up to the battalion position, but came under heavy fire from the enemy tanks and also from 88-mm. guns. B Armoured Brigade eventually withdrew Eastwards.

A small party in carriers left the battalion position at 0900 hours to take back some of the more severe casualties and got through successfully, although one of the carriers received a direct hit en route. It was hoped that they would be able to bring back the Medical Officer who had not been able to reach the battalion position because of casualties incurred earlier on in the night, and also some more ammunition. This, however, proved impossible.

PHASE IV

6. First Enemy Counter Attack, 0900—1100 hrs.—27 October.

When B Armoured Brigade withdrew to their original positions, the enemy developed two counter-attacks. The first was made by 13 M.13s., who attacked North-East towards the battalion position. One of these was destroyed, together with a 3-tonner and three more were hit. The enemy did not press home this attack.

Simultaneously a group of 25—30 German tanks moved East to attack the retiring tanks of B Armoured Brigade. They moved across the Southern flank of the battalion position at about 1,000 yards range. They were engaged both by the battalion and by the armoured brigade. This caused the enemy, who was being engaged from two sides, to divert half of this tank group North to attack the battalion position. A successful action resulted as those tanks attacking B Armoured Brigade presented broadside targets to the battalion, and attacking position presented broadside targets to the armoured brigade. At least 8 enemy tanks were set on fire during this action.

By 1100 hours only 13 of the original 19 anti-tank guns were in action and those guns which had been shooting hard in the West andSouth-west sectors were running short of ammunition. The transporting of ammunition from one sector of the front to another was an extremely hazardous job owing to very heavy enemy shelling which was continually falling into the position.

PHASE V

7. Second Enemy Counter Attack, 1300—1400 hrs.—27 October.

At about 1300 hours, 8 M.13 tanks supported by some Semovente S.P. guns attacked the battalion position from the South. Owing to the shortage of ammunition only one gun was able to engage the enemy.

The gun was ordered to hold its fire until the tanks were within 600 yards. 5 M.13s. and 1 Semovente were then hit and set on fire. The gun was down to about two or three rounds and the remaining 3 tanks continued to advance using their machine guns. Under great difficulty more ammunition was obtained and the gun was re-loaded. All 3 remaining M.13s. were hit and set on fire at about 200 yards range.

PHASE VI

8. Third Enemy Counter Attack, 1600—1830 hrs.—27 October.

At about 1600 hours there appeared to be much activity by A Armoured Brigade. There was also a strong force of enemy tanks, mainly German, to the North of the battalion position, which were disposed in two main bodies.

In the Westerly group there were about 30 German tanks and 10 M.13s. A second group of about 30 German tanks could also be seen to the East of them. At 1700 hours the Easterly group of enemy tanks moved rapidly East and South-east in the direction of A Armoured Brigade and were heavily engaged.

The Southernmost of this party of tanks passed within 500 yards of the North-east corner of the battalion position where several of the anti-tank guns of B Battery were sited, but which had not been presented with any targets since the early morning and had thus remained silent. The guns of the battery engaged these tanks and claimed that they had set on fire 9 and that several more were hit.

The battalion anti-tank guns of their left flank also had a good shoot and engaged these tanks and others further North. The machine guns of the motor companies were also presented with good targets by the enemy crews as they baled out of the knocked out and the destroyed German tanks.

The Northern group of enemy tanks was also effectively engaged by A Armoured Brigade.

At about 1730 hours the Westerly group of enemy tanks became active and 15 Mark III's moved South-east to attack the battalion position. They advanced slowly but only three anti-tank guns were in position to engage them and these guns had only an average of 10 rounds per gun left.

Three of the enemy tanks managed to secure hull down positions from which they fired continuously at the battalion position until well after dark.

The leading enemy tank was hit and destroyed at 200 yards range and the next two tanks were also set on fire. One more tank was hit at about 100 yards range and backed away but burst into flames after going about 500 yards.

Two more enemy tanks further back were set on fire and the remainder backed away to hull down positions about 800 yards away and continued to machine gun the position. The anti-tank guns in this sector now had an average of 3 rounds per gun but providentially no further attack developed although there were 20 enemy tanks within about 1,000 yards.

During the period of this attack the three anti-tank guns were continuously under heavy machine gun fire.

PHASE VII

9. Withdrawal, 27/28 October.

During the afternoon plans were made for X Motor Brigade to be relieved. The battalion received orders at about 1740 hours that they would be relieved that night.

At about 1930 hours the 20 enemy tanks moved away from North-west and at about 1950 hours the remaining few rounds of 6-pr. ammunition were fired at their silhouettes—one hit being claimed.

At about 2030 hours the forward company position was heavily machine gunned by the three tanks which had taken up a hull down position earlier on. It was thought at the time that an infantry attack was about to develop but in point of fact nothing more occurred and it is doubtful if the enemy had any intention of launching one because very few infantry had been seen during the day.

The enemy was very active in recovering his own tanks and wounded.

At 2230 hours, our own artillery started to fire a barrage which landed well amongst the enemy harbour 1,200 yards North-west of the position. This made the enemy take avoiding action and they moved Eastwards towards the battalion position. At about 2315 hours the battalion rear party withdrew without further incident having evacuated all wounded and made all anti-tank guns unserviceable. With the exception of the anti-tank guns, all equipment was brought back.

CONCLUSION

10. It is obvious that more tanks were claimed than were actually destroyed, since frequently two or more guns fired at the same target and each gun claimed the same success.

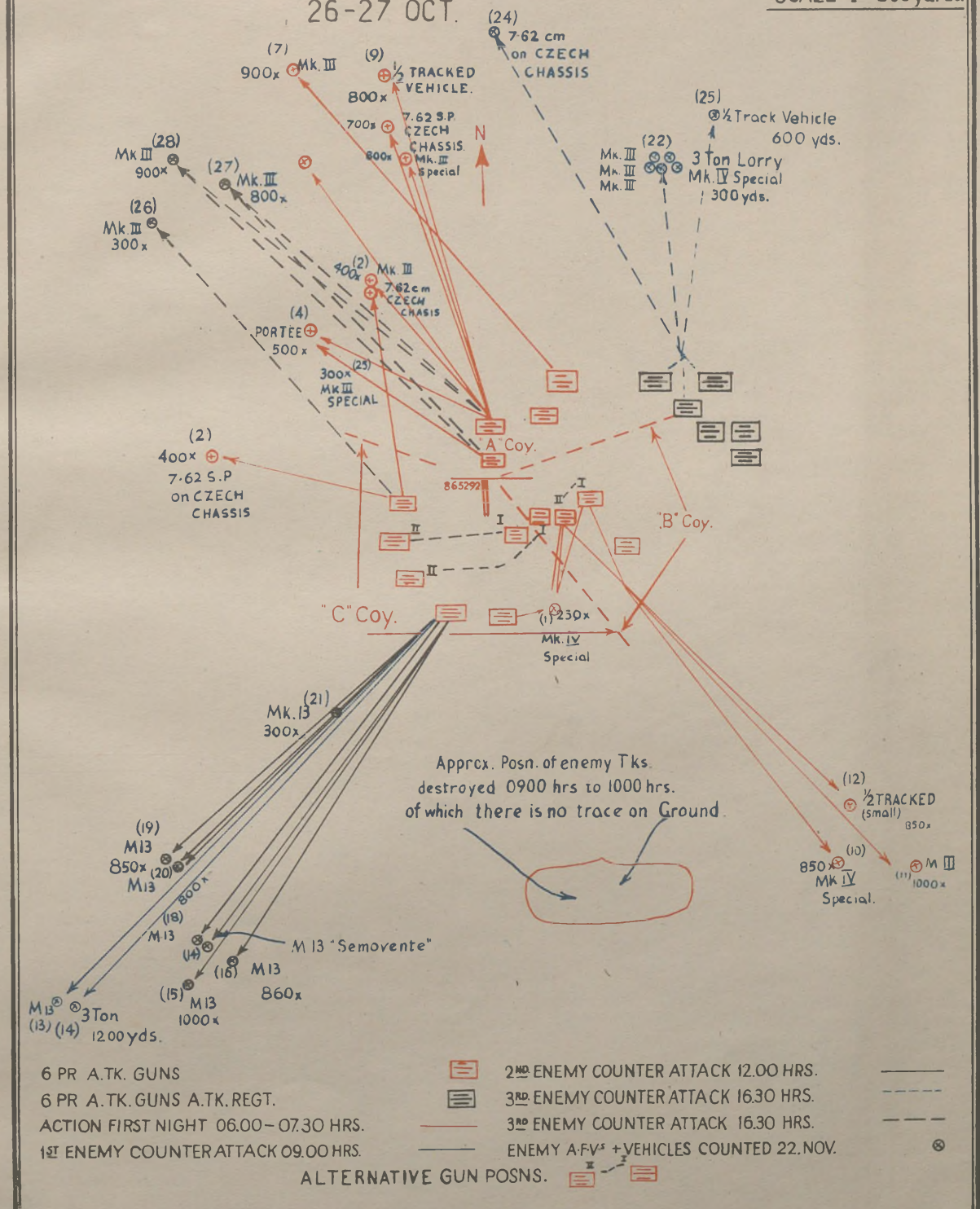
On the other hand, it is quite definite that the enemy recovered all his disabled tanks on the night 27-28 Oct., or between that date and Nov. 1-2. during which time he remained in possession of the battlefield.

The figure of 32 enemy tanks (22 German and 10 Italian) excluding S.P. guns is considered a minimum number destroyed, and there were probably at least another 15—20 enemy tanks which were knocked out and recovered by the enemy but which took no further part in the battle for several days.

APPENDIX J
DIAGRAM 7

SKETCH MAP OF "SNIPE" POSNS SHOWING LAYOUT OF A.TK. GUNS AND ENEMY TKS. DESTROYED. 26-27 OCT.

SCALE 1" = 300 yards.

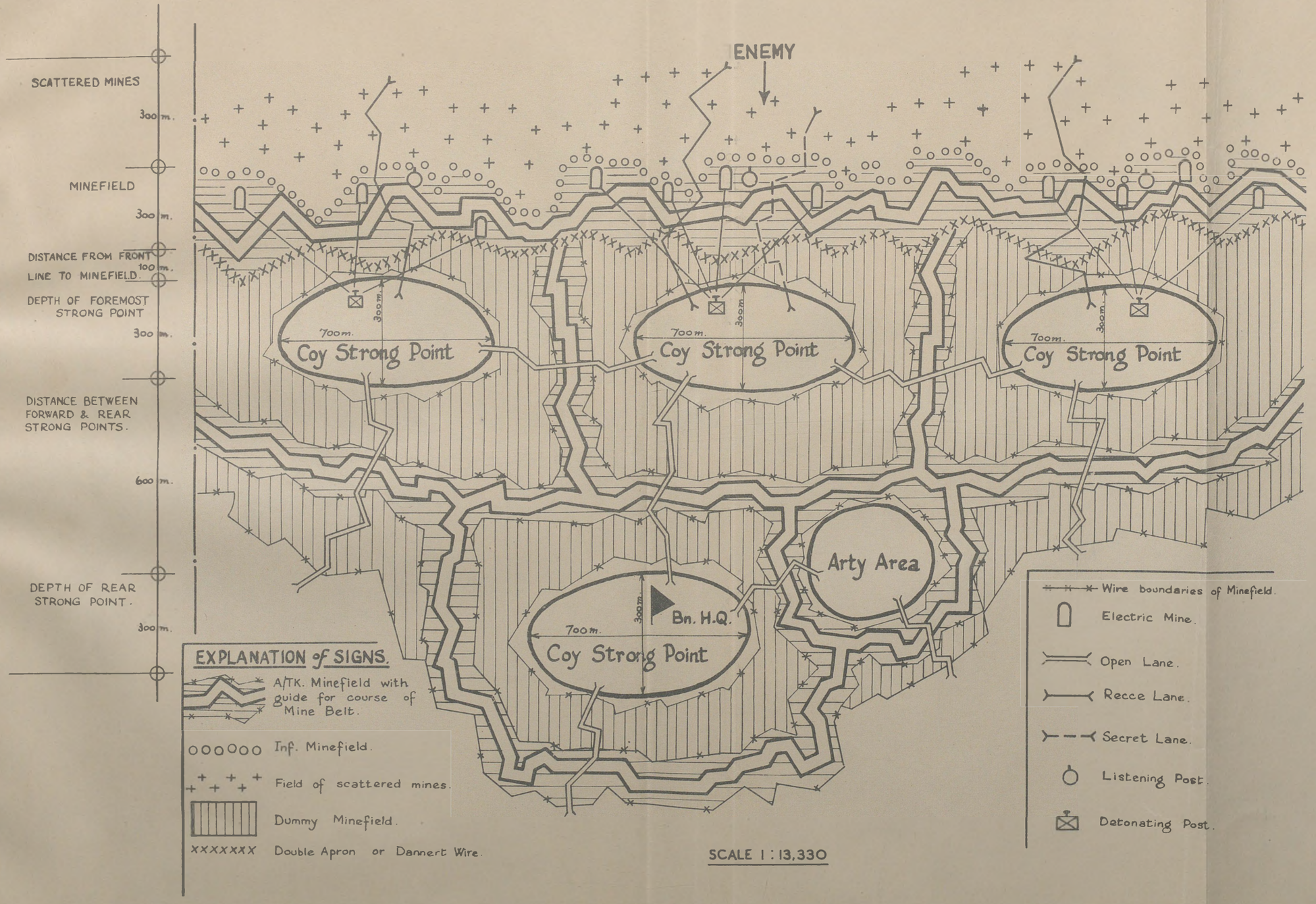


6 PR A.TK. GUNS
6 PR A.TK. GUNS A.TK. REGT.
ACTION FIRST NIGHT 06.00 – 07.30 HRS.
1ST ENEMY COUNTER ATTACK 09.00 HRS.
2ND ENEMY COUNTER ATTACK 12.00 HRS.
3RD ENEMY COUNTER ATTACK 16.30 HRS.
3RD ENEMY COUNTER ATTACK 16.30 HRS.
ENEMY A·F·V's + VEHICLES COUNTED 22. NOV.
ALTERNATIVE GUN POSNS.

GUIDE FOR LAYOUT OF A BN. STRONGPOINT

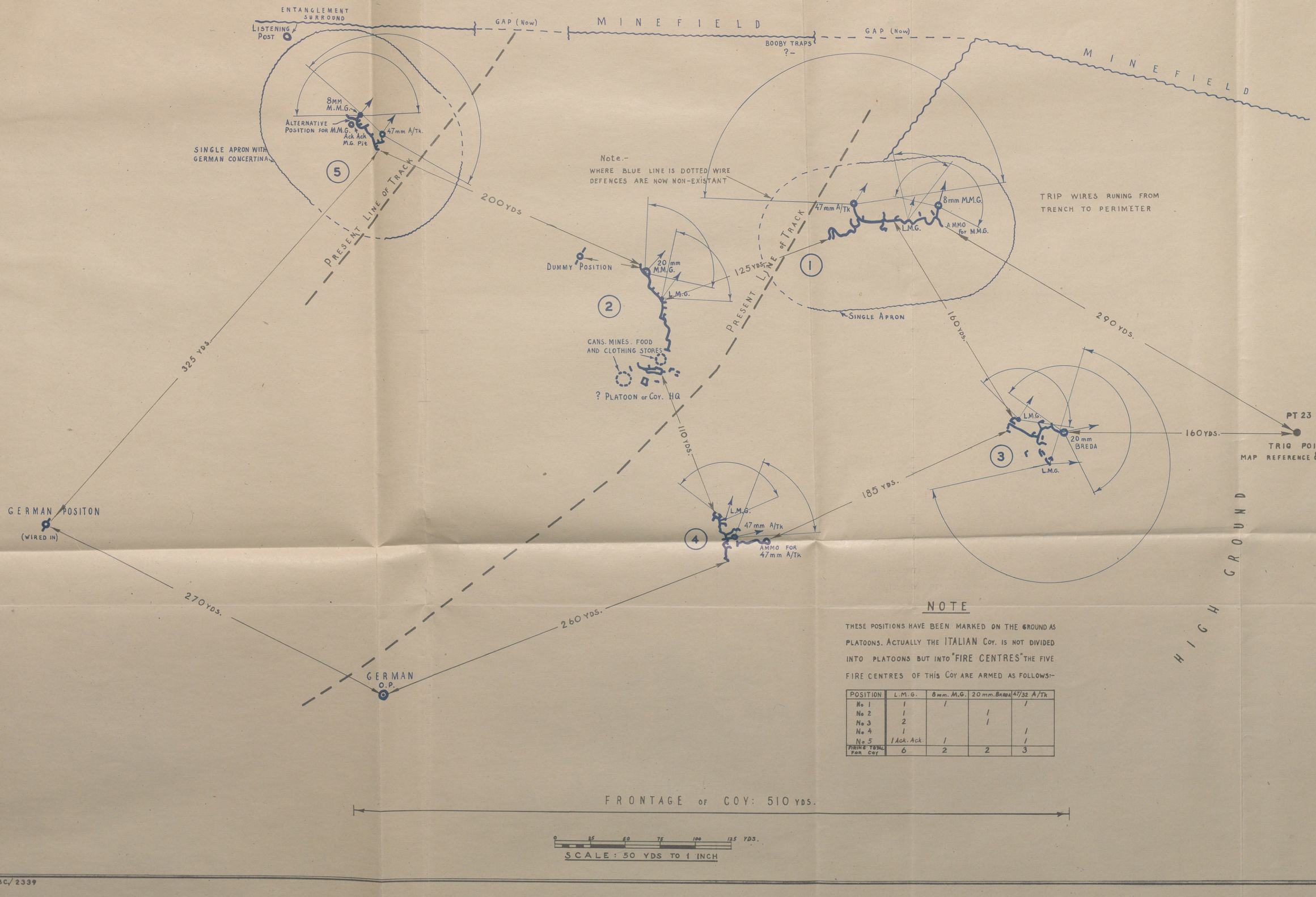
APPENDIX K

DIAGRAM 7



APPENDIX L

DETAIL of ITALIAN COY POSITIONS IN AREA 872296



NOTE

THESE POSITIONS HAVE BEEN MARKED ON THE GROUND AS PLATOONS. ACTUALLY THE ITALIAN COY. IS NOT DIVIDED INTO PLATOONS BUT INTO "FIRE CENTRES" THE FIVE FIRE CENTRES OF THIS COY ARE ARMED AS FOLLOWS:-

POSITION	L.M.G.	8mm. M.G.	20mm. BREDA	47/32 A/Tk
No 1	1	1		1
No 2	1		1	
No 3	2		1	
No 4	1			1
No 5	1 Ack. Ack.	1		1
FIRING TOTAL FOR COY	6	2	2	3

FRONTAGE of COY: 510 YDS.

0 25 50 75 100 125 YDS.

SCALE: 50 YDS TO 1 INCH

M.D.R./MISC./2339

PERSONNEL LEFT OUT OF BATTLE

1. *Inf. and Mot. Bns.*

2nd i/c	(n)
Four or five officers	(a)
Two W.Os.	
Three Sgts. one for each Coy.	(o)
Nine N.C.Os.	
Forty-seven rank and file	(b)

2. *M.G. Bns.*

2 i/c
Four or five officers
Two W.Os.
Three Sgts.
Six N.C.Os.
40 rank and file

3. *R.A.C.*

A Fd. Offr. or senior Capt.		
Two or three other offrs.		
One W.O.		(d)
Two Sgts.	(d)	
Three Cpls.	(e)	
24 rank and file	(f)	

4. *Ind. Inf., M.G. and Mot. Bns.*

2 i/c	(n)
Two K.C.Os. or I.C.Os.	(g)
Three V.C.Os.	
One Hav. Pl. Comd.	(o)
One Hav. per Coy.	
Nine Naiks	
47 L/Naiks and Sepoys	(h)

5. *Ind. Armd. Units*

2nd i/c	(n)
Two K.C.Os.	(j)
Three V.C.Os.	
Two Daffadars	(k)
Three L/Daffadars	(l)
25 A/L/Daffadars and Sepoys	(m)

6. Although it is equally important that R.E., R.A. and R. Sigs. units should have a L.O.B. nucleus in case they have to reform, it is impracticable to draw up a list of L.O.B. personnel for such units. The proportion of ranks and specialists of these arms who should be L.O.B. will be decided by Div. Comds. on the advice of C.R.A., C.R.E. and O.C. Div. Sigs.

2730

7. Personnel on leave and courses should be included in the strength of the L.O.B. cadre provided they can be recalled if urgently required.

NOTES:—(a) To include an officer suitable to replace the Adjutant, but not to include the QM. or Tpt. Offr.

(b) Includes three Signallers, six Drs. I.C. (of whom two will be trained Drs. of carriers where applicable), two Mortar personnel (where applicable).

(c) To include an officer suitable to replace the Adjt.

(d) To include one suitable to replace a SQMS.

(e) One to be a fitter.

(f) To include five Dr. Mechs., five Dr. Operators, five Drs. I.C., five men trained as gunners.

(g) As in para. 3 Note (a) above.

(h) As in para. 3 Note (b) above, and include three Dr. Mechs. or Motor Mechs.

(j) To include an officer suitable to replace the Adjt.

(k) To include one suitable to replace a SQMD.

(l) One to be a fitter rating.

(m) Includes five Dr. or Motor Mechs., five Dr. Operators, five Drs. I.C., five trained as gunners.

(n) 2nd i/c, or Fd. Officer capable of taking over command, at the discretion of the Div. Command.

(o) To include one suitable to replace a RQMS. or RQM. Hav.

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