Night Vision and Electronic Sensors Directorate

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Breaching the "Devil's Garden"
Operation Lightfoot
The Second Battle of El Alamein
23 October 1942
(APPENDICES)

February 2006

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13. ABSTRACT *(Maximum 200 words)*
This study is one in a series that will examine combat breaching operations. Other studies have covered Operation Citadel and Operation Desert Storm. In this report, the breaches created in the zone of the 6th New Zealand Brigade are studied in detail. This report has been structured such that the situations of both sides are discussed, followed by a detailed narrative of the operation. Of particular interest to students of military engineering, is the effect of the lack of antipersonnel mines on the effectiveness of the "Devil's Garden." Although this was forced on *Generalfeldmarshall* Rommel and his men by logistic constraints, it should be of current interest as our soldiers are stripped of conventional mines by 2010.

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GENERALFELDMARSHALL ROMMEL'S DEFENSIVE PLAN, DATED 20 SEPTEMBER 1942[1]

SECRET COMMAND ISSUE

Headquarters, Panzerarmee
Afrika
Abt.Ia/Pi Nr.2090/42 secret command issue.

Army Command Post, 20.9.42
9 Copies
9th Copy

The daily casualties of static warfare requires a shortening of the front in order to gain depth based on the following new organization plan:

1.) The foremost mine obstacles (the former Main Line of Resistance) are to be observed day and night by combat outposts. The night garrison must be as strong as the day garrison. Watchdogs will be supplied to assist the troop detachments with overwatch.

The combat outpost line will consist only of squad strong points. Therefore, extra positions will be used as alternate positions. All new positions will be placed in the minefields. A part of each combat outpost, in the old positions will guard the lanes through the minefields.

The former battleground in the forward portion of the obstacle area remains the maneuver area of the combat outposts and the engagement area for local counterattacks.

2.) An area about 1 to 2 km deep will be left unoccupied between the combat outpost line and the main battle area.

3.) The M.L.R. (Main Line of Resistance) is to shift to the back half of the obstacle areas (Devil's Gardens). Therefore, the forward edge of the main engagement area lies mostly in the Devil's Garden, about 2 km behind the zone of the combat outposts. These troops positioned in the main battle area are to be organized to a depth of about 2 km.

4.) For the present, continue to work toward the new employment given in Attachment 1. Afterwards, establish a battalion sector with a width of about 1 ½ km and a depth of about 5 km. One company of the battalion (without heavy anti-tank weapons) is to be employed in the combat outposts, while the bulk of the battalion is deployed in the main battle area.

In the X Corps sector, the newly won minefields in correspondence with those of the XX Corps are to be used to deepen the obstacle areas.

5.) The tasks in Merkblattes für Stellungsbau (Instructional Pamphlet on Fortified Position Construction), as modified by the current instructional Pamphlet (Pz.A.O.K. Ia/Pi Nr.1334/42geh. III. Ang. V. 1.9.42), are to be applied.

6.) On 25 September 42, present to the Army Headquarters:
a.) A proposal for a new organization with appropriate directions on a 1:25,000 map.
b.) A proposal for the development of new obstacle zones.
The execution time for the new organization will be given by special order

1 Attachment

The Commander-In-Chief

Distribution
General Plan

Generalfeldmarshall

[1] *Generalfeldmarshall* Rommel's memo to subordinate units dated 20 September 1942, US National Archives, Captured German Records Division, Series T-313, Roll 431, frame 8723662.

Geheime Kommandosache

Ia IPi 456/64

Oberkommando der Panzerarmee
Afrika
Abt.Ia/Pi Nr.2090/42 g.Kdos.

A.Gef.Stand, den 20.9.42

9 Ausfertigungen
9.) Ausfertigung

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Die täglichen Verluste im Stellungskrieg erfordern eine Auflockerung der Front nach der Tiefe. Hierzu ist folgende Neugliederung vorzusehen:

1.) Die vordersten Minensperren (bisherige H.K.L.) sind durch Gefechtsvorposten Tag und Nacht zu bewachen. Die Nachtbesetzung muß stärker als die Tagesbesetzung sein. Zur Erleichterung der Überwachung werden den Truppenteilen Wachhunde zugeführt werden.

Die Stellung der Gefechtsvorposten hat nur aus Gruppenstützpunkten zu bestehen. Demnach überflüssig werdende Anlagen sind zunächst als Wechselstellungen zu benutzen. Bei allen Neuanlagen sind die Gefechtsvorposten in die Minenfelder zu legen. Bei alten Anlagen haben Teile der Gefechtsvorposten in den Minenfeldern die Bewachung durchzuführen.

Der bisherige Kampfraum im vorderen Teil der Sperrgebiete bleibt Bewegungsraum der Gefechtsvorposten und Kampfraum für örtliche Gegenstöße.

Tiefe der Gefechtsvorposten je nach Gelände etwa 500 - 1000 Meter.

2.) Zwischen den Gefechtsvorposten und dem Hauptkampffeld ist ein etwa 1 - 2 km tiefer Raum unbesetzt zu lassen.

3.) Die H.K.L. ist in die rückwärtige Hälfte der Sperrgebiete (Teufelsgärten) zu verlegen. Demnach liegt der vordere Rand des Hauptkampffeldes der Grösse der Teufelsgärten entsprechend etwa 2 km hinter der Zone der Gefechtsvorposten. Die im Hauptkampf-

155 103

feld eingesetzten Truppen sind etwa 2 km tief zu gliedern.

4.) Einen Anhalt für den demnach durchzuführenden neuen Einsatz gibt Anlage 1. Demnach beträgt die Breite der Btl.-Abschnitte etwa 1½ km, die Tiefe etwa 5 km. Eine Kompanie des Btl. (ohne schwere Pz.Abwehrwaffen) ist als Gefechtsvorposten, die Masse des Btl. in dem Hauptkampffeld einzusetzen.

Im Abschnitt des X.A.K. sind die neu gewonnenen Minenfelder entsprechend denen des XX.A.K. zu Sperrgebieten zu vertiefen.

5.) Bis zur Ausgabe eines abgeänderten Merkblattes für Stellungsausbau ist das bisherige Merkblatt (Pz.A.O.K.Ia/Pi Nr.1334/42 Geh. III.Ang.v.1.9.42) sinngemäss anzuwenden.

6.) Zum 25.9.42 sind dem A.O.K. vorzulegen:

a) Vorschlag für Neugliederung entsprechend vorstehenden Richtlinien mit Karte 1 : 25 000,

b) Vorschlag für neuen Verlauf der Sperrgebietumrandungen.

Der Zeitpunkt der Durchführung der neuen Gliederung wird besonders befohlen werden.

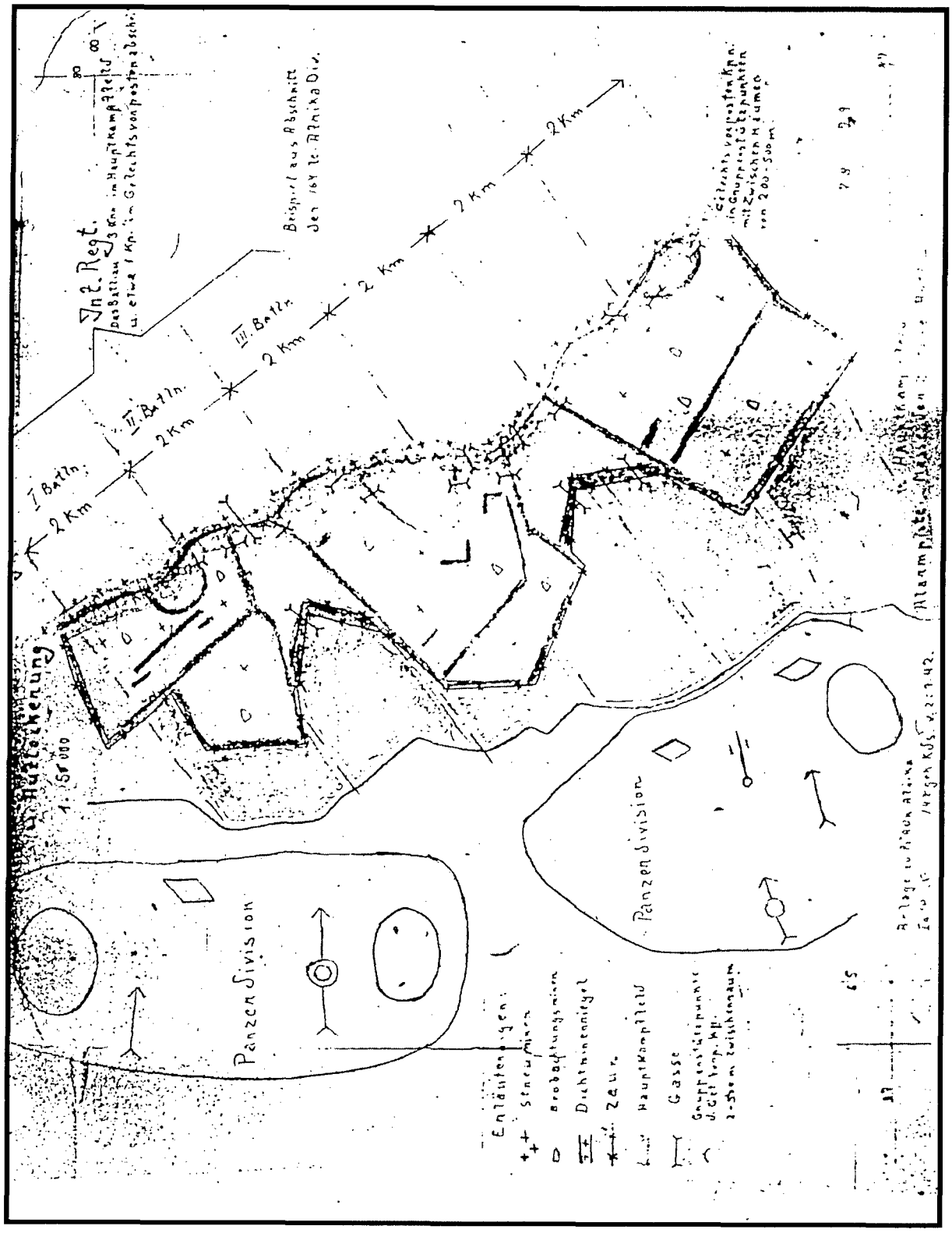
1 Anlage.

Der Oberbefehlshaber:

Kluge

Generalfeldmarschall.

Verteiler
gemäß Entwurf.


Panzer Division
Panzer Division
2 Km
2 Km
2 Km
2 Km
2 Km
Gasse

APPENDIX A, ANNEX 2
GENERAL DER KAVALLERIE STUMME'S INSTRUCTIONS, DATED 22 OCTOBER 1942

Headquarters, Panzerarmee Afrika
The Commander-in-Chief
Abt.Ia/Pi Nr.9532/42 secret

Army Command Post, 22.10.42

Subject: Instructions

During times of positional warfare it is most possible to exploit training opportunities. This applies in the front lines to troops not deployed in the fortified position. But also offers an opportunity to the units deployed directly behind the front to train in a limited scope. I give a few guidelines on the training orders of the divisions-on the execution of training-to establish the basis.

I. General

1.) The attack is and remains the best defense. Therefore, place this form of combat in the forefront of training.

2.) A pure defense can never bring success, to wrestle down an attacking opponent. Rather, every defense must change into an attack where the opportunity presents itself. The decision based on local combat conditions must be made lightning quick. The counterthrust is therefore the duty of the local leaders. They must be trained in this. This leader training must be obeyed. The counterattack is the duty of the senior leaders. Each quicker and better prepared to break loose; so greater is the success.

3.) The unconditional holding of the position without regard for threats to the flanks, breakthroughs to the sides, or within the position and so on alone guarantees the defensive success. Therefore wiring and mining, as well as all around defense of the battle groups in the line of combat outposts and the M.L.R. are ordered.

The combat outposts and forward strongpoints as well as the M.L.R. are to be held. No leader of the combat outposts is authorized to decide on his own to give up the line of combat outposts. Also a breakdown in communications to the rear does not justify such a decision.

II. In Particular.

1.) No driving of unarmored vehicles into organized defenses of the enemy without protection (panzers, armored cars) in advance. No concentrations of vehicles or soldiers.

2.) Present no targets and locations. Against it: camouflage, adapt to the country and with each halt go to ground.

3.) Reconnaissance troops: train reconnaissance and assault troops with the object of reconnaissance, as possible bring in many prisoners and through fire, destroy the enemy.

4.) Rapidly breach enemy minefields and belts as well as wire obstacles under enemy defensive fire. The enemy minefield must not be allowed to be a grave to an attack's spirit and drive. In addition training exercises are necessary. Mine detection and removal is only the first step. Protective fire, close engagement of the enemy, smoke, lanes created through all arms and so on.

5.) Advance the Infantry through thoroughly planned fire from all infantry support weapons. Ensuring this is the main task of the battalion and regimental commanders in an attack.

6.) Exploit the success of the panzers or of the fires of all support weapons including artillery through closely placed infantry, often these will be mounted possibly.

7.) Fire discipline! Aimed fire of all weapons including rifles. In addition maneuver the fires of all support weapons for fully effective firing ranges.

8.) Application of close combat means. Hand grenades, bayonets, shovels, pistols!

9.) Training and schooling of the junior leader up to company commander. For this under different planning games in the smallest scope.

10.) Weapons training on as many weapons as possible including captured weapons.

11.) Vehicle driver training.

12.) Drill exercises only to fortify the discipline of the men, never over half an hour.

The Commander-in-Chief:
Acting

General der Panzertruppen

Distribution:
To the divisions.

Oberkommando der Panzerarmee A.Gef.Stand, den 22.10.42.
A f r i k a
Der Oberbefehlshaber

Abt.Ia Nr. 9532/42 geheim

Betr.: Ausbildung.

Die Zeit des Stellungskrieges ist weitmoeglichst zur Ausbildung auszunutzen. Dies gilt in erster Linie fuer die nicht in der Stellungsfront eingesetzten Truppen. Aber auch den eingesetzten Verbaenden wird sich unmittelbar hinter der Front Gelegenheit bieten, in beschraenktem Rahmen auszubilden. Nachstehend gebe ich einige wenige Richtlinien, die den Ausbildungs-Befehlen der Divisionen - den Traegern der Ausbildung - zu Grunde zu legen sind.

I. Allgemeines.

1.) Der Angriff ist und bleibt die beste Verteidigung. Daher steht diese Kampfform im Vordergrund der Ausbildung.

2.) Eine reine Abwehr kann nie den Erfolg bringen, der den angreifenden Gegner niederringt. Jede Abwehr muss vielmehr in Angriff uebergehen, wo sich nur eine Gelegenheit dazu bietet. Der Entschluss dazu wird meist aus der oertlichen Kampflage heraus oft blitzschnell gefasst werden muessen. Der Gegenstoss ist daher Aufgabe des oertlichen Fuehrers. Er muss darin geschult sein. Dies gehoert zur Fuehrerausbildung. Der Gegenangriff ist Aufgabe der hoeheren Fuehrung. Je schneller und je besser vorbereitet er losbricht, umso groesser ist der Erfolg.

3.) Das unbedingte Halten der Stellung ohne Ruecksicht auf Flankenbedrohung, Durchbrueche seitwaerts oder an an-

deren Stellen usw. verbuergt allein den Abwehr-Erfolg. Deshalb ist Eindrahten und Einminen, sowie Rundumverteidigung der Kampfgruppen in der Linie der Gefechtsvorposten und der H.K.L. befohlen worden.

Die Gefechtsvorposten und vorgeschobenen Stuetzpunkte sind ebenso wie die H.K.L. zu halten. Kein Fuehrer der Gefechtsvorposten darf aus eigenem Entschluss die Linie der Gefechtsvorposten aufgeben. Auch eine Unterbrechung der Verbindung nach rueckwaerts kann einen solchen Entschluss nicht rechtfertigen.

II. Im Einzelnen.

1.) Kein Fahren von ungepanzerten Kfz. in den zur Abwehr gegliederten Feind ohne Sicherungen (Panzer, Pz.Spaehwagen) voraus. Keine Zusammenballungen von Kfz. und Kaempfern.

2.) Nicht Scheibe zeigen und liegen. Dagegen: Tarnen, sich dem Gelaende anpassen und in die Erde gehen bei jedem Halt.

3.) Spaehtrupp: Ausbildung von Spaeh- und Stosstrupps mit dem Ziel aufzuklaeren, moeglichst viel Gefangene einzubringen und den Feind durch Feuer zu vernichten.

4.) Schnelles Ueberwinden von fdl.Minenfeldern und -riegeln sowie der dahinterliegenden Drahthindernisse im fdl.Abwehrfeuer. Das fdl.Minenfeld darf nicht zum Totengraeber jeden Angriffsgeistes und -schwunges werden.

Dazu sind Lehruebungen noetig. Das technische Minensuchen und -beseitigen ist nur der erste Schritt dazu. Feuerschutz, Niederhalten des Feindes, Einnebeln, Gassen schaffen durch alle Waffen usw.

- 3 -

5.) Vorschiessen der Inf. durch planvolles Feuer aller Inf.-Unterstuetzungswaffen. Hierfuer zu sorgen, ist eine Hauptaufgabe der Btls.- und Rgts.-Kdre. im Angriff.

6.) Ausnutzen der Erfolge der Panzer oder des Feuers aller Unterstuetzungswaffen einschl. Artillerie durch dichtes Heranhalten der Infanterie. Oft wird dies aufgelockert möglich sein.

7.) Feuerdisziplin! Gezieltes Feuer aller Waffen einschl. des Gewehres. Dazu Wendigkeit des Feuers aller Unterstuetzungswaffen auf wirkungsvolle Schussentfernungen.

8.) Gebrauch der Nahkampfmittel. Handgranaten, Bajonett, Spaten, Pistolen!

9.) Ausbildung und Schulung der Unterfuehrer bis hinauf zu den Kompaniefuehrern. Hierzu unter anderem Planspiele im kleinsten Rahmen.

10.) Waffenausbildung an moeglichst vielen Waffen einschl. Beutewaffen.

11.) Kraftfahrausbildung.

12.) Exerzierdienst nur zur Festigung der Mannszucht, nie ueber eine halbe Stunde.

Der Oberbefehlshaber:
I. V.

Hauser

General der Panzertruppen.

Verteiler:

Bis zu den Divisionen.

APPENDIX B
8th ARMY OPERATIONS ORDER FOR OPERATION LIGHTFOOT[1]

LIGHTFOOT
14 September 1942
General Plan of Eighth Army

OBJECT

1. To destroy the enemy forces now opposing Eighth Army. The operations will be designed to 'trap' the enemy in his present area and to destroy him there. Should small elements escape to the West, they will be pursued and dealt with later.

PLAN IN OUTLINE

2. The enemy will be attacked simultaneously on his North and South flanks.
3. The attack on the North flank will be carried out by 30 Corps with the object of breaking in to the enemy defences between the sea and inclusive the MITEIRIYA Ridge, and forming a bridgehead which will include all the enemy main defended positions and his main gun areas. The whole of this bridgehead will be thoroughly cleared of all enemy troops and guns. 10 Corps will be passed through this bridgehead to exploit success and complete the victory.
4. On the South flank, 13 Corps will:
    a) Capture HIMEIMAT
    b) Conduct operations from HIMEIMAT designed to draw enemy armour away from the main battle in the North.
    c) Launch 4 Lt Armd Bde round the Southern flank to secure DABA and the enemy supply and maintenance organization at that place, and to deny to the enemy air the use of the air landing grounds in that area.

30 CORPS OPERATIONS

5. The break-in attack will be carried out in the moonlight and will be supported by a great weight of artillery fire. Zero hour will be after moonrise on D1 i.e. probably about 2200 hours. See para. 12.
6. The following troops will be available:
    9 Aust Div.
    51 (Highland) Div.
    23 Armd Bde.
    2 NZ Div (less such troops as are not required for the task allotted).
    1 SA Div.
7. The troops of NZ Div will be used to capture and hold the MITEIRIYA Ridge West of the QATARA track. These troops will return to command 10 Corps at a time to be arranged mutually between 10 Corps and 30 Corps.
    1 SA Division will swing forward its right to join up with NZ troops on the MITERIYA Ridge.
8. The attached tracing shows:
    a) Objectives of 30 Corps.
    b) Assembly area 10 Corps.
    c) The two areas where gaps in the enemy minefield are to be made by 10 Corps.
    d) Routes from 10 Corps assembly area forward to the battle area.
    e) Deployment areas of armoured brigades of 10 Corps.
    f) Subsequent areas to be occupied by 10 Corps. As to whether these precise areas are actually occupied will depend on the development of the battle.
9. It is essential to the success of the whole operation that leading armoured brigades of 10 Corps should be in the deployment areas (para. 8(e)) ready to fight at first light on D2. They must not become embroiled in local fighting on the early morning of D2 whilst moving in to their deployment areas.

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[1] As extracted from Monty, the Making of a General, 1887-1942, by Nigel Hamilton, ISBN 0-07-025805-8, McGraw-Hill Book Company, New York, 1981, pages 732-741. Author's note: this order was revised or "fragged" on 6 October 1942 as discussed in Section 5.1, but no written change seems to have been published.

Therefore, 30 Corps will ensure that the deployment areas and the routes to them are thoroughly cleared of all enemy troops and guns before the armoured brigades begin to move in to them.

10. Gaps in our own minefields will be cleared, marked, and lit by 30 Corps.

11. The successful result of the whole operation will depend on whether 30 Corps achieve success in the break-in attack, clear the bridgehead area, and hold securely the ground gained. A great deal will depend on the proper employment of the artillery. Up to about 400 guns will be available and the concentrated use of this great firepower should ensure success.

In order to make certain that the best use is made of the available artillery resources the [Corps Chief of Royal Artillery] 30 Corps will, for this attack, assume command of all the artillery in 30 Corps. Once the bridgehead area has been secured, artillery must reach out to deal with targets further afield and to assist in beating off counter-attacks.

12. 30 Corps will report the desired zero hour for the attack, consulting with 10 Corps. The ruling factor is as given in para. 9 above. A full moon will be assumed.

10 CORPS OPERATIONS

13. See attached tracing referred to in para 8 above.

14. The operations of 30 Corps are so designed that 10 Corps can pass unopposed through gaps in the enemy minefields and be launched into territory West of these main minefields. 10 Corps will then pivot on the MITEIRIYA Ridge, held by its own NZ Division, and will swing it right round till the Corps is positioned on ground of its own choosing astride the enemy supply routes.

Further operations will depend on how the enemy re-acts to this initial thrust.

The aim in the development of the further operations will be based on:

a) The enemy being forced to attack 10 Corps on the ground of its own choice.

b) 10 Corps being able to attack the enemy armoured forces in flank.

c) The fact that once the enemy armoured and mobile forces have been destroyed, or put out of action, the whole of the enemy army can be rounded up without any difficulty.

15. The move of 10 Corps to its assembly area will take place by night, the Corps being assembled by dawn on D1 day. Several nights will be used as may be decided by 10 Corps. See para 25(a).

The move forward from the assembly area to deployment areas will begin after dark on D1 day; see paras 9 and 12.

16. 10 Corps will be responsible for:

a) Marking and policing of its routes from the assembly area up to the gaps in the enemy minefields.

b) Clearing its own gaps in the enemy minefields. See para 8(c). CE Eighth Army will arrange for any additional RE assistance that may be required.

17. 30 Corps will be responsible for:

a) Construction of routes forward from 10 Corps assembly area up to the present forward positions.

b) AA protection for all gaps in minefields, including 10 Corps gaps in the enemy minefields.

13 CORPS OPERATIONS

18. The task of 13 Corps is twofold:

First. To assist the main armoured battle in the North by drawing off enemy armour to the South.

Second. To launch a mobile and armoured force round the enemy's Southern flank to secure and hold the enemy supply base, maintenance organizations, and air landing grounds, in the DABA area.

19. For both tasks, and especially for the successful conduct of the first task, a secure base is essential. 13 Corps will therefore begin its operations by breaking into the enemy positions at or about HIMEIMAT. This attack will begin at the same time as the attack of 30 Corps; see para. 12.

20. Operations will then be so developed that 4 Light Armd Bde can be launched at first light on D2 to secure DABA vide [see] para 18.

It will be particularly important to destroy all enemy aircraft found on the ground at DAGA; also to deny the enemy the use of the landing grounds; holding them for our own use later on.

On arrival in the DABA area 4 Light Armd Bde will come directly under Army HQ.

21. Having launched 4 Light Armd Bde to Daba, 13 Corps will operate with 22 Armd Bde with the object of drawing enemy armour down to the South and away from the main battle area in the North.

All enemy MET, and transport generally in rear of the enemy positions in the South will be destroyed; enemy armoured divisions attack 10 Corps from the South will themselves be attacked from the rear by 22 Armd Bde.

The operations of 22 Armd Bde will be conducted with the greatest vigour and determination. But in order to ensure that Eighth Army is at all times properly balanced, and has no need to re-act to enemy thrusts, it is essential that 22 Armd Bde should not be destroyed by superior armoured forces; it must remain 'in being' on the Southern flank, operating as indicated above, until it is clear how the battle is going to swing; at the appropriate moment everything will be thrown into the fight by Army HQ in order to finish off the enemy.

SEA LANDING

22. A combined operation is being planned and organized with the object of landing a small force of tanks, artillery and infantry on the coast about RAS ABU EL GURUF.

This force, having landed, will operate Eastwards towards SIDI ABD EL RAHMAN and assist the operations of 30 Corps and 10 Corps.

The time of landing will be synchronized carefully with the main operations of the Eighth Army.

This force will come directly under Army HQ.

AIR OPERATIONS

23. These are being developed on the following lines:

a) Heavy bombing of the enemy's main aerodromes during the September full moon period. No attack by our land forces will follow.

b) Heavy bombing of the enemy's main aerodromes during the October full moon period.

c) At zero hour on D1 day heavy bombing attacks of the enemy armoured formations. These will continue all night on a very heavy scale.

DECEPTION MEASURES

24. Every endeavour will be made to deceive the enemy as to our intentions to attack at all and, if this fails, as to the direction of our main attack.

25. Offensive intentions are usually given away by concentrations of transport, thereby implying concentration of troops and force for an attack. It is therefore essential that a certain normal density of vehicles should be decided for any area and that density be stabilised on 1 October and not altered after that date. This is vitally important in the following areas:

a) *Assembly area of 10 Corps.* This area must be made a general living area *now*, and arrangements made so that the number of vehicles in it by 1 October will be approximately the same as when 10 Corps is in the area during daylight hours on D1. Furthermore, the positions of the vehicles should be approximately those of the tanks and vehicles of 10 Corps will occupy on D1. On the nights before D1 the units of 10 Corps will move into the area, and the appropriate transport echelons now there will move out. For this scheme to be a success the most careful plans must be made by 30 Corps, and the most complete cooperation arranged between 10 Corps and 30 Corps.

b) *Area of 9 Australian Division.* This Division will require a certain amount of transport for use during exploitative towards SIDI RAHMAN. All other transport should be sent back.

c) *Area of 51 (Highland) Division.* This Division will require practically no transport, or very little. 30 Corps must ensure that when the Division moves in to its concentration area for attack, the density of transport remains unchanged.

d) *Area of NZ Division (see para 7).* This Division, with tanks co-operating, will capture and hold the MITEIRIYA Ridge, and later may be required for further mobile operations Westwards. A good deal of transport will be necessary.

e) *Area of 1 SA Division.* This Division will require practically no transport.

26. Orders will be issued by Army HQ regarding the camouflage and formation of dumps in the assembly areas and further forward. The camouflage will be erected first, before the dumps begin to form.

27. Orders regarding the movements, positioning, and handling of artillery in 30 Corps area will require very careful organization in order not to give away our intentions to the enemy, but rather to deceive him. Further detailed orders on this subject will be issued by Army HQ.

28. Work on tracks and routes forward from 10 Corps assembly area will be started now, work being confined to those places which take a long time to complete. See para. 17(a).

The remaining portions of the tracks will be finished off on the last two nights before D1 day.

It is not possible to camouflage long lengths of track, but much can be done by careful organization of work.

CE Eighth Army will co-ordinate all work in connection with the construction of tracks and routes forward.

It is important that tracks forward should start at the Eastern end of 10 Corps assembly area.

SECRECY

29. It is impossible to over-stress the need for secrecy regarding operation 'LIGHTFOOT'.

Details of the operation will not be communicated below Div HQ, and at Div HQ no officer will be told anything about the operation except the CRA and GSO 1. All work in connection with preparations for the attack will be given to officers as part of their normal work, and they will not be told the reason for the work. Nothing will be written about the operation; all orders will be verbal for the present.

TRAINING

30. All formations and units will at once begin to train for the part they will play in this battle. Time is short and we must so direct our training that we shall be successful *in this particular battle,* neglecting other forms of training.

31. This battle will take place during the period of the full moon.

The initial break-in attack by 30 Corps, the initial operations by 13 Corps, and the move forward of 10 Corps to deployment areas will all be carried out by night with a full moon.

Therefore, full advantage must be taken of the September full moon period to practise operating on a moonlit night and actually to rehearse the operations concerned, using similar bits of ground.

32. There will be a great weight of artillery fire available for the break-in battle. During the training period, infantry and other arms must be accustomed to advancing under the close protection of artillery fire and mortar fire.

We must have realism in our training and use live ammunition in our exercises with troops, even if this should result in a few casualties. I will accept full responsibility for any casualties that may occur in this way.

33. The accurate fire of mortars will be of the greatest value in the break-in battle. No troops can stand up to sustained heavy and accurate artillery and mortar fire without suffering a certain loss of morale; low category troops will be definitely shaken by such fire, and can then be dealt with easily by our own attacking troops.

34. Tanks that are to work in close co-operation with infantry in this battle must actually train with that infantry from now onwards.

35. The individual soldier must be given practice so that he will reach a high degree of skill with the weapons he will use in battle.

36. Full use will be made of the model in preparation for this battle. Every formation headquarters and every unit should have a model of the ground over which it is to operate, and on this model all officers will be instructed in the stage-management of the battle.

Finally all NCOs and men will be shown on the model the part they will play in the battle.

As far as officers and NCOs are concerned the model will be any ordinary piece of ground; the actual place names must not be shown. As the day of attack approaches more information can be disclosed.

No information about our offensive intentions will be disclosed to any officer or other rank who has even the slightest chance of being taken prisoner in a raid; this order will not be relaxed until the morning of D1 day.

37. I direct the attention of Corps and Divisional Commanders to Eighth Army Training Memorandum No. 1 issued on 31 August 1942. The fundamentals outlined in that memorandum will govern the conduct of our battle operations, and will, therefore, form the basic background for all our training.

Battle drill must be highly developed, and a good system organized in every formation and unit.

Unless our standard of battle drill and operational discipline is on a very high level, we shall fight at a disadvantage.

MORALE

38. This battle for which we are preparing will be a real rough house and will involve a very great deal of hard fighting. If we are successful it will mean the end of the war in North Africa, apart from general 'clearing-up' operations; it will be the turning point of the whole war. Therefore, we can take no chances.

39. Morale is the big thing in war. We must raise the morale of our soldiery to the highest pitch; they must be made enthusiastic, and must enter this battle with their tails high in the air and with the will to win.

There must in fact be no weak links in our mental fitness.

40. But mental fitness will not stand up to the stress and strain of battle unless troops are also physically fit.

This battle may go on for many days and the final issue may well depend on which side can best last out and stand up to the buffeting, the ups and downs, and the continuous strain of hard battle fighting.

There will be no tip and run tactics in this battle; it will be a killing match; the German is a good soldier and the only way to beat him is to kill him in battle.

41. I am not convinced that our soldieries are really tough and hard. They are sun burnt and brown, and look very well; but they seldom move anywhere on foot and they have led a static life for many weeks.

During the next month, therefore, it is essential to make our officers and men really fit; ordinary fitness is not enough, they must be made tough and hard.

42. This memorandum will not be reproduced or copied. It will form the basis of all our plans and preparations for operation 'LIGHTFOOT'.

APPENDIX C
8th ARMY OPERATIONS ORDER FOR OPERATION SUPERCHARGE[1]

OPERATION SUPERCHARGE
EIGHTH ARMY PLAN

MOST SECRET
20 Oct 1942

1. Operation SUPERCHARGE will take place on night 31 Oct/1 Nov. The operation is designed to:
   (a) Destroy the enemy armoured forces.
   (b) Force the enemy to fight in the open, and thus make him use petrol by constant and continuous movement.
   (c) Get astride the enemy supply route, and prevent movement of supply services.
   (d) Force the enemy from his forward landing grounds and aerodromes.
   (e) Bring about the disintegration of the whole enemy army by a combination of (a), (b), (c) and (d).

30 CORPS TASK

2. To attack by night from the present forward positions between the 297 and 301 Northing grids. Attack to penetrate Westwards to a depth of 4000 yds.
3. On reaching the final objective, armoured and infantry patrols to push out farther to the West so as to cover the debouchment of the armoured divisions and so enable them to get out and deploy the more easily.
4. The flanks of the penetration to be held securely, and their Eastern extremities to be linked up firmly with our existing positions.
5. The whole area of penetration to be cleared, and organised for free movement, and to be held securely as a firm base from which to develop offensive operations.

10 CORPS OPERATIONS

6. 10 Corps will break out into the open through the penetration made by 30 Corps.
7. Armoured cars, at least two regiments initially, will be launched through the bridgehead area before daylight on 1st November and will push out to the N.W., the West, the S.W., and the South.

   The task of the armoured cars will be to operate offensively on the enemy supply routes, destroy everything they meet, and prevent any supplies or reinforcements from coming forward, and prevent any movement from the forward areas to the rear.

   Armoured cars must be prepared to operate on their own for some days, keeping up the stranglehold and making full use of enemy petrol and supplies.
8. 10 Corps will secure as a first objective the general area Pt 46 in 858299 – Tell el Aqqaqir in 860297. Operations will then be developed so as to:
   (a) Destroy the enemy armoured forces.
   (b) Bring about the complete disintegration of the enemy's rear areas.
9. The general axis of operations for 10 Corps, subject to the fulfillment of the task given in para. 8(a) will be N.W. towards Ghazal Station, so as to get in behind the enemy forces in the Sidi Rahman area and cut them off.
10. The forward movement of 10 Corps will be timed so that the area of the first objective is secured before daylight on 1st November, and operations developed from that area as the sun is rising.
11. It will be clearly understood that should 30 Corps not succeed in reaching the final objective vide paras. 2 and 3, the *armoured divisions of 10 Corps will fight their way to the first objective.*

10 AND 30 CORPS

12. 30 Corps will hold N.Z. Div. in readiness to take over the area of 10 Corps first objective vide para. 8, so as to free 10 Corps for offensive operations against the enemy armoured formations or for a N.W. movement towards Ghazal Station.

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[1] As extracted from The Memoirs of Field-Marshal the Viscount Montgomery of Alamein, K.G., by Sir Bernard Law Montgomery, The World Publishing Company, New York, 1958, pages 121-123.

13. Very close touch, co-operation, and liaison will be required between 10 Corps and 30 Corps throughout the whole operation.
14. This operation if successful will result in the complete disintegration of the enemy and will lead to his final destruction.

It will therefore be successful.

Determined leadership will be vital; complete faith in the plan and its success, will be vital; there must be no doubters; risk must be accepted freely; there must be no "bellyaching."

I call on every commander to carry through this operation with determination, to fight their formations bravely, and to instill optimism and offensive eagerness into all ranks.

SUPERCHARGE will win for us the victory.

13 CORPS

15. 13 Corps will do what is possible on the Southern flank before or after dark on 31st October to make the enemy think an attack is coming on that flank.
16. The corps will be ready to take immediate action the moment it appears that the enemy is beginning to crack.

ARMY RESERVES

17. 7th Arm. Div. (less 4th Lt. Army. Brigade).
131st Inf. Bde. (Queens).

These two formations will be held in Army reserve ready for use as the situation develops.

R.A.F. OPERATIONS

18. The R.A.F. are playing a great part in inflicting moral and material damage on the enemy. This is being intensified, from tomorrow inclusive onwards, and will reach its culminating point as SUPERCHARGE is launched.

FINALLY

19. We know from all sources of intelligence that the enemy is in a bad way, and his situation is critical. The continued offensive operations of Eighth Army and the R.A.F. have reduced him to such a state that a hard blow *now* will complete his overthrow.

The first stage in the blow is the operation being staged by 9th Aus. Div. tonight on the North flank; success in this operation will have excellent repercussions on SUPERCHARGE.

SUPERCHARGE itself, tomorrow night 31st October/1st November, will be the second blow and a staggering one, and one from which I do not consider he will be able to recover.

APPENDIX D
GERMAN ASSESSMENT OF ITALIAN INFANTRY RELIABILITY[1]

The Italian officers and their men were unready, their tanks too weak, their artillery unable to fire beyond five miles. Italian troops had no field kitchens and were frequently begging food and drink from their German comrades. *"They're useless except for defense, and even then they're useless if the British infantry attacks with fixed bayonets." "The ordinary Italian soldiers are good, their officers are worthless." "The Italian troops have failed once more exactly as during the last offensive. The reasons for this are as follows: the command is not equal to the mobile direction of battle in desert warfare... The training of Italian units does not correspond to the demands of a modern war. For example, units brought up to replace lost battalions for a division fired for the first time near the front. Officers who had not served since the end of World War I were detailed as battalion commanders. The arms of Italian units do not permit the Italian soldier to withstand British attacks without German assistance. Apart from the well-known faults of Italian tanks – short range and feeble engines – the artillery, with its lack of mobility and inadequate range (6km – maximum 8km), is absolutely inferior to the British artillery, which is known to be good. Also weak equipment with antitank weapons gives the Italian soldier a feeling of inferiority. Supply of the Italian troops is not adequate. Troops have no field kitchen and quantities of food are small. For this reason, the Italian soldiers, who are usually extremely contented and unassuming, often come to their German comrades to beg something to eat and drink. The great difference in food allocation to officers and men has an adverse effect on morale of the troops. The Italian soldier is not equal to the bayonet attacks of the British infantry. He has not got the nerve to hold on when enemy tanks have broken through. Continual bombing attacks and artillery fire quickly wear down his will to resist. The Italian soldier can maintain defense only with German support, and then only if the German soldier bears the brunt of the fighting."*

[1] Air Historical Branch Translations of Captured Documents (New Zealand), as sited in Rommel, A Narrative and Pictorial History, by Richard D. Law and Craig W. H. Luther, ISBN 0-912138-20-3, R. James Bender Publishing, San Jose, California, 1980, footnote 38 on page 179. See also "Italy as a Military Ally," by *Generalfeldmarshall* Albert Kesselring, MS# C-015, Foreign Military Studies, Headquarters, US Europe, July 1948 and *Beitrag zur Alamein-Schlacht, unter besonderer Beruecksichtigung der Kaempfe im Abschnitt der 15. Panzer Division*, Heinrich Mueller, MS # D-348 (copy of *Gefechtsbericht der 15. Panzerdivision, Schlacht in der el-Alamein-Stellung und Rueckzug in die Marsa-el-Brega-Stellung, 23.10-25.11.1942*.). Foreign Military Studies. Headquarters, US Army Europe. 1 December 1947, page 22.

APPENDIX E

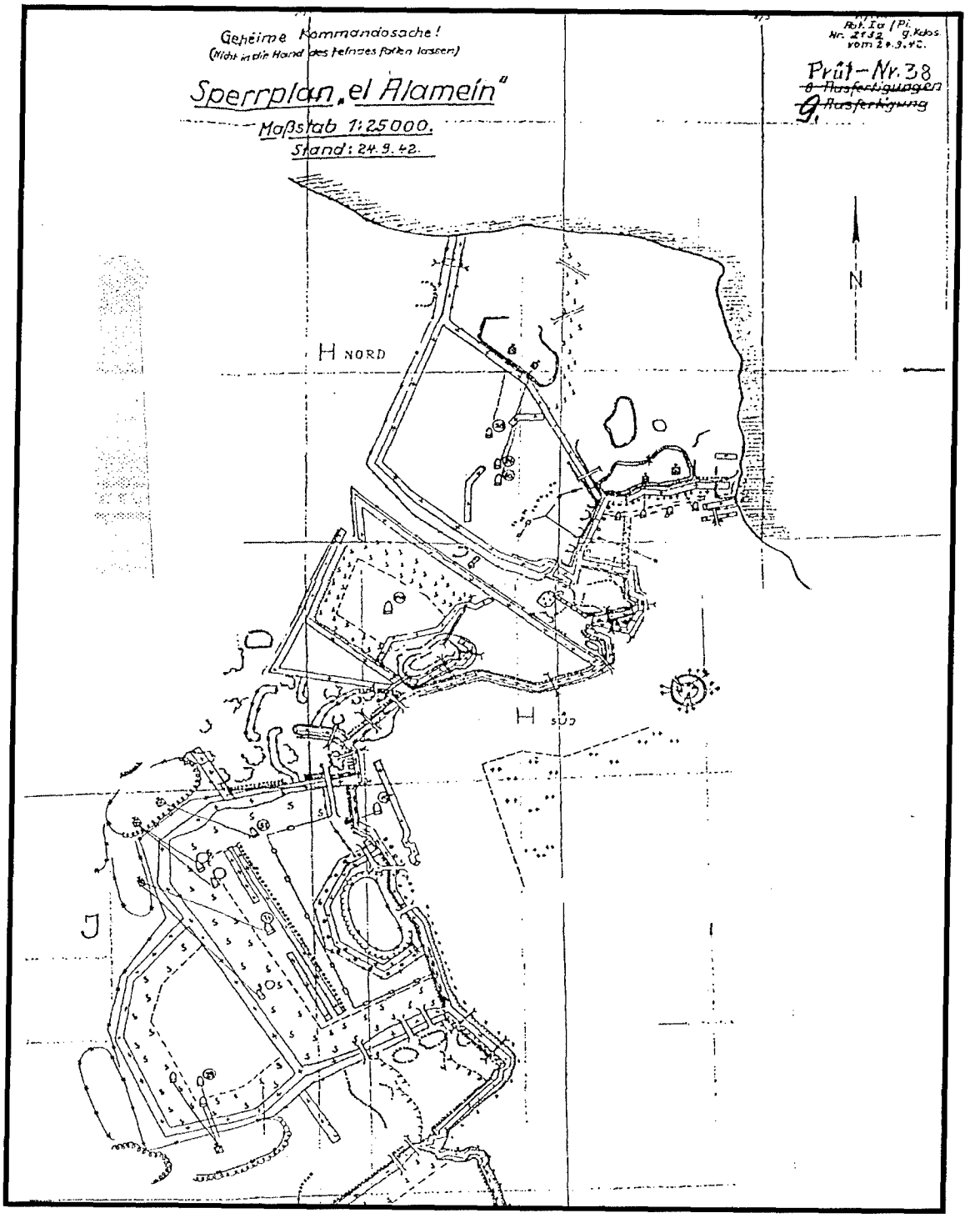
"Sperrplan el Alamein"

AXIS OBSTACLE PLAN AS OF 24 SEPETEMBER 1942

Annex 1. "Sperrplan el Alamein"
Annex 2. Italian Obstacle Overview
Annex 3. Detailed Obstacle plan for the 2nd New Zealand Division Zone of Attack
- a) Overview of Mine Box K and L
- b) Early Mining Efforts in the Vicinity of Mine Box K and L
- c) Detailed Mine Sheet (*Blätter)* for Mine Box K
- d) Detailed Mine Sheet (*Blätter)* for Mine Box L
- e) Later Mining Activity in the 2nd New Zealand Division Zone

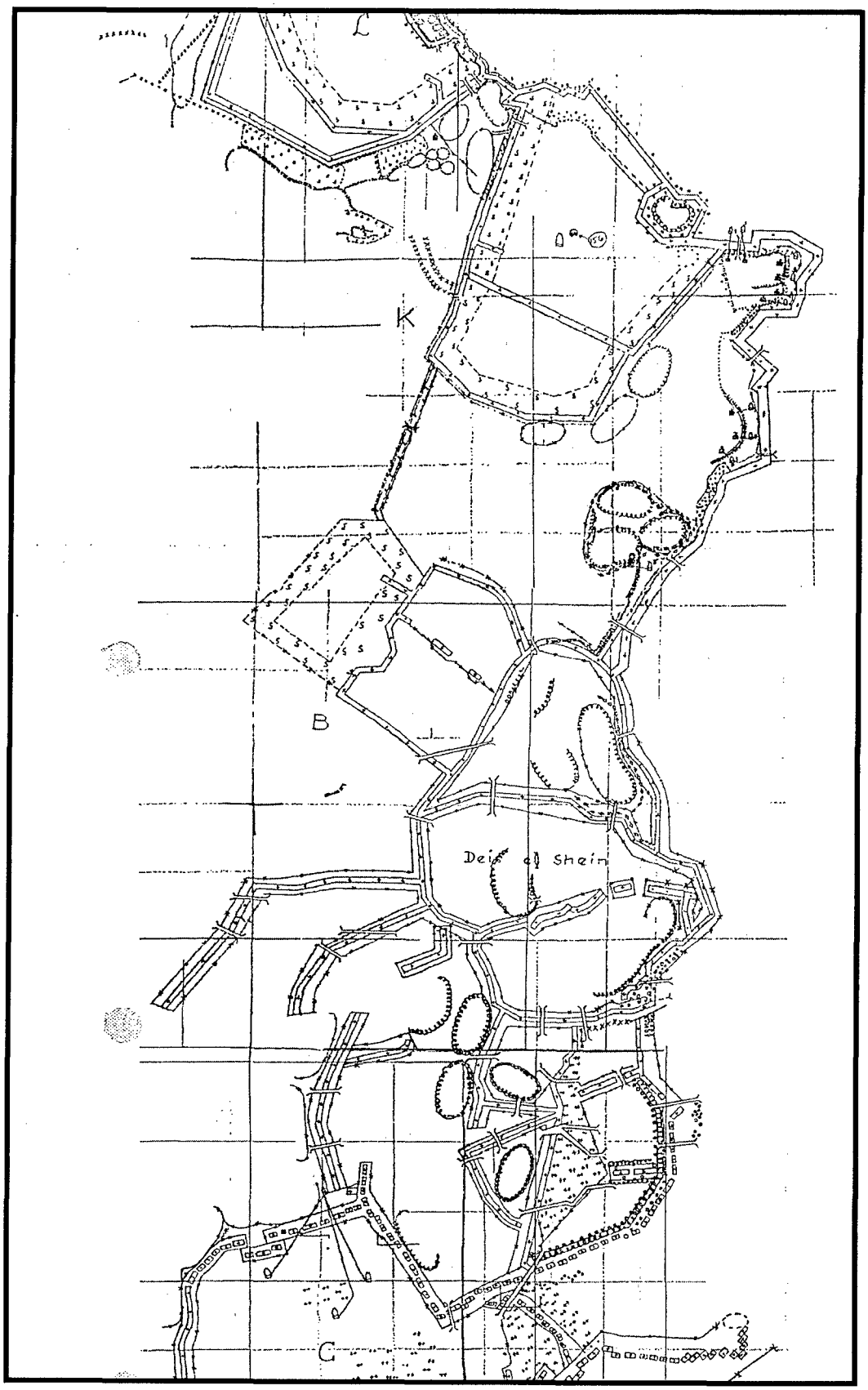
Annex 4. World War II German Military Symbology

Appendix E, Annex 1.
"Sperrplan el Alamein"[i]
As of 24 September 1942



Note: See page E-4 for the legend to this map

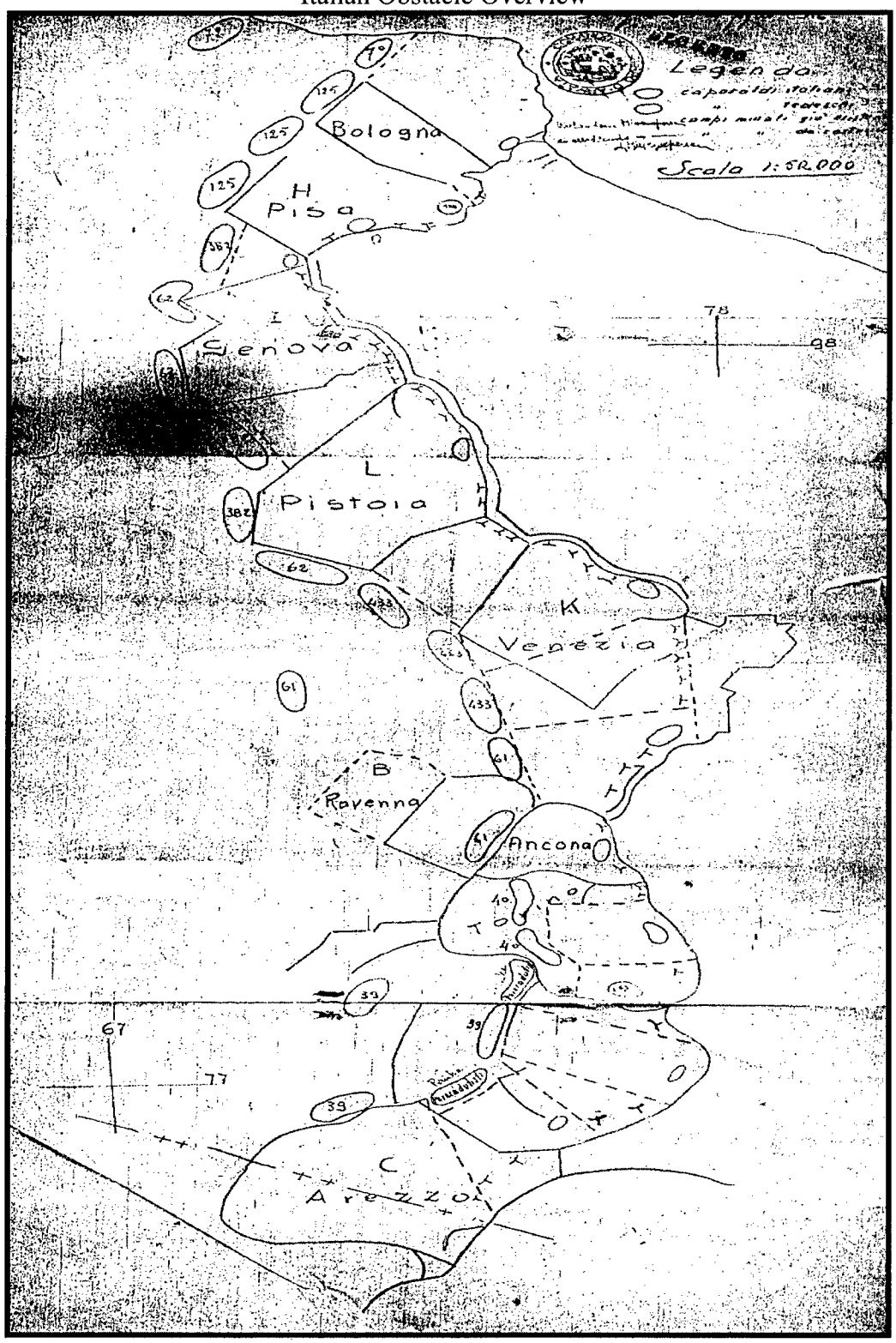
[i] US National Archives, Captured German Records Division, Series T-313, Roll 432, beginning on frame 8.724.578.


L
K
B
Deir el Shein
C

Legend to "*Sperrplan el Alamein*"

Graphic	German	English Translation
	*Panzer Dichtminenfeld*	Tactical minefield composed only of anti-tank mines
	*Ungefähre Lage geplanter Minenfelder*	Approximate position of a planned minefield
	*Panzer Streuminen*	Randomly emplaced anti-tank mines
	*Scheinminenfeld*	Dummy minefield
	*S-Minen*	S-mines
	Spanndrahtminen	Tripwire-fuzed mines
	*Beobachten-Minen*	Command-detonated mines
	*Fliegerbomben (# Stück)*	Aircraft bombs rigged as mines (# placed)
	*Zündstelle für Beobachten-Minen*	Firing point for command-detonated mines
	Zündleitung oder Zünddraht	Firing train or firing wire
	*S-Rollen (einfach)*	Barbed wire concertina (single coil)
	*S-Rollen (zweifach)*	Barbed wire concertina (double coil)
	S-Rollen (dreifach)	Barbed wire concertina (triple coil)
	*Offene Gasse*	Open lane
	*Geheime Gasse*	Secret lane
	*Spähtruppegasse*	Reconnaissance patrol lane
	*Lage des Sperrtrupps für Schließung der Gassen*	Position of troops responsible for closing the lanes
	Drahtzaun	Barbed wire fence
	Flanderzaun	double apron fence
	*Steinhaufen und Kanisterbegrenzung*	Pile of rocks or canisters to mark minefields
	*Versteckte Ladungen*	Hidden charges (booby traps)
	*Ausgebauter Stützpunkt*	Prepared strongpoint
	*Noch nicht fertig ausgebauter Stützpunkt*	Strongpoint under construction

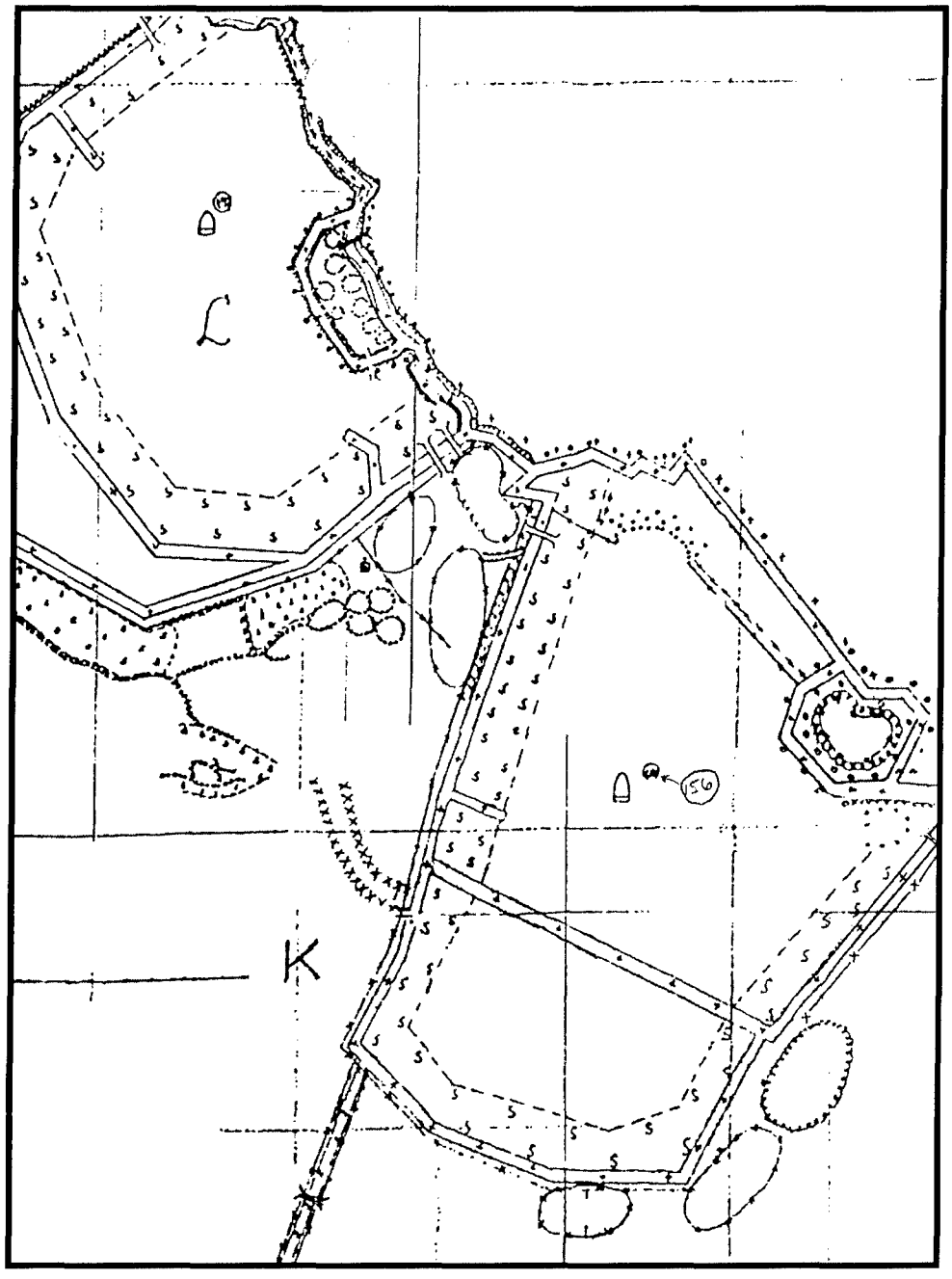
Appendix E, Annex 2.
Italian Obstacle Overview[ii]



[ii] This overlay is included primarily because it gives the names the Italians used for the various mine boxes (which appear in the narrative), along with their German letter designator. Also, this map provides a useful overview without being too "busy." US National Archives, Captured German Records Division, Series T-313, Roll 467, frame illegible.

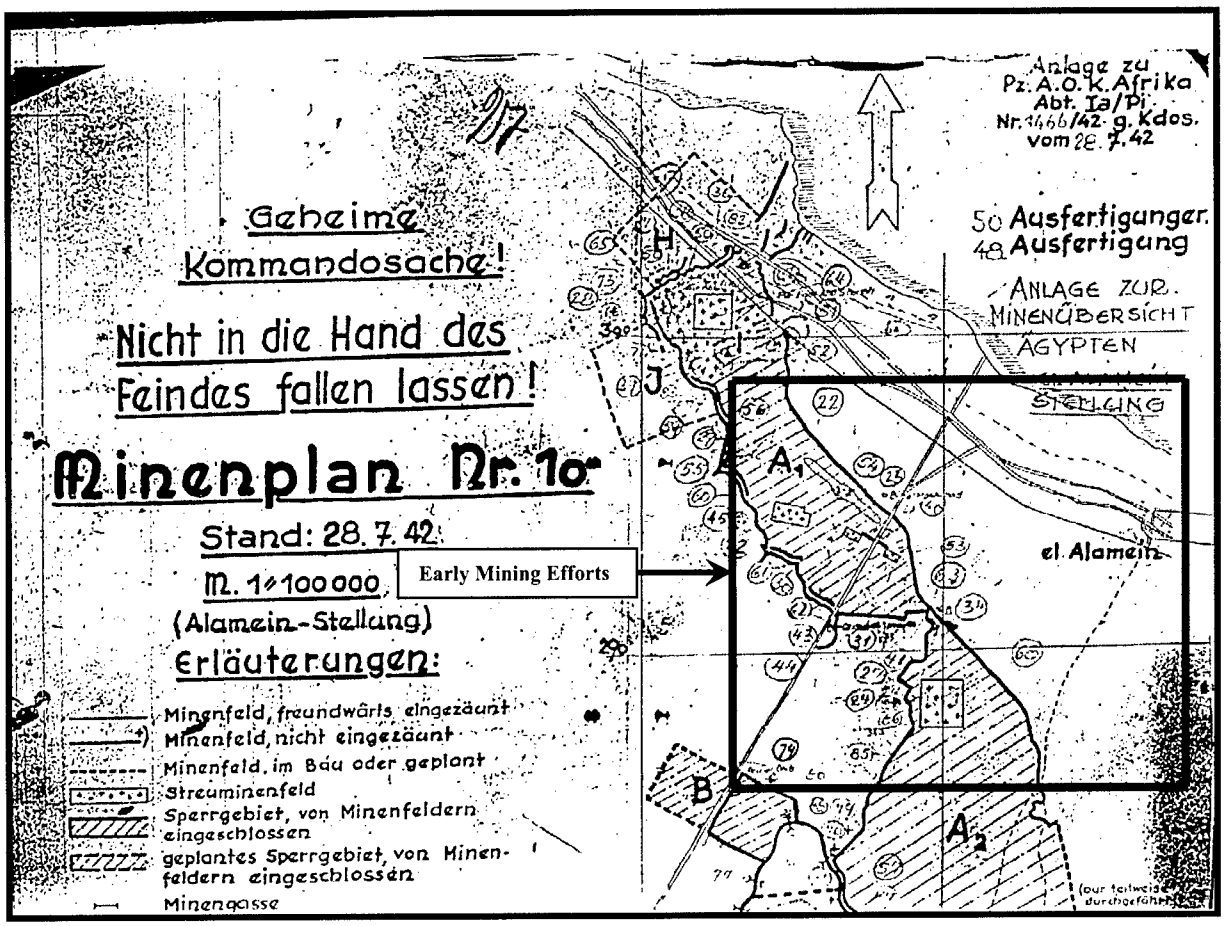
Appendix E, Annex 3.
Detailed Obstacle Plans for the 2nd New Zealand Division Zone of Attack

Appendix E, Annex 3a
Overview of Mine Boxes K and L[iii]
As of 24 September 1942



[iii] Included to help orient the reader. The engineers of the panzerarmee significantly modified the area between mine boxes K and L between 24 September and 23 October (the beginning of Operation 'Lightfoot'), see Annex 3c. In this overlay, Mine Box L is to the top left, while Mine Box K is to the bottom right of the page. US National Archives, Captured German Records Division, Series T-313, Roll 432, frame 8,724,585.

Appendix E, Annex 3b.
Early Mining Efforts in the Vicinity of Mine Boxes K and L[iv]



[iv] "*Minenplan Nr. 10,*" Anlage zu Pz. A.O.K. Afrika, Abt. Ia/Pi, Nr. 1466/42 g. Kdos, vom 28.7.42 (28 July 1942), US National Archives, Captured German Records Division, Series T-313, Roll 432, frame 8,724,838. See also "*Minenübersicht Ägypten. El Alamein-Stellung. Vom 10.7.1942 bis 31 August 1942.*" US National Archives, Captured German Records Division, Series T-313, Roll 432, frames 8,724,840 to 8,724,854.

Forward of Mine Boxes K and L (The numbers below correspond to the circled numbers found in the highlighted box on *Minenplan Nr. 10* on page E-7. These numbers are in Obstacle Zone A1 from South to North)

53. The 2nd Company of the 900th Pioneer Battalion reported on 25 July 1942 that they had laid 200 mines between the Italian III Battalion, 62nd Infantry Regiment and III Battalion, 61st Infantry Regiment in an area 1600 wide and 800 meters deep.

5. The 1st Company of the 900th Pioneer Battalion reported on 15 July 1942 that they had laid a "*Minenriegel vor Kasta Briehl*" of 2419 English mines.

40. The 3rd Company of the 220th Pioneer Battalion reported on 24 July 1942 that they had randomly laid (*streueinsatz*) 150 mines to the left and right of the *Steinpiste* road in this area.

23. The 2nd Company of the 900th Pioneer Battalion reported on 20 July 1942 that they had laid 100 English mines along a 300 meter frontage in this area.

54. The 2nd Company of the 900th Pioneer Battalion reported on 25 July 1942 that they had randomly laid (*streuminen*) 180 mines 2 kilometers north of *Stutzpunkt* 1/361.

22. The 2nd Company of the 900th Pioneer Battalion reported on 20 July 1942 that they had randomly laid 1800 mines (*streuminen*) between the railroad embankment and *Kampfstaffel Kiel.* (Based on this description from the German records and as marked on "*Minenplan Nr. 10*", this minefield appears to overlap both Mine Box L and Mine Box J.)

56. The 7th Bersaglieri of the Italian XXI Corps reported on 25 July 1942 that they had emplaced 1900 mines in this area. (As marked on "*Minenplan Nr. 10*", this minefield appears to overlap both Mine Box L and Mine Box J.)

Along the Forward Edge of Mine Box K (The numbers below correspond to the circled numbers found in the highlighted box on *Minenplan Nr. 10* on page E-7. These numbers are from Southeast to Northwest)

31. The Italian III Battalion, 61st Infantry Regiment of the XXI Corps reported on 22 July 1942 that they had laid 850 mines at a density of 1 mine per meter of at this location.

43. The Italian II and III battalions, 62nd Infantry Regiment of the XXI Corps reported on 24 July 1942 that they had laid 750 mines to close a gap at this location.

62. On 26 July 1942, the Engineer Command of the Italian XXI Corps reported that III Battalion, 62nd Infantry Regiment had laid 600 mines at this location.

30. The Italian II Battalion, 62nd Infantry Regiment of the XXI Corps reported on 22 July 1942 that they had laid 1,000 mines at a density of 1 mine per meter at this location.

61. On 26 July 1942, the Engineer Command of the Italian XXI Corps reported that II Battalion, 62nd Infantry Regiment had laid 300 mines at this location. (As marked on "*Minenplan Nr. 10*", this minefield appears to overlap both Mine Box K and Mine Box L.)

44. The Italian II Battalion, 62nd Infantry Regiment and I Battalion, 61st Infantry Regiment of the XXI Corps reported on 24 July 1942 that they had laid 800 mines to complete the minefield at this location. (As marked on "*Minenplan Nr. 10*", this minefield may have actually been within Mine Box K.)

Along the Forward Edge of Mine Box L (The numbers below correspond to the circled numbers found in the highlighted box on *Minenplan Nr. 10* on page E-7. These numbers are from Southeast to Northwest)

61. On 26 July 1942, the Engineer Command of the Italian XXI Corps reported that II Battalion, 62nd Infantry Regiment had laid 300 mines at this location. (As marked on "*Minenplan Nr. 10*", this minefield appears to overlap both Mine Box K and Mine Box L.)

72. The 2nd Company of the 900th Pioneer Battalion reported on 27 July 1942 that they had randomly laid 250 mines (*streuminen*) in the vicinity of the German I Battalion, 155th Infantry Regiment.

45. The Italian II Battalion, 61st Infantry Regiment of the XXI Corps reported on 24 July 1942 that they had laid 700 mines to protect their left flank at this location.

60. On 26 July 1942, the Engineer Command of the Italian XXI Corps reported that the II Battalion, 61st Infantry Regiment had laid 900 mines at this location.

55. On 25 July 1942, the Italian XXI Corps reported that I Battalion, 62nd Infantry Regiment and II Battalion, 61st Infantry Regiment had laid 500 mines at this location.

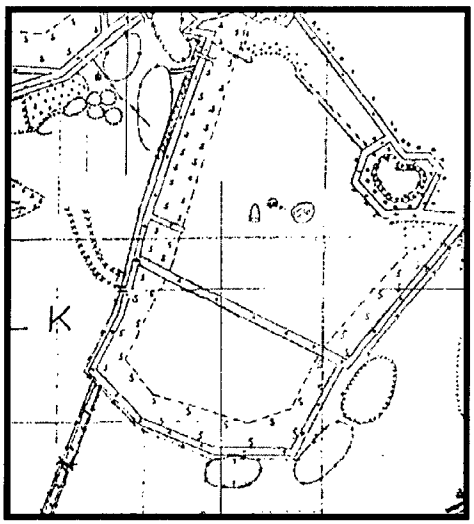
Appendix E, Annex 3c.
Detailed Mine Sheets (*Blätter*) for Mine Box K in the 2nd New Zealand Division Zone[v]

Overview	E-11
Blatt 1	E-12
Blatt 2	E-13
Blatt 3	E-14
Blatt 4	E-15
Blatt 5	E-16
Blatt 6	E-17
Blatt 7	E-18
Blatt 8	E-19
Blatt 9	E-20
Blatt 10	E-21
Blatt 11	E-22
Blatt 12	E-23
Blatt 13	E-24
Blatt I	E-25
Blatt II	E-26
Minenriegel A	E-28
Minenriegel B	E-20
Minenriegel C	E-30
Minenriegel D	E-31

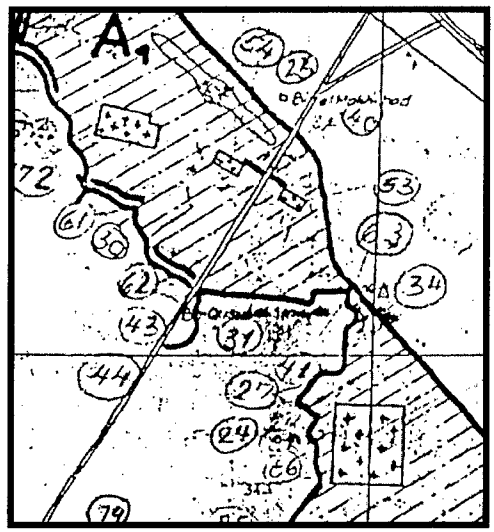
For the period between 11 and 22 August 1942, *Oberleutnant* Junkersdorf of 1st Company, 220th Pioneer Battalion reported that the work completed in Mine Box K included the emplacement of 7533 mines (1233 Tellermines, 2092 French mines, 3956 Egyptian mines, and 252 English mines), laid at a density of 1 mine per meter (except in the minefields reported on *Blätter* 12 and 13, where the mines were laid at 1 mine per 2 meters). Presumably, all anti-tank mines. In addition, he notes that within Mine Box K aircraft bombs had been emplaced as mines (31 on 16 August and 16 on 25 August, with 156 bombs as of 24 September 1942 according to Appendix E, Annex 3a) controlled from 63 firing points. These bombs were fuzed with tellermines, tripwires, or controlled with pull firing devices. *Oberleutnant* Junkersdorf does not include the mines covered in "Early Mining Efforts in the Vicinity of Mine Boxes K and L" (Appendix E, Annex 3b) in this report. In this same report, *Oberleutnant* Junkersdorf noted that these minefields were marked with a high barbed wire fence with iron stakes on the friendly side.

[v] This overview of Mine Box K (on page E-11) shows the arrangement of the related "*Blätter*" (literally leaves or sheets) within this mine box. "*Blätter*" 1, 2, 11-13, I, and II were in the 1st South African Division zone of attack. US National Archives, Captured German Records Division, Series T-313, Roll 430, frames 8,723,323 to 8,723,346 or in "Historical Minefield Database (El Alamein)," by William Schneck and Fred Clodfelter, CD-ROM, 1998. The reader should be aware of the north arrow on each *Blatt*. Most of the time, North is not at the top of the page. The summary by *Oberleutnant* Junkersdorf is at Frame 8,723,324.

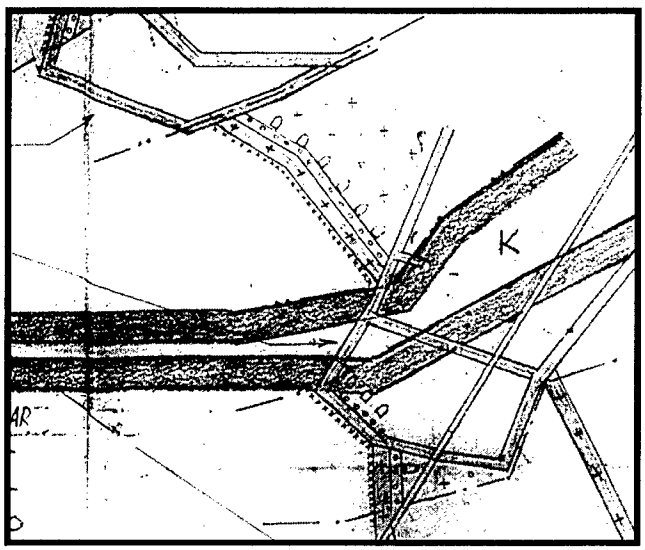
OVERVIEW OF MINE BOX K[vi]



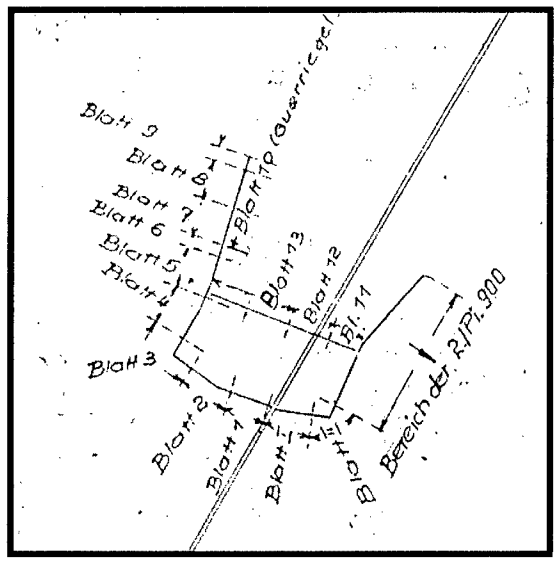
Overview of Mine Box K as of 22 September 1942



Numbers 61, 30, 62, 43, and 31 correspond roughly with the northeastern edge of Mine Box K

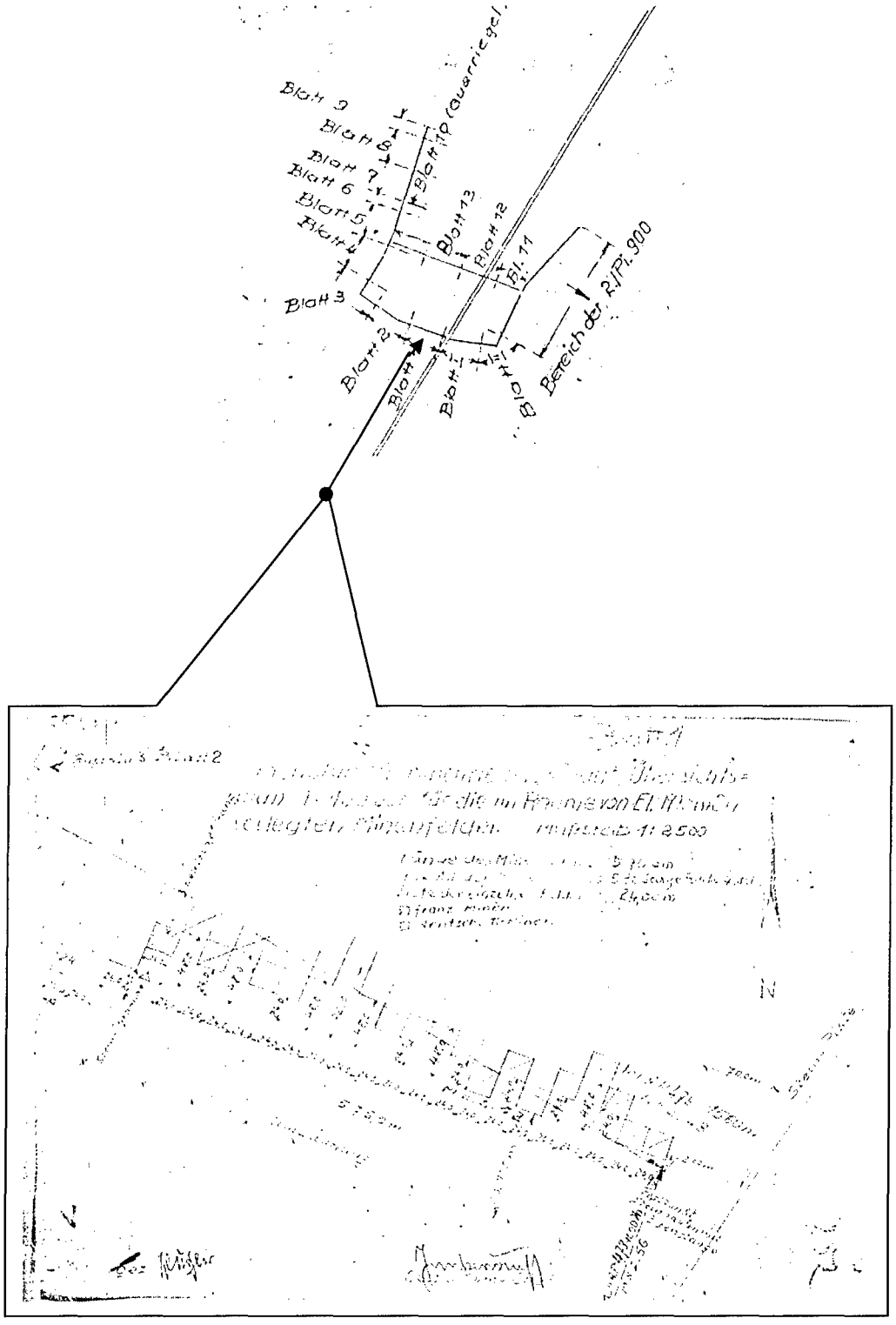


This sketch shows planned additions to Mine Box K (Command detonated aircraft bombs, S-mines, etc.) and the minefield that was placed between mines boxes K and L as of 6 October 1942

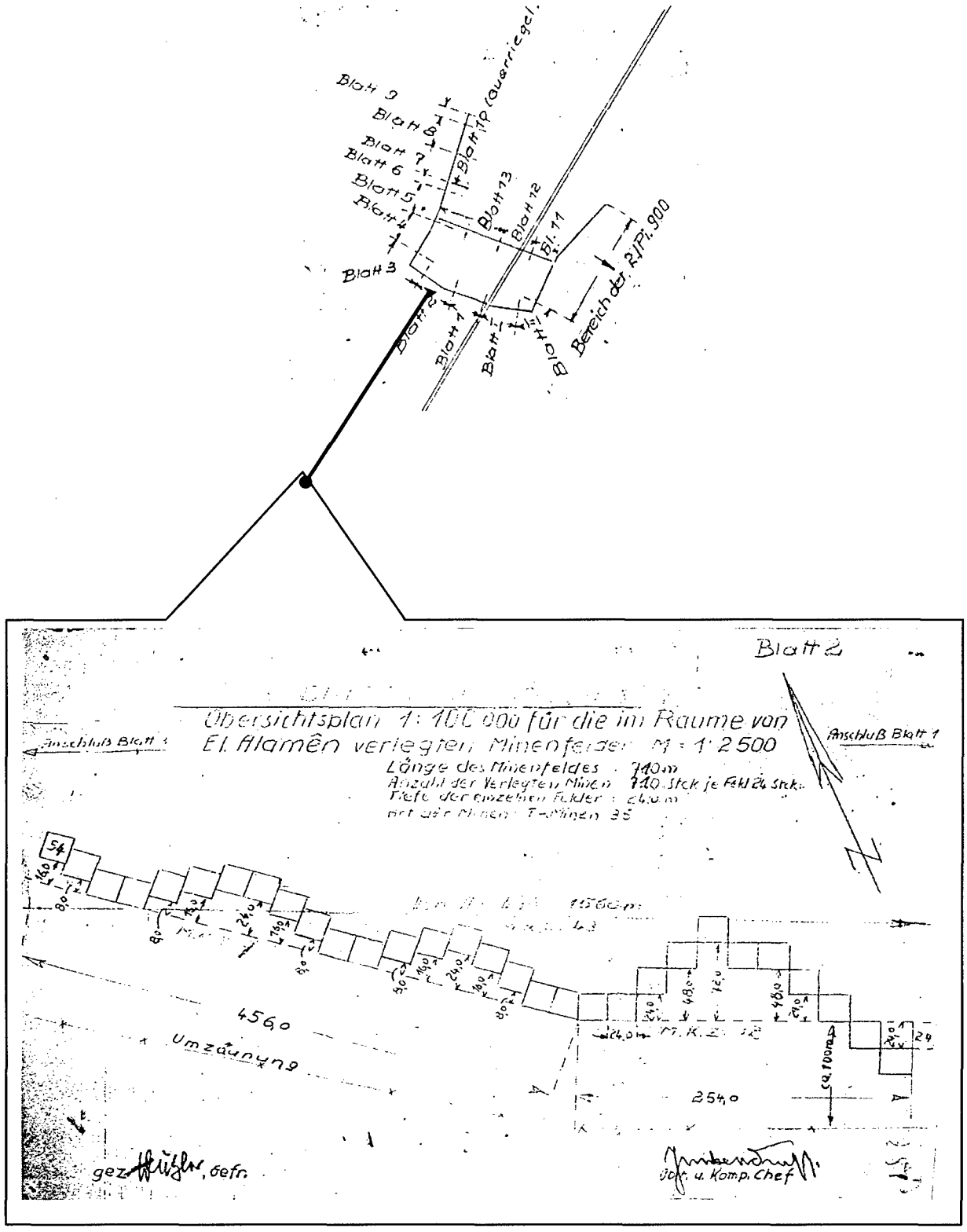


This sketch shows the distribution of the various blatt within Mine box K

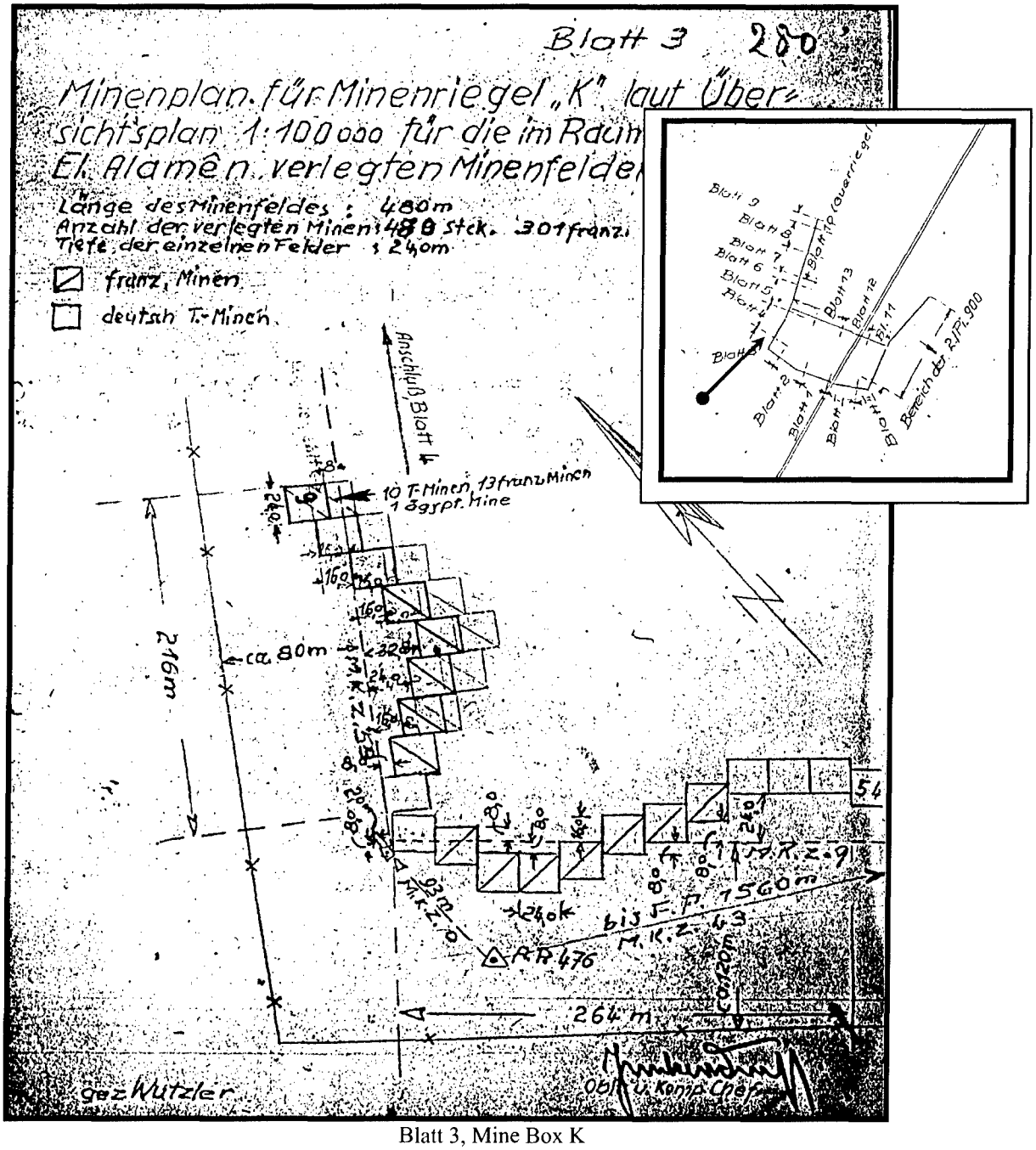
[vi] This illustration depicts relationship between Mine Box K and its individual minefields (as depicted on the subsequent *Blätter*) as well as previous (numbers 31, 43, 62, 30, 61, and 44 on the plan to the top right) and later mining efforts (as discussed later in Appendix E, Annex 3c). It also shows the relationship between Mine Box K and the overall obstacle plan.



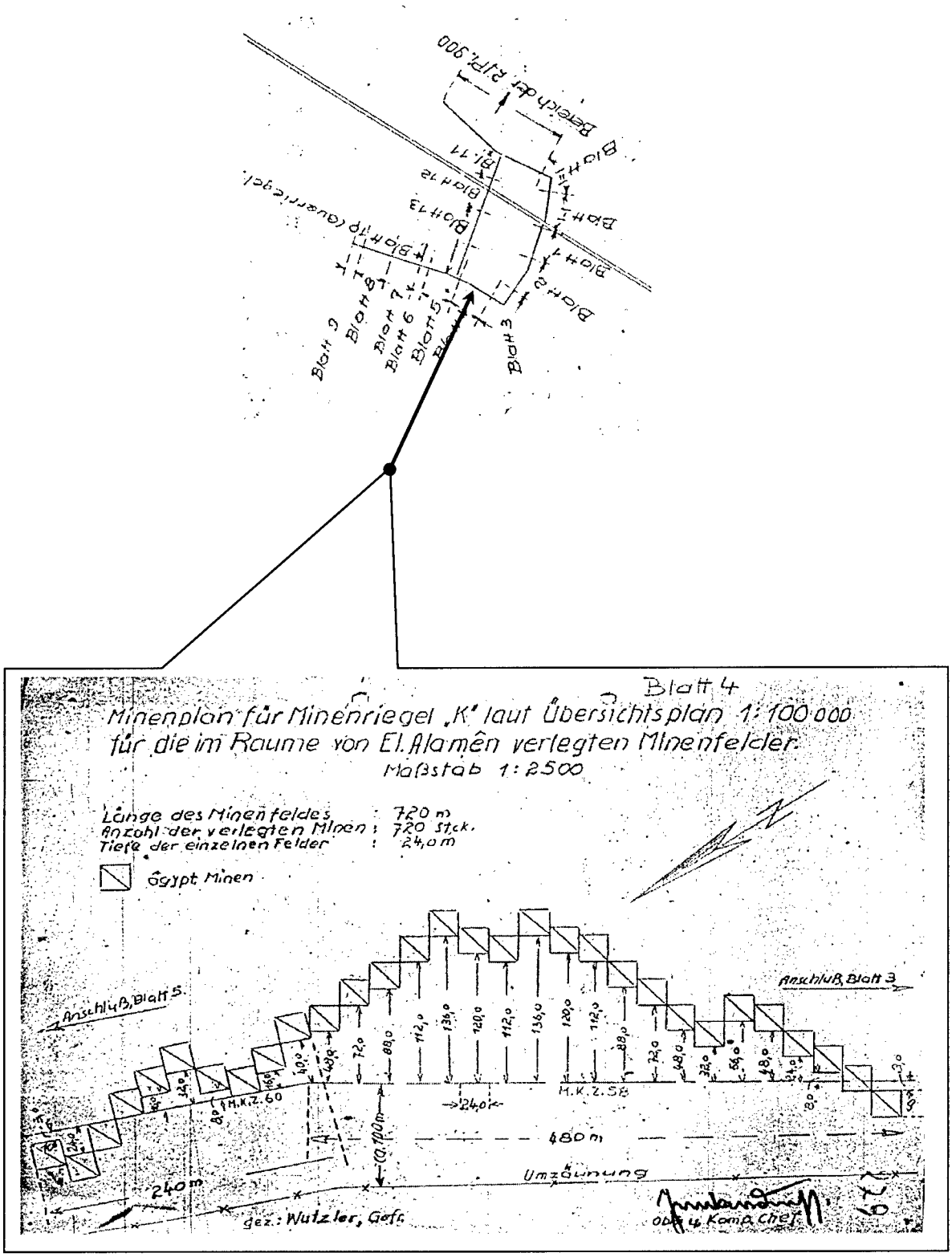
Blatt 1, Mine Box K



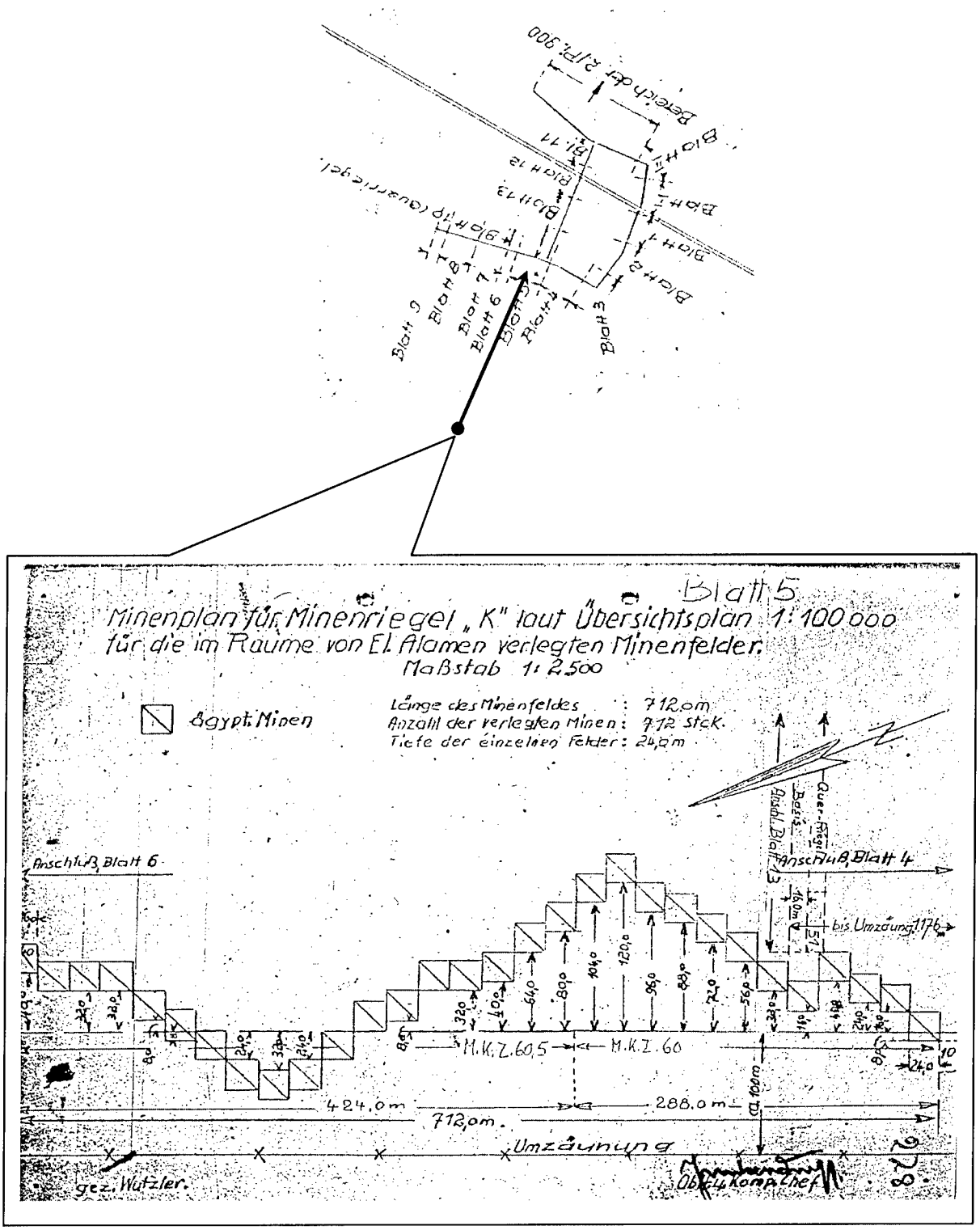
Blatt 2, Mine Box K



Blatt 3, Mine Box K

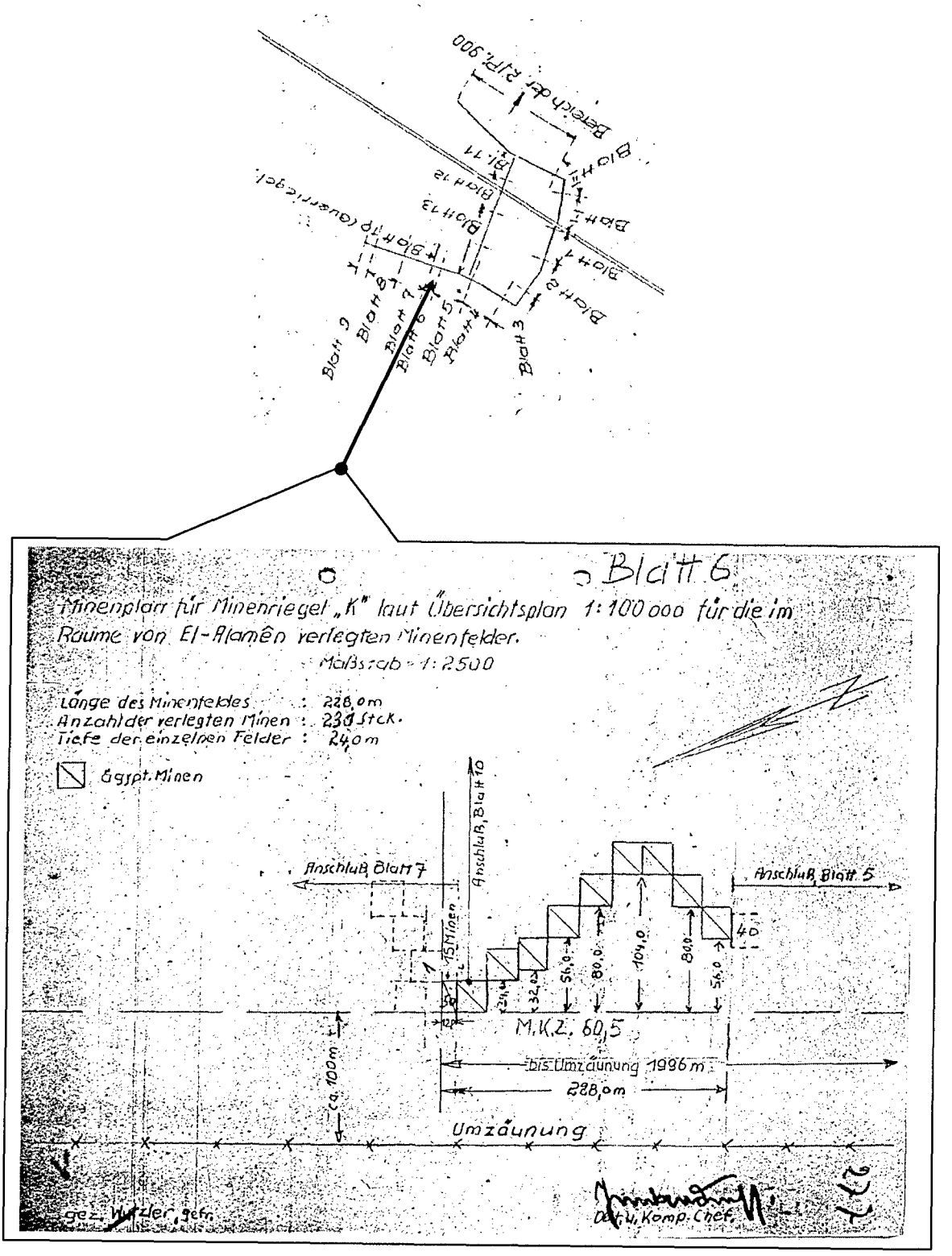


Blatt 4, Mine Box K



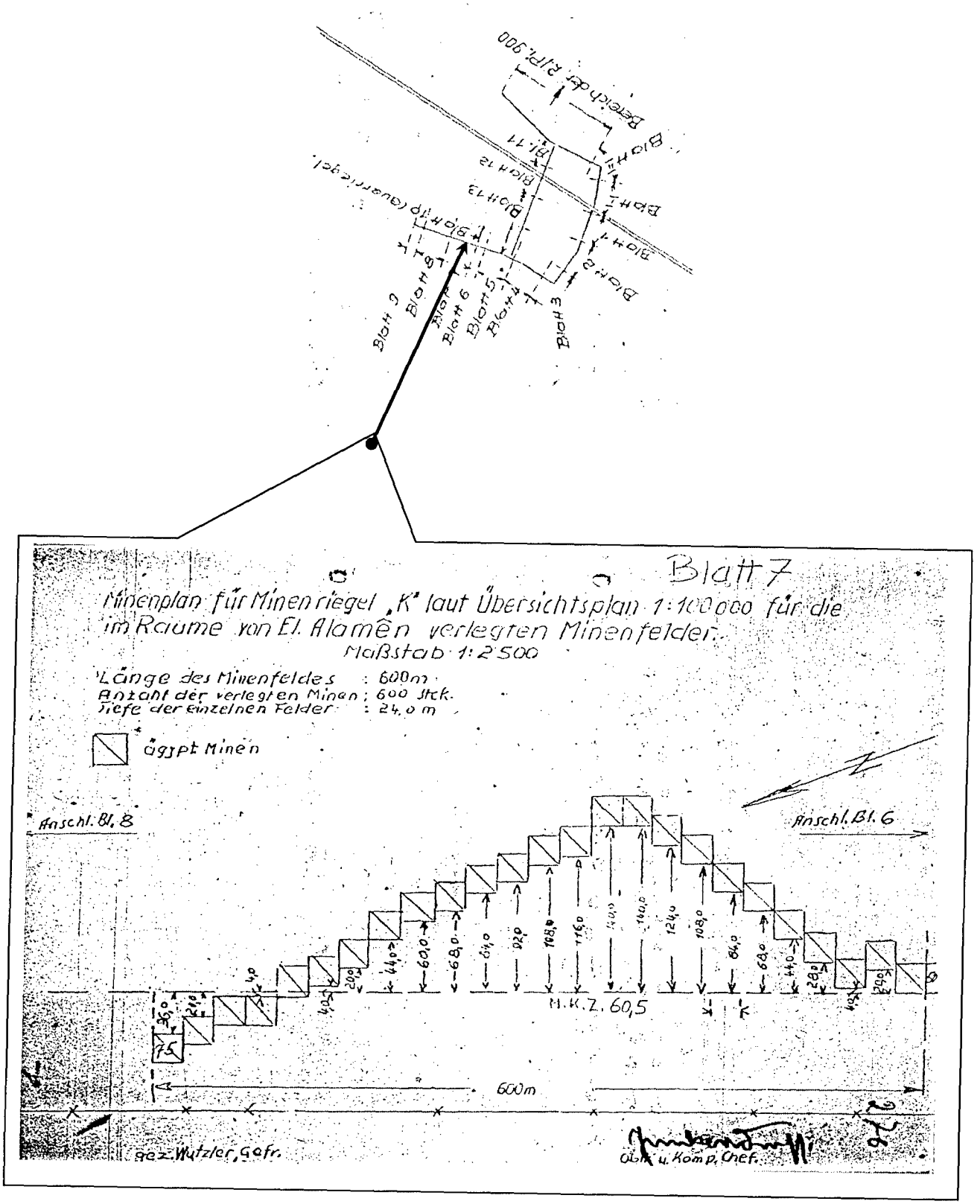
Blatt 5, Mine Box K

Note: Blatt 13 (page E-24) also adjoins Blatt 5 near its southern end.

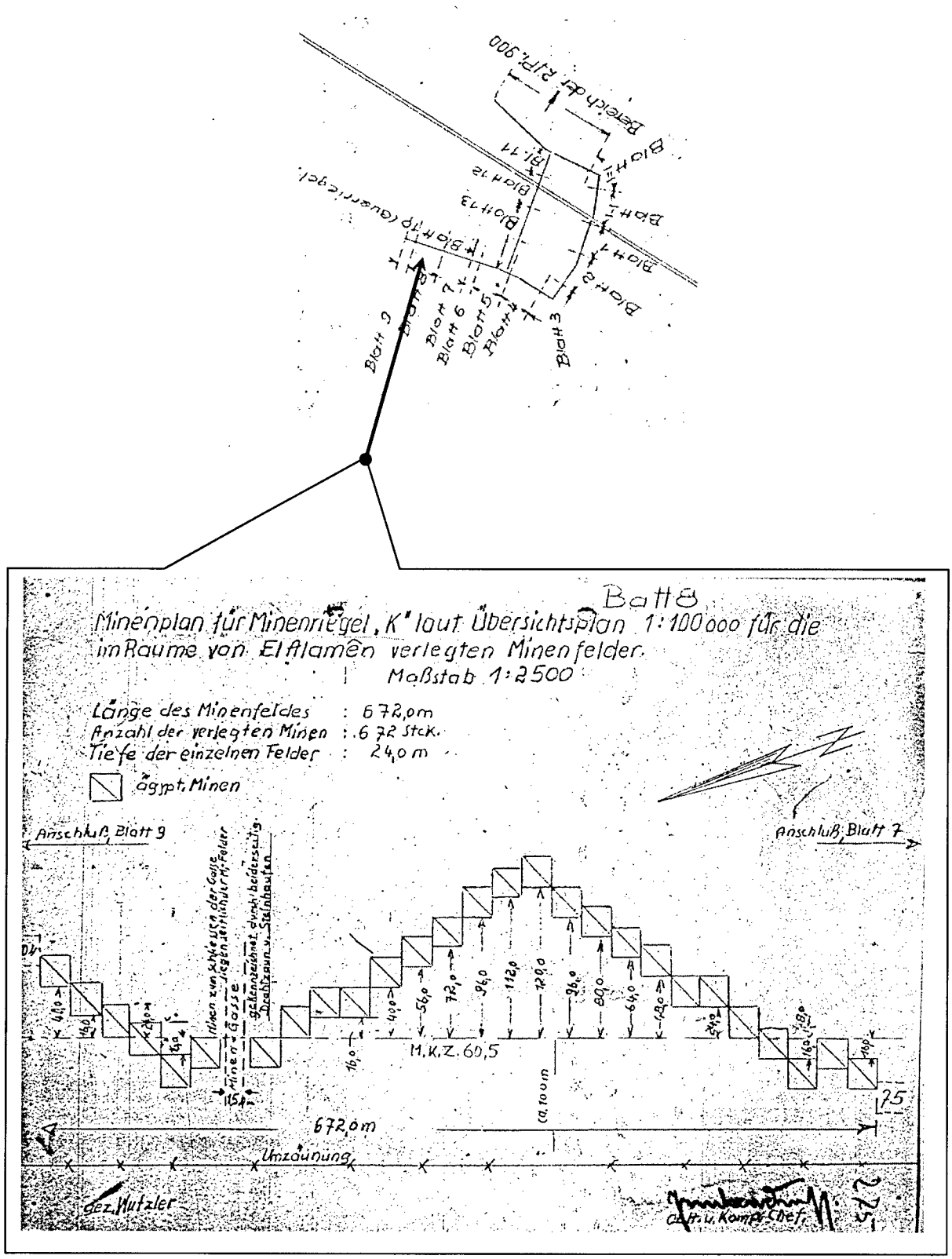


Blatt 6, Mine Box K

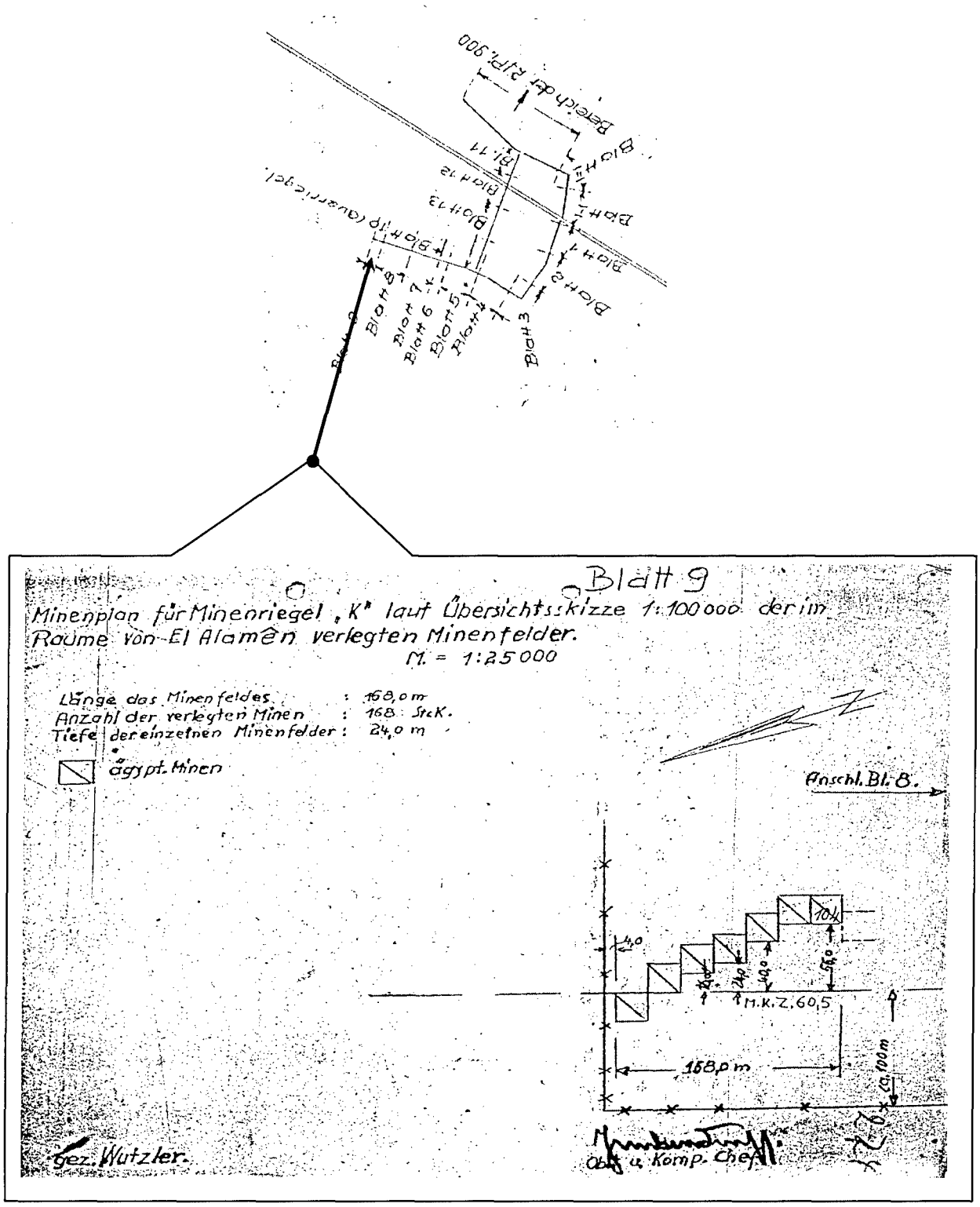
Note: Blatt 10 (page E-21) also adjoins Blatt 6 on its northern end.



Blatt 7, Mine Box K

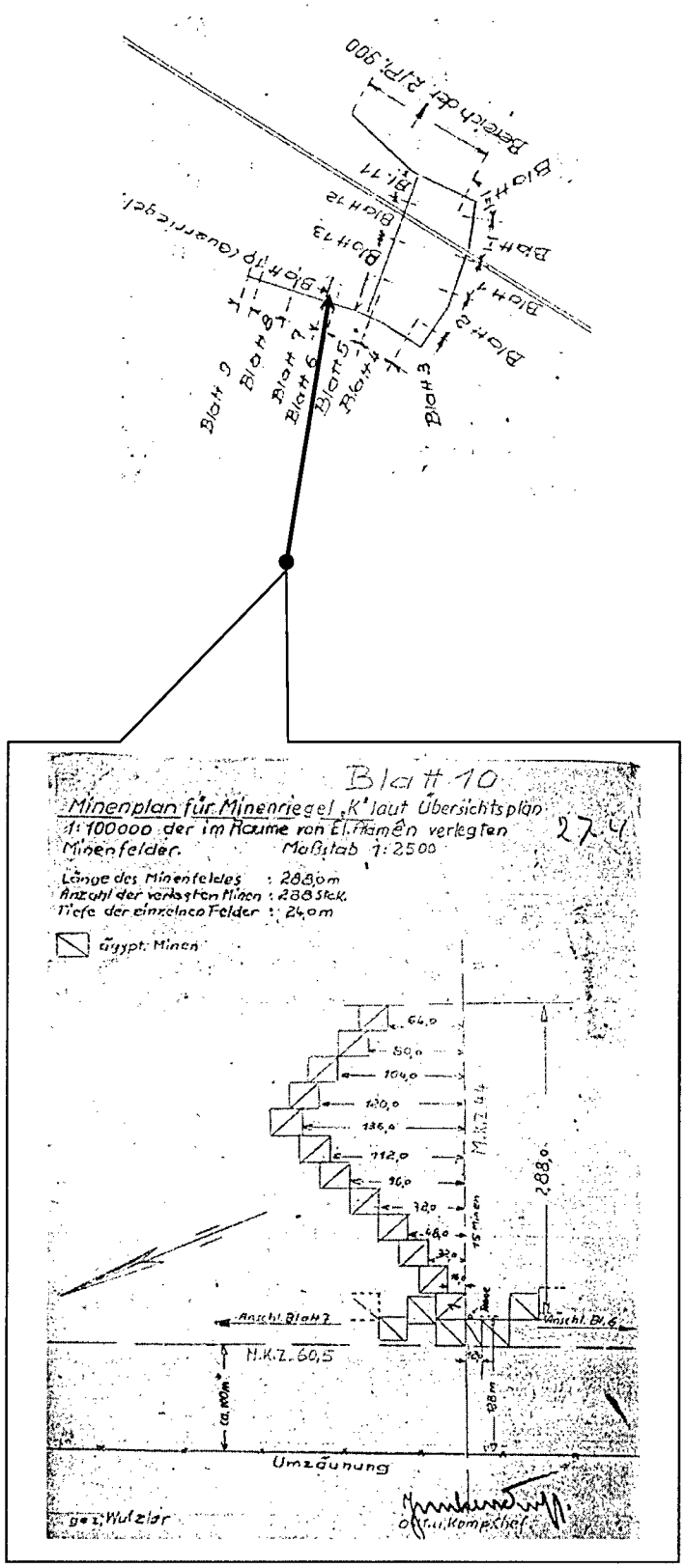


Blatt 8, Mine Box K



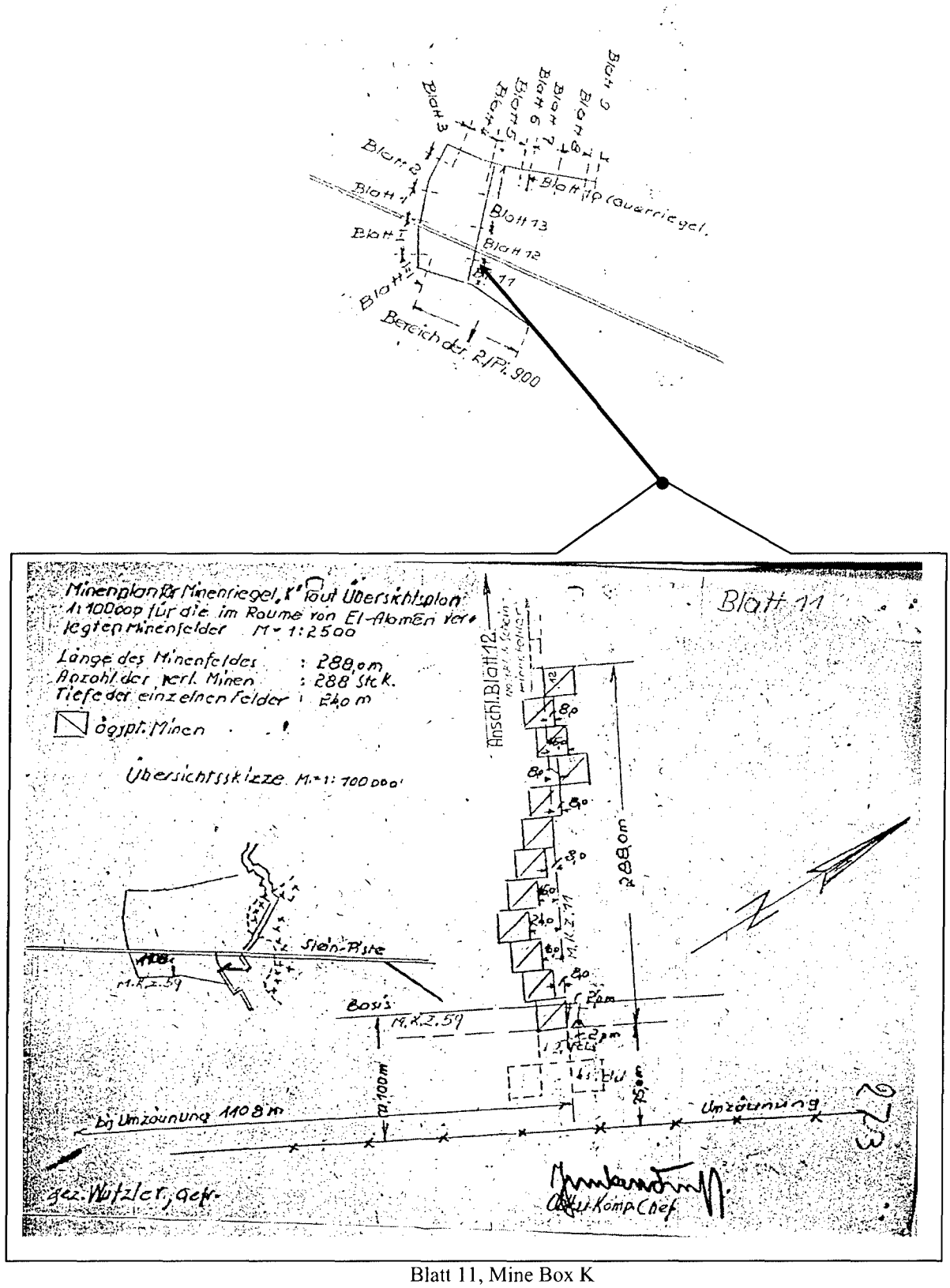
Blatt 9, Mine Box K

Note: No reference is made to tying in with the older Italian-laid minefields (most likely number 61 on Minenplan Nr. 10, page E-7) which ran along the forward (northeast) edge of Mine Box K



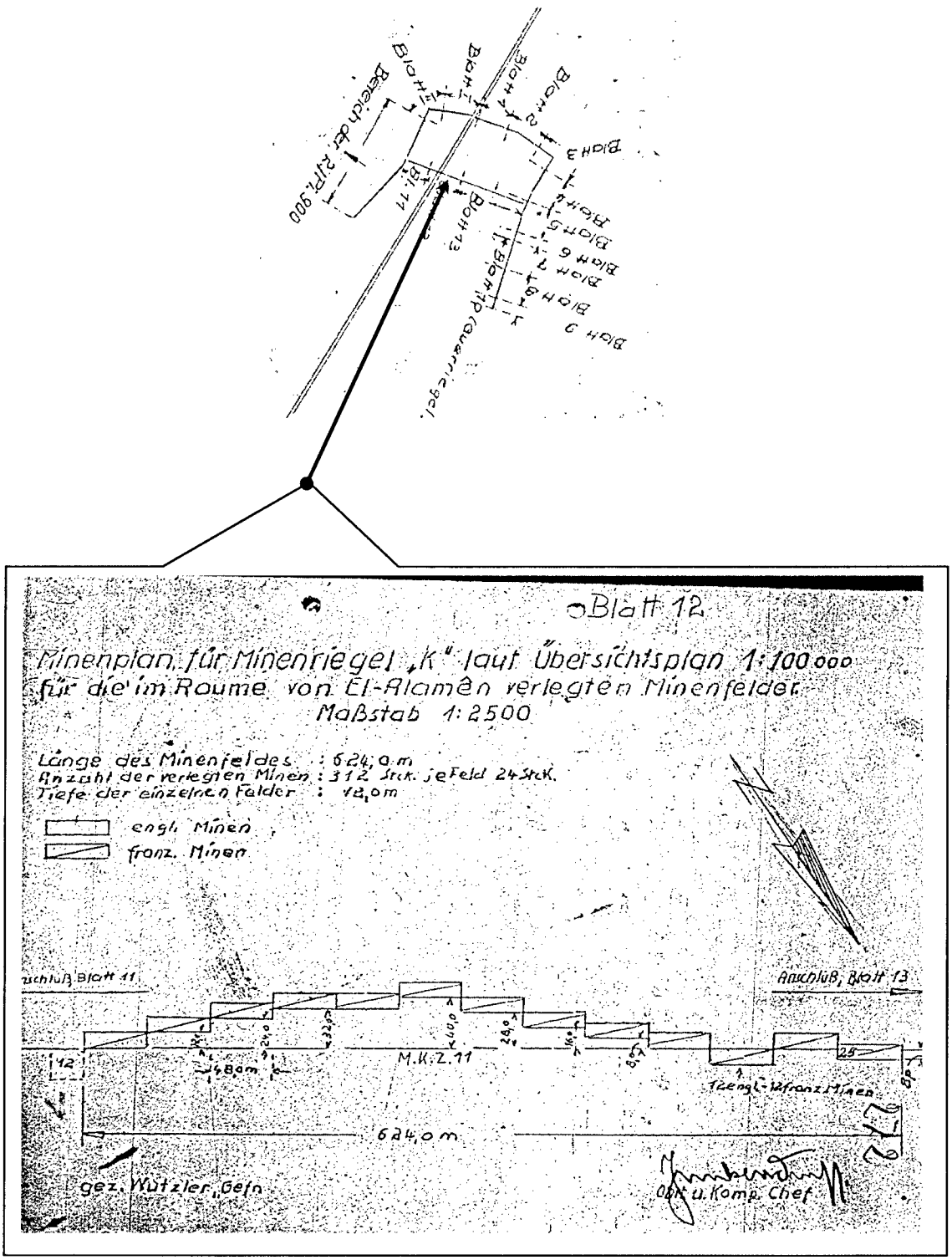
Blatt 10, Mine Box K

Note: This blatt adjoins to Blatt 6 (page E-17) on its western end.

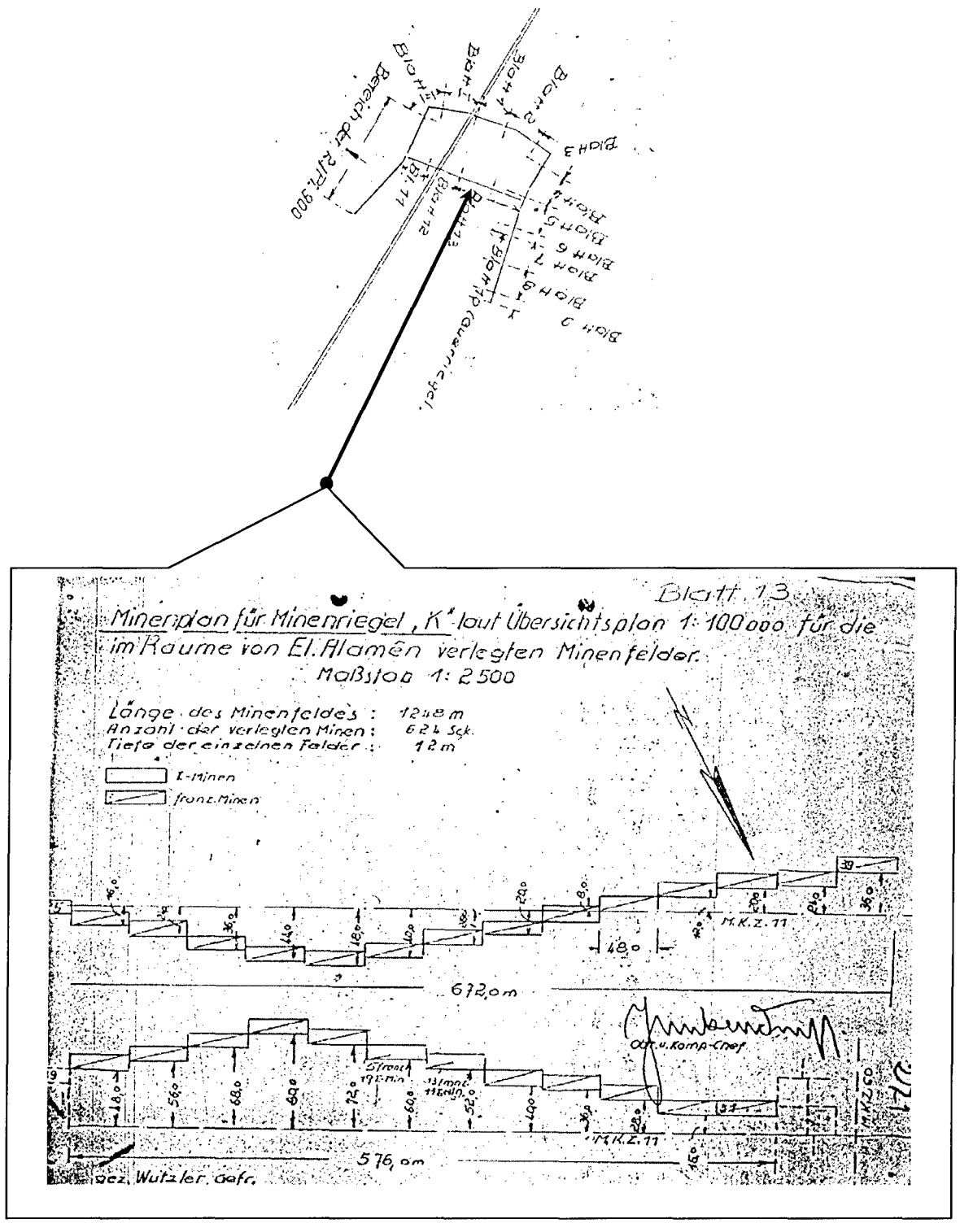


Blatt 11, Mine Box K

Note: On its eastern end, this blatt adjoins with Minenriegel "A" emplaced by 2nd Company, 900th Pioneer Battalion (see page E-28).

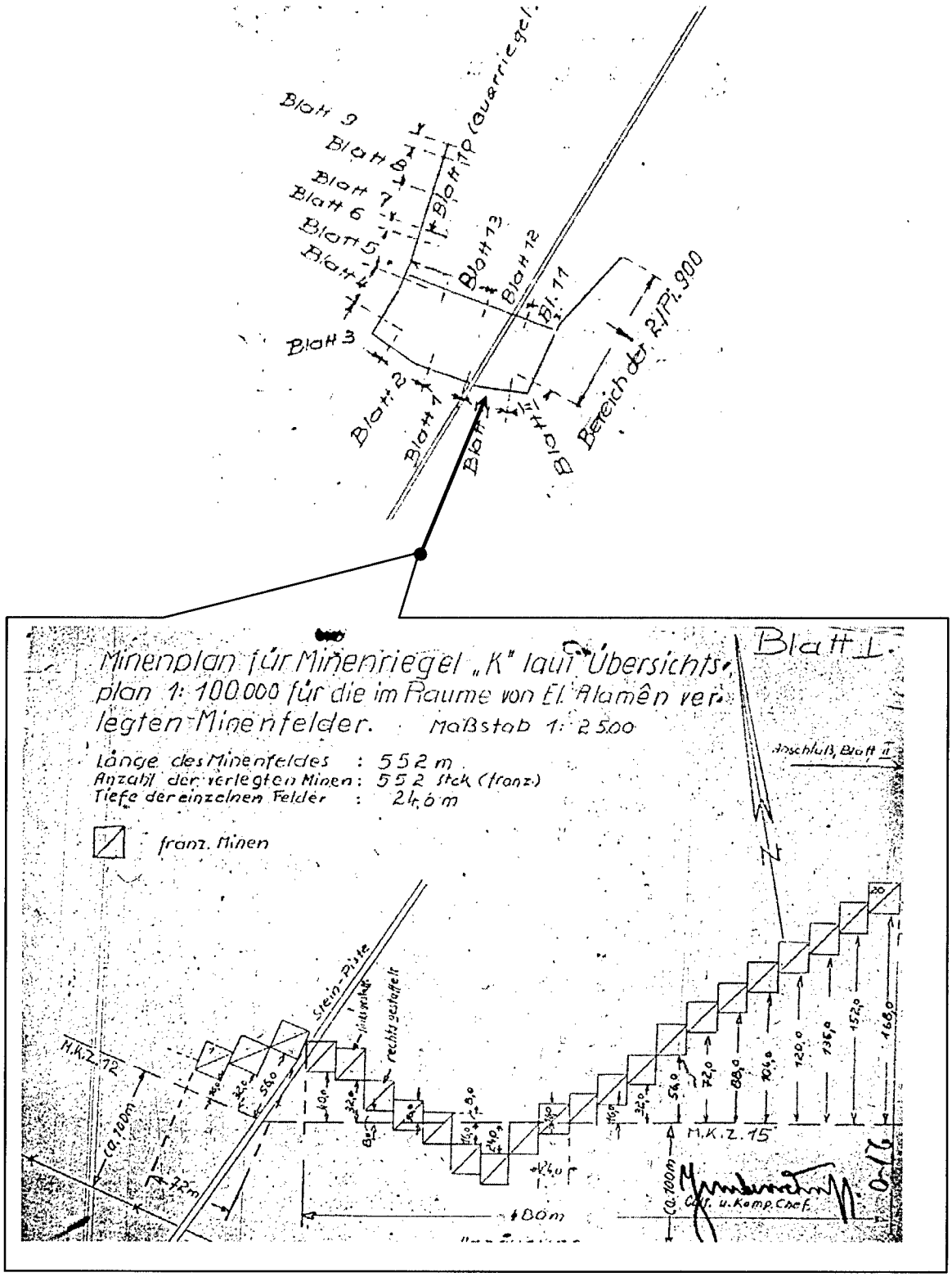


Blatt 12, Mine Box K



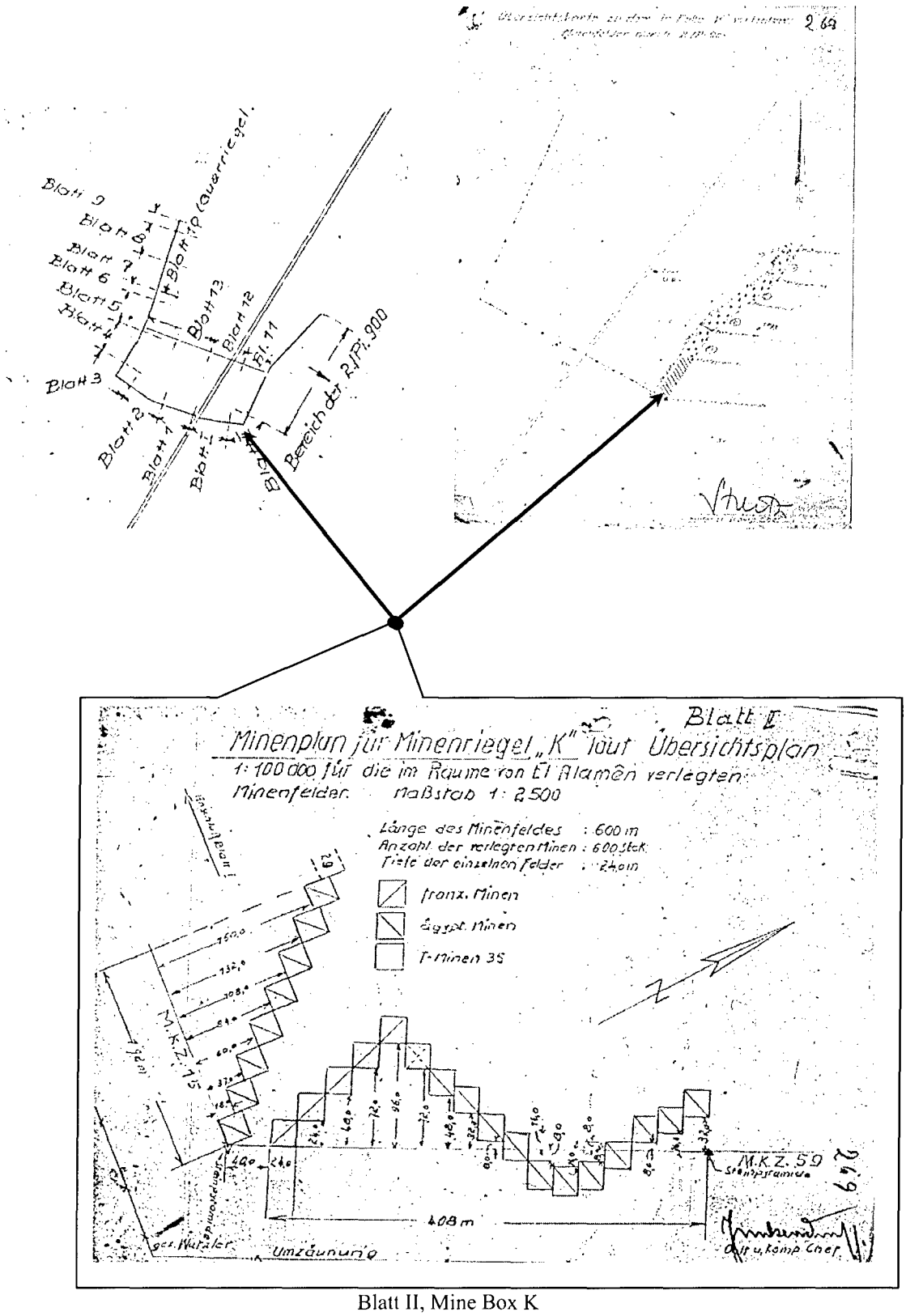
Blatt 13, Mine Box K

Note: The left (eastern) end of the top row of mine panels in this blatt adjoins Blatt 12, while the right (western) end adjoins with the left (eastern) end of the bottom row of mine panels. Finally, the right (western) end of the bottom row of mine panels adjoins with Blatt 5, Mine Box K (page E-11).



Blatt I, Mine Box K

Note: The western end of this blatt adjoins with Blatt 1, Mine Box K (page E-12)



Blatt II, Mine Box K

Note: The northern end of this blatt adjoins the southern end of Minenriegel "A" emplaced by 2nd Company, 900th Pioneer Battalion (see page E-28).

Ständige Anlagen

1. Lageplan 1:100.000
2. Minenkarte 1:10.000 (Ausgegeben an die anderen im Abschnitt eingesetzten Waffen)
3. bis 4 Minenpläne

Nur für den Dienstgebrauch!

Minensperrbeschreibung

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sonstige Anlagen

1. Name der Minensperre:	2. Verlegt am: 11.-15.2.42 durch: Hptm. Streitz 20502 (Name, Dienstgrad und Einheit)	3. Minenplan gezeichnet am: 15.8.42 durch: Gefr. Kubendorff (Name, Dienstgrad und Einheit)
Falle K an Steinpiste im Raum von Alamein		

4. Ort und Lage der Minensperre:
An Steinpiste 2 km nördl. [illegible]

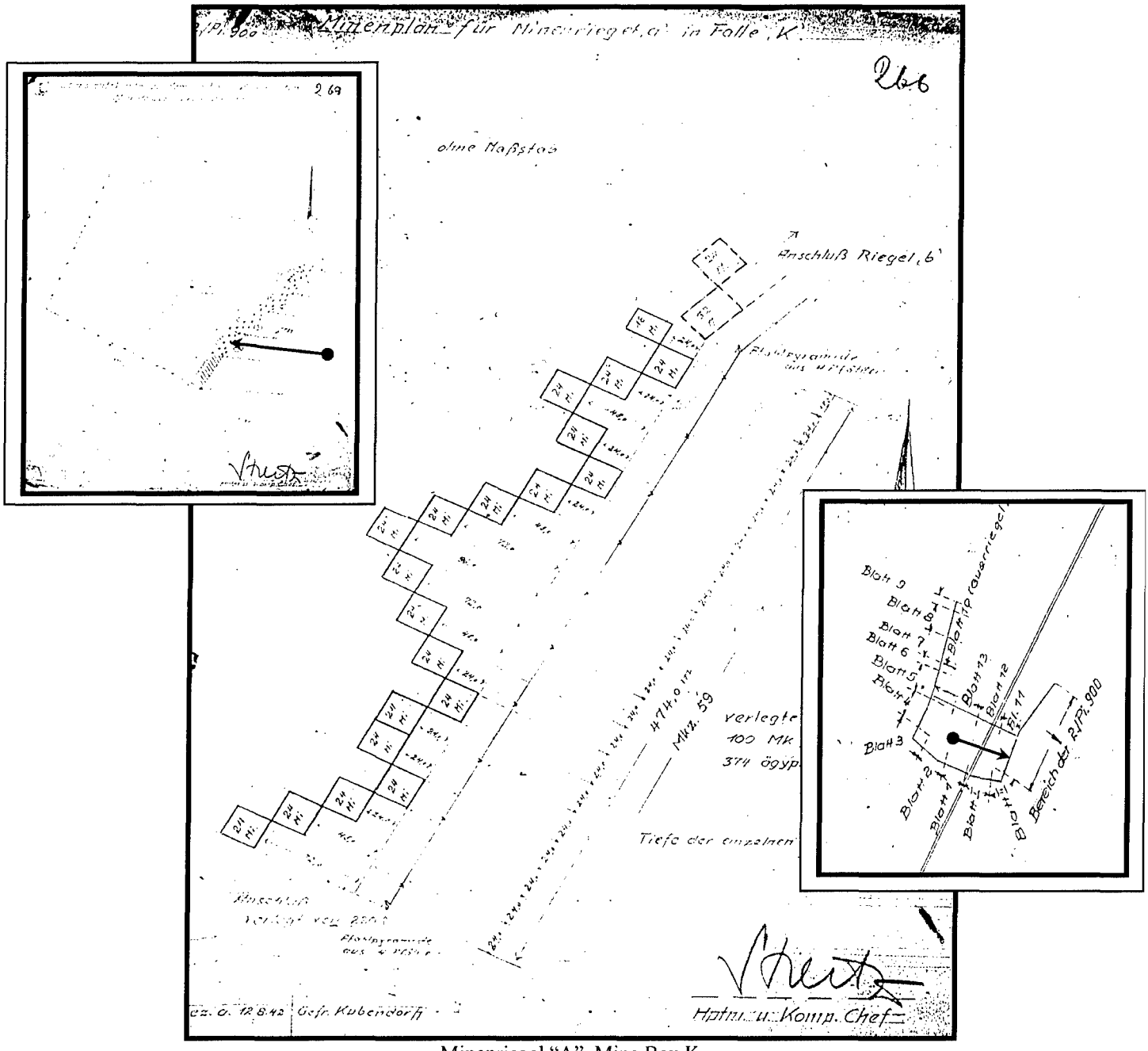
5. Festpunktbeschreibung:
Minen wurden in die vorbereitete Scheinsperre K verlegt.
Die Absperrungen des [illegible] verlegten Minenfeldes sind durch [illegible] bestehend aus [illegible]

6. Teilfeld	a	b	c	d	e	f	g	h	i	k	Summe
S-Minen	[illegible]	[illegible]	[illegible]								
T-Minen	374	72	36	488							2018
7. Verlegungsform	[illegible]										
8. Einzäunung											

9. Aufbewahren von	Stückzahl:	Ort:
Entsicherungsschnüren (S-Minen)	[illegible]	[illegible]
Entsicherungsdrähten (T-Minen)		[illegible] Village West
Verschlußkappen für S-Minen		[illegible] Sidi el Rahman
„ „ T. Mi. Z.		

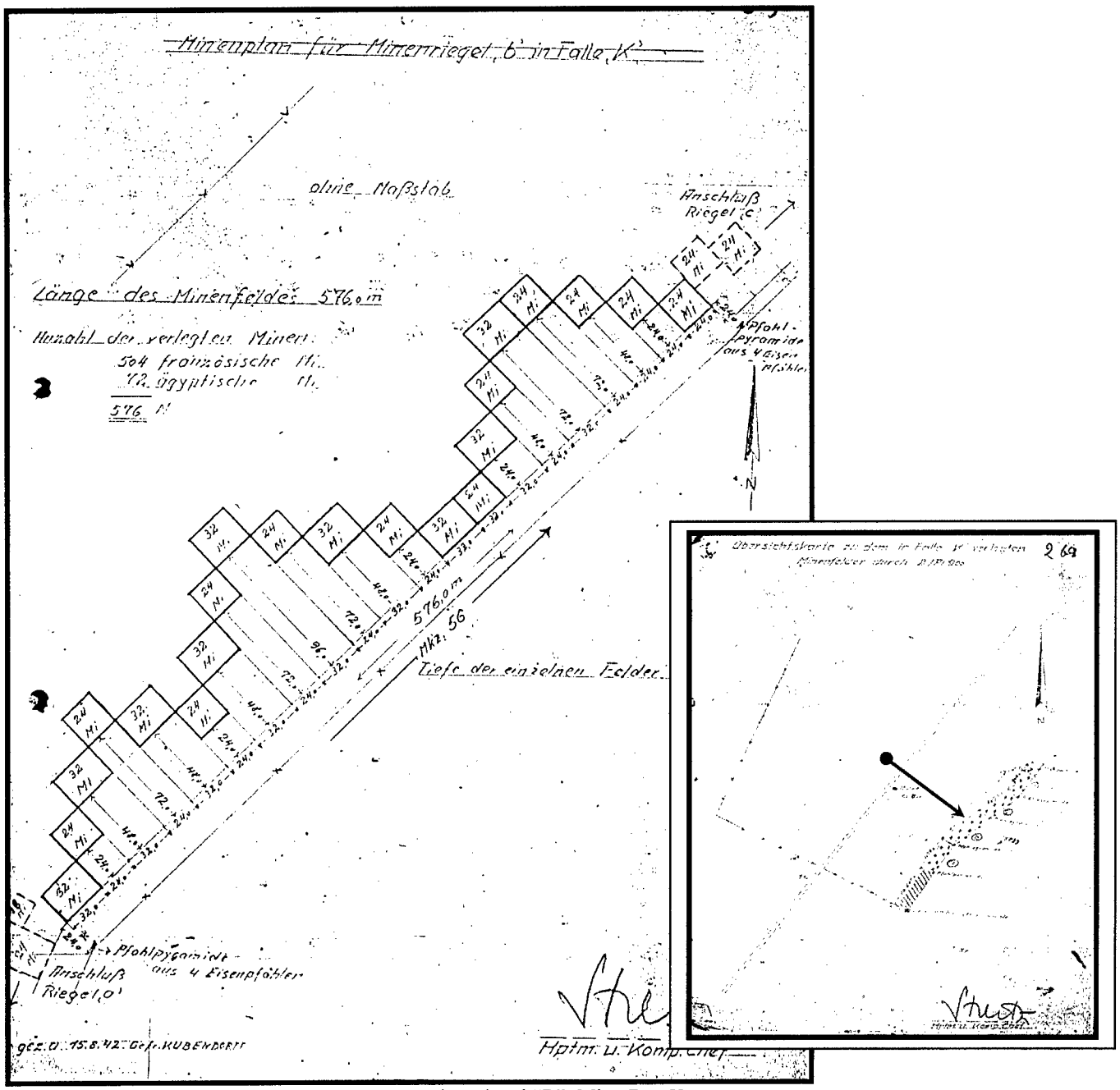
10. Besonderes: 300 m vor Ende des Riegel d. Gasse. Breite d. m. Geheimzeichnet durch beiderseitigen hohen Drahtzaun. Verlauf der Gasse: [illegible] Mag. 41, 130 m Mag. 18.

11. Verantwortlich:	12. Ablösungen	I	II	III	IV	V
Name: Streitz						
Dienstgrad: Hauptmann	Datum					
Feldpost-Nr.: 30502						
Datum: 16.8.42	Neue Anlage Nr.					

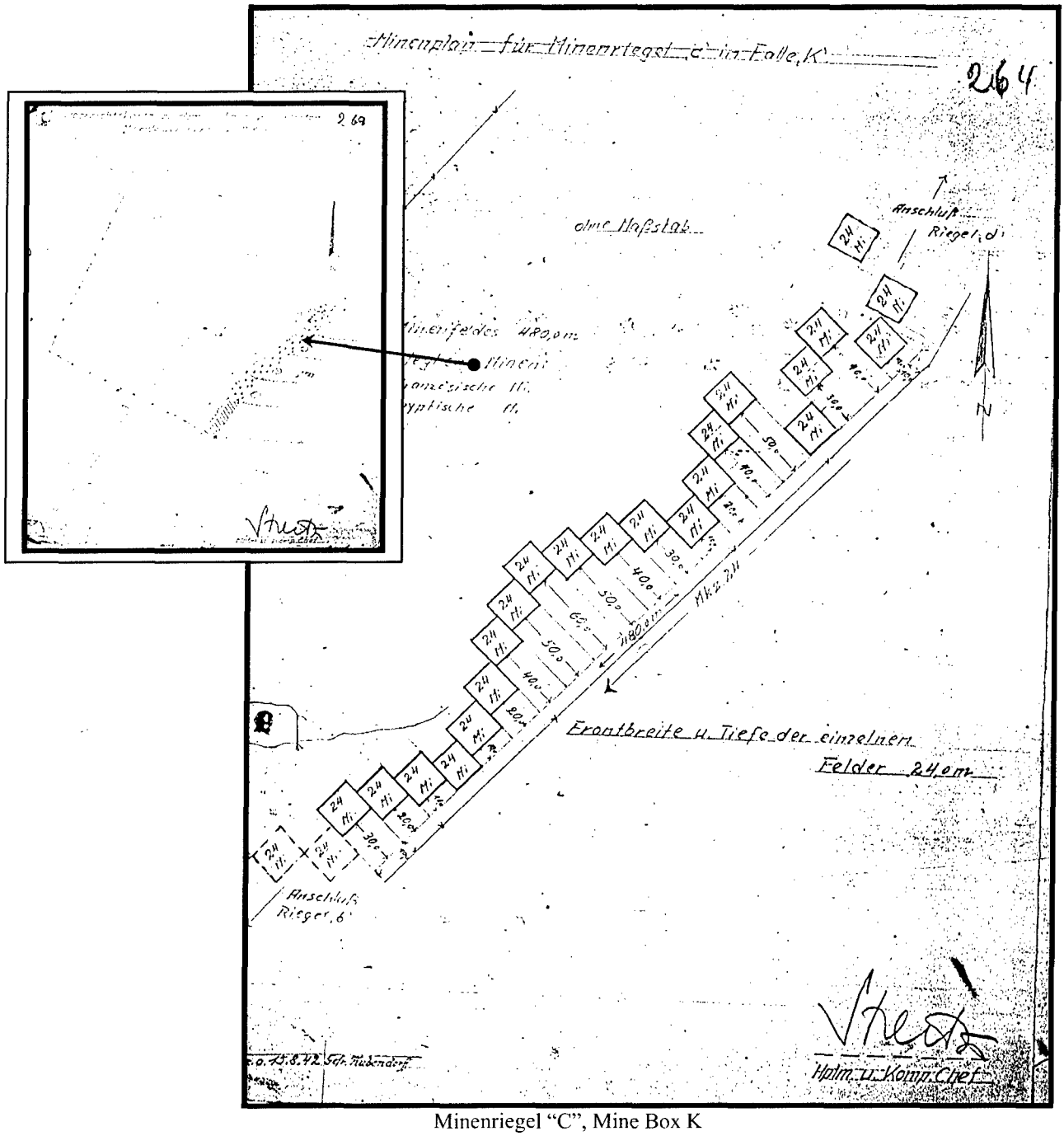


Minenriegel "A", Mine Box K

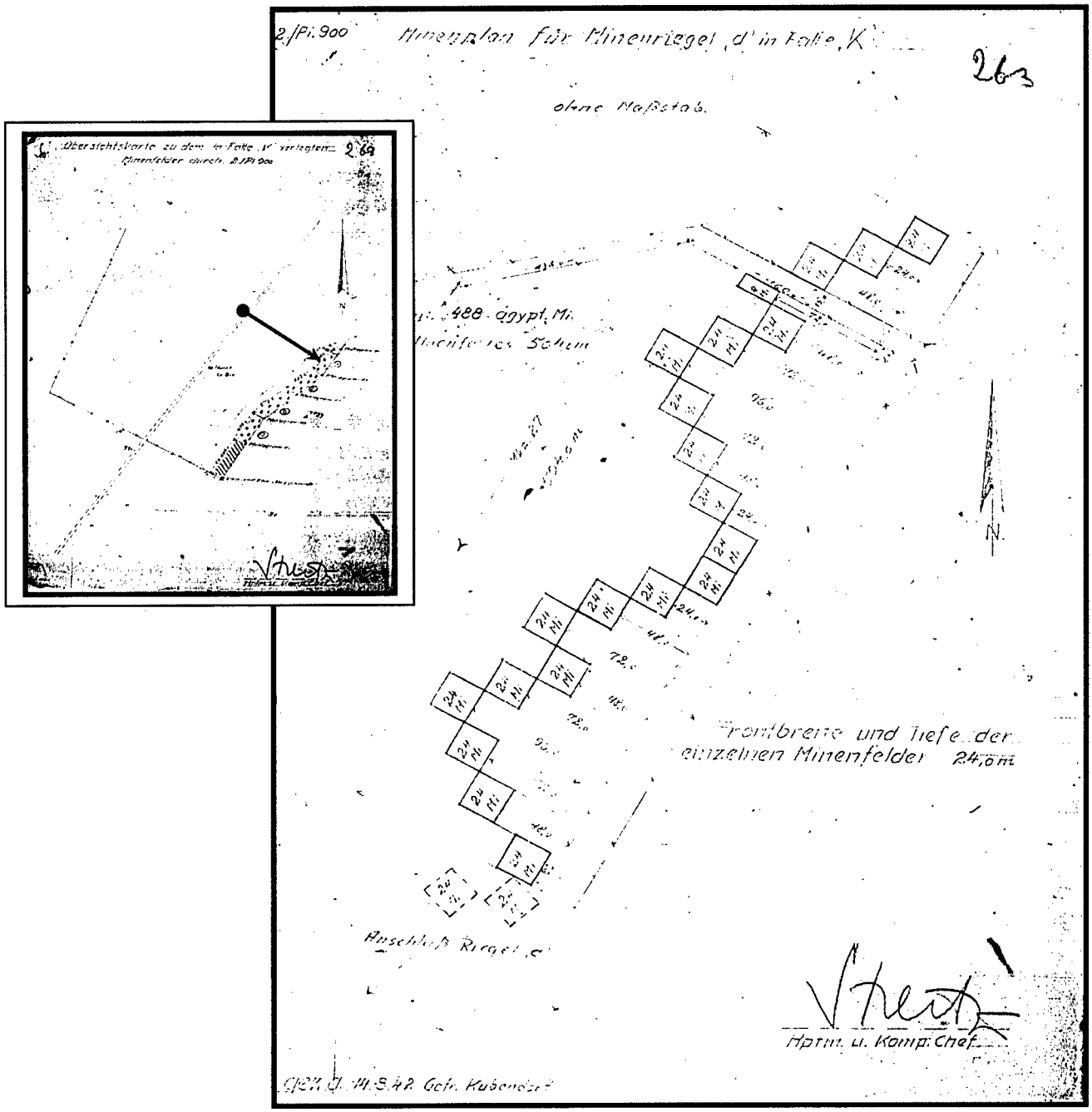
Note: Blatt II (page E-22) adjoins Minenriegel "A" near its northern end.



Minenriegel "B", Mine Box K



Minenriegel "C", Mine Box K



Minenriegel "D", Mine Box K

Note: No reference is made to tying in with the older Italian-laid minefields (most likely number 31 on Minenplan Nr. 10, page E-7) which ran along the forward (northeast) edge of Mine Box K. Also note that the safe lane through Minenriegel "D" is not shown on the overall obstacle plan (page E-6).

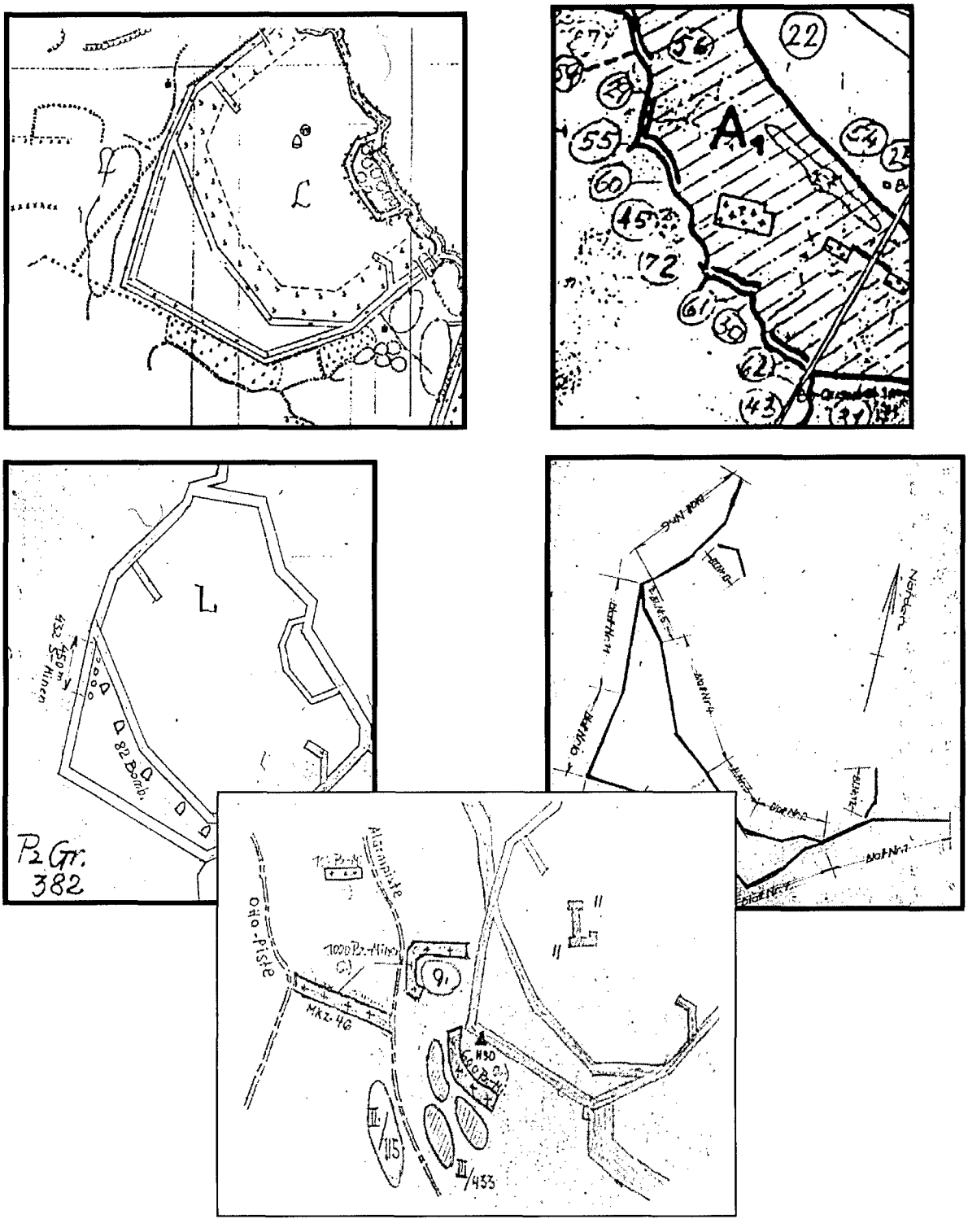
Appendix E, Annex 3d.
Detailed Mine Sheets (*Blätter*) for Mine Box L in the 2nd New Zealand Division Zone[vii]

Overview	E-33
Blatt 1	E-36
Blatt 2	E-37
Blatt 3	E-38
Blatt 4	E-39
Blatt 5	E-40
Blatt 6	E-41
Blatt 7	E-42
Blatt 8	E-43
Blatt 9	E-44
Blatt 10	E-45
Blatt 11	E-46
Blatt 12	E-47
Blatt 13	E-48

On 28 and 30 August 1942, *Gefreiter* Ulbricht of the 2nd Company, 900th Pioneer Battalion reported on the work thus far completed in Mine Box L. He noted that they had emplaced a total of 10,424 mines (5864 French mines, 2742 Egyptian mines, and 1818 English mines (marks II – IV), presumably all anti-tank mines) at a density of 1 mine per meter and covering a frontage of 10,590 meters. This does not include the mines covered in "Early Mining Efforts in the Vicinity of Mine Boxes K and L" (Appendix E, Annex 3b). In the same reports, *Gefreiter* Ulbricht noted the emplacement of 11,150 meters of barbed wire fence in Mine Box L. In addition, the records of the panzerarmee pioneer commander, Oberst Hecker, note that within Mine Box L the 220th Pioneer Battalion had emplaced 279 aircraft bombs as mines (202 in August, followed by 77 more in September).

[vii] This overview of Mine Box L (on page E-33) shows the arrangement of the related "*Blätter*" (literally leaves or sheets) within this mine box. "*Blätter*" 4-6, 10, and 11 were in the 51st Highland Division zone of attack. US National Archives, Captured German Records Division, Series T-313, Roll 430, frames 8,723,355 to 8,723,372, or in "Historical Minefield Database (El Alamein)," by William Schneck and Fred Clodfelter, CD-ROM, 1998. The reader should be aware of the north arrow on each *Blatt*. Most of the time, North is not at the top of the page. The summaries prepared by *Gefreiter* Ulbricht at frames 8,723,355 and 8,723,364 contain arithmetic and/or transcription errors. The numbers given on this page are taken directly from the individual *Blätter*.

OVERVIEW OF MINE BOX L[viii]



[viii] This illustration depicts relationship between Mine Box L and its individual minefields (as depicted on the subsequent *Blätter*) as well as previous and later mining efforts (as discussed later in Appendix E, Annex 3e). It also shows the relationship between Mine Box L and the overall obstacle plan.

2. Pi. 220 — 2. Ausfertigung.

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Minenplan: L-Falle

Maßstab 1:4000

Länge der L-Falle:

1. Stacheldrahtzaun: 598m + 450m + 424m + 132m + 248m + 404m + 496m + 400m + 514m + 250m + 392m + 192m + 148m + 94m + 204m + 208m + 580m + 254m + 258m + 198m + 100m = 6544 m

Länge des Minenriegels:

100m + 240m + 400m + 175m + 100m + 525m + 75m + 500m + 400m + 150m + 125m + 250m + 275m + 225m + 250m + 200m + 200m + 350m + 375m + 300m + 1000m + 25m = 6240 m

Anzahl u. Arten der Minen:

Französische Minen: 96 + 480 + 384 + 144 + 600 + 104 + 460 + 144 + 660 = 30
Ägyptische Minen: 735 + 375 = 1.1.
Englische Minen: 1563 + 72 + 359 = 17
Insgesamt verlegte Minen: = 591

Verlegungsart: 1 Mine auf 1m.

Anlagen: -7-

Aufgestellt: O.U. den 15.8.42
durchgez. Ulbricht, Gefr. am 30.8.42

Minensperrbeschreibung

1. Name der Minensperre: L – Falle	2. Verlegt vom 9. bis 22. 8. 42 durch Gbld. Lautzing 2./Pi 220	3. Minenplan gezeichnet 22.8.42 Obfw. Lehr Stüpfel 2./Pi

4. Ort und Lage der Minensperre:

6. Kurze Beschreibung der Eisenbahnstation Tellil – Linie (zwischen Tellil und el Alamein) und el Alamein)

5. Festgestellte Hilfszeichen:

a) Markierung der Umgehungen:
A.P. 484, 407, 495, 501, Fp. 30.

b) Hauptsperrpunkte:
1) Steinhaufen mit Kennstab: 800 m NW 34 von A.P. 495
2) Ecke des Dialogeländes, 2 Tonnen 1200 m NW 30 von A.P. 495, NW 41 von A.P. 407
3) Ecke des Dialogeländes auf 300 m NW 42 von Fp. 30,
4) 5 Tonnen 1100 m NW 50 von
c) Notsperrpunkte: 3 Tonnengruppen

6. Teilsperre	A	B	C	D	E	F	G	H	I	K	L	M	N	O	P
Kreuzung	46		1762		460		744		264		336		1882	504	456
Ausgang b				735		375				1032		600			
Ausgang Nord II–IV		1435						359							

7. Verlegungsform: Die Linie je 2 Glieder, 1 Mine auf 1 m, Minenfeld 24 Minen, 25 m breit, 30 m tief.

8. Eingrenzung: freundliches Dialogfeld mit 2 Steinen Steinhaufen, feindliches Dialogfeld mit 1 Steinhaufen und 1 Kennstab, sonst Tonnen weiß und Steinhaufen.

9. Sicherungsmittel von Minenfeldern gegen Tiere: –

10. Besonderes:

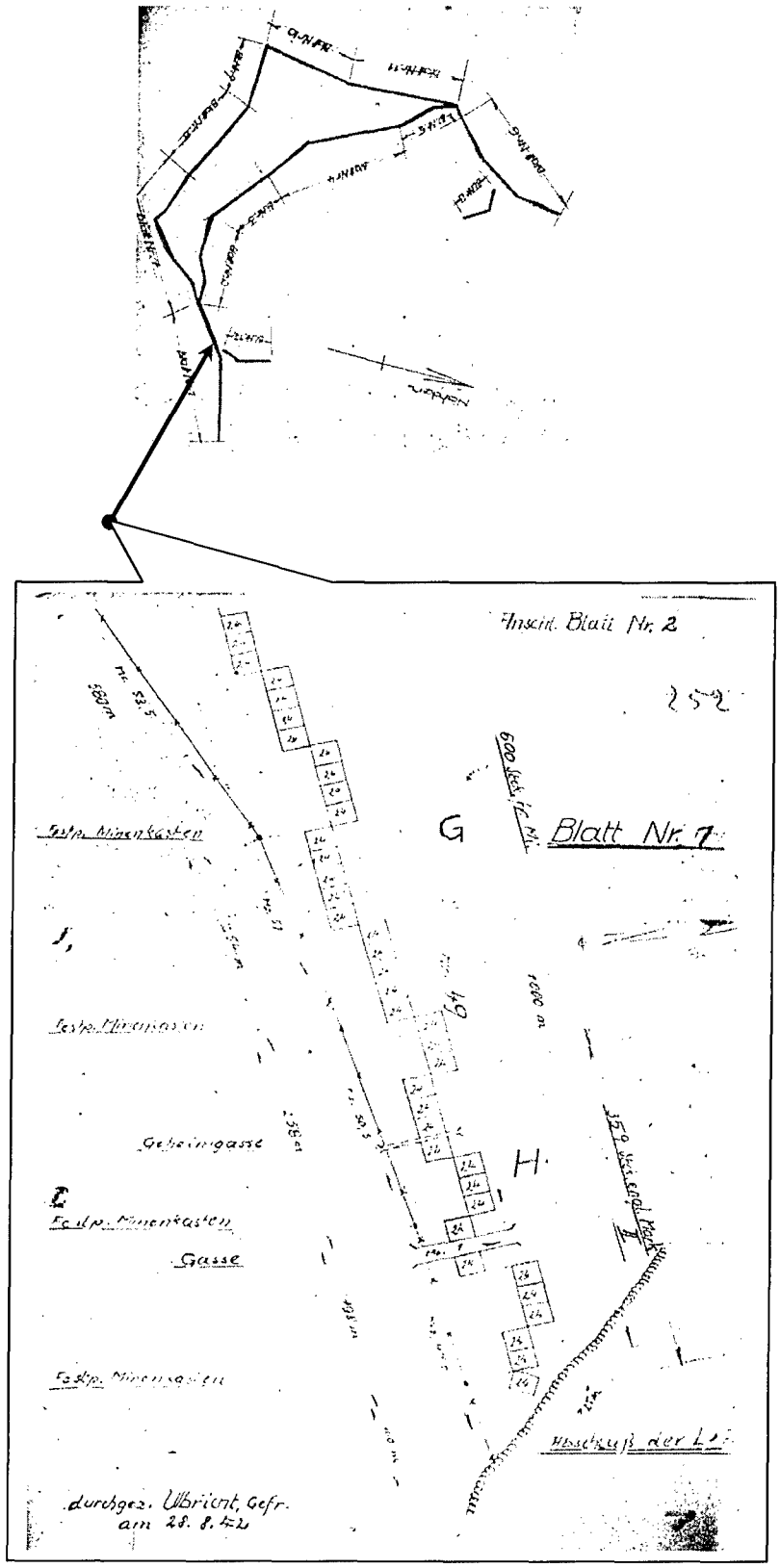
A. Minengassen: a) Hauptweg 18 m breit, bei Feindangriff mit Minen gesperrt, 1 Weg (275 m östl. Dialogfeld Fp. 30)
b) Nebenweg 10 m " , 1 Weg wie a)
c) Nordweg 10 m breit, 300 m von feindl. Ecke des
d) " 5 " " 400 " " " " "
e) Südweg 4 m " 280 " " " " "
f) " 5 " " 400 " " " " "

Die Gassen c) bis f) sind bei Feindangriff mit Dialogfeld zu umgehen.

B. Die innerhalb der Falle befindliche Bombenfeld wird in einer besonderen Bescheinigung angegeben.

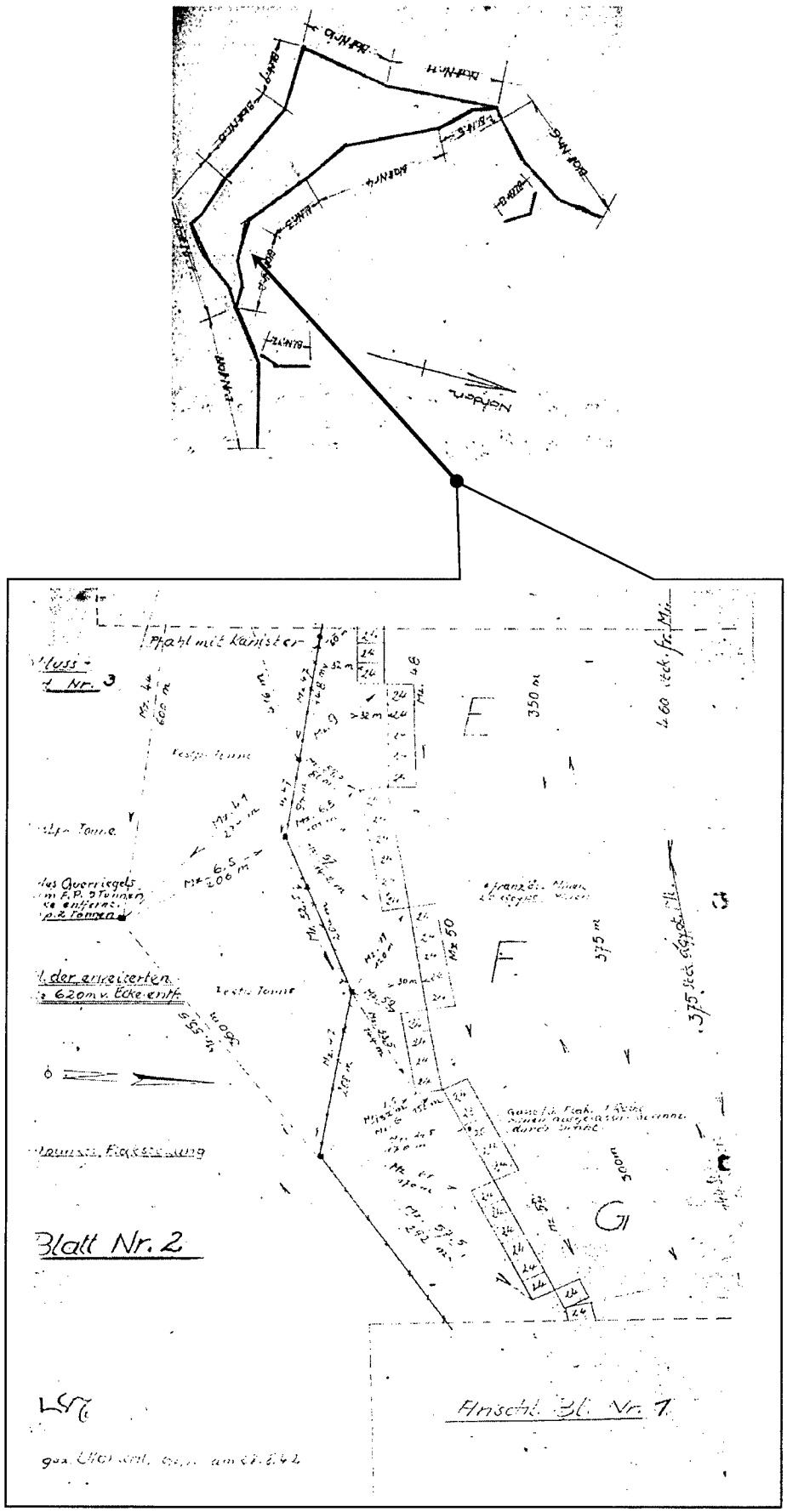
11. Verantwortliche:
Gbld. Lautzing
Feldpost-Nr. 22340
den 22. 8. 1942

12. Abteilungen:	I	II	III
Gbld.			
Fähnr. Gefr. K			

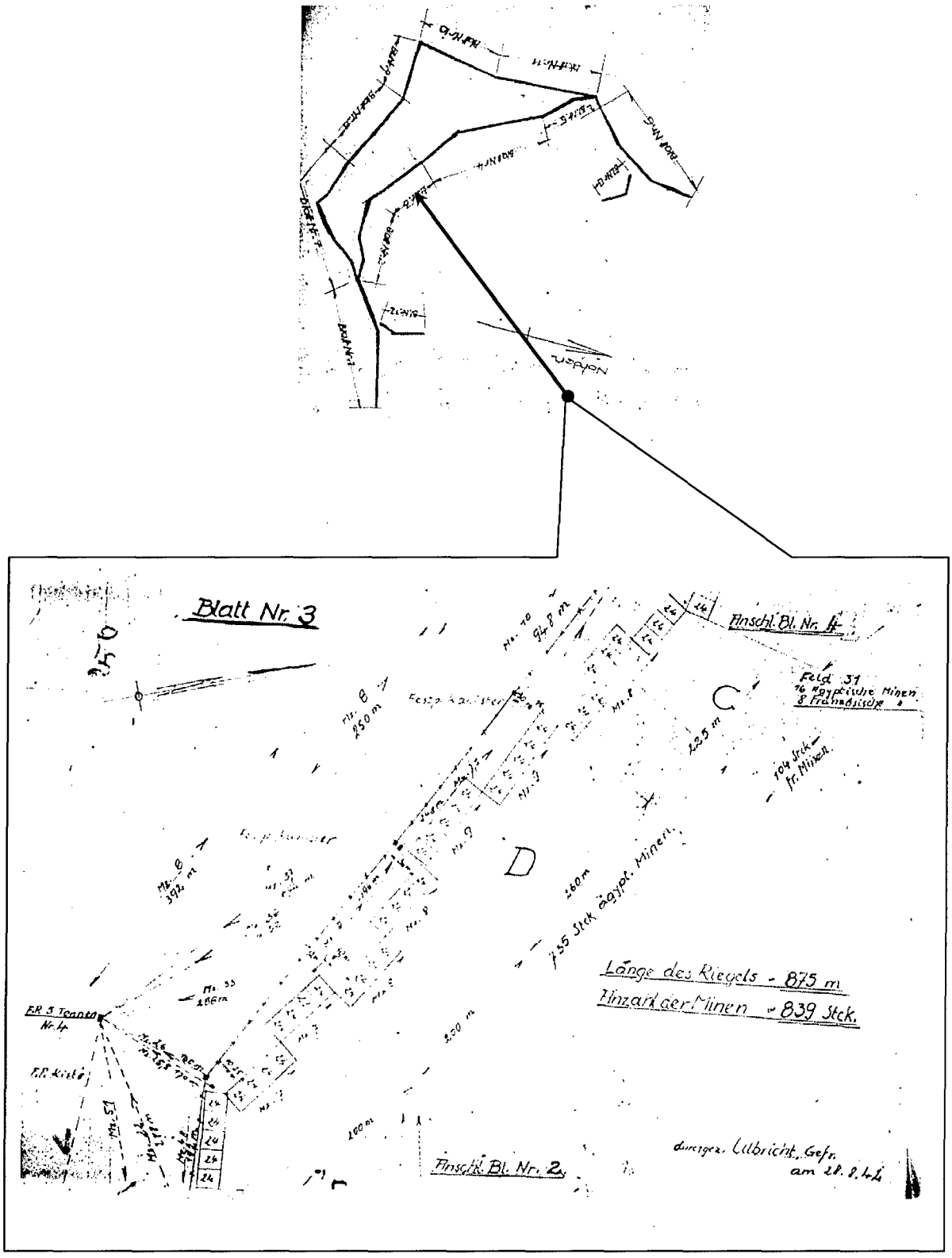


Blatt 1, Mine Box L

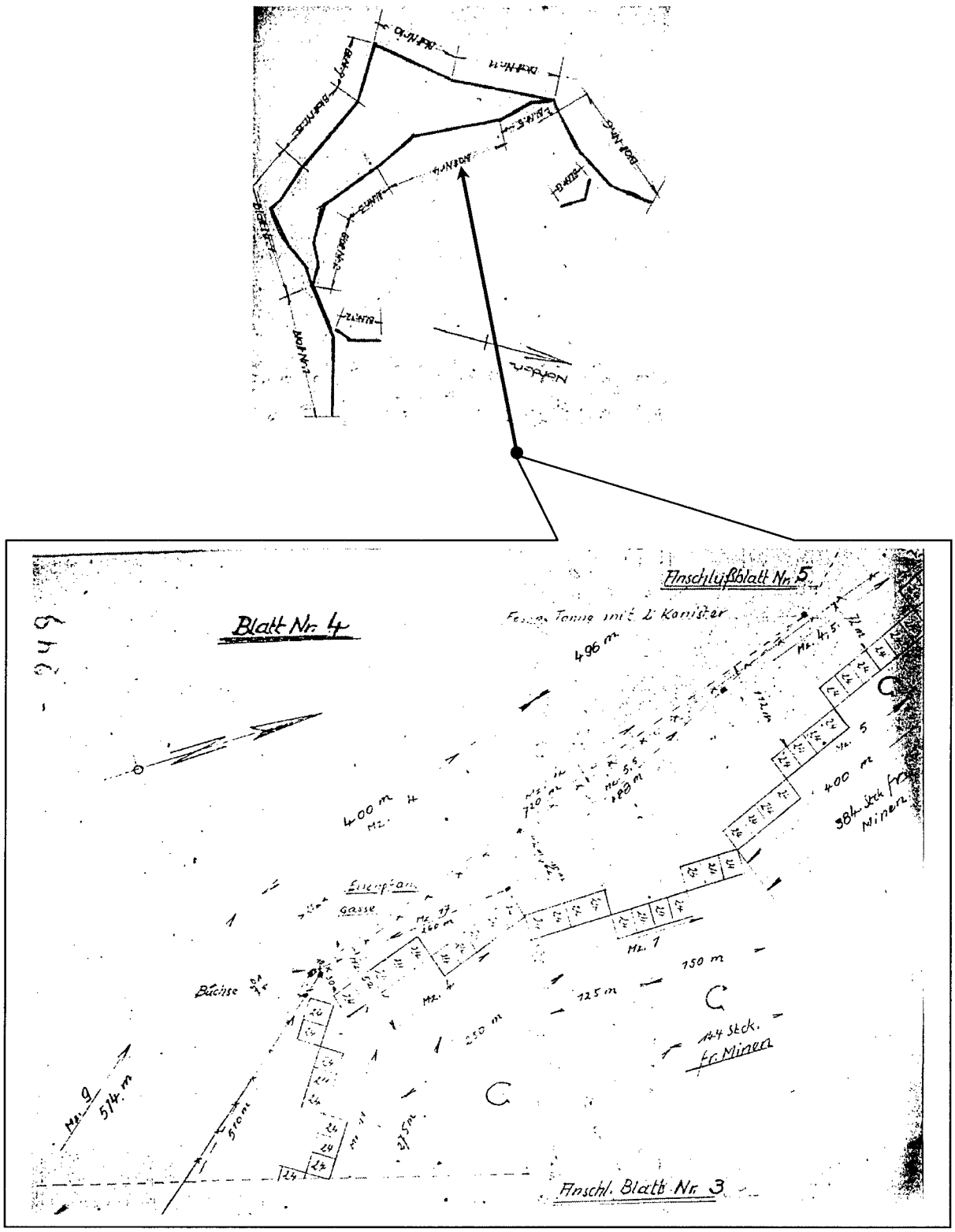
Note: No reference is made to the older Italian-laid minefield (mostly likely number 45 or 61 on the Minenplan Nr. 10, page E-7) which ran along the forward (northeast) edge of Mine Box L. Also note that Blatt 12 (page E-47) is located to the north of Blatt 1. Blatt 7 (page E-42) adjoins the west end of Blatt 1.



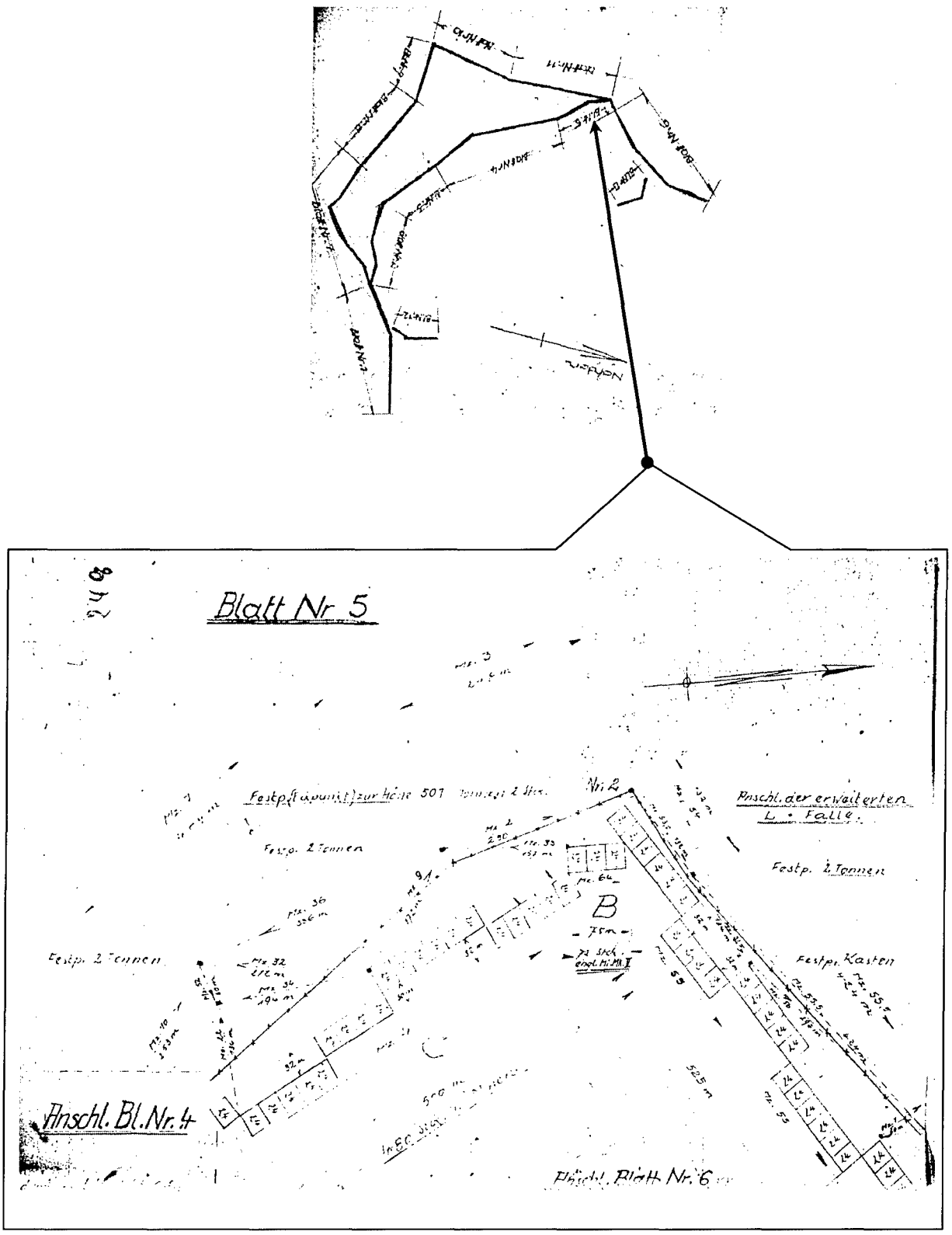
Blatt 2, Mine Box L



Blatt 3, Mine Box L

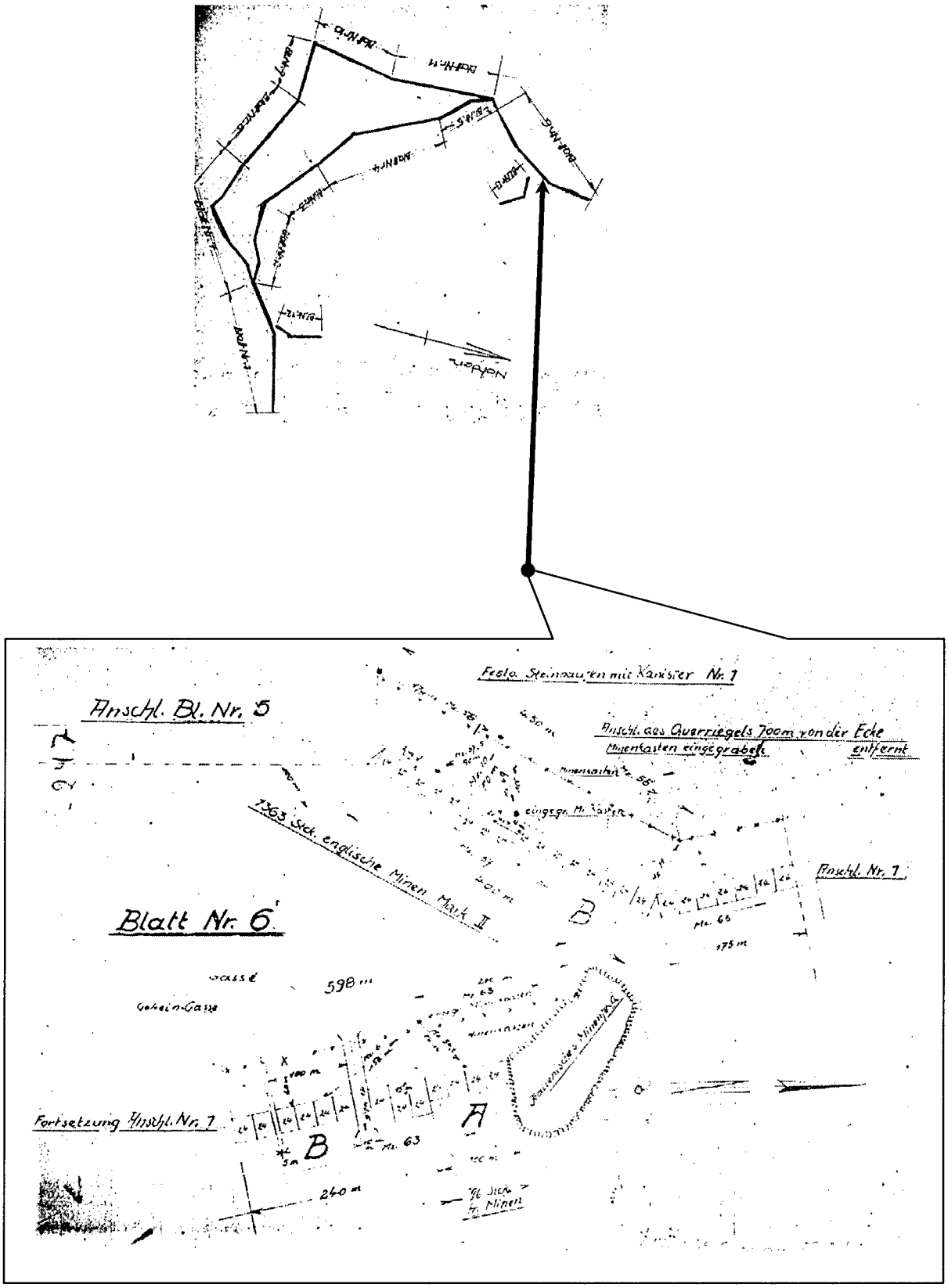


Blatt 4, Mine Box L



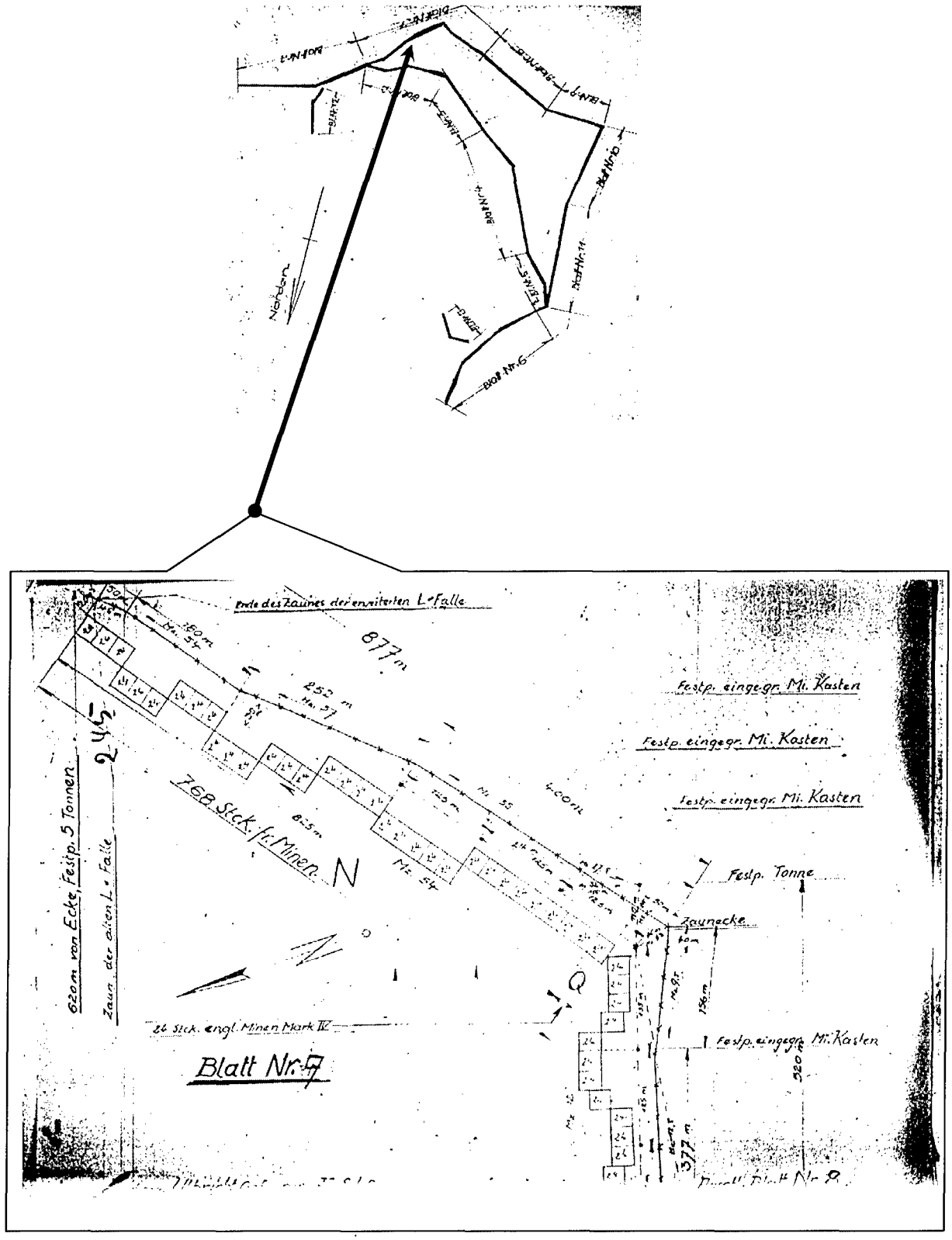
Blatt 5, Mine Box L

Note: Blatt 11 (page E-46) adjoins Blatt 5 at its western most point.



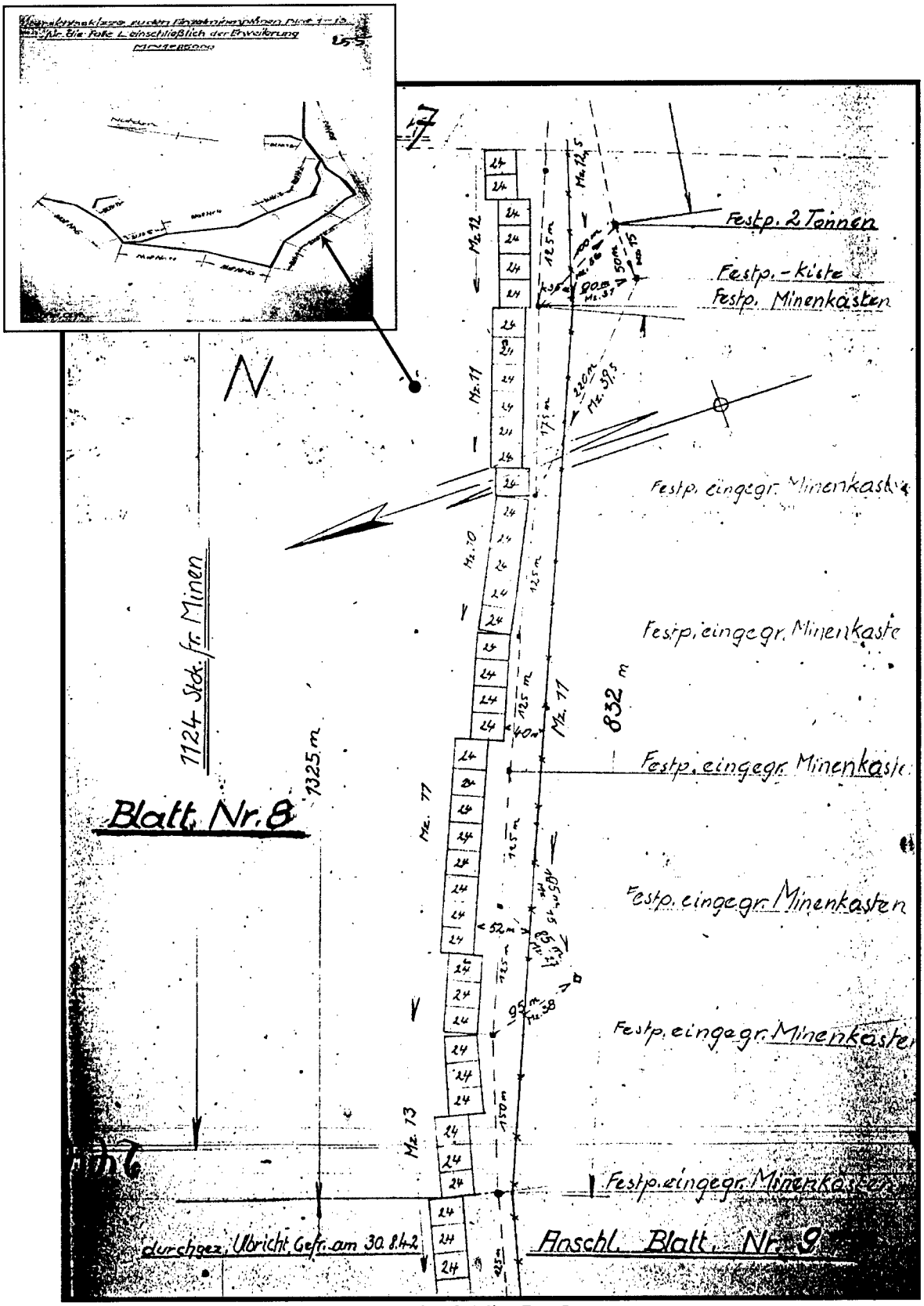
Blatt 6, Mine Box L

Note: The right (north) end of the top row adjoins with the left (southern) end of the bottom row. The Italian minefield at the right (north) end of the bottom row is most likely number 55 or 61 from Minenplan Nr. 10, page E-7). Also note that Blatt 13 (page E-48) is located to the east of Blatt 6.

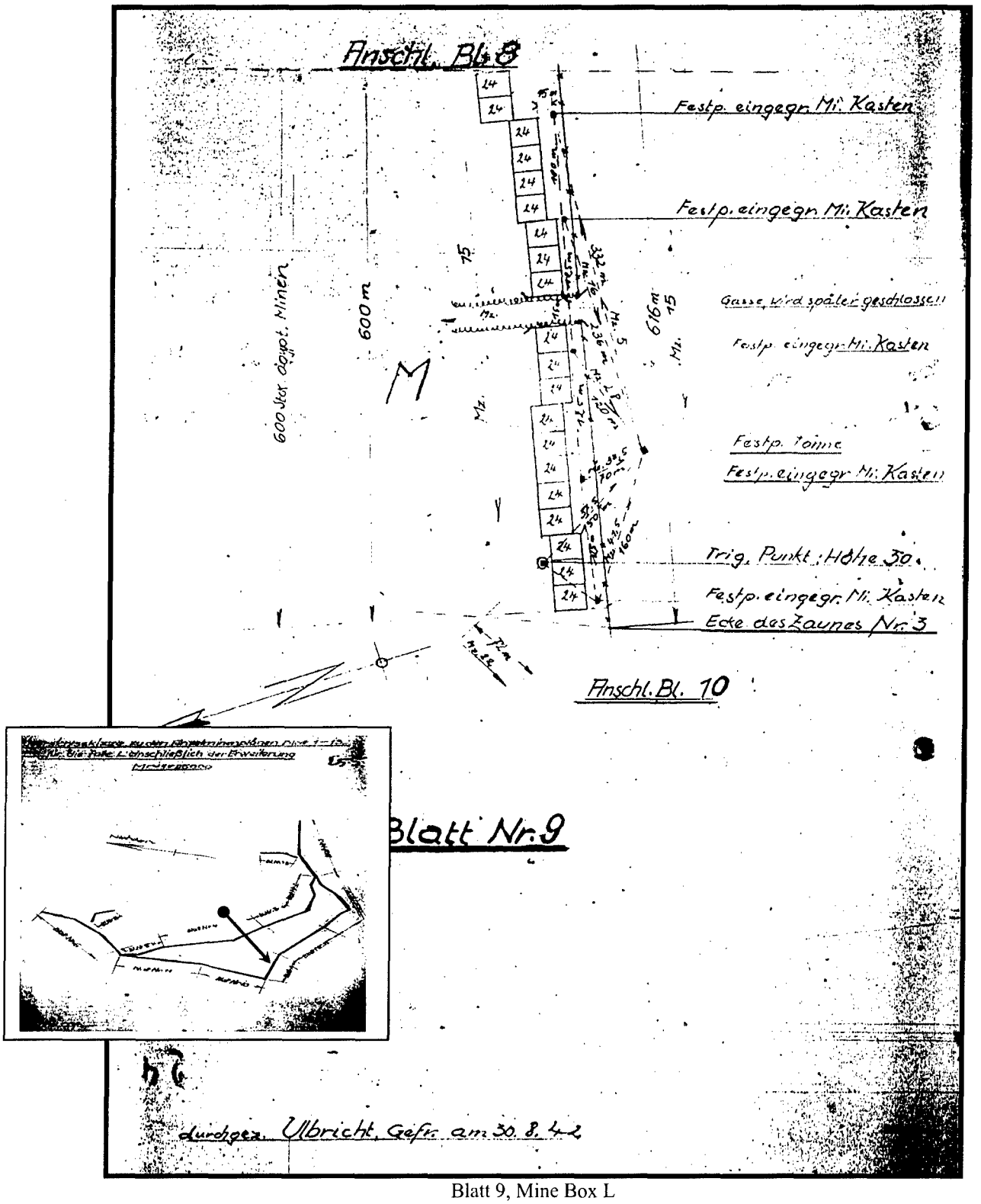


Blatt 7, Mine Box L

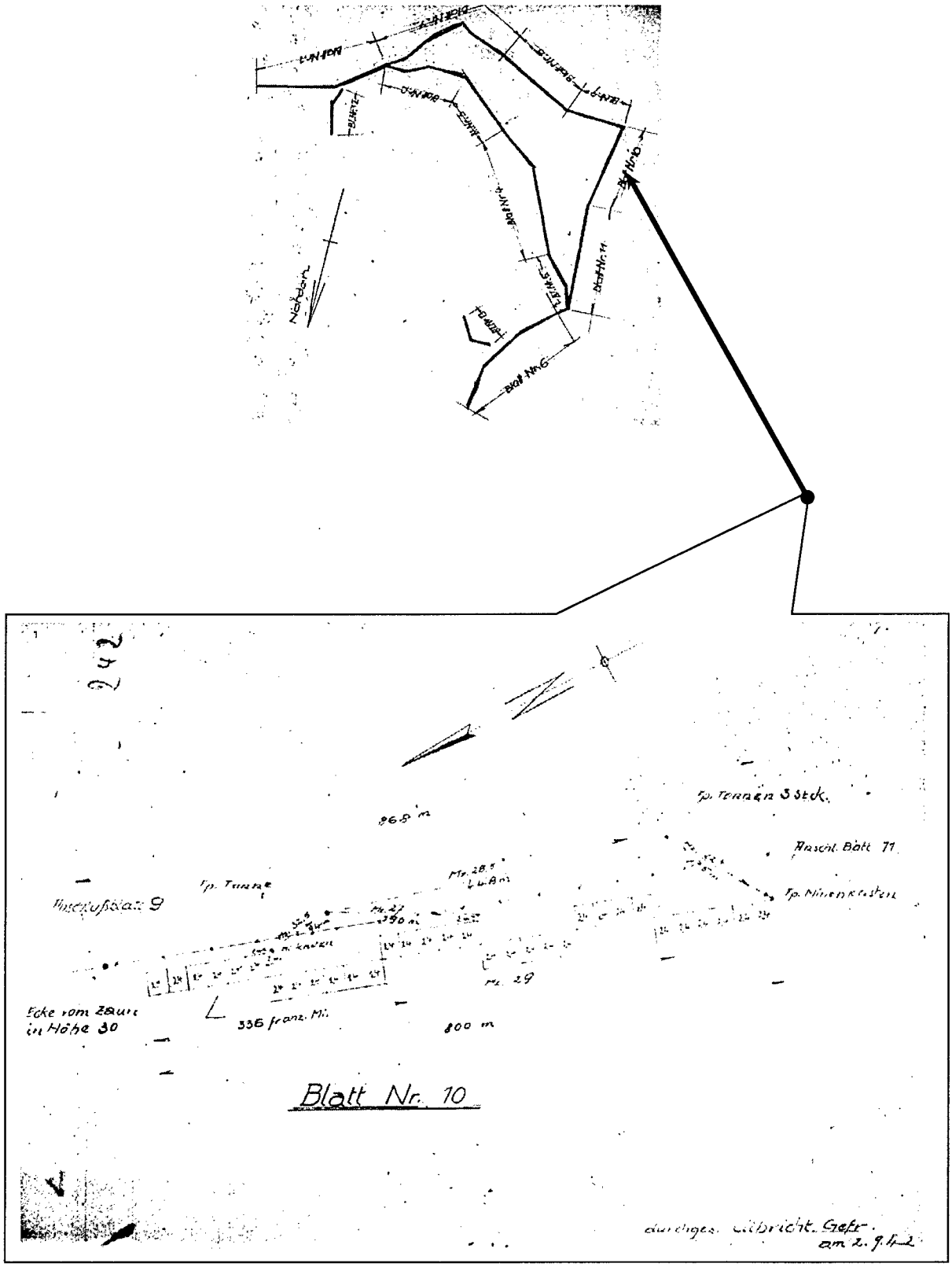
Note: The east end of Blatt 7 adjoins Blätter 1 and 2 (pages E-36 and E-37, respectively).



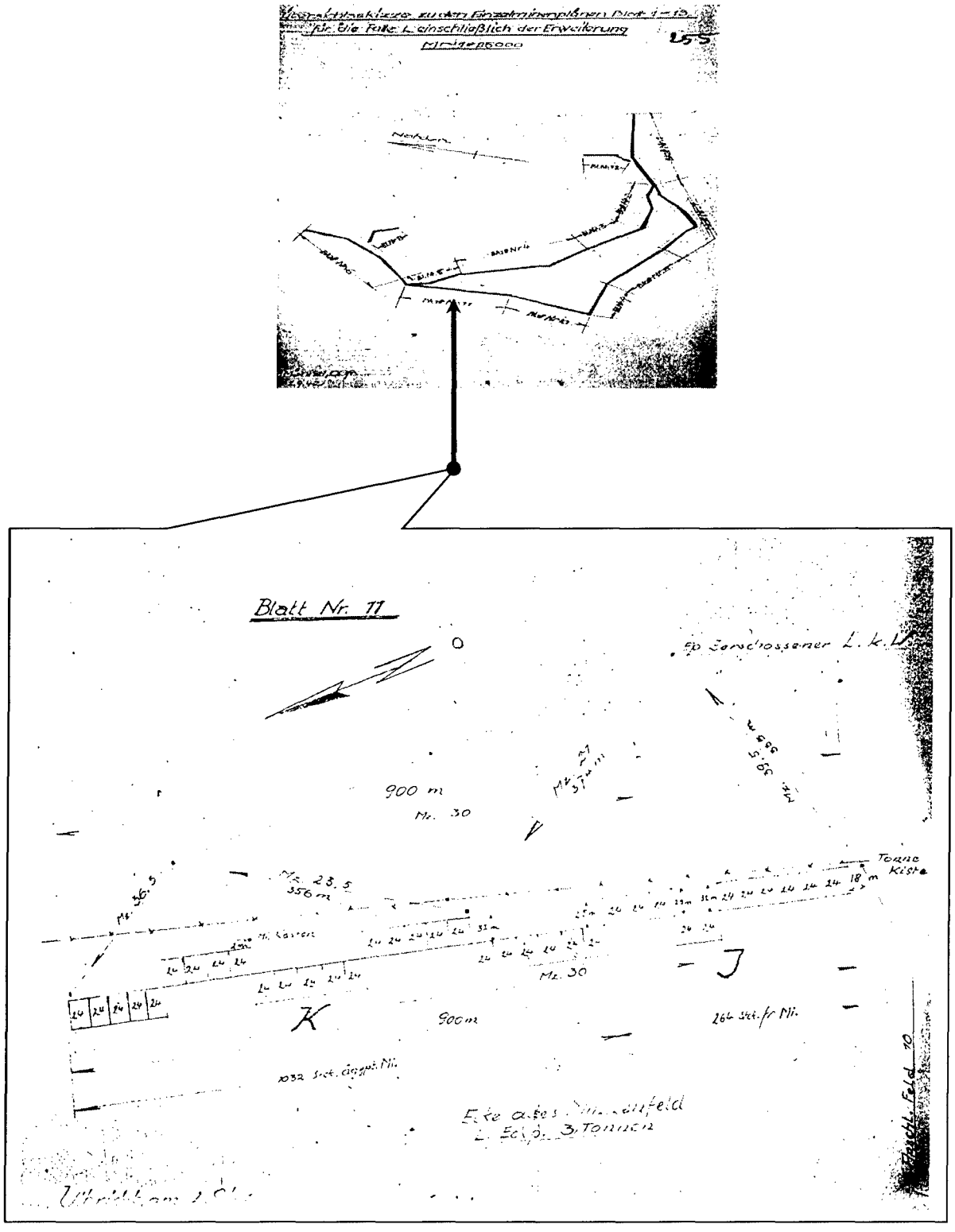
Blatt 8, Mine Box L



Blatt 9, Mine Box L

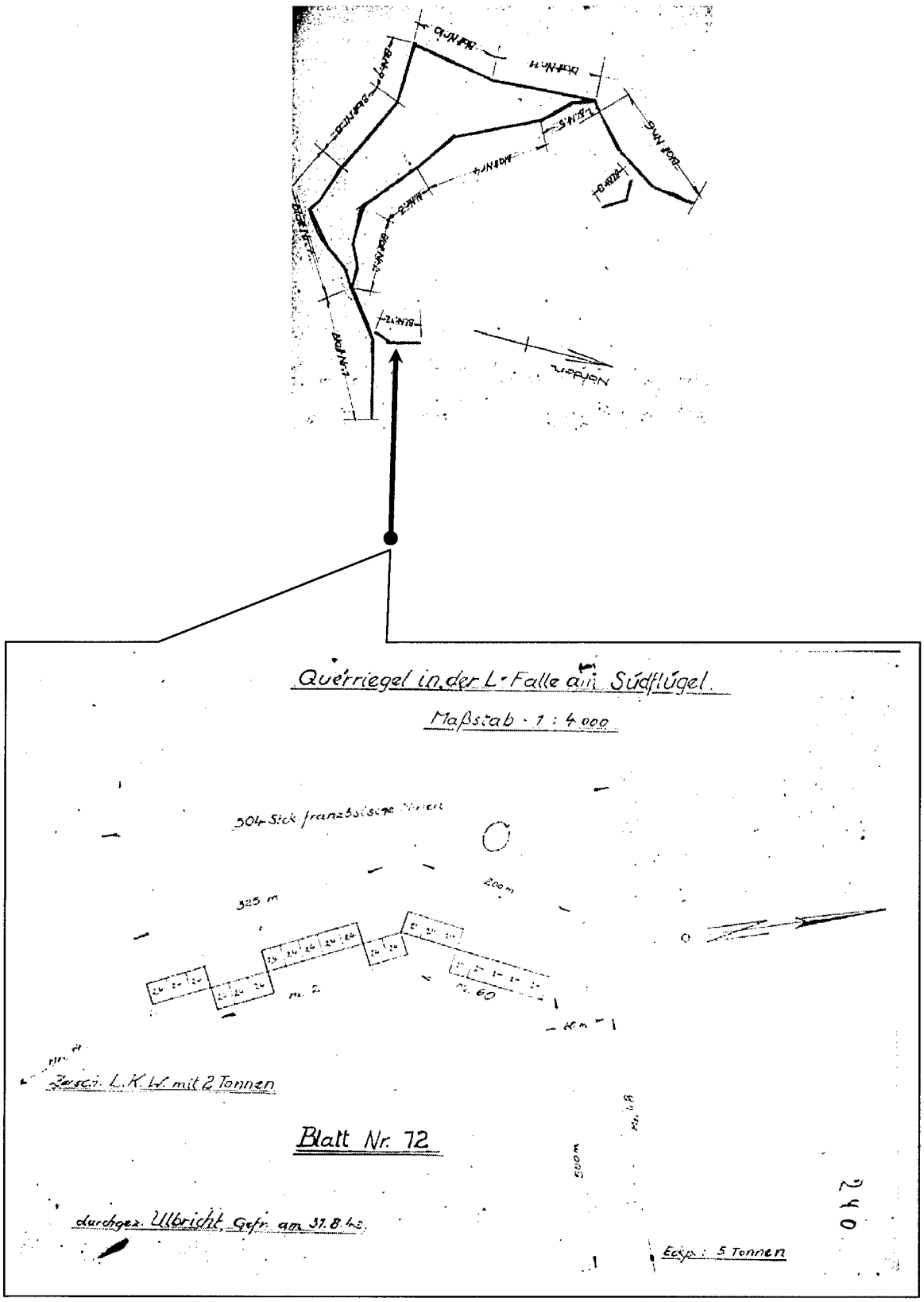


Blatt 10, Mine Box L



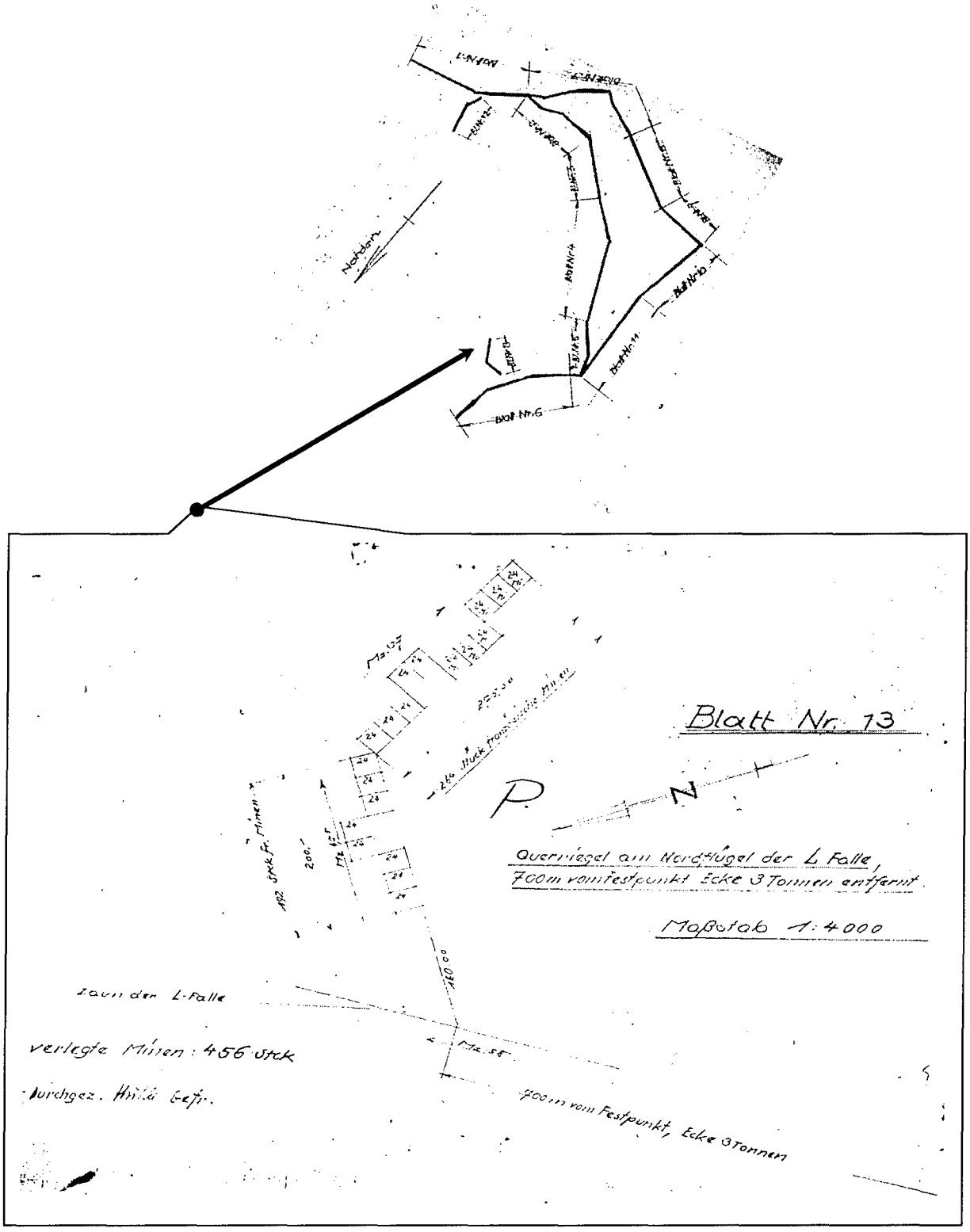
Blatt 11, Mine Box L

Note: Blatt 5 (page E-40) adjoins the north end of Blatt 11.



Blatt 12, Mine Box L

Note: Blatt 1 (page E-36) is located to the south of Blatt 12.



Blatt 13, Mine Box L

Note: Blatt 6 (page E-41) is located to the west of Blatt 13.

Appendix E, Annex 3e.
Later Mining Activity in the 2nd New Zealand Division Zone[ix]

On 6 October 1942, the 164th *Leicht Afrika* Division published a document that addressed the emplacement of new minefields, randomly laid mines, command-detonated mines, wire obstacles and material requirements, which stated that the division still had 4,400 antitank mines, 890 aircraft bombs, 2500 rolls of wire and 375 long pickets allotted to it. The division directed that in the future both antitank and antipersonnel mines were to be emplaced at a density of 1 mine per meter, while the command-detonated bombs were to be emplaced at a density of 10 per 100 meters of front. The remaining wire was to be used to provide a more complete tactical obstacle to the front, while a perimeter fence was to be emplaced around each company. In an area that included part of Mine Box "K," all of "L," and part of "J," the division reported the employment of 3600 antitank and 7000 S-Mines, along with 700 bombs, 3000 rolls of wire, 2625 long pickets, and 5250 short pickets. Six hundred antitank and 7000 S-Mines, along with 1500 rolls of wire, 2625 long pickets, and 5250 short pickets were still available to this sector. This left an estimated short fall of 3000 antitank mines, 700 bombs and 1500 rolls of wire.

Mine Box "K"

In September, the 220th and 900th pioneer battalions reported emplacing 455 antitank and 164 antipersonnel mines in Mine Box K. In October, they reported the emplacement of 3115 antitank and 1213 antipersonnel mines in Mine Box "K." For example on 11 October, *Hauptmann* Streitz, commander of the 220th Pioneer Battalion, reported that "Between 'K' and 'L' the emplacement of an antitank minefield was begun. 408 Tellermines were emplaced along of length of 800 meters."

Mine Box "L"

In September, the 220th Pioneer Battalion reported emplacing 1406 antitank and 64 antipersonnel mines. For 10 October, *Hauptmann* Streitz, commander of the 220th Pioneer Battalion, reported that "In 'L' – in the western part, emplaced 82 command-detonated bombs and 432 S-Mines at a length of 450 meters along the length of the antitank minefield." The battalion emplaced another 288 antipersonnel mines in Box "L" on the same day. During the battle, the 220th Pioneer Battalion emplaced 4751 antitank mines in front of the 2nd New Zealand Division (see section 6.7.9. and 6.10.2.2.).

Documents:

1. "*Erläuterungen zur Deckpause über neuanzulegende Minenriegel, Streuminen, Beob.-Minen, Verdrahtungen und Materialbedarf.*"
2. "*Veränderungen im Zuge des Ausbaues der neuen H.K.L. von 6.10. – 10.10.1942.*"
3. "*Deckpause zur Karte El Alamein*"

[ix] US National Archives, Captured German Records Division, Series T-313, Roll 432, frames 8,724,856 to 8,724,867.

"Erläuterungen zur Deckpause über neuanzulegende Minenriegel, Streuminen, Beob.-Minen, Verdrahtungen und Materialbedarf."

Anl. zu Fk. 2340/42 geh. Kdos.
vom 6.10.42
178

164.le.Afrika-Division
Ia/Pi.

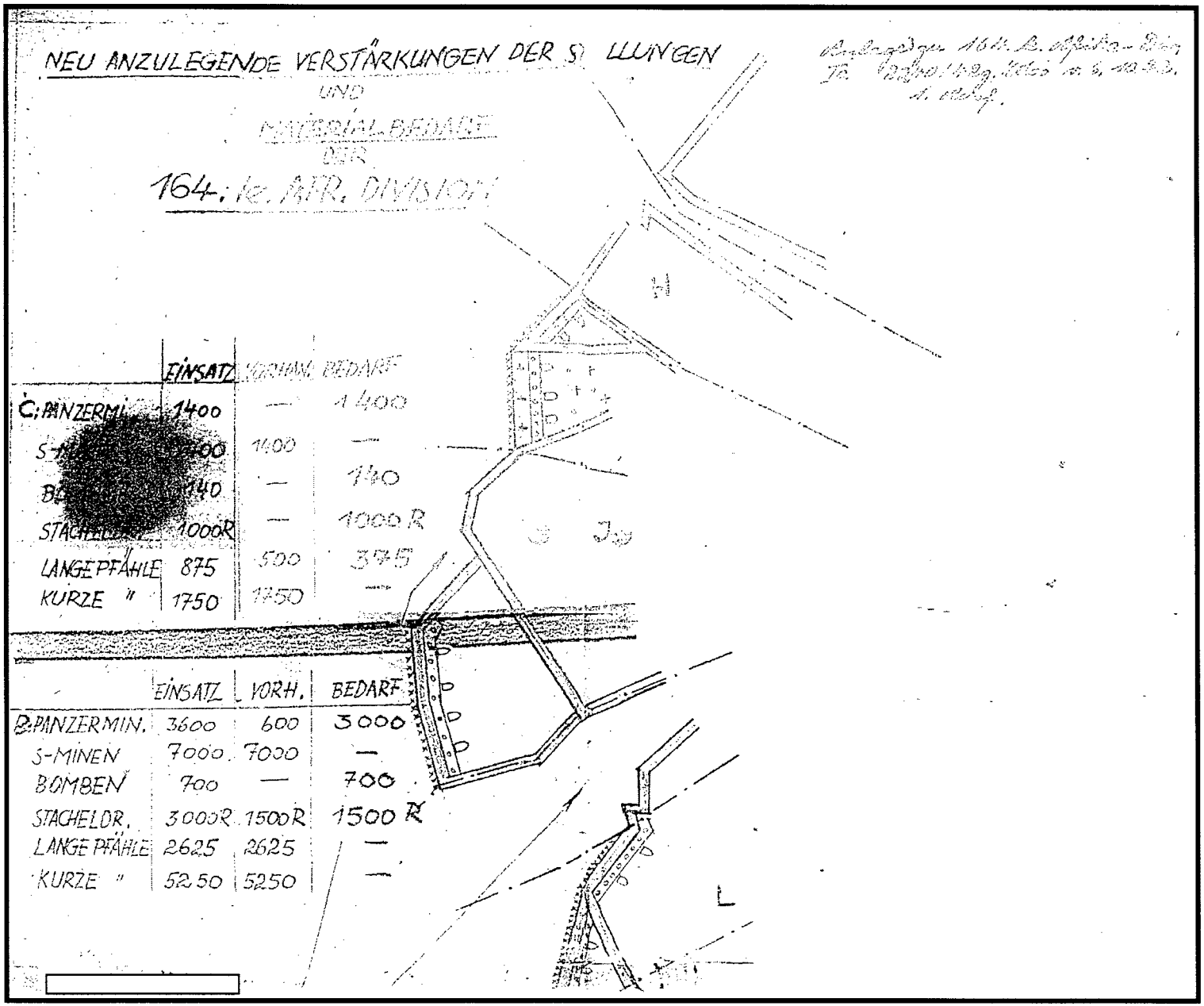
des Ob. Kdos. der Pz. Armee-Afrika Div.Gef.St., 6.1o.42/W.

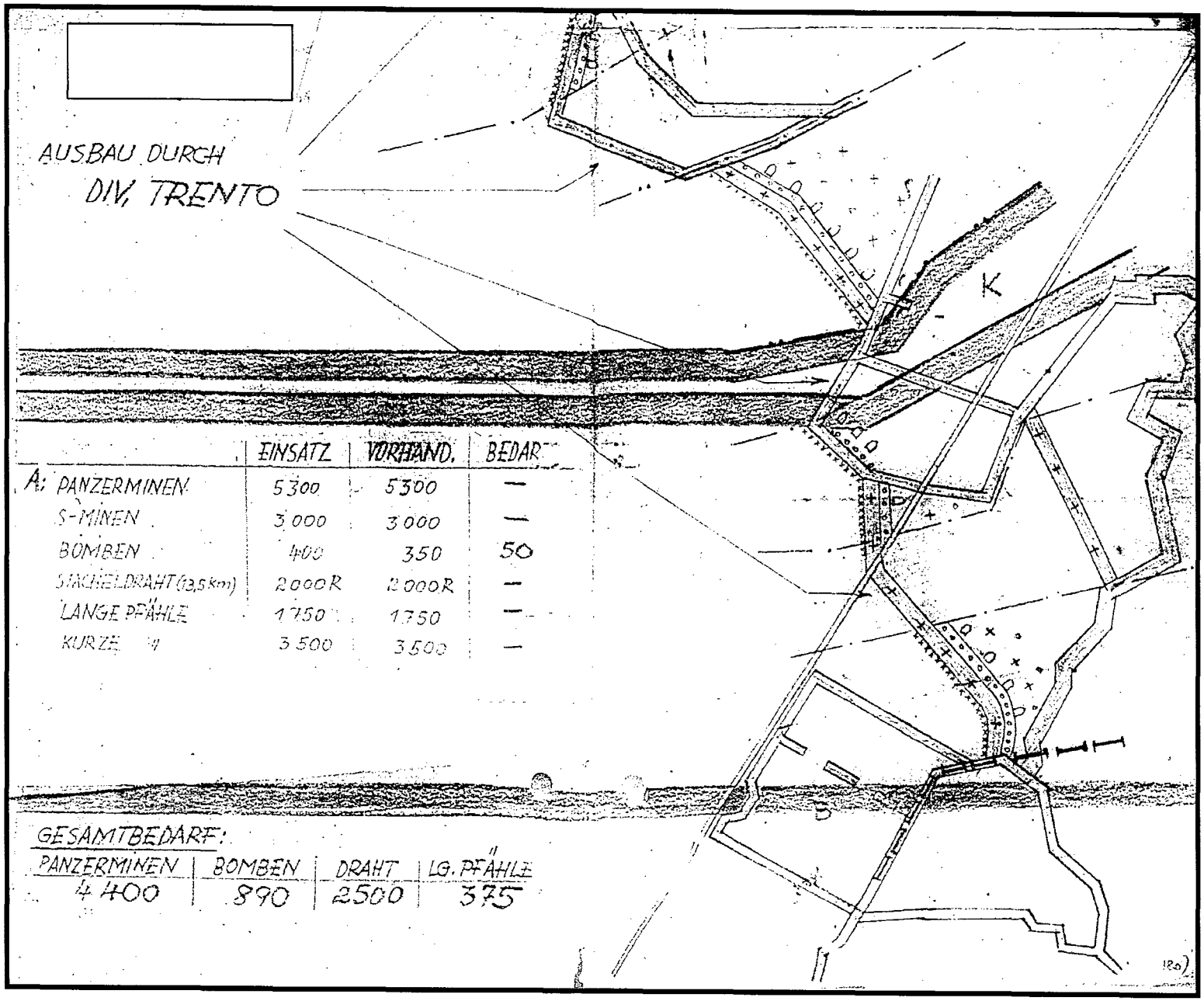
Erläuterungen zur Deckpause über neuanzulegende Minenriegel, Streuminen, Beob.-Minen, Verdrahtungen und Materialbedarf.

	Pz.-Minen	S-Minen	Bomben	Stacheldraht	Pfähle lg.	Pfähle kz.
1. Noch zuzuweisendes Material zum Ausbau der neuen H.K.L.(Stand 6.1o.)	4.4oo	-	89o	2.5oo Rollen	375	-

2. Nach Einbau des gesamten Materials ist in den Abschnitten der 164.le. Afr.Div. erreicht :

a) Pz.Miner-Dichte etwa 1 Mine auf 1 m
b) S-Miner-Dichte " 1 Mine auf 1 m
c) Durchlaufender Frontalflandernzaun
d) Ringumverdrahtung der Kp.
e) Auf 1oo lfd. m Frontbreite 1o Beob.-Bomben.


NEU ANZULEGENDE VERSTÄRKUNGEN DER S. ELLUNGEN
UND
MATERIAL-BEDARF
DER
164. le. INF. DIVISION
EINSATZ VORHAM. BEDARF
C. PANZERMI 1400 — 1400
S-M 1400 1400 —
B 140 — 140
STACHELDR. 1000R — 1000R
LANGE PFÄHLE 875 500 375
KURZE " 1750 1750 —
EINSATZ VORH. BEDARF
B. PANZERMIN. 3600 600 3000
S-MINEN 7000 7000 —
BOMBEN 700 — 700
STACHELDR. 3000R 1500R 1500R
LANGE PFÄHLE 2625 2625 —
KURZE " 5250 5250 —



	EINSATZ	VORHAND.	BEDARF
A: PANZERMINEN	5300	5300	—
S-MINEN	3000	3000	—
BOMBEN	400	350	50
STACHELDRAHT (3,5 km)	2000 R	2000 R	—
LANGE PFÄHLE	1750	1750	—
KURZE "	3500	3500	—

GESAMTBEDARF:

PANZERMINEN	BOMBEN	DRAHT	LG. PFÄHLE
4400	890	2500	375

Document 2, Appendix E, Annex 3e.

"Veränderungen im Zuge des Ausbaues der neuen H.K.L. von 6.10. – 10.10.1942."[x]

Thüringer

Geheim

1135

Pz.Pionier-Bataillon 22e
Ia 625/42 geh.

Gefechtsstand, 11.10.42/W.

Betr.: Einsatzmeldung.

Oberkommando der Panzerarmee Afrika
Eing. 13. OKT. 1942
Beil. 1 Abt. Ia/Pi. Nr. 8926/42

Pionierführer
Ia Nr. 442

Oberkommando der Panzerarmee Afrika
Ia/Pi.

TQ

Abt. Veränderungen im Zuge des Ausbaues der neuen H.K.L.
von 6.10. - 10.10.1942.

1. Der Nordriegel der Falle "B" wurde vollkommen geräumt. Ausser den am 6.10. als aufgenommen gemeldeten 389 T-Minen befanden sich im Nordriegel weiter keine Minen.

2. Im Anschluss an den Querminenriegel von Falle "K" wurde nach OSO ein Minenriegel von 1.000 m Länge (498 T-Minen) verlegt.(s.Skizze).

3. Im Zuge des Ausbaues der neuen H.K.L. wurde ein Minenriegel von Deir el Shein bis an Falle "K" mit 2.209 T-Minen und 1.213 S-Minen in einer Länge von cca. 4 1/2 km angelegt. Vorläufig ausgespart wurden hiebei mit T- und S-Minen die jetzige Stellung des Rgts.-Gef.-St. Pz.Gren.Rgt. 433, mit S-Minen der italienische Abschnitt.(s.Skizze).

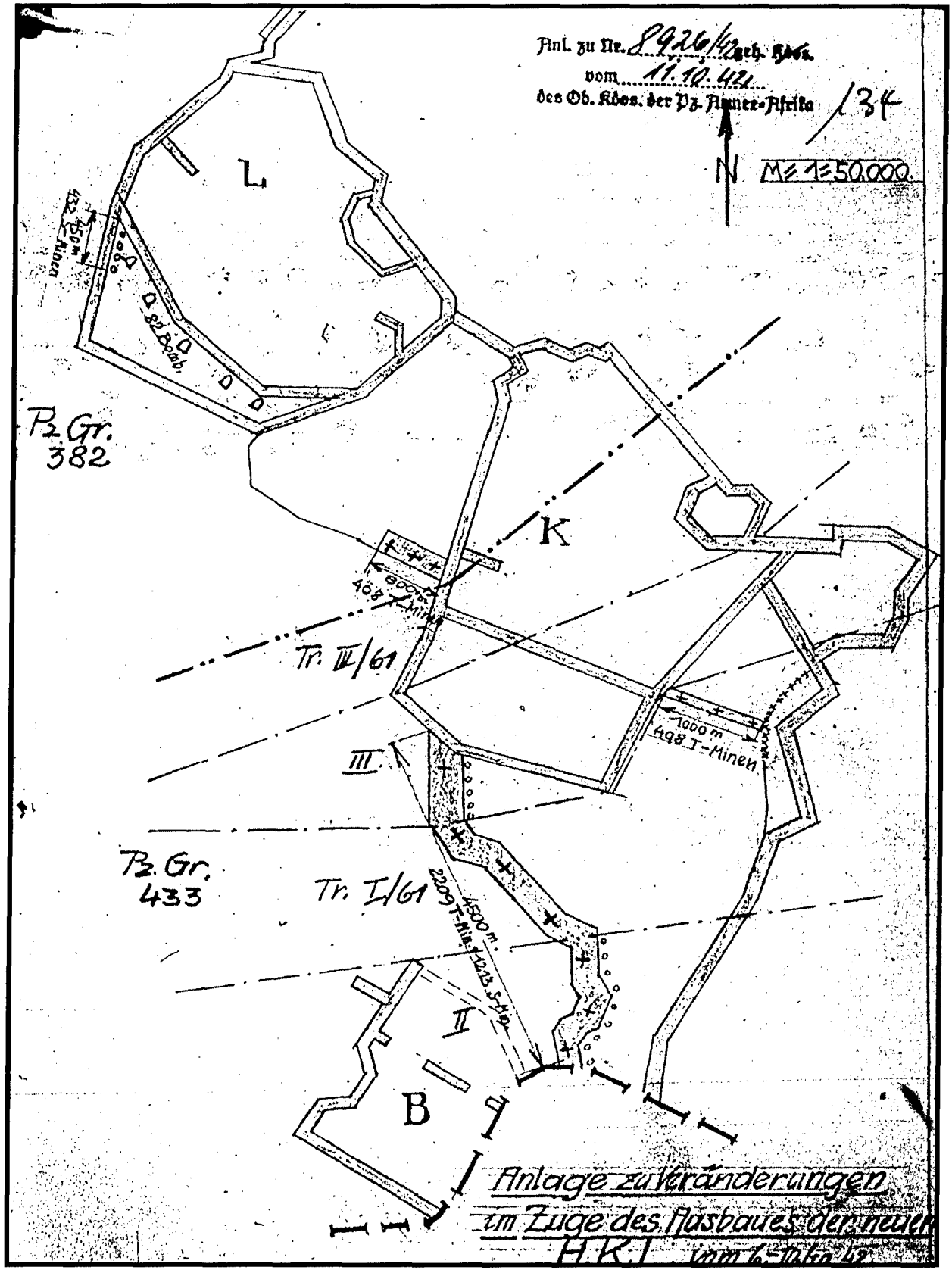
4. Zwischen "K" und "L" wurde mit der Anlage eines Pz.-Minenriegels begonnen. 408 T-Minen wurden auf eine Länge von 800 m verlegt (s. Skizze).

5. Im "L" - Westteil wurden 82 Beob.-Bomben und längs des Pz.Minenriegels in einer Länge von 450 m 432 S-Minen verlegt(s.Skizze).

1 Anlage.

Hptm. und Btl.Fhr.

[x] US National Archives, Captured German Records Division, Series T-313, Roll 430, frames 8,723,489 and 8,723,490.


Anl. zu Nr. 8926/42 Geh. Kdos.
vom 11.10.42
des Ob. Kdos. der Pz. Armee-Afrika
134
N
M = 1 = 50.000
L
K
B
Pz Gr. 382
Pz. Gr. 433
Tr. III/61
Tr. I/61
III
II
1000 m 498 T-Minen
1500 m 2209 T-Min. 1213 S-Min.
Anlage zu Veränderungen im Zuge des Ausbaues der neuen H.K.L. vom 6. bis 10. 10. 42

Document 3, Appendix E, Annex 3e.

"*Deckpause zur Karte El Alamein*"

Geheime Kommandosache

179)

164. le. Afrika-Division
Ia 2240/42 g.Kdos.

Div.Gef.Stand, den 6.10.1942
3 Ausfertigungen
1. Ausfertigung

Bezug: Obkdo.der Pz.Armee Afrika Ia 2328/42 g.Kdos.v.29.9.42, Ziff.3.

Betr.: Auflockerung nach der Tiefe.
- 3 Anlagen -

Oberkommando der Panzer-Armee Afrika.
Ia Nr. 2328/42
Eing. 8. OKT. 1942
Anl. Fnl.:

Dem

a) Karte 1 : 50000 mit beabsichtigten Truppeneinsatz wird als Anlage 1 überreicht.

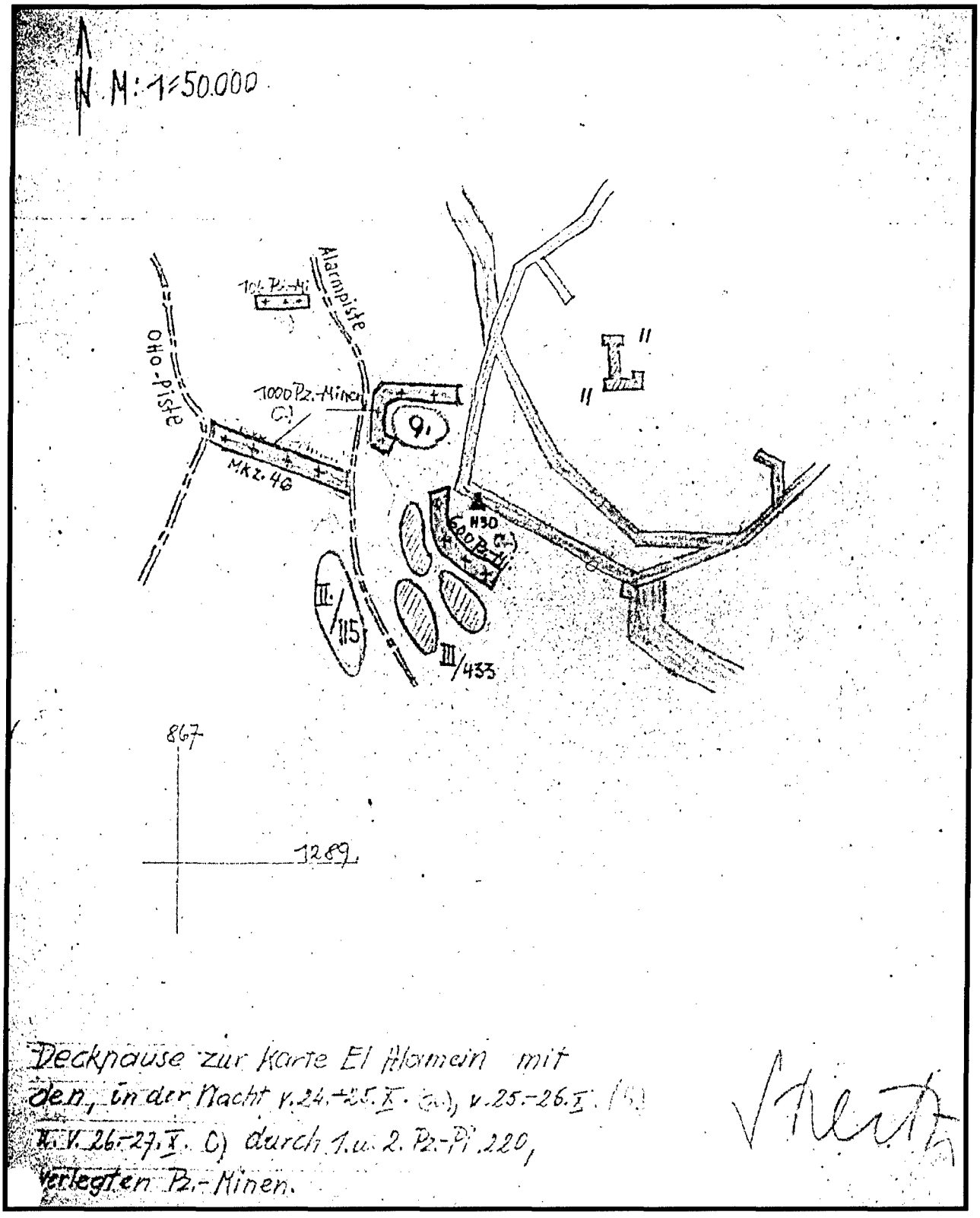
b) Für die Umgruppierung ist die Zeittafel (Anlage 2) vorgesehen. Hierzu meldet die Division:

Die Umgruppierung erfolgt im engstem Einvernehmen mit der Division Trento. Sie wird eingeleitet, sobald der Ausbau der neuen Stellungen und Minenfelder so weit fortgeschritten ist, daß Gefechtsvorposten und H.K.L. hinreichend gesichert sind. Entsprechend diesem Ausbauzustand wird von der Div. der A Tag, der B Tag und der C Tag (vgl. Anl.2) festgesetzt. Die datumsgemäße Festsetzung dieser 3 Tage ist voneinander unabhängig. Angestrebt wird, den A, B und C Tag spätestens auf den 17.10. festzusetzen, sodaß die Umgruppierung spätestens am 20.10. durchgeführt ist.
Es ist Vorsorge getroffen, daß während der Umgruppierungstage Lücken in der Abwehrfront nicht entstehen.

c) Verminungen, Hindernisbauten und Materialbedarf siehe Plan-pause Anlage 3.

Oberkommando der Panzerarmee Afrika
Eing.: 11.OKT.42 Anl.:
Nr. 2534 Fnl. Lg.

2534



Decknause zur Karte El Hamein mit den, in der Nacht v. 24.-25. X. a.), v. 25.-26. X. b.) u. v. 26.-27. X. c) durch 1. u. 2. Pz.-Pi. 220, verlegten Pz.-Minen.

APPENDIX E, Annex 4.
WORLD WAR II GERMAN MILITARY SYMBOLOGY[xi]

The symbols in this work are based on the official German handbook of military symbols (H.Dv. 272) of 24.03.1941, (with changes up to November 1941) and the actual symbols used in the organizational charts (Kriegsgliederungen des Feldheers, (15.05.1941 through May 1942)). Where symbols in the latter are at variance with the former, those symbols of the organizational charts have been used.

In German organizational charts (and, as reflected here), the headquarters symbol represents two purposes. First, it indicated the size, function, and mobility of the unit. And, second, it also indicated the headquarters of that echelon itself, i.e., there was no separate symbol for this echelon's headquarters. For all headquarters units with (and sometimes important units without) separate KStN (Kriegstärkenachweisung – equivalent to a "Table of Organization and Equipment"), the corresponding symbols were placed to the right of the echelon's symbol. The same applied to those units that were directly assigned to the echelon's headquarters.

The different functions and mobility additions were used to enhance the echelon's symbol to indicate a specific purpose. Company-sized units and sub-units symbols were also modified in a similar fashion.

The Germans numbered their units on organizational charts from the right, i.e., the first company was on the far right, and the last company was on the far left. The same applied to battalions and regiments.

An interesting feature of company and sub-unit symbols is that their size and shape dimensions could be altered to fit the diagram being depicted with them. Several infantry companies, for example, were placed side-by-side, elongated upwards, (so that all weapons symbols could fit within), and only the left-hand company had the thickened edge used to indicate its size (more of this below). The variations in size and shape followed the original configuration, so that the basic symbol was still recognizable as such.

The symbols were intended to be mnemonic. The headquarters symbols reflected the units' pennants used on vehicles or the standards themselves. (These flags and pennants were of different colors to represent the various combat arms, and usually had a number, letter, and/or heraldic symbol superimposed upon them). Hence, any German looking at one of these symbols could immediately recognize the unit type being depicted. The colors in real life were substituted by the unit function and mobility modifiers above and below the symbols. In addition, a simplified version of the organizational symbols was, for example, painted on unit vehicles.

The mobility of the unit was also quickly recognizable. The two small circles ('wheels') underneath a symbol identified the unit as being motorized. In case these wheels were over the symbol (applied only to artillery-type units), this indicated that the unit was motorized by half-tracked prime movers. Elongated ovals ('tracks') applied underneath the symbol meant that the unit was self-propelled.

All units assigned to Panzer divisions were at least motorized, so that it was thought that the addition of the motorization wheels to the upright staff symbol could be dispensed with, and that the Panzer-Truppen pennant was indication enough.

Although the official handbook indicated that armored infantry units should have the halftrack symbol underneath them instead of the motorized symbol, this practice was not yet followed in most organizational charts at that time. The diagrams in this book reflect this usage.

The lozenge symbol represented armor. All tank units used this symbol. It was shaped to reflect World War I tanks, and hence provided a good memory assist.

[xi] "German Army, 1941 – 1942 Organizational Symbols High Command," by Leo Niehorster, available online at: http://www.orbat.com/site/ww2/drleo/011_germany/symbols/_symbols_41.html , "an excerpt of the 176 page handbook (*H.Dv. 272 - "Muster für taktische Zeichen des Heeres"*, dated 24.03.1941.

Aside from a very few specialized symbols, which were quickly memorized, all company-sized and smaller unit symbols tended to reflect the units' function or at least their main weapon. In most cases, a unit too difficult to depict easily was instead represented by a box with a corresponding abbreviation inside. In case it belonged to a particular arm, the arms symbol could be placed on top of or within this box. Where various modifiers applied, these were all added to the symbol.

Company-sized units had, somewhere within their symbol, a thickened part, usually a side.

Excluded from this were the firing artillery (tube, rocket-launcher, and Army anti-aircraft) batteries. There, the weapon symbol itself in firing batteries (usually with the number of guns underneath) indicating a battery. (Firing artillery, in units smaller than battery size was depicted on a smaller scale). None-firing batteries of the artillery arm followed the normal form of thickening a portion of the symbol to indicate their size. Infantry-type artillery (anti-aircraft and infantry gun) as well as machine gun companies followed the normal practice, and the weapon symbols representing these types of companies had the upright stems thickened accordingly.

Where several columns, platoons, or detachments were gathered into a headquarters company or heavy company (and each of these sub-units had its own KStN), these symbols were enclosed in a box without a thick side.

Units smaller than companies appeared on organizational charts only if they had their own Table of Organization. Exceptions occurred, particularly if headquarters sub-units had specialized equipment. They were depicted on a smaller scale than company-sized units.

Staffel

(Detachment) An elastic designation for several components under a headquarters section, these components being from section to platoon size. Often this was merely an administrative grouping, and the components were distributed to other sub-units in combat. It could either have its own small headquarters section, or one of the components' leaders could carry out a dual function.

Kolonne

(Column) An independent transportation unit, varying from platoon to company size, transporting equipment or supplies such as a bridge column (which in fact did not actually build the bridge it was transporting), or even as a light 'infantry' column (which consisted of a set number of horse-drawn vehicles capable of transporting a fixed tonnage).

Zug

(Platoon) An independent unit or the typical main sub-division of companies and batteries. Usually, the 1st and 2nd platoons in each company-sized unit, and also of independent platoons, were lead by a lieutenant, while the other platoons were headed by a senior NCO.

Trupp

(lit. Troop; Section) A small unit equipped with specialized equipment; it could also be used as the designation for a headquarters echelon unit (*Kompanie-Trupp*: Company Headquarters; *Zug-Trupp*: Platoon Headquarters, etc.).

The units indicated below were not depicted as separate symbols.

Halb-Zug

(lit.: Half-Platoon) Some platoons, for example HMG Platoons, could be divided into two parts.

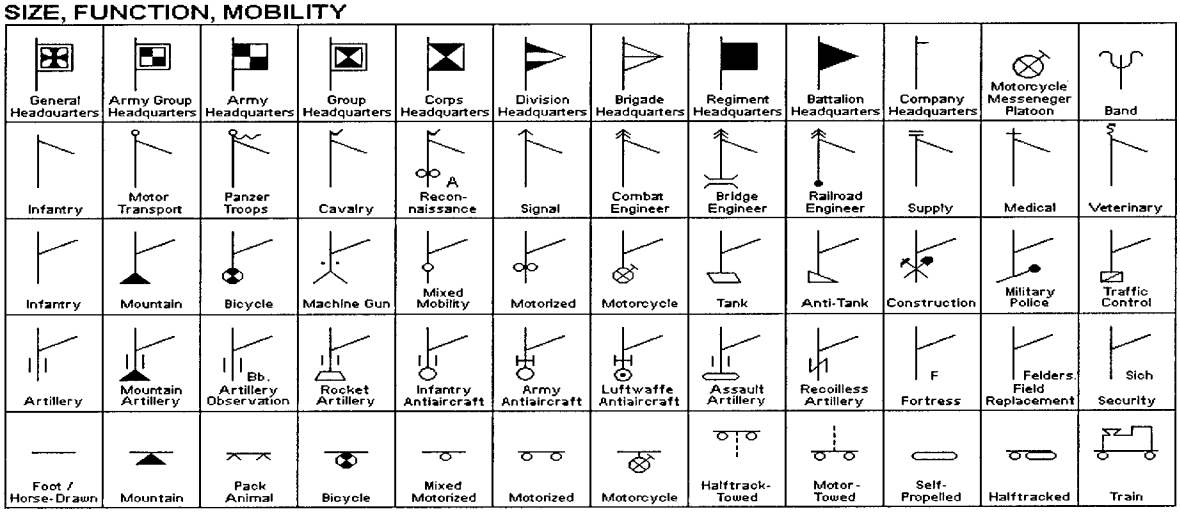
Gruppe

(Squad, Section) This was normally the smallest sub-unit that existed in the German Army. In this work, the word "Squad" has only been used for infantry and reconnaissance infantry units. All other units of this size have been designated as "Sections".

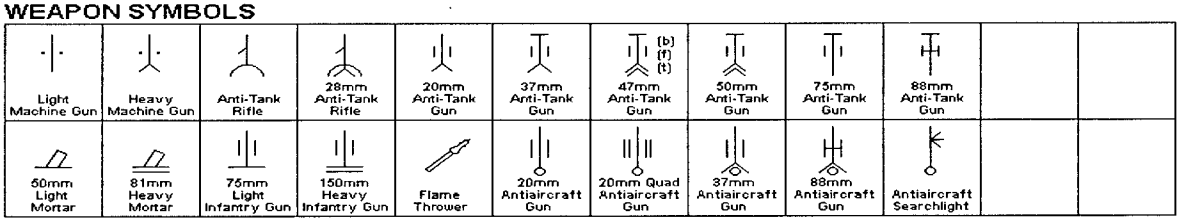
Halb-Gruppe

(lit. Half-Squad, i.e. Team) In the case of infantry and reconnaissance units, squads could be broken down into two parts. Infantry and reconnaissance squads were built up around the squad LMG. Where only one LMG was provided, the LMG team provided cover while the other team was the movement element. Where two LMG were available, the teams covered each other in turns. Reconnaissance teams, on the other hand, were trained to work independently, although they too could function as a squad.

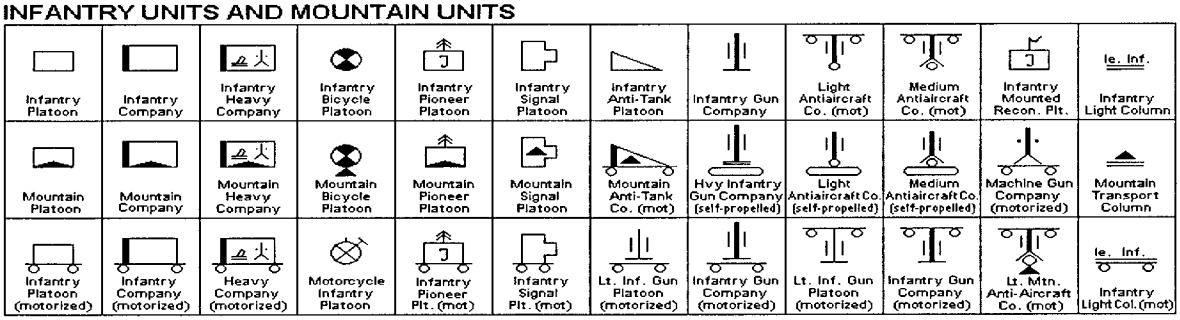
SIZE, FUNCTION, MOBILITY



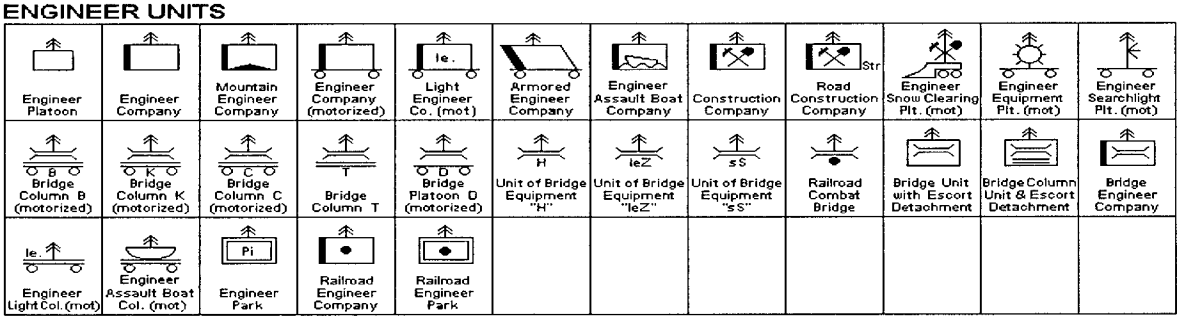
WEAPON SYMBOLS



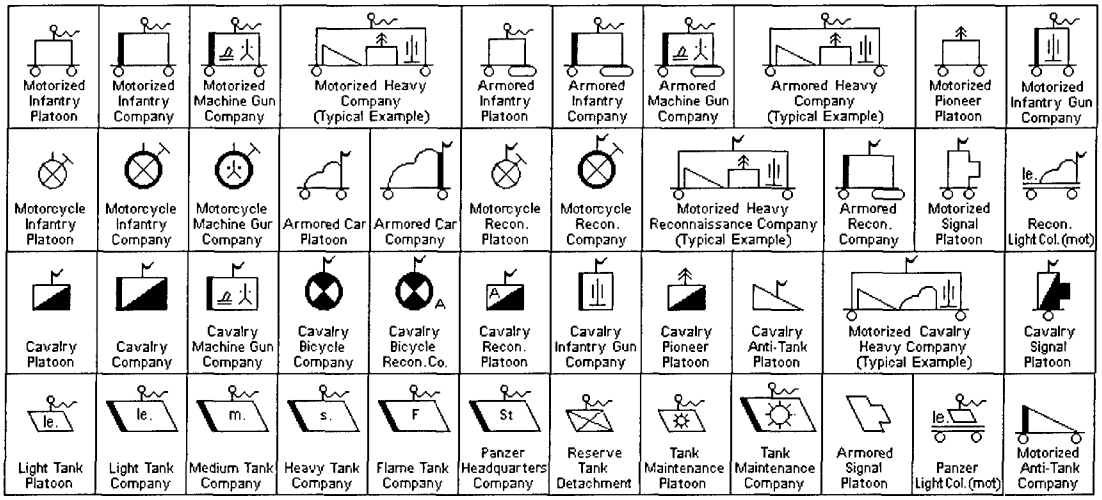
INFANTRY UNITS AND MOUNTAIN UNITS



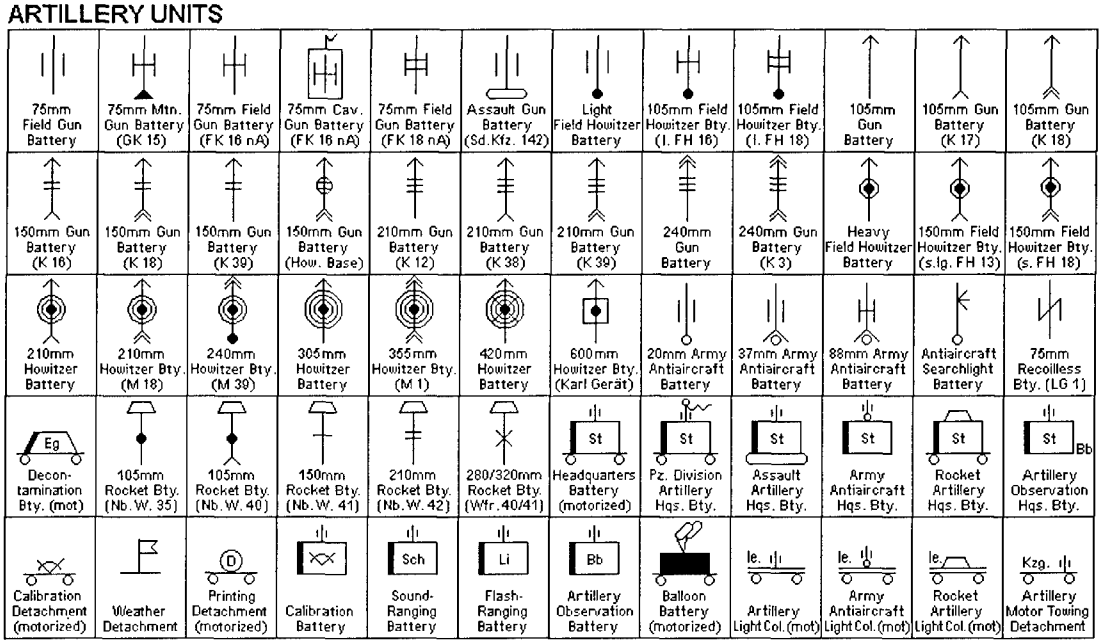
ENGINEER UNITS



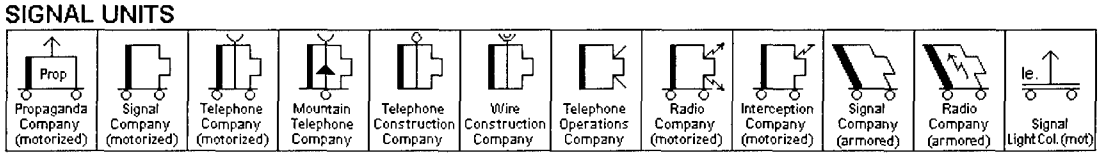
MOBILE TROOPS



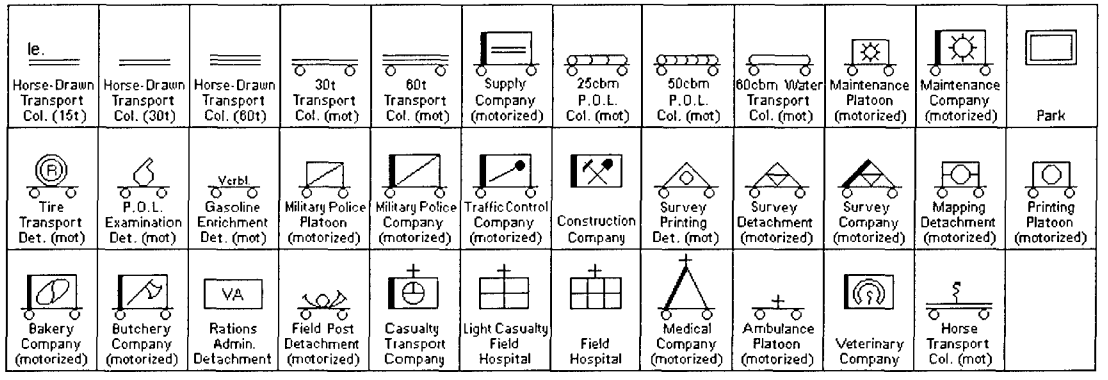
ARTILLERY UNITS



SIGNAL UNITS



REAR ECHELON UNITS



APPENDIX F
GERMAN MINE WARFARE DOCTRINE AND POLICY

Annex 1. Extract from *Ausbildungsvorschrift für die Pioniere, Teil 4b, Minen und Zünder*, H. Dv. 220/4b, 1 October 1939.

Annex 2. Special Orders for Mine and Obstacle Employment from Oberst Hecker and his Staff
- a) New Method of Arranging Minefields ("Mine Boxes")
- b) Special Order for Mine Employment Nr. 8
- c) Special Order For Obstacle Employment Nr. 3

Annex 3. Chapter IV. "Tactics," Section VII. "Minefields," extracted from Handbook on German Military Forces, TM-E 30-451, War Department, Washington, D. C., 15 March 1945.

APPENDIX F, ANNEX 1.

Extract from *Ausbildungsvorschrift für die Pioniere, Teil 4b, Minen und Zünder*, H. Dv. 220/4b, 1 October 1939.

F. Mining of Roads, Paths and Areas

134. For mine obstacles to delay enemy movement **on roads and paths (march obstacles), the following are in effect**:

a) Gravel, asphalt, or concrete roads are only mined where speed and perfect camouflage are possible. These roads can only be obstructed by mining soft shoulders or fair weather paths. There, perfect camouflage is possible. Also with broad roads, these shoulders must suffice.

b) When the mining of paved roads is executed, places with poor paving stones or thin pavement are most favorable. Perfect camouflage is possible here.

c) This mining must not be too dense and must have great depth.

Even 100 meters or more with only one mine has a great effect. With dense employment, the enemy detects them easily, and the mines are quickly found and neutralized.

d) Dummy emplacements are used on this occasion, especially on hard road surfaces, as well as asphalt and concrete roads. The scattering of unarmed mines increases the delay effect.

On the furthest side toward the enemy, unarmed mines are placed for laying.

135. The positioning of mine obstacles on the terrain as tactical obstacles is determined by the situation, mission, site, terrain form, weather, illumination, time, strength, and number of mines more than manner of laying and pattern.

Illustration 71-81, especially 77, 78, and 81 give examples thereof.

The maximum extent for continuous minefields is prescribed:

a) for buried minefields go to Illustration 77,

b) for surface laid minefields 100 meters.

Gaps of 50 paces are directed to be placed between continuous minefields. They serve as protective strips against sympathetic detonation. The gaps are covered by overlapping minefields (see Illustration 78). Prevent the constant use of protective strips against sympathetic detonation as passage lanes through the minefield. The wheel tracks and worn paths can be detected by the enemy and show the way through the minefield.

As more supplies of mines become available, minefields can be reinforced with additional minefields, which can be laid right behind them, for example, a minefield with 1 Tellermine per meter of front can be increased to 2 Tellermines per meter of front.

136. Dimensions for Distances between Mines:

a) For buried camouflaged mines, at least 5 paces (4 meters) from center to center for Tellermines.

b) For surface laid, superficially camouflaged or un-camouflaged mines, at least 10 paces (8 meters) from center to center for Tellermines.

For intact minefields, the probability of effect against motor vehicles of all types is:

2 Tellermines per meter	about 60%
1 Tellermine per meter	about 30%
1 Tellermine per 2 meters	about 15%

137.

a) The form of the squad in combat can be regarded as a prop for the emplacement of mines. Thereby, each man in the 12-man squad is assumed to have 2 Tellermines. The most practical form of emplacement is the "**Mine Pack**" (previously the Rifleman's Pack).

The "**Squad Column**" is the form selected for blocking a hollow or defile.

By giving up minefield depth, the "**Mine Skirmish Line**" (previously the fire skirmish line) swiftly obstructs a wide area.

b) **Measurement of emplacements with the two-meter staff or tape measure is cancelled.** The distance between mines will only be paced, in so far as they are not already given through the battle formations. It is prohibited to emplace Tellermines in depressions (Illustration 24). To begin with, each man lays down his first Tellermine, then he moves the prescribed number of paces forward and to the right (or left) and lays down his second Tellermine. After the

Tellermines have been laid down, the squad leader moves to the front of his minefield and corrects any disparities (for instances, inaccurate pacing between two Tellermines).

c) After emplacing and arming the Tellermines, the Tellermines are buried and camouflaged. The Tellermines are armed on a special order. The arming begins with the Tellermines laid closest to the enemy. As these Tellermines are armed, the men move back, and then the next Tellermines are armed and so on. The arming wires with hook are given to the squad leader. These are **kept** so that later the mines may be removed and **collected**.

138. For standardized training, the following signals are used:

Emplacement of Tellermines-	Squad leader turns his head and thrusts out his arm and thrusts the other arm under it while bending slightly forward with the upper part of the body down (movement of emplacement);
Proceed to the emplacement of the second Tellermine-	Squad leaders thrusts his arm several times high;
Begin Arming-	Squad leader strikes in "Straddle Position"-facing the squad-under forward bend of the upper part of the body with a slight forward extending of the arm between the legs to the rear (movement of arming).

In darkness the same signals are given with a dimmed flashlight.

With the use of a whistle:

Halt!	-1 short whistle,
Lay down Tellermine	-2 short whistles,
Proceed to lay the second Tellermine	-5 short whistles,
Begin arming	-twice alternate a long and a short whistle.

139. In case a squad, due to having to employ a machine gun or casualties, has a strength of less than 12 men, they will begin to emplace on the enemy side a part of each squad minefield in the ordered density (ref. Illustrations 71 & 72), and then proceed to emplace the rest of the 24 Tellermines.

For instance, when a squad is only 9 men strong, it will begin by laying the first 18 Tellermines (each man with 2 Tellermines), while the remaining 6 Tellermines are laid at the appropriate interval and echeloned right (or left) by 3 men (each man with 2 Tellermines).

Legend for Illustrations 71 to 81.[1]

↓=Approach direction of the enemy

X=Pace

•=First Tellermine of each man

O=Second Tellermine of each man

The Tellermines are distinguished because there are no tailor-made symbols, especially for large-scale drawings.

a) **For minefields emplaced in the ground and camouflaged, the center-to-center spacing of the Tellermines is at least 5 paces (4 meters). Only a rough estimate.**

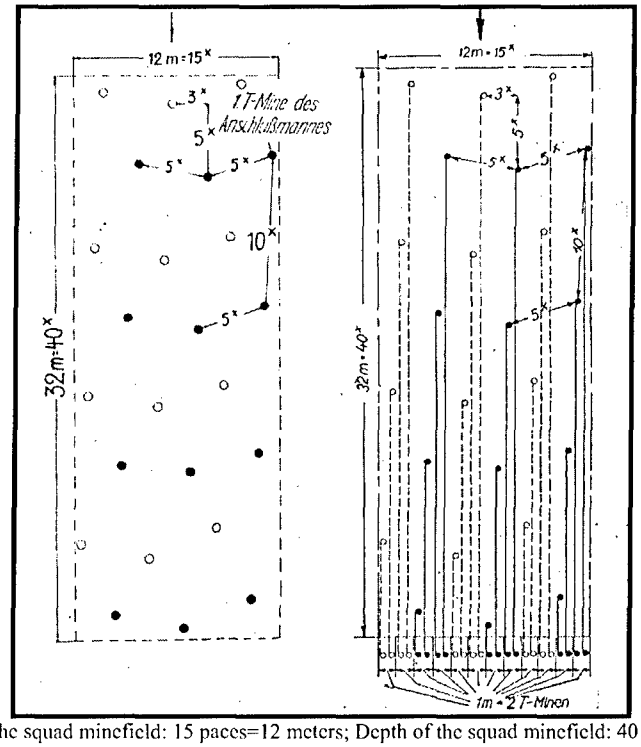
140. Illustrations 71 and 72 show squad minefields, patterns, and **Mine Packet**, in various densities.

Command of the squad leader:

To the left (or right) at five pace interval (laterally between mines) **and ten pace spacing** (longitudinally between soldiers) – **Mine Packet!**

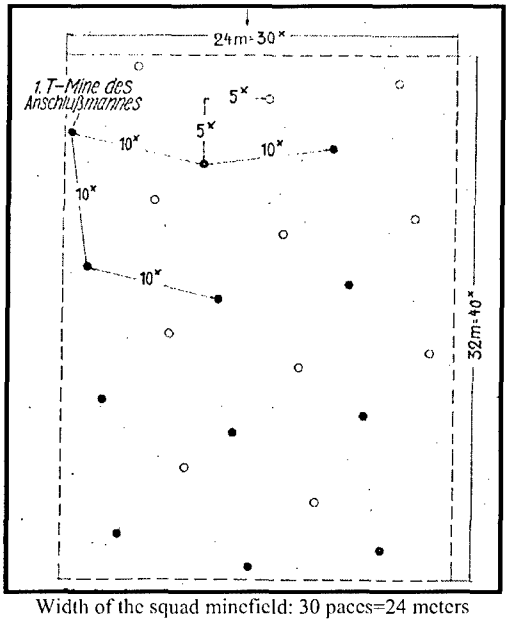
Each man lays his second Tellermine five paces forward and three paces left (or right) of his first Tellermine.

[1] This legend does not apply for registration on maps and mine plans (Illustration 82 (not included)). Therefore refer to Table 4. "Tactical Mine Symbols Etc."



Width of the squad minefield: 15 paces=12 meters; Depth of the squad minefield: 40 paces=32 meters

Illustration 71. **Squad Minefield, 2 Tellermines Per Meter, Laid by One Squad of 12 Men, Each Man with 2 Tellermines**
(Schematic representation, with Tellermines marked in a standard lay out.)



Width of the squad minefield: 30 paces=24 meters
Depth of the squad minefield: 40 paces=32 meters

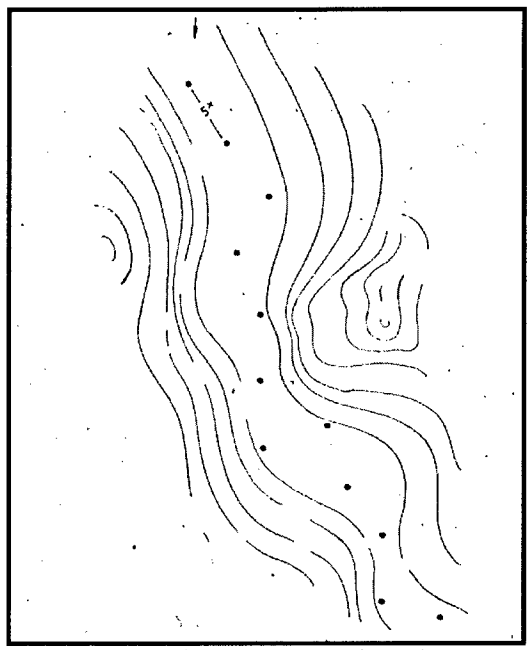
Illustration 72. **Squad Minefield, 1 Tellermine Per Meter, Laid by One Squad of 12 Men, Each Man with 2 Tellermines**

Command of the squad leader:

To the right (or left) at ten pace interval (laterally between mines) **and spacing** (longitudinally between soldiers) – **Mine Packet!**

Each man lays his second Tellermine five paces forward and five paces right (or left) of his first Tellermine.

141. Illustration 73 shows the obstruction of a defile with Tellermines, laid using the **Squad Column**.



Center-to-center spacing between Tellermines at least 5 paces.

Illustration 73. **Obstruction of a Defile with Tellermines, Laid using the Squad Column, by 1 Squad of 12 Men, Each man with 1 Tellermine.**

142. Illustration 74 shows a squad minefield, with the **Mine Skirmish Line** chosen as the configuration.

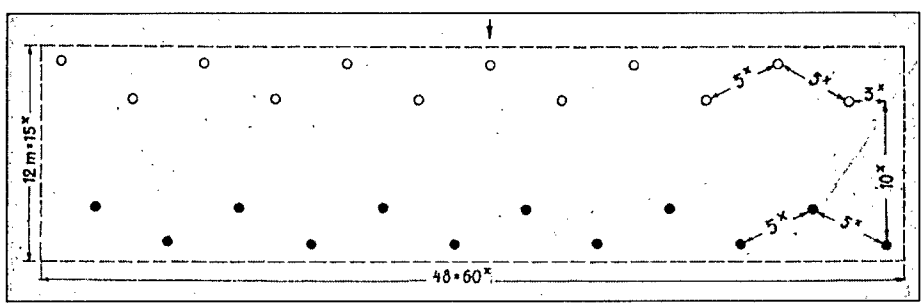


Illustration 74.

Squad Minefield in Mine Skirmish Line Pattern, 1 Tellermine Per 2 Meters, Laid by One Squad of 12 Men, Each Man with 2 Tellermines.

Command: **At Five Pace Interval-Mine Skirmish Line!**

Each man lays his second Tellermine ten paces forward and three paces left (right) of his first Tellermine.

143. Platoon-, company-, etc. minefields are illustrated through setting squad minefields side-by-side and echeloning them in depth, based on purpose, situation and terrain. Illustrations 75 and 76 show platoon minefields, Illustration 77 a company minefield.

Other methods of echeloning are possible; however, care must be taken that the mines along the seam are placed no closer than five paces (4 meters). The squad leader must balance those cases where Tellermines are placed closer than five paces. For this reason, he plans for an interval of 1 meter between individual squad minefields.

Echeloned Right

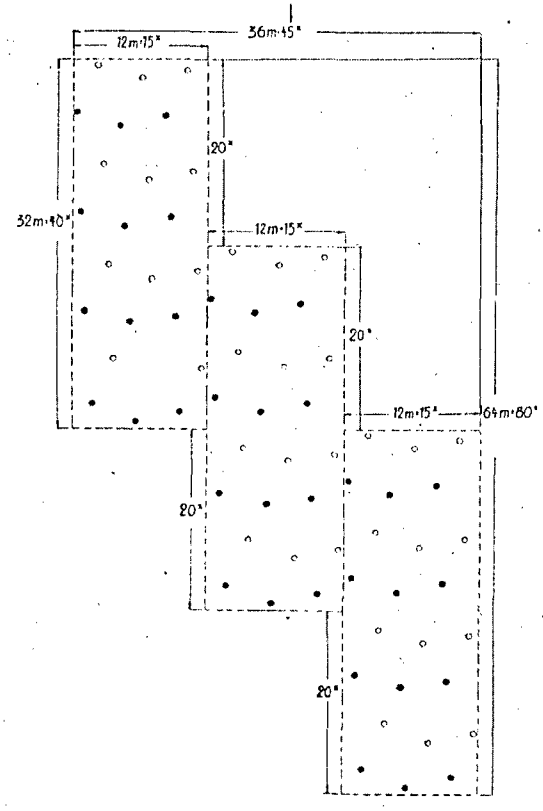


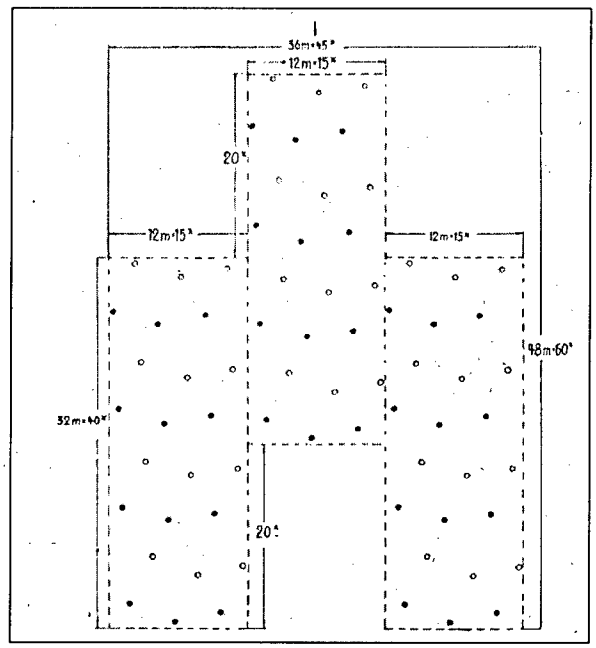
Illustration 75. **Platoon Minefield with 2 Tellermines Per Meter, Laid by 1 Platoon of 36 Men, Each Man with 2 Tellermines.**

Side-by-side placement of minefields results in the following widths:

	Platoon	**Company**
2 Tellermines per meter	45 paces=36 meter wide	135 paces=108 meter wide
1 Tellermine per meter	90 paces=72 meter wide	270 paces=216 meter wide

Illustration 75 (cont'd).

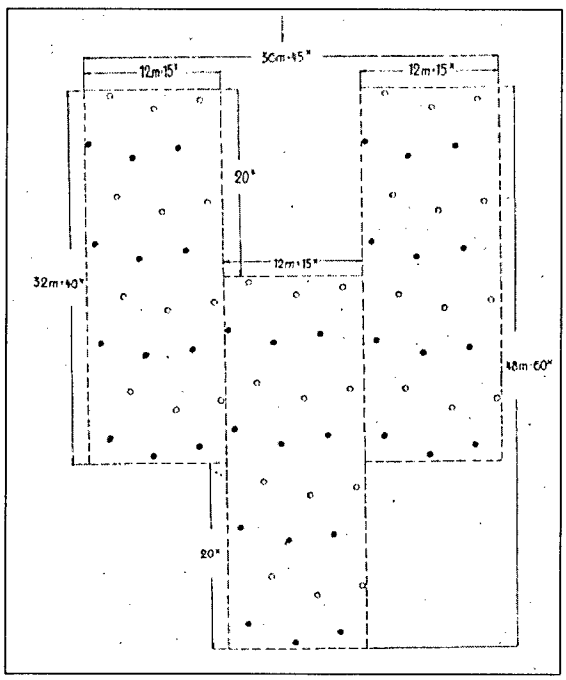
Platoon Wedge.



The same level for the rearward squad is not necessary.

Illustration 75 (cont'd).

Platoon Broad Wedge.



The same level for the forward squad is not necessary.

Echeloned Right

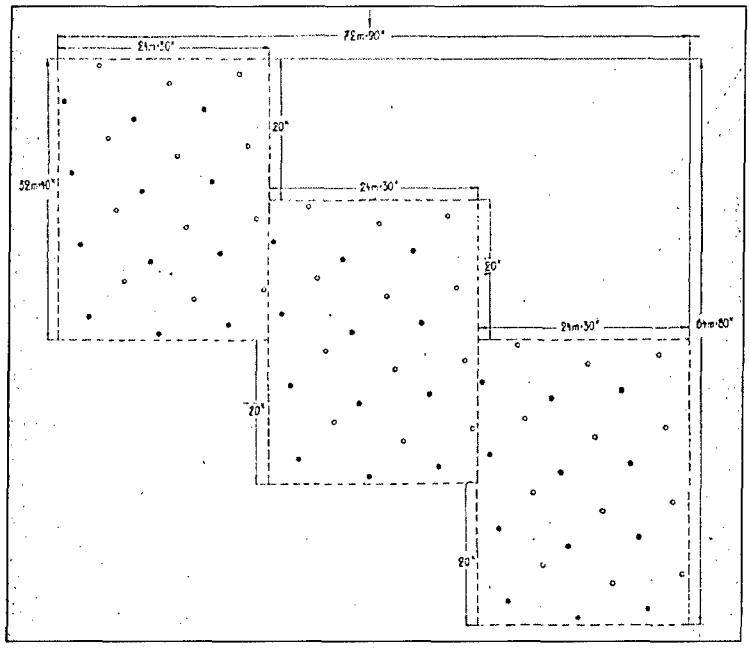
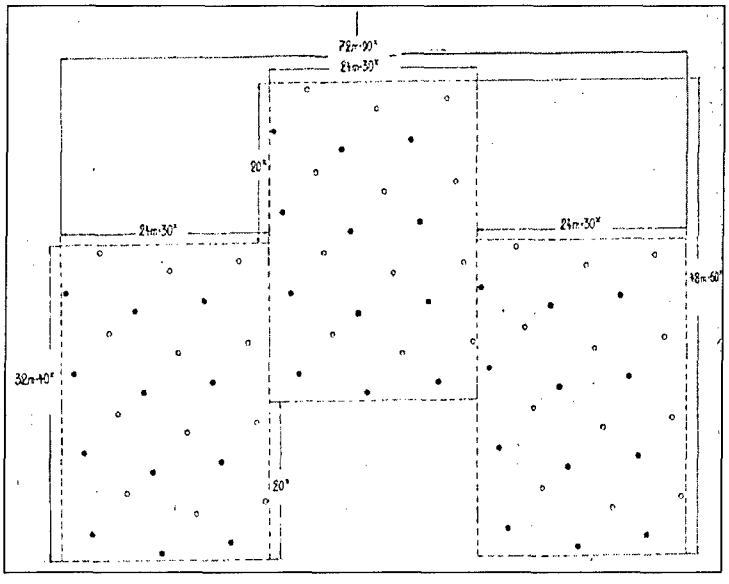


Illustration 76. **Platoon Minefield, 1 Tellermine Per Meter, Laid by 1 Platoon of 36 Men, Each Man with 2 Tellermines**

Illustration 76 (cont'd).

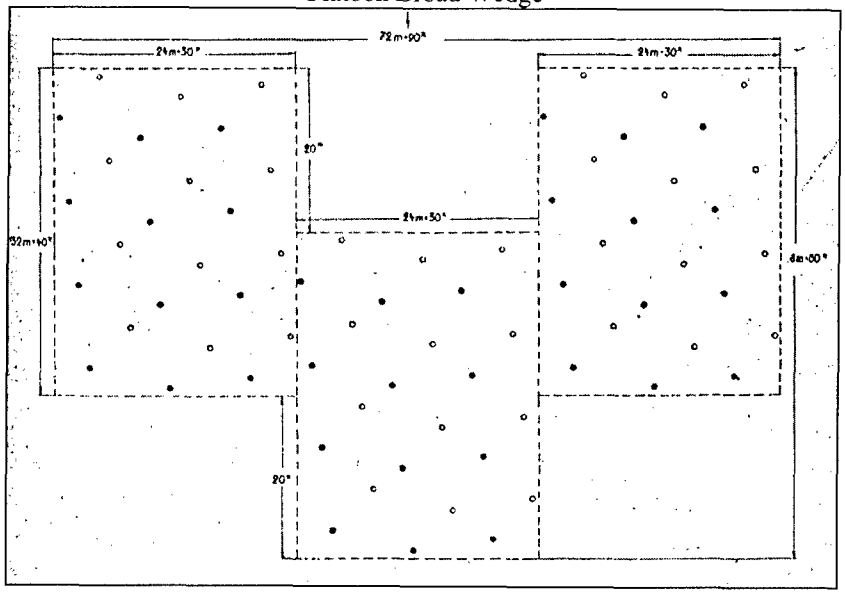
Platoon Wedge



The same level for the rearward squad is not necessary.

Illustration 76 (cont'd)

Platoon Broad Wedge



The same level for the forward squad is not necessary.

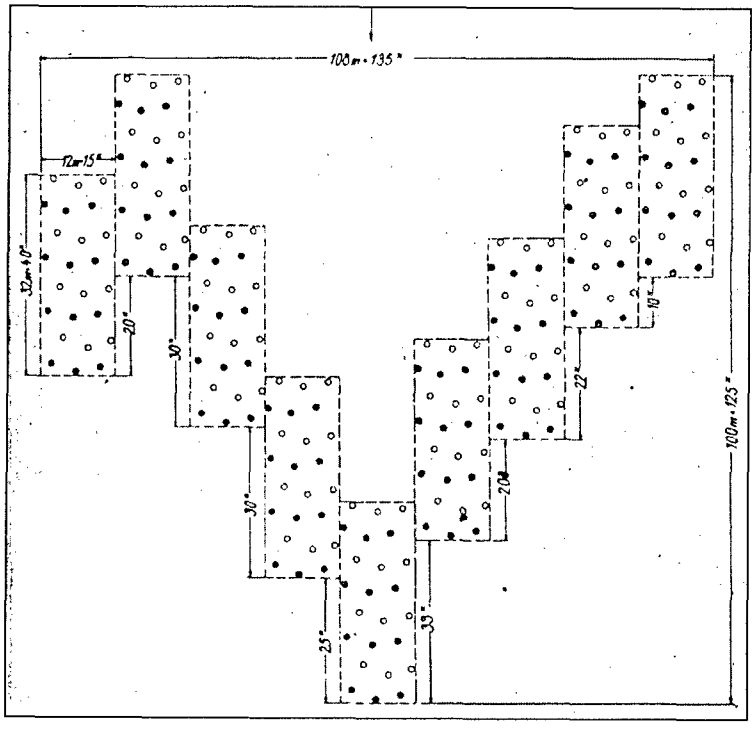


Illustration 77. **Company Minefield, 2 Tellermines Per Meter, Laid by 1 Company of 108 Men, Each Man with 2 Tellermines**

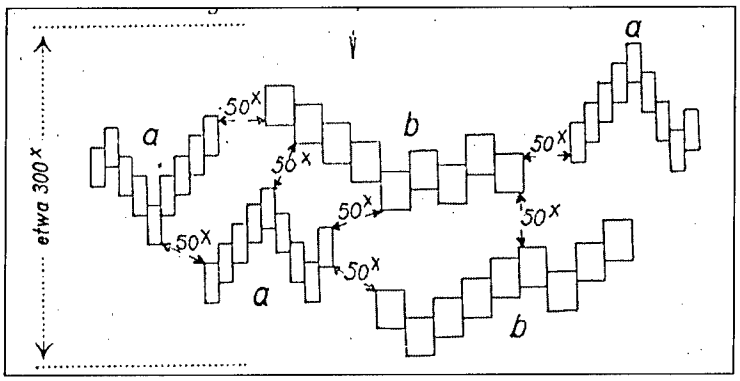
3rd Platoon:	2nd Platoon	1st Platoon
Platoon Wedge	Platoon Broad Wedge	Echelon Left

Advantages of Echeloning:

a) Makes reconnaissance difficult
b) Artillery effectiveness reduced
c) Slight risk of sympathetic detonation by very large explosive charges (refer to figure 151 (not included)).

If a minefield was emplaced according to Illustration 77 with 1 Tellermine per meter, then the combined width is 216 meters.

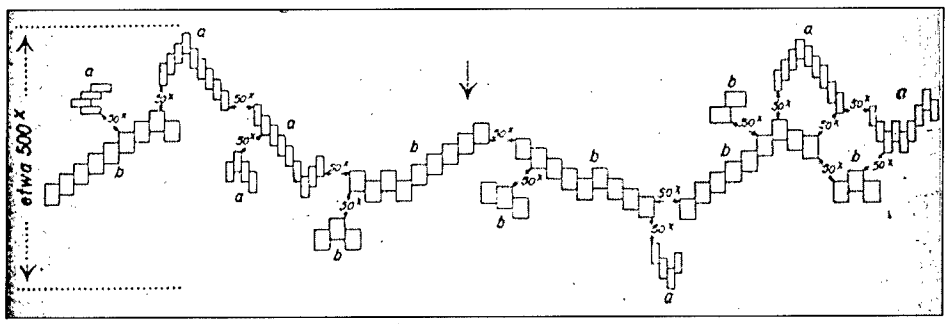
a) Camouflaged company minefield that is laid with a protective strip through company minefields.



a=minefields with 2 Tellermines per meter.
b=minefields with 1 Tellermine per meter.

Illustration 78. **Example of a Minefield with a Protective Strip to Counter Sympathetic Detonation.**

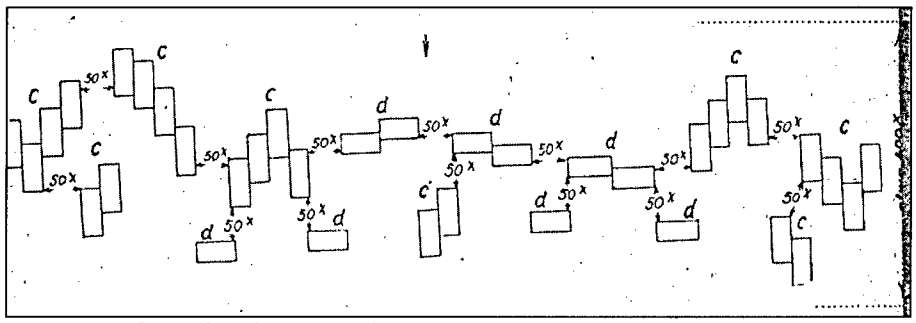
b) Camouflaged company minefield that is laid with a protective strip through camouflaged squad minefields.



a=minefields with 2 Tellermines per meter.
b=minefields with 1 Tellermine per meter.

Illustration 78 (cont'd)

c) Surface laid minefield with a protective strip through surface laid squad minefields.



c=surface laid minefields with 1 Tellermines per meter, according to Illustration 79.
d=surface laid minefields with 1 Tellermine per 2 meter, according to Illustration 80.

b) Surface laid Tellermines (superficially camouflaged or un-camouflaged) emplaced by pioneer reserves in snow and frost as well as a rapid counter against an armored attack in the depth of the main battle area for instance. The center-to-center spacing of the Tellermines is at least 10 paces (8 meters).

144. For the rapid emplacement of surface laid Tellermines, the following configurations are practical:
a) Emplacement from march order (Illustration 79),
b) Emplacement by a line of 2 ranks (Illustration 80).

145. The minefield from march order is emplaced upon the command:

Mine Emplacement from March Order! On whistle or hand signal.

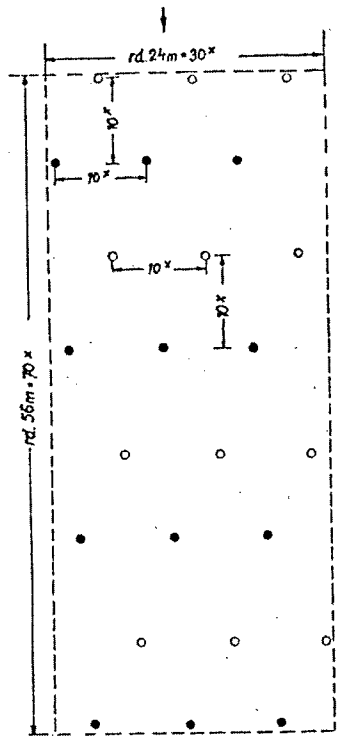


Illustration 79. **Teller minefield Surface Laid by 1 Squad (12 Men), Each Man with 2 Tellermines, 1 Tellermine Per Meter of Front.**

For drill practice:

I. **Squad X 10-pace interval** (to right (or left) or to right and left).

II. **1st rank 60 paces forward,**
2nd rank 40 paces forward,
3rd rank 20 paces forward
4th rank remains standing.

III. **1st rank remain standing,**
2nd rank 1 pace to the right,
3rd rank 3 paces to the right
4th rank 4 paces to the right.

IV. **Each man lays his first Tellermine and places in it an armed Tellermine fuze.**

V. **All 10 paces forward, 5 paces to the right.**

VI. **Each man lays his second Tellermine and places in it an armed Tellermine fuze.**

On order, the first rank arms the Tellermines laid closest to the enemy, the 2nd rank arms the Tellermines and moves back and so on.

A second squad employed behind the first, results in a minefield with 2 Tellermines per meter.

146. In the platoon and company, squads are placed side-by-side, without echeloning, so that a platoon front is 90 paces (72 meters) and a company front is 270 paces (216 meters). The density of the fields is 1 Tellermine per meter of front.

Deep echeloning, for example the employment of one company behind another, results in a minefield with 2 Tellermines per meter of the current front.

147. The minefield from the line in 2 ranks on the command:

Mine laying from the line in 2 ranks! By whistle or hand signal.

For drill practice:

I. **Both ranks at 10 pace interval** (to right (or left) or in combination with adjacent man to right or left)

II. **1st rank 20 paces forward, 2nd rank 5 paces to the right.**

III. **Each man lays his first Tellermine and places in it an armed Tellermine fuze.**

IV. **Both ranks 10 paces forward, 3 paces to the right.**

V. **Each man lays his second Tellermine and places in it an armed Tellermine fuze.**

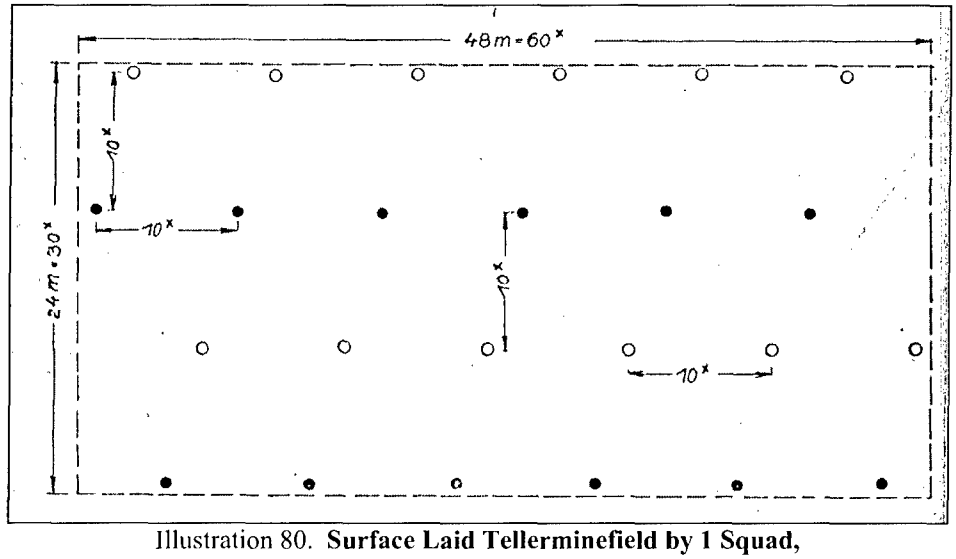


Illustration 80. **Surface Laid Tellerminefield by 1 Squad, Each Man with 2 Tellermines, 1 Tellermine Per 2 Meters of Front**

Arming will be on order. The 1st rank will begin with the Tellermines laid closest to the enemy, the 2nd rank arms their first mine when the 1st rank arms their second Tellermine and is moving back.

Two squads placed one behind the other; result in a minefield with 1 Tellermine per meter of front.

In a platoon and company, with squads placed side-by-side, free of echeloning, results in a platoon front of 180 paces (144 meters) and a company front of 540 paces (432 meters). The density of the minefield: 1 Tellermine per 2 meters of front.

Deep echeloning (with two companies placed one behind the other) results in a minefield of 1 Tellermine per meter of the current front.

148. Illustration 81 shows a surface laid company minefield with various emplacement configurations applied.

Also, using the squad configurations in the buried minefield in Illustrations 71 and 72, it is possible to follow Illustration 81. With the buried configurations, reduce the spacing appropriately.

This minefield, with both surface-laid and buried mines, has the fewest risks against the destructive effects of bombs, artillery shells and explosive charges.

(The following pages (95-116) have been extracted from the German Warfare Doctrine)

F. Verminen von Straßen, Wegen und Gelände.

134. Für Minensperren, die zur Verzögerung feindlicher Bewegungen **auf Straßen und Wegen dienen (Marschsperren), gilt folgendes:**

a) Schotter-, Asphalt- oder Betonstraßen werden nur dort vermint, wo schnelle und einwandfreie Tarnung möglich ist. In der Regel können diese Straßen nur an den nicht befestigten Randstreifen oder auf Sommerwegen vermint werden. Dort ist einwandfreie Tarnung möglich. Auch bei breiten Straßen werden diese Ränder benutzt.

b) Verminung von gepflasterten Straßen ist auszuführen. Am günstigsten ist schlechtes Kopfstein- und Kleinpflaster. Hier ist einwandfreie Tarnung möglich.

c) Diese Verminungen dürfen nicht zu dicht sein und müssen große Tiefe haben.

Selbst auf je 100 m und darüber nur eine Mine hat große Wirkung. Bei zu dichtem Einsatz, der feindliches Spüren erleichtert, werden Minen rasch gefunden und unschädlich gemacht.

d) Scheinanlagen sind hierbei anzuwenden, besonders auf festen Straßendecken, auch auf Asphalt- und Betonstraßen. Einstreuen von scharfen Minen erhöht die verzögernde Wirkung.

Am weitesten feindwärts sind stets scharfe Minen zu verlegen.

135. Beim Anlegen von **Minensperren im Gelände** als Gefechtssperren entscheiden Lage, Auftrag, Gelände, Bodenform, Bodenart, Wetter, Beleuchtung, Zeit, Kräfte und Minenzahl über Verlegungsart und -form.

Die Bilder 71—81, insbesondere 77, 78 und 81, geben Beispiele dafür.

Für zusammenhängende Minenfelder ist dabei als Höchstmaß der Ausdehnung vorgeschrieben:

a) für im Boden verlegte Minenfelder nach Bild 77,

b) für offen verlegte Minenfelder 100 m.

Zwischen zusammenhängenden Minenfeldern sind Gassen von 50 Schritt Abstand und Zwischenraum anzuordnen. Sie dienen als Schutzstreifen gegen Zerknallübertragung. Die Gassen werden durch auf Lücke verlegte Minenfelder gedeckt (s. Bild 78).

Zu unterbinden ist, daß die Schutzstreifen gegen Zerknallübertragung ständig als Gassen durch das Minenfeld benutzt werden, da sonst entstandene Wagenspuren und Trampelpfade dem Gegner den Weg durch das Minenfeld zeigen.

Minenfelder können bei später eintreffendem Minennachschub durch Anlegen eines weiteren Minenfeldes, hinter dem bereits verlegten „treffenweise" gestaffelt, verstärkt werden, z. B. ein Minenfeld, das bisher nur eine T-Mine auf 1 lfd. m der Breite des Minenfeldes aufwies, zu einem solchen mit zwei T-Minen auf 1 m.

136. Maße für Abstände von Minen:

a) Für im Boden verlegte getarnte Minen von Mitte zu Mitte T-Mine mindestens 5 Schritt = 4 m.

b) Für offen verlegte, flüchtig getarnte oder ungetarnte Minen von Mitte zu Mitte T-Mine mindestens 10 Schritt = 8 m.

Wirkung gegen Fahrzeuge aller Art (Wahrscheinlichkeitswerte) bei unzerstörten Minenfeldern:

2 T-Minen auf 1 m rd. 60 %,
1 T-Mine auf 1 m rd. 30 %,
1 T-Mine auf 2 m rd. 15 %.

137. a) Für das Verlegen der Minen gelten die Formen der Gruppe im Gefecht als Anhalt. Dabei ist die Gruppe zu 12 Mann angenommen, jeder Mann 2 T-Minen. Zweckmäßigste Form für das Verlegen ist das **„Minenrudel"** (früher Schützenrudel).

Zum Sperren einer Mulde oder eines Hohlweges wird als Verlegungsform die **„Schützenreihe"** gewählt.

Sind unter **Verzicht auf Tiefe** des Minenfeldes rasch breite Räume zu sperren, wird die **„Minenkette"** (früher Feuerkette) genommen.

b) **Messen mit dem Zweimeterstab oder Bandmaß beim Verlegen entfällt.** Die Entfernungen zwischen den Minen werden nur abgeschritten, soweit sie nicht bereits durch die Gefechtsform gegeben sind. Beim Verlegen ist darauf zu achten, daß die T-Minen nicht in kurze Geländevertiefungen (Bild 24) gelegt werden. Jeder Mann legt zunächst seine 1. T-Mine ab, geht dann die befohlene Schrittzahl vor und nach rechts (links) und legt seine 2. T-Mine ab. Nach dem Ablegen der T-Minen geht der Gruppenführer die Front seines Gruppenminenfeldes ab und läßt etwaige Unstimmigkeiten (z. B. wenn sich infolge ungenauen Abschreitens zwei T-Minen decken) ausgleichen.

c) Nach dem Ablegen werden die T-Minenzünder aller T-Minen auf „S c h a r f" gestellt, die T-Minen werden eingegraben und getarnt. Entsichert werden die T-Minen erst auf besonderen Befehl. Mit dem Entsichern wird bei den am weitesten feindwärts verlegten T-Minen begonnen. Sind diese T-Minen entsichert, gehen die Leute zurück, erst dann werden die nächsten T-Minen entsichert usw. Die Entsicherungsdrähte mit Haken sind dem Gruppenführer abzugeben. Sie sind für spätere Aufnehmen der Minen zu **sammeln** und **aufzubewahren.**

BREACHING THE "DEVIL'S GARDEN" Operation Lighfoot F-15

138. Zur einheitlichen Ausbildung werden folgende Zeichen eingeführt:

Ablegen der T-Minen — Gruppenführer winkelt — Gesicht zur Gruppe — den Arm an und stößt ihn unter leichtem Vorwärtsbeugen des Oberkörpers nach unten (Bewegung des Ablegens);

Vorgehen zum Verlegen der zweiten T-Mine — Gruppenführer stößt den Arm mehrmals hoch;

Beginn des Entsicherns — Gruppenführer schlägt in Seitgrätschstellung — Gesicht zur Gruppe — unter Vorwärtsbeugen des Oberkörpers den leicht vorwärts gestreckten Arm zwischen die Beine nach rückwärts (Bewegung des Entsicherns).

Bei Dunkelheit werden die gleichen Zeichen mit abgeblendeter Taschenlampe gegeben.

Bei Anwendung von Pfiffen:

Halt! — 1 kurzer Pfiff,
Ablegen der T-Minen — 2 kurze Pfiffe,
Vorgehen zum Verlegen der zweiten T-Mine — 5 kurze Pfiffe,
Beginn des Entsicherns — zweimal abwechselnd ein kurzer u. ein langer Pfiff.

139. Falls die Gruppen bei Einsatz des l. MG.-Trupps oder bei Verlusten nicht mehr 12 Mann stark sind, wird zunächst der feindwärtige Teil jedes Gruppenminenfeldes in der befohlenen Dichte (vgl. Bilder 71 und 72) verlegt; die an der Zahl 24 fehlenden T-Minen werden nachträglich verlegt.

Wenn also z. B. die Gruppe nur noch 9 Mann stark ist, werden zunächst die ersten 18 T-Minen (je Mann 2 T-Minen) verlegt, während die restlichen 6 T-Minen von 3 Mann (je Mann 2 T-Minen), in entsprechenden Abständen und Zwischenräumen rechts (links) gestaffelt, nachträglich verlegt werden.

Zeichenerklärung für die Bilder 71 bis 81[1]).

↓ = Anmarschrichtung des Feindes,
× = Schritt,
● = erste T-Mine jedes Mannes,
○ = zweite T-Mine jedes Mannes.

Die T-Minen sind der Deutlichkeit wegen nicht maßstabgerecht, sondern größer gezeichnet.

a) Minenfelder, im Erdboden getarnt verlegt. Entfernung von Mitte zu Mitte T-Mine mindestens 5 Schritt = 4 m.

Nur Anhalt.

140. Die Bilder 71 und 72 zeigen Gruppenminenfelder, Verlegungsform, **Minenrudel,** in verschiedener Dichte.

Kommando des Gruppenführers:

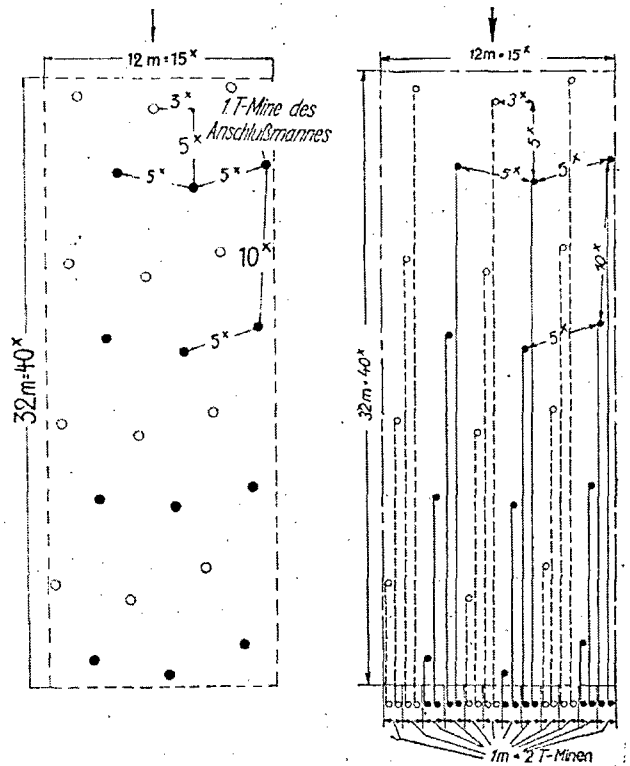
Nach links (rechts) mit fünf Schritt Zwischenraum und zehn Schritt Abstand — Minenrudel!

Jeder Mann verlegt seine zweite T-Mine fünf Schritt vorwärts, drei Schritt links (rechts) seitwärts seiner ersten T-Mine.

[1]) Die Zeichenerklärung gilt nicht für Eintragungen in Karten- und Minenplänen (Bild 82). Hierzu vgl. Tafel 4 „Taktische Minenzeichen usw.".

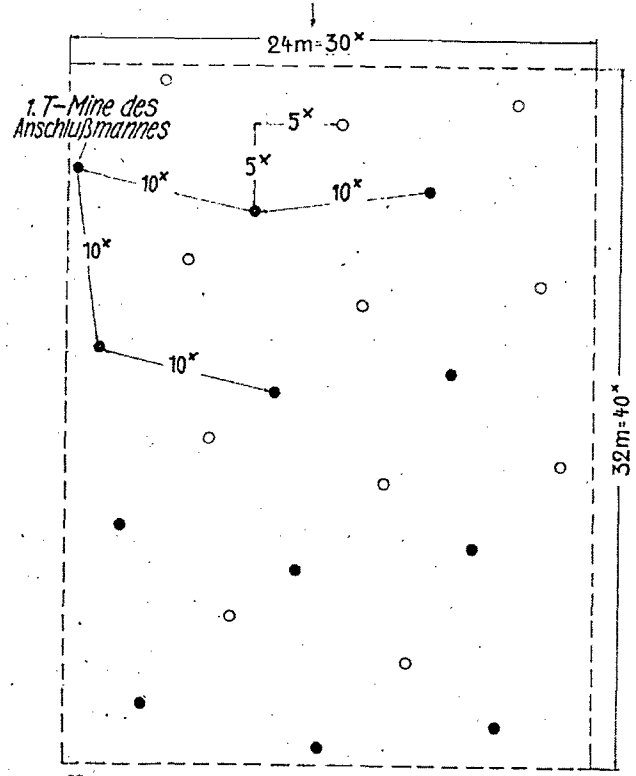
Bild 71.
Gruppenminenfeld, 2 T-Minen auf 1 m, verlegt von 1 Gruppe zu 12 Mann, je Mann 2 T-Minen.

Schematische Darstellung, bei der die T-Minen maßstabsgerecht gezeichnet sind.



Breite des Gruppenminenfeldes: 15× = 12 m.
Tiefe des Gruppenminenfeldes: 40× = 32 m.

Bild 72. **Gruppenminenfeld, 1 T-Mine auf 1 m, verlegt von 1 Gruppe zu 12 Mann, je Mann 2 T-Minen.**



Breite des Gruppenminenfeldes: 30× = 24 m.
Tiefe des Gruppenminenfeldes: 40× = 32 m.

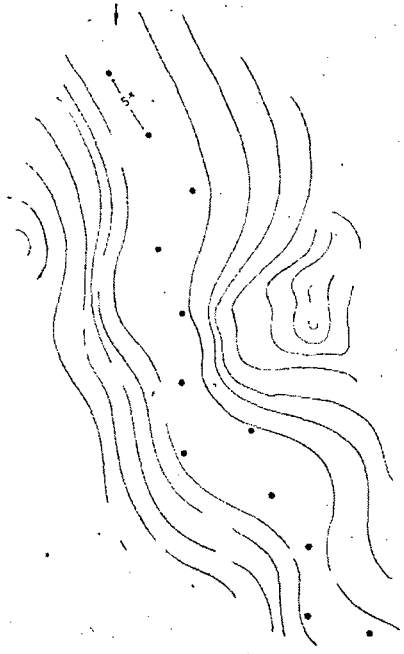
Kommando des Gruppenführers:
Nach rechts (links) mit zehn Schritt Zwischenraum und Abstand — Minenrudel!

Jeder Mann verlegt seine zweite T-Mine fünf Schritt vorwärts, fünf Schritt rechts (links) seitwärts seiner ersten T-Mine.

141. Bild 73 zeigt das Sperren einer Mulde durch T-Minen, die aus der **Schützenreihe** verlegt sind.

Bild 73.

Sperren einer Mulde durch T-Minen, aus der Schützenreihe verlegt von 1 Gruppe zu 12 Mann, je Mann 1 T-Mine.

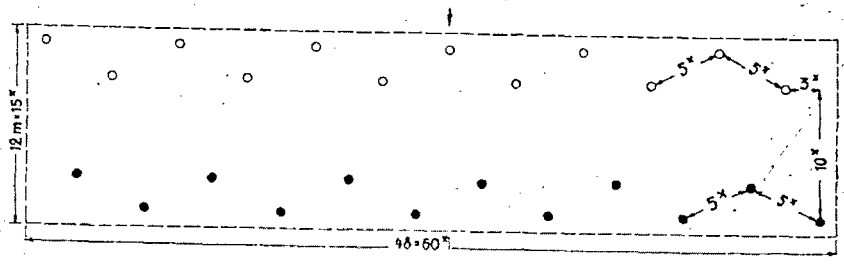


Abstand von Mitte T-Mine zu Mitte T-Mine mindestens 5 Schritt.

142. Bild 74 zeigt ein Gruppenminenfeld, bei dem als Verlegungsform die **Minenkette** gewählt ist.

Bild 74.

Gruppenminenfeld in Minenkettenform, 1 T-Mine auf 2 m, verlegt von einer Gruppe zu 12 Mann, je Mann 2 T-Minen.



Kommando: **Fünf Schritt Zwischenraum — Minenkette!**

Jeder Mann verlegt seine zweite T-Mine zehn Schritt vorwärts, drei Schritt links (rechts) seitwärts seiner ersten T-Mine.

143. Zug-, Kompanie- usw. Minenfelder werden gebildet durch Nebeneinandersetzen dieser Gruppenminenfelder und Staffelung nach der Tiefe, je nach Zweck, Lage und Gelände. Die Bilder 75 und 76 zeigen Zugminenfelder, Bild 77 ein Kompanieminenfeld.

Jede andere Art der Staffelung ist möglich; nur muß stets darauf geachtet werden, daß an den Nahtstellen die T-Minen nicht dichter als fünf Schritt = 4 m aneinanderliegen. Erforderlichenfalls muß dies durch die Gruppenführer ausgeglichen werden. Daß die T-Minen an den Nahtstellen näher als fünf Schritt = 4 m aneinanderliegen, läßt sich auch da-

durch vermeiden, daß zwischen den einzelnen Gruppenminenfeldern von vornherein 1 m Zwischenraum vorgesehen wird.

Staffelung rechts.

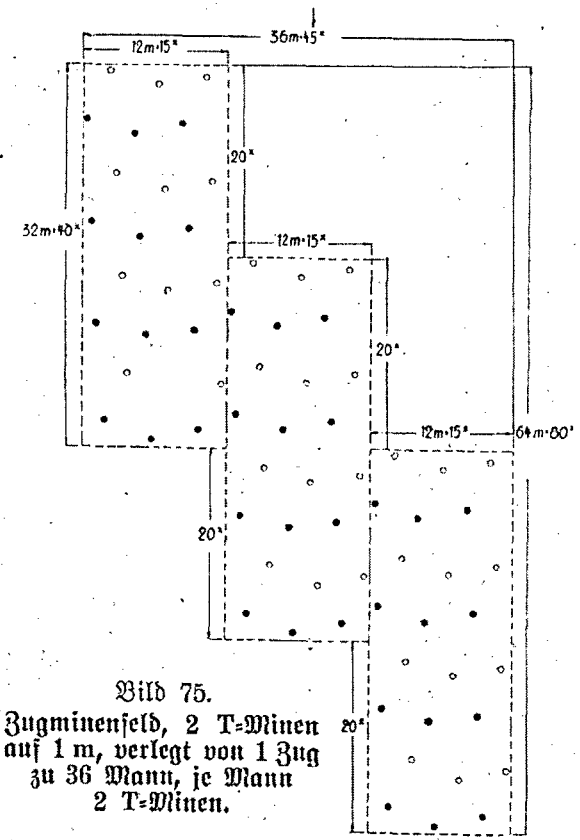


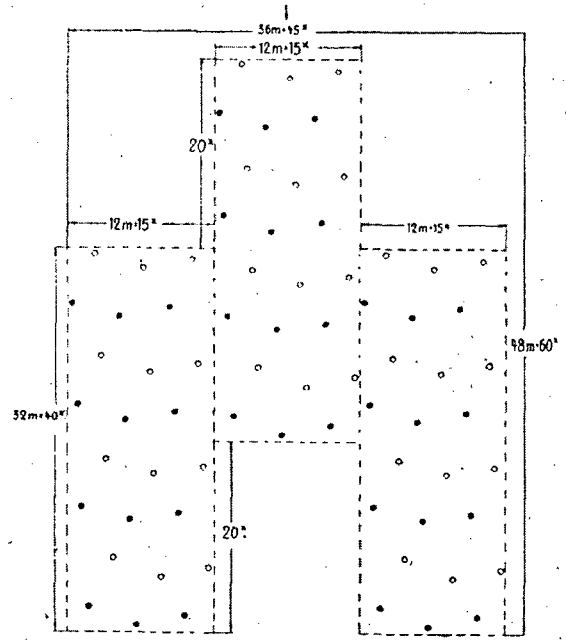
Bild 75.
Zugminenfeld, 2 T-Minen auf 1 m, verlegt von 1 Zug zu 36 Mann, je Mann 2 T-Minen.

Durch das Nebeneinandersetzen ergeben sich Minenfelder in folgenden Breiten:

	Zug	Kompanie
2 T-Minen auf 1 m	45 × = 36 m breit	135 × = 108 m breit.
1 T-Mine auf 1 m	90 × = 72 m breit	270 × = 216 m breit.

Noch Bild 75.

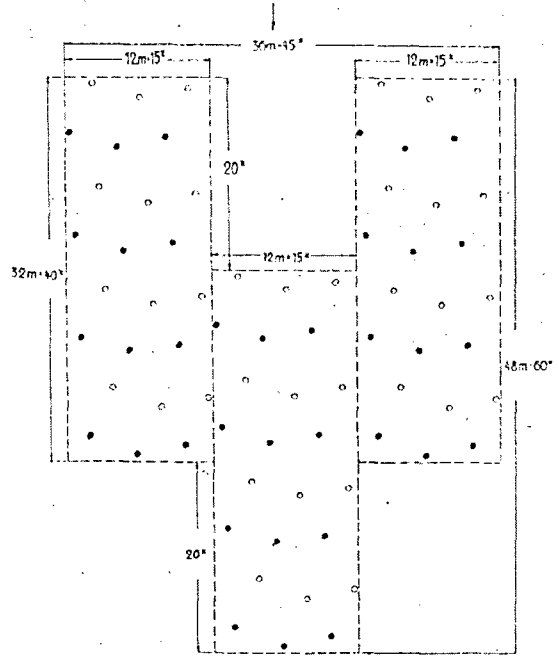
Zugkeil.



Gleiche Höhe der hinteren Gruppen ist nicht erforderlich.

Noch Bild 75.

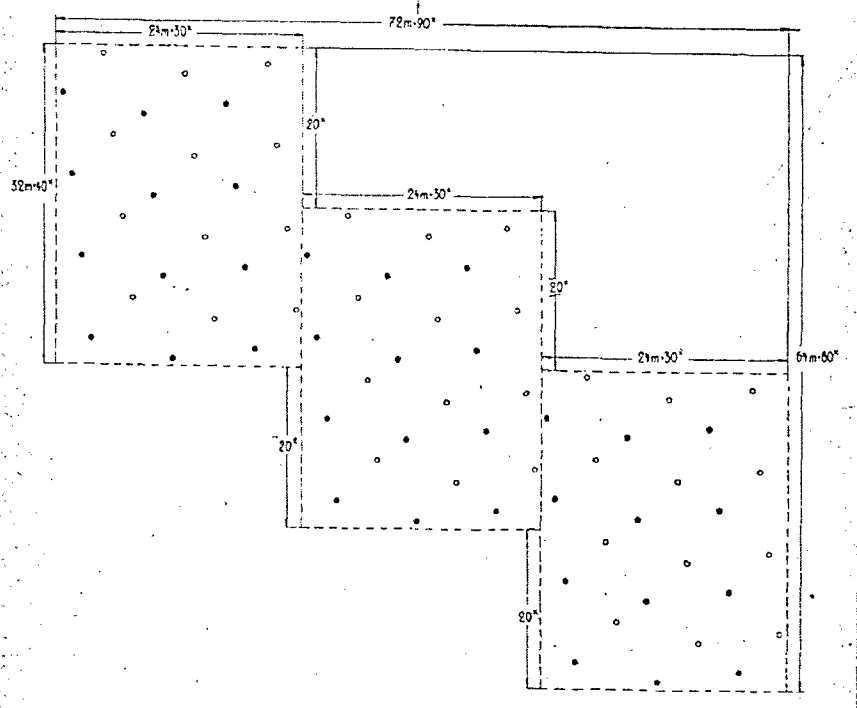
Zugbreitkeil.



Gleiche Höhe der vorderen Gruppen ist nicht erforderlich.

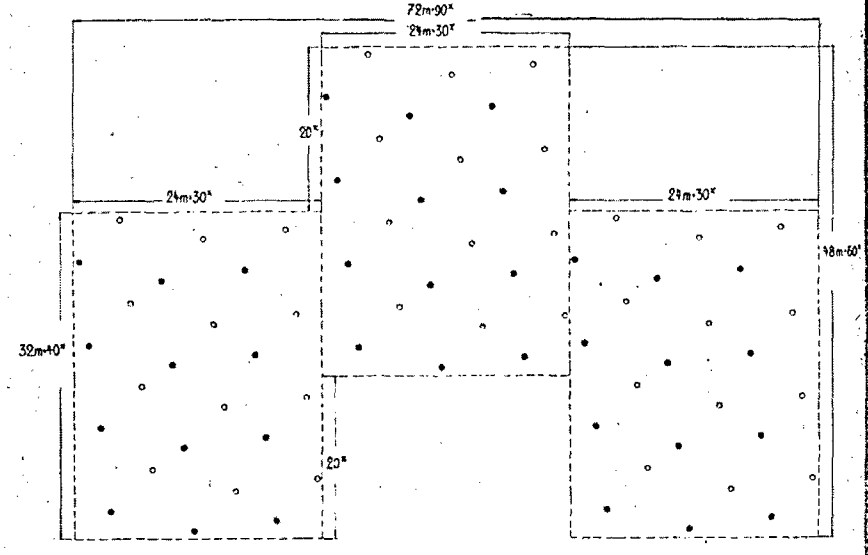
Bild 76.
Zugminenfeld, 1 T-Mine auf 1 m, verlegt von 1 Zug zu 36 Mann, je Mann 2 T-Minen.

Staffelung rechts.



Noch Bild 76.

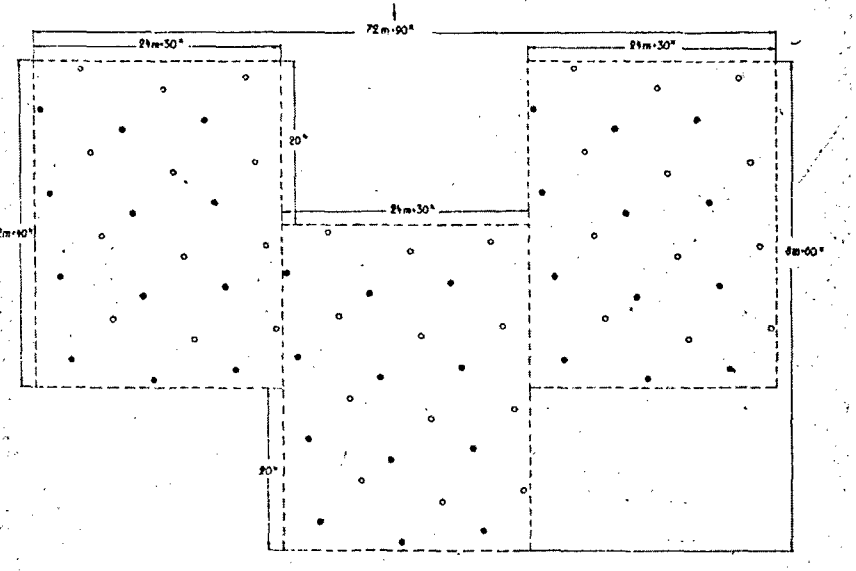
Zugkeil.



Gleiche Höhe der hinteren Gruppen ist nicht erforderlich.

Noch Bild 76.

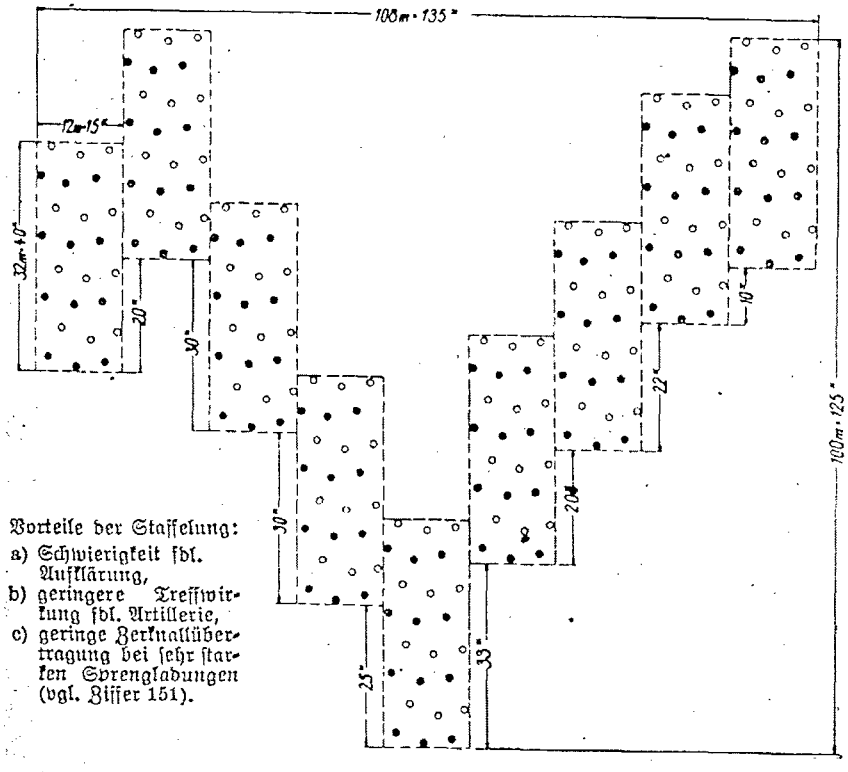
Zugbreitkeil.



Gleiche Höhe der vorderen Gruppen ist nicht erforderlich.

Bild 77.
Kompanieminenfeld, 2 T-Minen auf 1 m, verlegt von 1 Kompanie zu 108 Mann, je Mann 2 T-Minen.

3. Zug: Zugkeil. 2. Zug: Zugbreitkeil. 1. Zug: Staffelung links.

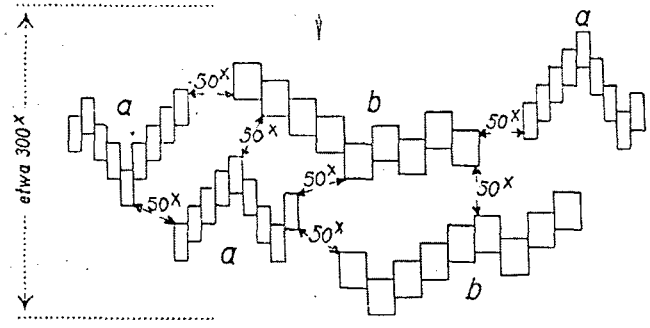


Vorteile der Staffelung:
a) Schwierigkeit fdl. Aufklärung,
b) geringere Treffwirkung fdl. Artillerie,
c) geringe Zerknallübertragung bei sehr starken Sprengladungen (vgl. Ziffer 151).

Wird ein Minenfeld nach Bild 77 mit 1 T-Mine auf 1 m verlegt, dann sind als Gesamtbreitenmaß 216 m in zusammenhängender Form zulässig.

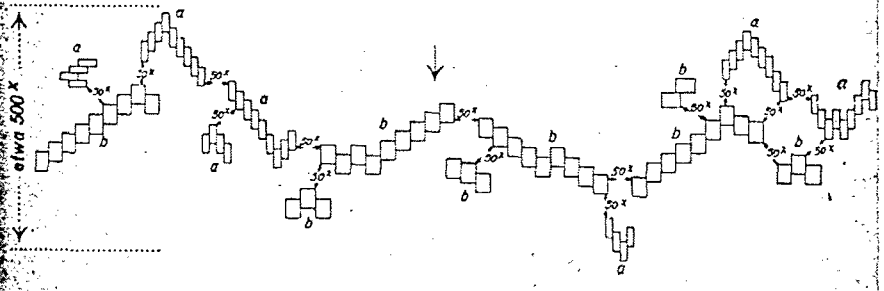
Bild 78.
Beispiele für Minenfelder mit Schutzstreifen gegen Zerknallübertragung.

a) Kompanieminenfelder getarnt verlegt, Deckung der Schutzstreifen durch getarnt verlegte Kompanieminenfelder.



a = Minenfelder, 2 T-Minen auf 1 m.
b = Minenfelder, 1 T-Mine auf 1 m.

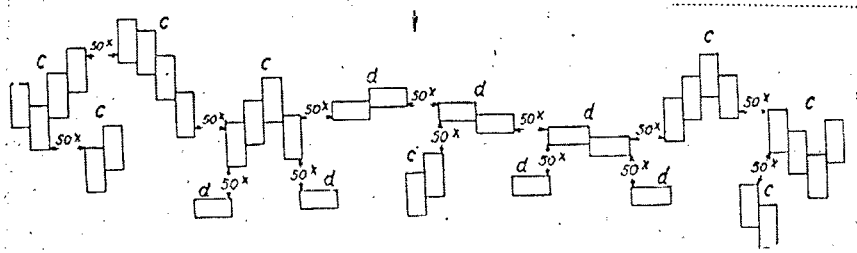
b) Kompanieminenfelder getarnt verlegt, Deckung der Schutzstreifen durch getarnt verlegte Gruppenminenfelder.



a = Minenfelder, 2 T-Minen auf 1 m.
b = Minenfelder, 1 T-Mine auf 1 m.

Noch Bild 78.

c) Minenfelder offen verlegt, Deckung der Schutzstreifen durch offen verlegte Gruppenminenfelder.



c = offen verlegte Minenfelder, 1 T-Mine auf 1 m, nach Bild 79.

d = offen verlegte Minenfelder, 1 T-Mine auf 2 m, nach Bild 80.

Teilbl. 2.

b) Offenes Verlegen von T-Minen (flüchtig getarnt oder ungetarnt) bei Schnee und Frost sowie zur raschen Abwehr eines erkannten Panzerangriffs z. B. in der Tiefe eines Hauptkampffeldes durch Pionierreserven. Entfernung von Mitte T-Mine zu Mitte T-Mine mindestens 10 Schritt = 8 m.

144. Für das rasche offene Verlegen von T-Minen sind folgende Formen zweckmäßig:

a) Verlegen aus der Marschordnung (Bild 79),

b) Verlegen aus der Linie zu 2 Gliedern (Bild 80).

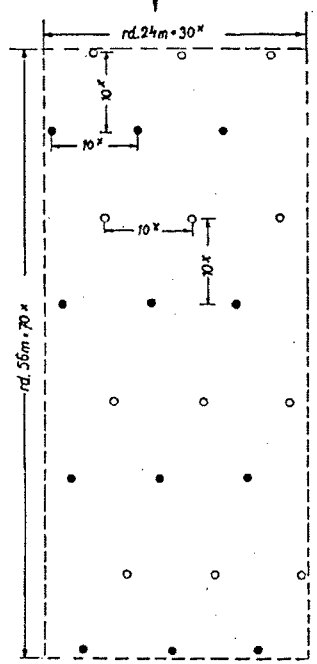
145. Das Minenfeld wird aus der Marschordnung auf das Kommando:

Minenverlegen aus der Marschordnung!

auf Pfiffe oder Zeichen verlegt.

Bild 79.

T-Minenfeld offen verlegt von 1 Gruppe (12 Mann), je Mann 2 T-Minen, je 1 m Frontbreite 1 T-Mine.



Hierzu ist drillmäßig zu üben:

I. **Gruppe X 10 Schritt Zwischenraum** (nach rechts [links] oder nach rechts und links).

II. **1. Glied 60 Schritt vorwärts,**
2. Glied 40 Schritt vorwärts,
3. Glied 20 Schritt vorwärts,
4. Glied bleibt stehen.

BREACHING THE "DEVIL'S GARDEN" Operation Lightfoot F-23

III. **1. Glied bleibt stehen,**
2. Glied 1 Schritt nach rechts,
3. Glied 3 Schritt nach rechts,
4. Glied 4 Schritt nach rechts.

IV. **Jeder Mann verlegt seine erste T-Mine und stellt deren T-Minenzünder auf „Scharf".**

V. **Alles 10 Schritt vor, 5 Schritt nach rechts.**

VI. **Jeder Mann verlegt seine zweite T-Mine und stellt deren T-Minenzünder auf „Scharf".**

Entsichert wird erst auf Befehl, das 1. Glied beginnt bei den am weitesten feindwärts verlegten T-Minen, das 2. Glied entsichert erst, wenn das 1. Glied seine 2. T-Mine entsichert hat und zurückgegangen ist, usw.

2 Gruppen „treffenweise" eingesetzt, ergeben ein Minenfeld mit 2 T-Minen je 1 m Frontbreite.

146. Im Zug und in der Kompanie werden die Gruppen nebeneinander angesetzt, Staffelung freigestellt, so daß eine Zugbreite von 90 Schritt = 72 m und eine Kompaniebreite von 270 Schritt = 216 m entsteht. Dichte des Feldes: 1 T-Mine je 1 m Frontbreite.

Tiefenstaffelung, z. B. „treffenweiser" Einsatz einer 2. Kompanie, ergibt ein Minenfeld von 2 T-Minen auf 1 lfd. m Frontbreite.

147. Das Minenfeld aus der Linie zu 2 Gliedern wird auf das Kommando:

Minenverlegen aus der Linie zu 2 Gliedern!

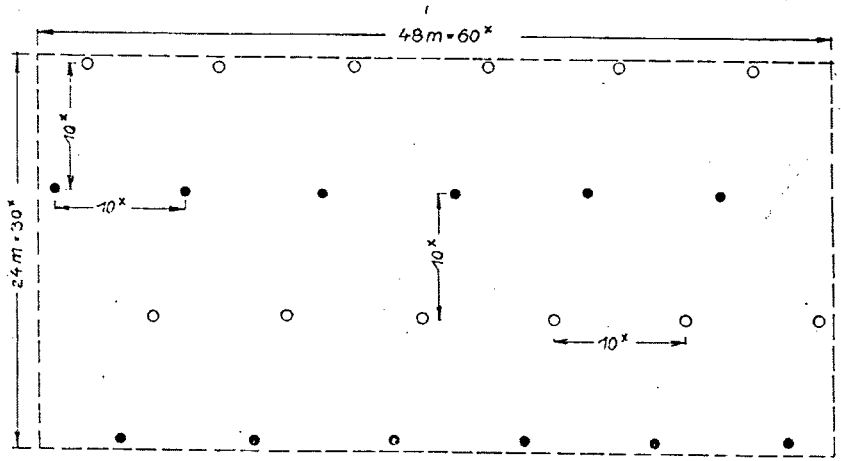
auf Pfiffe oder Zeichen verlegt.

Hierzu ist drillmäßig zu üben:

I. **Beide Glieder 10 Schritt Zwischenraum** (nach rechts [links] oder auf zu befehlenden Anschlußmann nach rechts und links).

Bild 80.

T-Minenfeld offen verlegt von 1 Gruppe, je Mann 2 T-Minen, je 2 m Frontbreite 1 T-Mine.



Schnellste Form für das rasche Verminen in breiter Front unter Verzicht auf Tiefe.

II. **1. Glied 20 Schritt vor, 2. Glied 5 Schritt nach rechts.**

III. **Jeder Mann verlegt seine erste T-Mine und stellt deren T-Minenzünder auf „Scharf".**

IV. **Beide Glieder 10 Schritt vor, 3 Schritt nach rechts.**

V. **Jeder Mann verlegt seine zweite T-Mine und stellt deren T-Minenzünder auf „Scharf".**

Entsichert wird erst auf Befehl. Das 1. Glied beginnt bei den am weitesten feindwärts verlegten T-Minen, das 2. Glied entsichert erst, wenn das 1. Glied seine 2. T-Mine entsichert hat und zurückgegangen ist.

2 Gruppen „treffenweise" eingesetzt, ergeben ein Minenfeld mit 1 T-Mine je 1 m Frontbreite.

Im Zug und in der Kompanie werden die Gruppen nebeneinander angesetzt, Staffelung freigestellt, so daß eine Zugbreite von 180 Schritt = 144 m und eine Kompaniebreite von 540 Schritt = 432 m entsteht. Dichte des Feldes: 1 T-Mine je 2 m Frontbreite.

Tiefenstaffelung („treffenweiser" Einsatz einer zweiten Kompanie) ergibt ein Minenfeld von 1 T-Mine auf 1 lfd. m Frontbreite.

148. Bild 81 zeigt ein Kompanieminenfeld, offen verlegt, bei dem die verschiedensten Verlegungsformen angewandt sind.

Auch für im Boden getarnt verlegte Minenfelder in den Gruppenformen nach den Bildern 71 und 72 ist die Form nach Bild 81 möglich. Bei getarnter Verlegungsform verringern sich die Maße entsprechend.

Dieses Minenfeld ist sowohl offen, wie im Boden getarnt verlegt, gegen Zerstörwirkung durch Bomben, Artilleriegeschosse und Sprengladungen am wenigsten gefährdet.

c. Minenpläne und Minenkarten

149. Minensperren aller Art sind kartenmäßig festzulegen, um ihre Instandhaltung und Beseitigung durch die eigene Truppe sicherzustellen und um eine Gefährdung der eigenen Truppe zu verhindern.

Hierzu werden von jeder Pioniereinheit, von der Minensperren verlegt werden, Minenpläne im Maßstab 1 : 2500 angefertigt (Bilder 82 und 83). Diese Minenpläne sind bodenständig. Bei Ablösung sind sie unter sorgfältiger, örtlicher Einweisung zu übergeben. Übergabe und Übernahme ist schriftlich zu melden. Die Minenpläne erhalten nur die

Heft 11.

APPENDIX F, ANNEX 2a.[2]
Special Orders for Mine and Obstacle Employment
From Oberst Hecker and his Staff

Headquarters, Panzerarmee Afrika
Abt.Ia/Pi Nr.1924/42 secret command issue.

Army Headquarters, 5 October 1942

2 Copies
2nd Copy

With Reference To: Army High Command General Staff of the Army/General der Pioniere und Festigungen (Pi 2) Az 80M Nr. 987/42 secret command issue from 28.8.1942.
Subject: New Method of Arranging Minefields ("Mine Boxes").

To
Army High Command
General Staff of the Army/General der Pioniere und Festigungen

I. Naming:
The "Mine Boxes" in the subject are called "obstacle areas" here.

II. Construction of the Obstacle Areas:

1.) For the position and expansion of the obstacle areas within the context of the El Alamein front go to Appendix 1 (drawn in red).

2.) Description of the Obstacle Areas:
Average width 3.0 km, depth up to 4.0 km. As much as possible, each point of the obstacle areas must be able to be covered by the heavy weapons of the infantry as well as Flak and artillery fires.

3.) Construction of an Obstacle Area:
The entire obstacle opens on a small battle area of about 500 to 800 meters deep at the forward edge (for combat outposts or forward deployed companies) with orders to stand within the mine-covered area.
Here dense, random and dummy minefields are laid and large numbers of command-detonated mines are emplaced, with fuzes leading to the edge of the positions on the obstacle area.
For example see Appendix 2. (Obstacle Areas H, J, L).

4.) Emplacement Configuration of the Minefields:
A) Emplacement Configuration of the individual dense minefields: Mine Panel.
B) Mine Density:

With dense minefield against tanks	1 mine per meter of front
With random minefield against tanks	1 mine per 3 meters of front
With dense minefield against riflemen	1 mine per meter of front

C) Depth of the Minefields: 56 meters for dense minefields (anti-tank and anti-personnel) laid within a 300meters deep irregularly laid strip.
2-400 meters with random minefields
D) The range of the minefield from the forward positions: about 100-200 meters, each position of mines within the 300-meter wide strip.

5.) Command Detonated Mines.
Employed in the greatest possible number in the obstacle areas as well as in front of the combat outposts. Here we use principally captured English aircraft bombs of 10 to 50 kilograms weight, additionally more mines (for instance: mine clusters of 5 captured mines) and explosive charges (English munitions).
About the placement of command detonated mines as well as the firing point see Appendix 2.

6.) Fuzing Methods:
Each fuze device used the available electric initiator and pull-fuze (the latter with up to 1,000 meters length).

[2] US National Archives, Captured German Records, Division 4.

The cutting of the firing wire by artillery fire occurs frequently, when the firing wires were not buried. Due to the large amount of frictional resistance, pull wires cannot be buried.

Because of the vulnerability of the initiators, each command-detonated mine was fuzed with three additional pressure mines and tripwire mines within a radius of 10-30 meters and linked with detonating cord.

Foreign anti-personnel mines were also used as pressure mines.

The effect of the command-detonated mines was increased (fragmentation and morale effects), when they were emplaced upon the ground. Here the business of camouflage toward the enemy is important. (Here camelthorn, sheet metal from destroyed vehicles, barrels and useless canisters).

7.) Employment of Minefield Fencing (see Appendix 2): A) All minefields received a fence on their friendly side. In general, this was coincided with the positions wire obstacles. Within an obstacle area it was given no wire of any kind. B) Near the squad strongpoint(s) of the combat outposts' perimeter mining and wiring was carried out. (The mines on the enemy side were not marked!)

III. The average expenditure of mines, munitions, and material for 1 obstacle area including front mining (for details see Appendix 3):

1.) Mines: 26,700 anti-tank mines and 8,000 anti-personnel mines.

2.) Bombs of all types ~250 (used as mines):

3.) Fuzing:

A)
5 Blasting Machines (or batteries)
125km of firing wire, (captured cable)
250 Electric Blasting Caps
19 km of detonating cord
250 blasting caps

Or

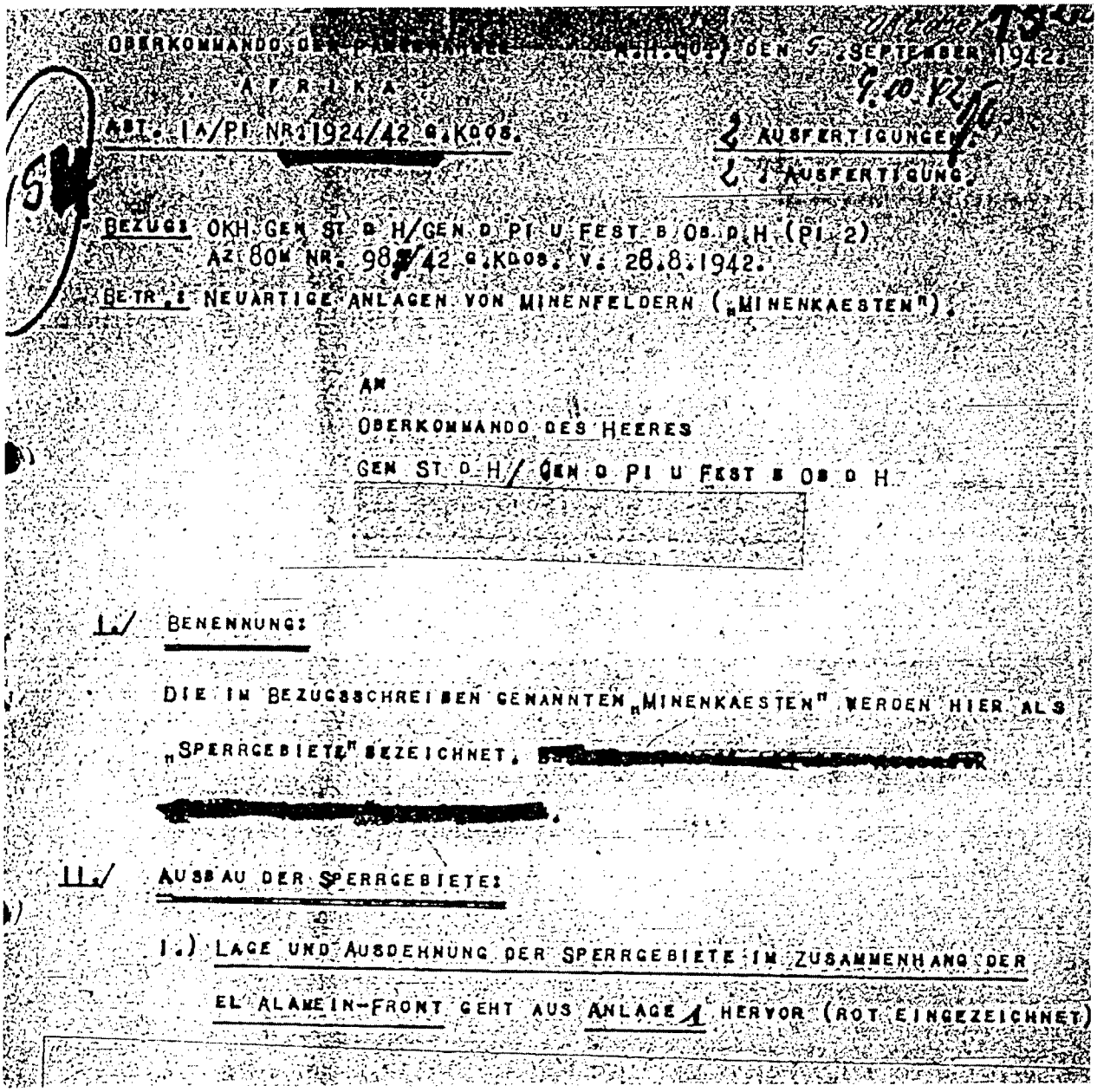
B)
125km of smooth wire,
250 pull-fuzes,
19km of detonating cord, and
250 blasting caps.

3.) Barrier Materials for Fencing:

36km barbed wire (or S-Rolls),
2,400 long pickets,
1,800 short pickets

3 Appendices [not found]

For the Army High Command
The Chief of the General Staff



OBERKOMMANDO DER [redacted] A.H.Qu.) DEN 5. SEPTEMBER 1942.

A F R I K A

Abt.: I A/PI NR: 1924/42 g.Kdos. 2 AUSFERTIGUNGEN

1 AUSFERTIGUNG.

Bezug: OKH GEN ST D H/GEN D PI U FEST B OB D H (PI 2)
AZ 80m NR. 98[redacted]/42 g.Kdos. v. 28.8.1942.

Betr.: NEUARTIGE ANLAGEN VON MINENFELDERN („MINENKAESTEN").

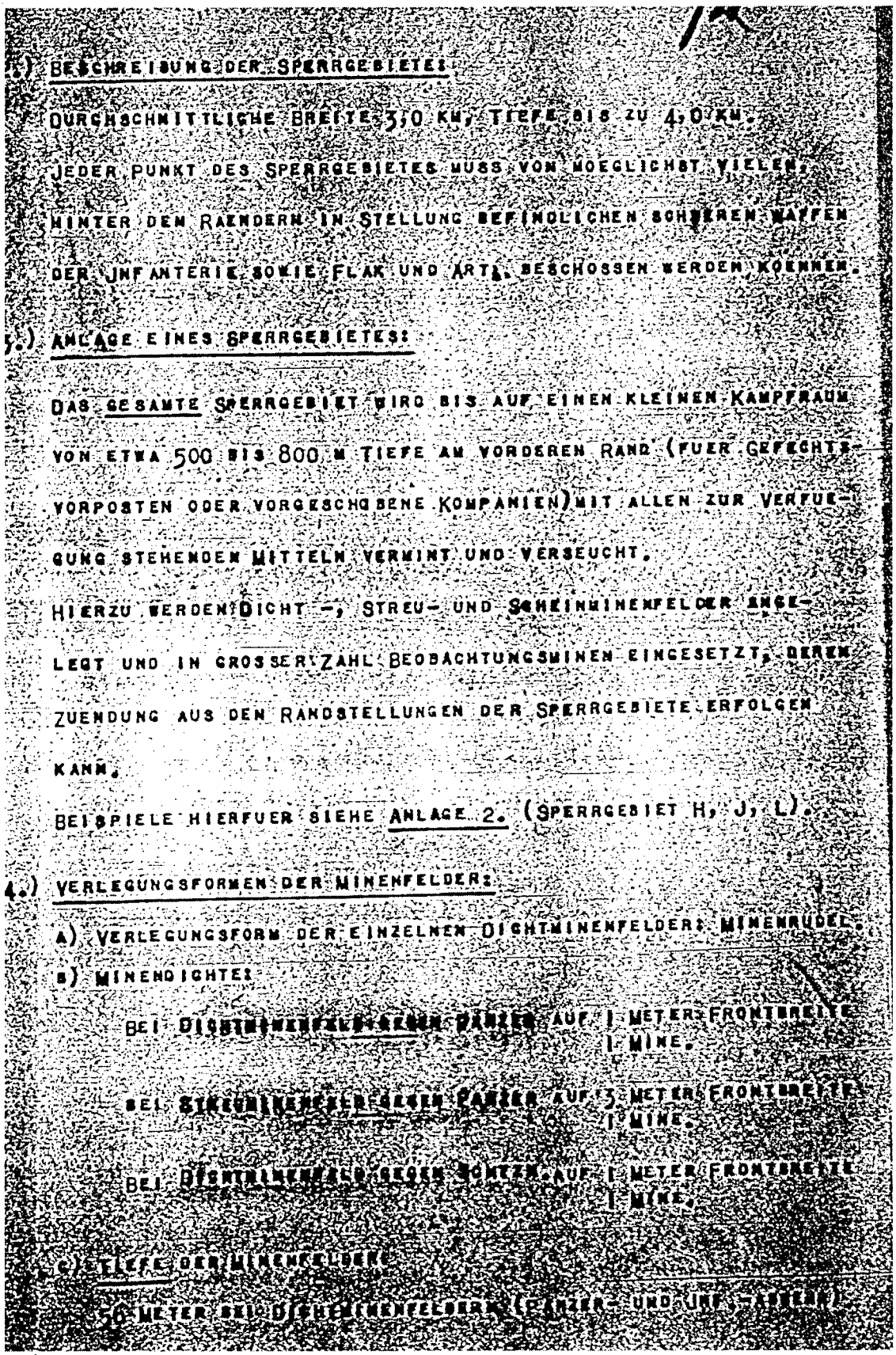
An
OBERKOMMANDO DES HEERES
GEN ST D H/GEN D PI U FEST B OB D H

I./ BENENNUNG:

DIE IM BEZUGSSCHREIBEN GENANNTEN „MINENKAESTEN" WERDEN HIER ALS „SPERRGEBIETE" BEZEICHNET. [redacted]

II./ AUSBAU DER SPERRGEBIETE:

1.) LAGE UND AUSDEHNUNG DER SPERRGEBIETE IM ZUSAMMENHANG DER EL ALAMEIN-FRONT GEHT AUS ANLAGE 1 HERVOR (ROT EINGEZEICHNET)



3.) BESCHREIBUNG DER SPERRGEBIETE:

DURCHSCHNITTLICHE BREITE 3,0 KM, TIEFE BIS ZU 4,0 KM.

JEDER PUNKT DES SPERRGEBIETES MUSS VON MOEGLICHST VIELEN, HINTER DEN RAENDERN IN STELLUNG BEFINDLICHEN SCHWEREN WAFFEN DER INFANTERIE SOWIE FLAK UND ART. BESCHOSSEN WERDEN KOENNEN.

4.) ANLAGE EINES SPERRGEBIETES:

DAS GESAMTE SPERRGEBIET WIRD BIS AUF EINEN KLEINEN KAMPFRAUM VON ETWA 500 BIS 800 M TIEFE AM VORDEREN RAND (FUER GEFECHTS-VORPOSTEN ODER VORGESCHOBENE KOMPANIEN) MIT ALLEN ZUR VERFUEGUNG STEHENDEN MITTELN VERMINT UND VERSEUCHT.

HIERZU WERDEN DICHT -, STREU- UND SCHEINMINENFELDER ANGELEGT UND IN GROSSER ZAHL BEOBACHTUNGSMINEN EINGESETZT, DEREN ZUENDUNG AUS DEN RANDSTELLUNGEN DER SPERRGEBIETE ERFOLGEN KANN.

BEISPIELE HIERFUER SIEHE ANLAGE 2. (SPERRGEBIET H, J, L).

4.) VERLEGUNGSFORMEN DER MINENFELDER:

A) VERLEGUNGSFORM DER EINZELNEN DICHTMINENFELDER: MINENRUDEL.

B) MINENDICHTE:

BEI DICHTMINENFELDERN GEGEN PANZER AUF 1 METER FRONTBREITE 1 MINE.

BEI STREUMINENFELDERN GEGEN PANZER AUF 3 METER FRONTBREITE 1 MINE.

BEI DICHTMINENFELDERN GEGEN SCHUETZEN AUF 1 METER FRONTBREITE 1 MINE.

C) TIEFE DER MINENFELDER:

50 METER BEI DICHTMINENFELDERN (PANZER- UND INF.-ABWEHR).

INNERHALB EINES STREIFENS VON 300 M TIEFE UNREGELMAESSIG VERLEGT.

2 - 400 M BEI STREUMINENFELDERN

D) ENTFERNUNG DER MINENFELDER VON DEN VORDEREN STELLUNGEN: ETWA 100 - 200 M, JE NACH LAGE DER MINEN INNERHALB DER 300 M BREITEN STREIFEN.

5.) BEOBACHTUNGSMINEN.

EINSATZ IN MOEGLICHST GROSSER ZAHL IN DEN SPERRGEBIETEN SOWIE VOR DER FRONT DER GEFECHTSVORPOSTEN. HIERZU WERDEN HAUPTSAECHLICH ERBEUTETE ENGLISCHE FLIEGERBOMBEN VON 10 BIS ZU 500 KG GEWICHT, FERNER MEHRERE MINEN (Z.B.: MINENPAKET VON 5 BEUTE-MINEN) UND GEBALLTE LADUNGEN (ENGL. MUNITION) VERWENDET.

UEBER LAGE VON BEOBACHTUNGSMINEN SOWIE DEREN ZUENDSTELLEN SIEHE ANLAGE 2.

6.) ZUENDUNGSARTEN:

ALS ZUENDVORRICHTUNG WIRD JE NACH VORHANDENEM MATERIAL ELEKTRISCHE, FEUERLEIT- UND ZUGZUENDUNG (LETZERE BIS ZU 1 000M ENTFERNUNG) VERWENDET.

DAS ZERREISSEN VON ZUENDLEITUNGEN DURCH ARTILLERIEBESCHUSS TRITT HAEUFIG EIN, WENN DIE LEITUNGEN NICHT EINGEGRABEN WERDEN.

ZUGDRAEHTE KANN MAN WEGEN DES GROSSEN REIBUNGSWIDERSTANDES NICHT EINGRABEN.

WEGEN DER VERLETZLICHKEIT DER ZUENDLEITUNGEN WIRD DAHER JEDE BEOBACHTUNGSMINE ZUSAETZLICH MIT 3 DRUCKMINEN UND SPANNDRAHTMINEN IM UMKREIS VON 10-30M DURCH KNALLZUENDSCHNUR VERBUNDEN.

ALS DRUCKMINEN WERDEN AUCH AUSLAENDISCHE JNF.-MINEN VERWENDET.

- 4 -

DIE WIRKUNG DER BEOBACHTUNGSMINEN WIRD ERHOEHT (SPLITTER- UND MORALISCHE WIRKUNG), WENN SIE AUF DEM BODEN VERLEGT WERDEN. (HIERBEI IST GESCHICKTE TARNUNG NACH DER FEINDSEITE WICHTIG.) (KAMELDORN, BLECHTEILE VON ZERSTOERTEN KFZ., TONNEN UND UNBRAUCHBARE KANISTER).

7.) EINSATZ VON MINENFELDEINZAEUNUNGEN (SIEHE ANLAGE 2):

A) ALLE MINENFELDER AUF DER FREUNDWAERTIGEN SEITE ERHALTEN EINZAEUNUNG. DIESE FAELLT IM ALLGEMEINEN MIT DEN STELLUNGSDRAHTHINDERNISSEN ZUSAMMEN.

INNERHALB EINES SPERRGEBIETES GIBT ES KEINERLEI EINZAEUNUNG.

B) BEI DEN GRUPPENSTUETZPUNKTEN DER GEFECHTSVORPOSTEN WIRD VERMINUNG UND VERDRAHTUNG RUNDUM DURCHGEFUEHRT. (FEINDWAERTS DER MINEN KEIN ZAUN!)

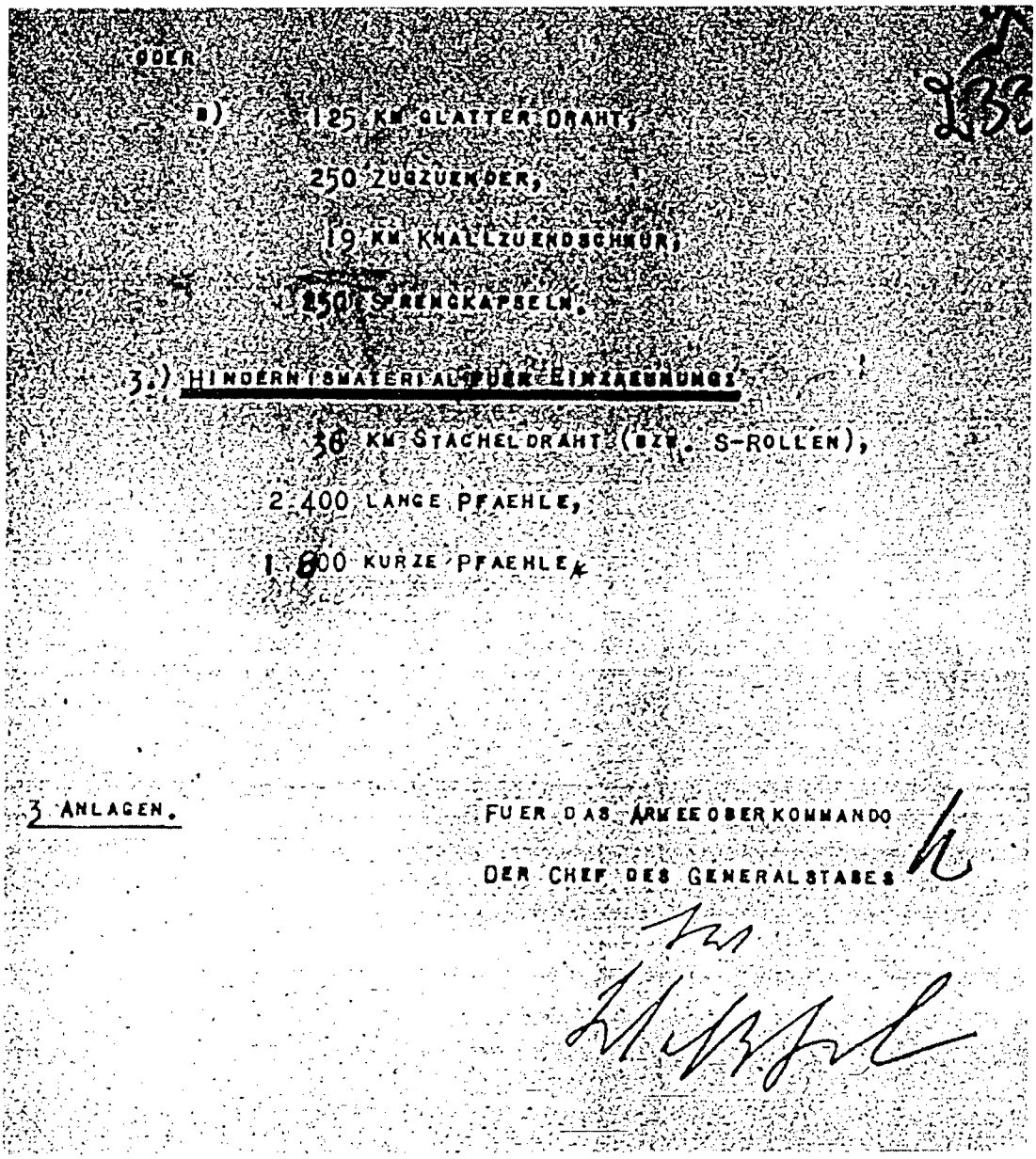
III.) DURCHSCHNITTLICHER MINEN-/MUNITIONS- UND MATERIALAUFWAND FUER 1 SPERRGEBIET EINSCHL. DER FRONTVERMINUNG (EINZELHEITEN SIEHE ANLAGE 3):

1.) MINEN: 26 700 PANZERABWEHR- UND
8 000 INFANTERIE-MINEN.

2.) BOMBEN ALLER ART (BZW. MINEN): ~250

3.) ZUENDMITTEL:

A) 5 GLUEHZUENDAPPARATE (OD. AKKUMULATOREN),
125 KM DOPPELSPRENGKABEL, (BEUTEKABEL),
250 GLUEHZUENDER,
19 KM KNALLZUENDSCHNUR,
250 SPRENGKAPSELN.



ODER

B) 125 KM GLATTER DRAHT,
250 ZUGZUENDER,
19 KM KNALLZUENDSCHNUR,
1 250 SPRENGKAPSELN.

3.) HINDERNISMATERIAL FUER EINZAEUNUNG:

36 KM STACHELDRAHT (BZW. S-ROLLEN),
2 400 LANGE PFAEHLE,
1 800 KURZE PFAEHLE.

3 ANLAGEN.

FUER DAS ARMEEOBERKOMMANDO
DER CHEF DES GENERALSTABES

APPENDIX F, ANNEX 2b.[3]

Headquarters, Panzerarmee
Afrika
Abt.Ia/Pi Nr.1468/42 secret command issue.

15 Copies
2nd Copy

Special Order for Mine Employment Nr. 8.

I. Obstacle Areas:

1.) The new El Alamein position will be through obstacle areas
A) In front of our front (for instance: A1 and A2)
B) In the depth of the defensive zone (B, C, D, E, J, H, K) – Appendices 1-5
Strengthened.

2.) Purpose is:
To A) to make the enemy's approach and penetration more difficult,
To B) to lure the enemy into the obstacle areas and destroy him it through mines and the fire effects of the troops surrounding the obstacle area.

3.) The battle is to be conducted such that the general fronts of the minefields are to be defended to the utmost. The minefields, lying under the constant overwatch of our own fires, can only be cleared by the enemy with great difficulty and large losses. Overwatched minefields are the best tank obstacle. On the other hand, from the fronts of the obstacle areas into the depth of the defensive zone, only small battle groups are defending at this time.

4.) Upon the order of the unit commander the last evacuates with strong enemy pressure on both sides. The element that evades the enemy is immediately returned again to the battle.

5.) Unit leaders are responsible for the timely closing of gaps into neighboring areas. Special gaps are to be marked for the combat leadership and reconnaissance of the obstacle areas, the troop commander, based on tactical requirements, determines the position and characteristics of these gaps. The commander of the troops deployed in the obstacle area and the senior pioneer of the division are instructed to work together in the strictest understanding.

6.) A part of the obstacle areas are already completed. The approximate position and design of the remaining planned obstacle areas in conjunction with the mining of the front continues forward as shown in Appendices 1-5. Their exact location will be set based on the tactical point of view of the sector commander, in cooperation with the army pioneer commander. The pioneer commanders of the divisions will be brought in for that purpose. The army pioneer commander assumes responsibility for the overall management of the construction of the obstacle areas.

7.) It will be constructed:

Obstacle Area	A1 A2 H J K	By	XXI Italian Corps and the 164th Infantry Division, with the commitment and temporary support from the army pioneer commander (900th Pioneer Battalion). Obstacle Area K is to be begun only with dummy positions without armed mines emplaced. Because of the present shortage of wire all boundaries here are to be marked with stone piles and English canisters.
Obstacle Area	B	By	X Italian Corps (the eastern portion of B has already been finished by the 900th Pioneer Battalion).
Obstacle Area	C	By	Deutsches Afrikakorps (finished).

[3] US National Archives - Captured German Records Division.

Obstacle Area	D	By	XX Italian (Motorized) Corps.
Obstacle Area	E	By	90th Light Infantry Division.

8.) Technical Details: Obstacle areas A1 and A2 are placed outside of dense minefields and placed in randomly mined ground.
Obstacle areas B-K are, according to Appendices 1-5, to be provided with a strong wire fence along the outside. Danger signs are to be posted for our own troops. (Additional information on the locations of the dense minefields is given in Appendices 1-5). The gaps through the obstacle areas are marked by a simple wire fence. Both sides of the wire fence are left free of mines for 10 meters. The mining of this area is completed through random mining. Random mines are especially to be emplaced there, so that an attack of the enemy is checked. Their emplacement follows without a mark on the ground, their position is carefully hidden.

II. Mine Density:
The densities of all existing minefields of the El Alamein position (with the exception of random minefields) are to be increased to one mine per meter of front. This will be done through the emplacement of additional minefields toward the enemy, or only when the enemy situation forces it, on the friendly side. The new minefields and mine belts in obstacle areas C, D, E, J, H, and K will be laid with a density of one mine per meter of front.
This warning order is through the decision of 27 July effective.

III. S-Mine Employment:
Begin immediately strengthening the defense through the employment of S-mines. Because of the shortage of S-mines, for the time being these will only be used on especially endangered positions of the front.
A) Approval to emplace S minefields is restricted to the army pioneer commander.
B) S minefields are to be laid with a density of one mine per meter of front.
C) S mines are only to be randomly emplaced in a small extent in special defiles in the terrain. The bulk of the S-mines are to be installed in minefields.
D) The friendly-side fence of S minefields is to be built especially strong. Numerous warning signs will be set up for our own troops.
Careful measurement of the S-minefields is directed.

IV. Command Detonated Mines:
Immediately begin the installation of command-detonated mines.
A) Command detonated mines will be laid on the approaches to the forward line at a distance of up to 400 meters. Their triggering requires special observers to find the enemy.
Since all types of mines can be command-detonated mines, especially heavy improvised mines and aircraft bombs will be used. Aircraft bombs will be arriving in 2-3 days at the forward pioneer parks.
B) The main effort for the emplacement of command-detonated mines is in the approaches, in defiles and likely penetration points.
C) Fuzing with all available means is authorized. An emplaced explosive charge is sufficient to cause the detonation of a mine or a bomb.

Attention is called to the following:
Electric fuzing with blasting machines or batteries,
Non-electric firing systems with time fuze and detonating cord,
Pull firing device with time fuze 24 or
Safety fuze and pull wire.

V. Contamination of Wire Obstacles:
Immediately begin strengthening wire obstacles through the emplacement of booby traps and Italian anti-personnel mines.
A) Booby traps in wire obstacles are to be small explosive charges, detonated through the movement of the wire, yet not destroy the wire obstacle.
B) Use all types of explosive munitions with pull fuzes.

C) The Italian hand grenades can with simple means be used to make a light anti-personnel mine. Their employment in wire obstacles is called to the attention of all Italian troops.

VI. Overwatching of Mine Lanes:

All of the mine lanes are to be overwatched by pioneers or infantry pioneers.

Be prepared to lay rapidly emplaced obstacles especially mines to quickly close the lanes. With the shortage of pioneer power infantry will be employed with only short training in rapid obstacles especially mines.

The tactical leader of the sector is responsible for adequate security measures especially for rapid closing.

This warning order is through the radio traffic of 27 July effective.

VII. All-Arms Engineer Missions:

The strengthening of positions, wiring and installation of dummy minefields is the business of the pioneer services of all arms. Your attention is called once more to the shortage of pioneer forces.

First reference to decision of 23 July 1942.

For the Army Command
The Chief of the General Staff
By Order and Proxy
Signed v. Mellenthin

5 Appendices! [not found]

For Accuracy:

Oberleutnant

AFRIKA

Gkdos. Ia/Pi. Nr. 1468/42 g.Kdos. 15 Ausfertigungen. 5. Ausfertigung.

Besondere Anordnungen fuer den Minene[illegible]satz Nr. 8. ... 1942

Ia/506/42 g.Kdos.

1. Sperrgebiete:

1.) Die neue El Alamein-Stellung wird durch Sperrgebiete

A) vor der eigenen Front (z.B.: A^1 und A^2)
B) in der Tiefe der Verteidigungszone (B, C, D, E, J, H, K)
– Anlage 1 – 5

verstaerkt.

2.) Zweck ist:

zu A) dem Gegner die Annaeherung und das Durchstossen zu erschweren,

zu B) den Gegner in das Sperrgebiet zu locken und ihn daran durch die Minen und Feuerwirkung der das Sperrgebiet umgebenden Truppe zu vernichten.

3.) Der Kampf ist so zu fuehren, dass die allgemeine Front an den Minenfeldern bis zum Aeussersten zu verteidigen ist. Die Minenfelder, die staendig beobachtet unter dem eigenen Feuer liegen, kann der Gegner nur sehr schwer unter grossen Verlusten durchbrechen. Bewachte Minenfelder bilden bestes Panzerhindernis.
Dagegen sind die Fronten der Sperrgebiete in der Tiefe der Verteidigungszone nur durch kleine Kampfgruppen auf Zeit zu verteidigen.

4.) Raeumung der letzteren hat bei staerkerem Feinddruck nach beiden Seiten auf Befehl der Einheitsführer zu erfolgen. Die ausweichenden Teile greifen danach sofort wieder in den Kampf ein.

5.) Fuer die rechtzeitige Schliessung der Gassen zu den angrenzenden Raumen sind die Einheitsfuehrer dieser Nachbargebiete verantwortlich.
Fuer die Kampffuehrung und Aufklaerung in den Sperrgebieten sind besondere Gassen zu kennzeichnen. Lage und Art der Gassen richtet sich nach den taktischen Forderungen und ist durch die Truppenkommandeure zu bestimmen. Die Kommandeure der an den Sperrgebieten eingesetzten Truppen und Pi.-Führer der Divisionen sind zu beauftragen, hierzu in engstem Einvernehmen zusammen zu arbeiten.

6.) EIN TEIL DER SPERRGEBIETE IST BEREITS AUSGEBAUT. UNGEFAEHRE LAGE UND AUSFUEHRUNG DER NOCH GEPLANTEN SPERRGEBIETE IM ZUSAMMENHANG MIT DEN VERMINUNGEN DER FRONT GEHT AUS ANLAGE 1 - 5 HERVOR. IHRE GENAUE LAGE IST NACH TAKTISCHEN GESICHTSPUNKTEN VON DEN ABSCHNITTSKOMMANDEUREN IN ZUSAMMENARBEIT MI ARMEEPIONIERFUEHRER IM GELAENDE FESTZULEGEN. DIE PI.-FUEHRE DER DIVISIONEN SIND DAZU HERANZUZIEHEN.
DIE GESAMTLEITUNG FUER DEN BAU DER SPERRGEBIETE UEBERNIMMT ARMEEPIONIERFUEHRER.

7.) ES WERDEN AUSGEBAUT:

SPERRGEBIET	A1 A2 H J K	DURCH	XXI.ITAL.A.K. UND 164.INF.DIV. MIT EINWEISUNG UND VORLAEUFIGER UNTERSTUETZUNG DURCH ARMEEPIONIERFUEHRER (PI.BTL.900). SPERRGEBIET K IST ZUNAECHST NUR A SCHEINANLAGE OHNE SCHARFE MINEN A ZULEGEN. WEGEN DERZEITIGEN MANGEL AN DRAHT SIND HIER ALLE BEGRENZUN GEN MIT STEINHAUFEN UND ENGL. KAN STERN PP. ZU MARKIEREN.
SPERRGEBIET	B	DURCH	X. ITAL.A.K. (B-OSTTEIL IST BEREI DURCH PI. BTL. 900 FERTIGGESTELLT
SPERRGEBIET	C	DURCH	D.A.K. (FERTIG).
SPERRGEBIET	D	DURCH	ITAL. XX.(MOT.)KORPS.
SPERRGEBIET	E	DURCH	90.LE.INF.DIV.

8.) TECHNISCHE EINZELHEITEN:

DIE SPERRGEBIETE A1 U. A2 BESTEHEN AUS DICHTMINENFELDERN UND MINENVERSEUCHTEN GELAENDESTUECKEN.
DIE SPERRGEBIETE B-K SIND GEM. ANLAGE 1 - 5 AN DEN AUSSENSEITEN MIT EINEM STARKEN DRAHTZAUN ZU VERSEHEN. FUER DIE EIGENE TRUPPE SIND WARNSCHILDER AUFZUSTELLEN. (EIN ANHALT FUER DIE LAGE DER DICHTMINENFELDER IST IN DEN ANLAGEN 1 - 5 GEGEBEN) DIE GASSEN DER SPERRGEBIETE SIND DURCH EINEN EINFACHEN DRAHTZAUN DARZUSTELLEN. BEIDERSEITS DES DRAHTZAUNES IST DAS GELAENDE IN 10 METER BREITE VON MINEN FREIZULASSEN. [DIE VERSEUCHTEN GELAENDESTUECKE SIND DURCH EINSATZ VON STREUMINEN AUSZUBAUEN. DIE STREUMINEN SIND BESONDERS DA ZU VERLEGEN, WO EIN ANGRIFF DES GEGNERS WAHRSCHEINLICH IST. IHRE VERLEGUNG ERFOLGT OHNE KENNZEICHNUNG IM GELAENDE, IHRE LAGE IST [illegible]]

II. MINENDICHTE:

DIE DICHTE SAEMTLICHER BESTEHENDEN MINENFELDER DER EL ALAMEIN-STELLUNG (AUSGENOMMEN NUR STREUMINENFELDER) IST AUF EINE MINE JE METER FRONTBREITE ZU ERHOEHEN. DIES ERFOLGT DURCH DAS VERLEGEN WEITERER MINENFELDER FEINDWAERTS, BEZW. NUR WENN DIE FEINDLAGE DAZU ZWINGT, FREUNDWAERTS DER VORHANDENEN. NEUE MINENFELDER UND MINENRIEGEL IN DEN SPERRGEBIETEN C, D, E, J, H, K SIND MIT DER DICHTE VON EINER MINE AUF EINEN METER FRONTBREITE ZU VERLEGEN.
VORBEFEHL HIERZU IST DURCH SPRUCH 27.7. ERGANGEN.

III. S-MINEN-EINSATZ:

AB SOFORT IST MIT DER VERSTAERKUNG DER ABWEHR DURCH EINSATZ VON S-MINEN ZU BEGINNEN. WEGEN MANGEL AN S-MINEN KANN DIES VORLAEUFIG NUR AN BESONDERS GEFAEHRDETEN STELLEN DER FRONT DURCHGEFUEHRT WERDEN.

A) DIE GENEHMIGUNG ZUR ANLAGE EINES S-MINENFELDES IST BEIM ARMEEPIONIERFUEHRER EINZUHOLEN.

B) DIE S-MINENFELDER SIND MIT EINER DICHTE VON EINER MINE AUF EINEN METER FRONTBREITE ZU VERLEGEN.

C) S-MINEN IM STREUEINSATZ SIND NUR IN GERINGEN UMFANGE AN BESONDEREN ENGPAESSEN IM GELAENDE ZU VERWENDEN. DIE MASSE DER S-MINEN IST IN MINENFELDERN EINZUBAUEN.

D) DIE FREUNDWAERTIGE EINZAEUNUNG VON S-MINENFELDERN IST BESONDERS STARK ZU BAUEN. ZAHLREICHE WARNSCHILDER FUER DIE EIGENE TRUPPE SIND AUFZUSTELLEN.
AUF SORGFAELTIGE VERMESSUNG DER S-MINENFELDER WIRD HINGEWIESEN.

IV. BEOBACHTUNGSMINEN:

AB SOFORT IST MIT DEM EINBAU VON BEOBACHTUNGSMINEN ZU BEGINNEN.

A) BEOBACHTUNGSMINEN WERDEN IM VORFELD IN EINER ENTFERNUNG BIS ZU 400 METERN VOR DER VORDEREN LINIE ANGELEGT. IHRE AUSLEGUNG GESCHIEHT NACH DER FESTSTELLUNG DES GEGNERS DURCH BESONDERE BEOBACHTER.
ALS BEOBACHTUNGSMINEN KOENNEN ALLE ARTEN VON MINEN, INSBESONDERE SCHWERE BEHELFSMINEN UND FLIEGERBOMBEN VERWENDET WERDEN. FLIEGERBOMBEN WERDEN IM 2 - 3 TAGEN BEI DEN VORGESCHOBENEN PI.-PARKS EINTREFFEN.

B) SCHWERPUNKT FUER LAGE DER BEOBACHTUNGSMINEN IM VORFELD, AN ENGPAESSEN UND VORAUSSICHTLICHEN EINBRUCHSSTELLEN.

C) ZUSAMMEN MIT ALLEN ZUR VERFUEGUNG STEHENDEN MITTELN.

AUF FOLGENDES WIRD HINGEWIESEN:

ELEKTR. ZUENDUNG MIT GLUEHZUEND-APPARATEN
BEZW. BATTERIEN,
LEITFEUERZUENDUNG MIT ZEIT- UND KNALLZUENDSCHNUR,
ZUGZUENDUNG MIT BRENNZUENDER 24 BEZW.
ZUENDSCHNURANZUENDER UND ZUGDRAHT.

V. VERSEUCHUNG VON DRAHTHINDERNISSEN:

AB SOFORT IST ~~DIE~~ mit der VERSTAERKUNG VON DRAHTHINDERNISSEN DURCH VERSTECKTE LADUNGEN UND ITAL. TRETMINEN ZU BEGINNEN.

A) VERSTECKTE LADUNGEN IN DRAHTHINDERNISSEN SIND KLEINE SPRENGLADUNGEN, DIE DURCH BEWEGUNG DES DRAHTES ZUR DETONATION GEBRACHT WERDEN, JEDOCH NICHT DAS DRAHTHINDERNIS ZERSTOEREN.

B) ALS LADUNG SIND ALLE ARTEN VON SPRENGMUNITION MIT ZUGZUENDERN ZU VERWENDEN.

C) DIE ITAL. HANDGRANATE KANN MIT EINFACHEN MITTELN IN EINE LEICHTE INFANTERIE-TRETMINE UMGEBAUT WERDEN. AUF IHREN EINSATZ ZUR VERSEUCHUNG VON DRAHTHINDERNISSEN WERDEN ALLE ITALIENISCHEN TRUPPEN HINGEWIESEN.

VI. BEWACHUNG VON MINENGASSEN:

SAEMTLICHE MINENGASSEN SIND DURCH PIONIERE BEZW. INFANTERIE-PIONIERE ZU BEWACHEN.
SCHNELLSPERREN BEZW. MINEN ZUR SCHNELLEN SCHLIESSUNG DER GASSEN SIND BEREITZULEGEN. BEI MANGEL AN PIONIERKRAEFTEN SIND INFANTERISTEN NUR NACH KURZER AUSBILDUNG AN DEN SCHNELLSPERREN BEZW. MINEN EINZUSETZEN.
DIE TAKTISCHEN FUEHRER DER ABSCHNITTE SIND FUER ANORDNUNG SICHERHEITSMASSNAHMEN BEZGL. DES SCHNELLEN SCHLIESSENS VERANTWORTLICH.
VORBEFEHL IST DURCH FUNKSPRUCH VOM 27.7. ERGANGEN.

VII. PIONIERDIENST ALLER WAFFEN:

STELLUNGSVERSTAERKUNG, VERDRAHTUNG UND ANLAGE VON SCHEIN[illegible] IST ANGELEGENHEIT DES PIONIERDIENSTES ALLER WAFFEN. HIERAUF WIRD BEI DEM MANGEL AN PIONIERKRAEFTEN NOCHMALS HINGEWIESEN.
ERSTER HINWEIS DURCH SPRUCH VOM 25.7.1942.

FUER DAS ARMEEOBERKOMMANDO
DER CHEF DES GENERALSTABES
J.A. UND J.V.
GEZ. S. V. MELLENTHIN

APPENDIX F, ANNEX 2c.[4]

SECRET COMMAND ISSUE

Headquarters, Panzerarmee Afrika
Abt.Ia/Pi Nr.2138/42 secret command issue.

Army Headquarters, 10 October 1942

6 Copies
6th Copy

Special Order For Obstacle Employment Nr. 3.

1.) X Corps and Jaeger Brigade Ramcke as top priority construct a new front between grid line 255, Deir el Munassib and Deir Umm Khawabir. There, where the line of combat outposts are not mined like the approaches to the M.L.R., carry out the strengthening of the defensive power of the first line through antitank and antipersonnel mines in the fastest manner. It is important for everyone for the defense of the corps sector to check the minefields, especially English ones, that they have been thickened. Report the execution and results by 25 October. Established gaps are to be closed immediately.
To the X Corps and Jaeger Brigade Ramcke will be given priority for the supply of mines and obstacle material.

2.) Hill 62 (1.5 km SSW of Deir el Shein) is to be secured by Jaeger Brigade Ramcke against tanks and infantry by including it within the combat outpost positions and through immediately emplaced mine obstacles. (Verbal Go-Ahead).

3.) XXI Corps and 164th Leicht Afrika Division urgently secures the new M.L.R. between obstacle areas with mine belts.
The delivery for the mines required for completion of the construction probably follows on 20 October 1942.
With the withdrawal of the M.L.R., the area east of Obstacle Area "K" as an approach is to be overwatched day and night, so that the current strong minefields remain effective against an expected tank attack.
Inoperable firing wires to command detonated mines are to be removed. As far as possible, the valuable bombs are to be linked by detonating cord with a mine.

4.) For the present, no further barrier materials will be available to the D.A.K. for the Qatani strip. The Qatani strip will be maintained primarily by the D.A.K. (It is important to avoid accidents).
The open and secret lanes as well as the gaps are to be secured. Pioneer forces and barrier materials are provided for the rapid closing as the enemy attacks. The intended employment is to be reported.

5.) The troops are once more to learn that:
a) A minefield only has a purpose when it is defended;
b) Antitank minefields constitute little if any obstacle to infantry;
c) With the currently small number of anti-personnel mines, especially careful overwatch of the minefields with small arms is of great importance.

6.) With all new mining, immediately reduce 20% of all antitank mine are to be secured for resumption.
The most careful management of the list of mine plans is indicated.

For the Army Command
The Chief of the General Staff
By Proxy

Distribution (Excerpt)

Draft	=6th Copy
XXI Corps	=1st Copy
X Corps	=2nd Copy
D.A.K.	=3rd Copy

[4] US National Archives - Captured German Records Division.

164th Leicht Afrika Div. =4th Copy
Jaeger Brigade Ramcke =5th Copy

Geheime Kommandosache

A E N D E R

Abt. Ia/Pi.Nr.2230/43 geheim.

6 Ausfertigungen.
6. Ausfertigung.

(185) (149)

Besondere Anordnungen Nr. 9 für den Sperreinsatz Nr. 9.

1.) X. A.K. und 346. Div. Kenske bauen vorrangig die neue Front einschl. Stützpunkt 235, Deir el Dueissib und Deir Abu Khergebiz aus. Dabei ist die Verstärkung der Abschnittsfront durch Panzer- und Geschützmulden in erster Linie an den Stellen mit größter Beschleunigung durchzuführen, wo sowohl in der Linie der Gefechtsvorposten wie vor der H.K.L. noch jegliche Verminung fehlt. Alle für die Verteidigung des Korps-Abschnittes wichtigen Minenfelder, insbesondere englische, sind auf ihre Richtigkeit an Ort und Stelle zu überprüfen. Vollzug ist mit Ergebnis bis 25.10. zu melden. Festgestellte Lücken sind sofort zu schließen.
Den H.K.L. und der 346. Div. Kenske werden hierfür bevorzugt Minen und Panzerabwehrstoffe zugewiesen.

2.) Höhe 62 (1,5 km südöstl. Deir el Shein) ist von 346. Div. Kenske in die Gefechtsvorpostenstellung einzubeziehen und sofort durch Minen-Sperranlagen gegen Panzer und Schützen zu sichern. (Mündlich befohlen!).

3.) XXX. A.K. und 164. Le.Afr.Div. sichern vorrangig die neue H.K.L. südlichen den Sperrgebieten durch Minenriegel.
Die Lieferung der für den Genehmigungsbau bestätigten Minen erfolgt voraussichtlich nach dem 20.10.1942.
Mit Rückverlegung der H.K.L. ist das östl. den Sperrgebieten „E" befindliche Gelände als Vorfeld Tag und Nacht zu überwachen, daß die dort vorhandenen, sehr starken Fremdminensperren beim nächsten Panzerangriff noch zur Wirkung kommen.
Kabel der Beobachtungsminen, die nicht mehr betätigt werden können, sind abzubauen, soweit noch möglich, sind hier die wertvolle

- 2 -

Gräben durch Kraftfahrzeuge mit einer Klaue zu kuppeln.

4.) Dem Radfz. werden nur den Gefechtsfahrern vorläufig keine weiteren Sperrmittel zur Verfügung gestellt.
Der Gefechtsfahrer ist weiterhin durch D.A.K. laufend(nächtig zur Verwendung von Sperrmitteln).
Die offenen und geschlossen Panzer sowie die Lücken sind zu schulen.
Für sämtliche Schützen bei Einsatz innerhalb eines Pionierraumes und Sperrmittel Verwendung, Gefechtsfahrer stundenlang zu schulen.

5.) Die Truppe ist ernaut zu belehren, daß
a) ein Minenfeld nur Zweck hat, wenn es verteidigt wird
b) Panzerminenfelder gegen Infanterie Einzelgänger kein Hindernis darstellen
c) bei der vorläufig noch geringen Zahl von Schützenpanzern eine besonders sorgfältige Überwachung der Minenfelder durch Spähtrupps vor Antritt der Gefechtsfahrt erfolgen muß.

6.) Bei allen Übungsanlagen sind als Maßstab für alle Panzerabwehrmittel gegen Minensuchgeräte zu wählen.
Auf sorgfältigste Tarnung bei der Aufstellung der Minensperre wird hingewiesen.

Für den Armeeoberbefehlshaber
Der Chef des Generalstabes
I. V.

Verteiler (in Auszug)

Entwurf = 6. Ausf.

XXI. A.K. = 1.Ausf.
X. A.K. = 2.Ausf.
D.A.K. = 3.Ausf.
164.le.Afr.D. = 4.Ausf.
Jäg.Brig.Ramcke = 5.Ausf.

10.10.42

APPENDIX F, ANNEX 2d.

Pz. Pi. Btl. 200
Abt. Ia Az. D
Br. Br. Nr. 247/42 geh.

Battalion Headquarters, 8.8.42

Secret
Experiences in Mine Employment in the Last Months

I. Tactical:
The employment principles have once more worked completely. A division of pioneers as reinforcements have always proved inappropriate. Pioneers, especially when only available in limited strength, are instructed to cooperate, as this has shown to be more favorable.

II. Technical:

1. Mine Types. Except the German Teller- and S-mines, English Mark II, IV and V were laid without difficulties. With the Egyptian mines, some special safe handling procedures had to be established.

2. Installation times. The mass of mines was laid during night operations. Special difficulties were caused in attempting to lay the mines after a pattern caused, above all due to enemy action and terrain difficulties (rocky ground). The installation of S-mines at night and in enemy proximity appears advisable only if one does intend to take them up later.

3. Methods of Emplacement. The past schemes have worked satisfactorily. During direct enemy action and at night the pattern sketched in the plans worked best (Anlage [appendices] 1, 2). Here could all things be brought to full employment with partially trained replacements at short notice. The double stacking of Mark II mines, as well as the installation of bombs encountered serious difficulty in rocky soil. The time, which must be allotted at beginning, does not always stand in relation to the number of mines laid.

4. Minefield Marking. Marking the friendly and enemy sides with a high wire fence is most appropriate; a low fence is too easily overlooked and driven over. Friendly and enemy marking should appear 500 – 800 meters away to deceive the opposition. It is often a simple matter to build at this distance at night, above all if the minefields do not run in a straight line. K- and S-concertina rolls have proved useful as well for fast emplacement.

5. Mine Clearing. The English mines were generally easy to recognize during the day because of their poor camouflage. The battalion has suffered larger personnel losses only because the forces used in mine clearance in all cases had to create for themselves the conditions necessary to proceed with their assigned work, i.e. overpowering the enemy directly covering the mined obstacle. The mine detectors have proven themselves well, if maintained, that it is extremely sensitive in a combat zone.

6. Successes Through Mine Employment. The defensive power of mines was proven again during the English attacks around 21 July. Enemy forces were not only denied their freedom of movement, but numerous enemy tanks and motor vehicles were put out of action by mines.

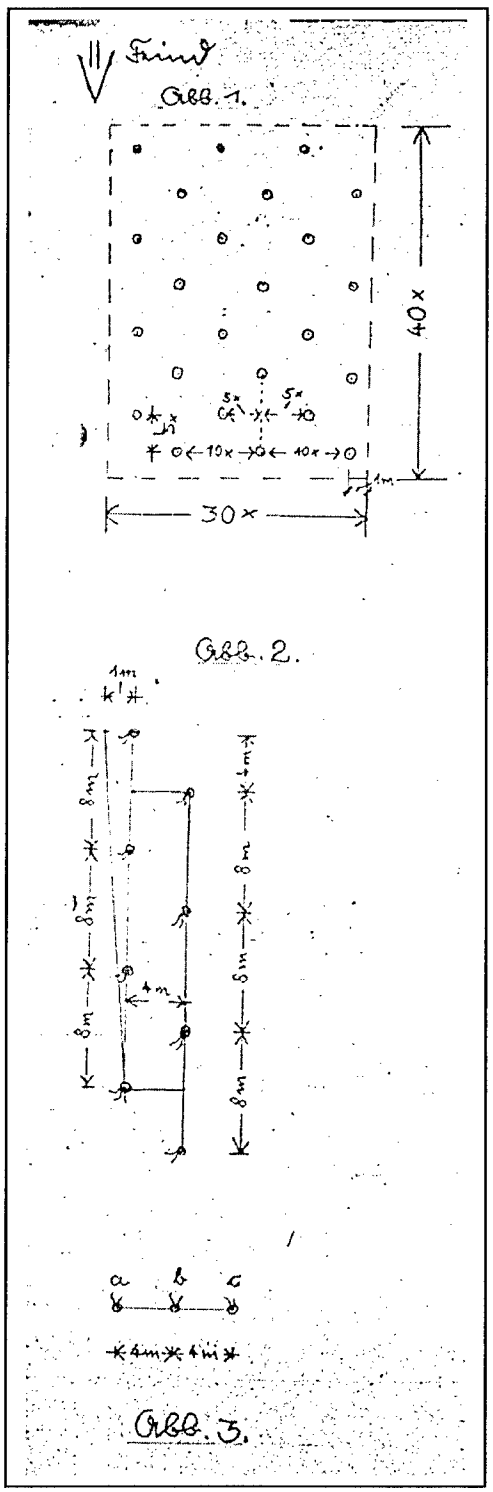
signed Andres.
Hauptmann and Battalion Commander

F.d.R.d.A.:

Oberleutnant

1. Anlage zu Pz.Pi.Btl. 200, Br.B.Nr. 247/42 geh. Copy

Description of Mine Doctrine for the Emplacement of
1 Tellermine per Meter, or 1 English Round Mine



Squad Minefields of 1 Tellermine per Meter

For the emplacement of 1 Tellermine per meter, the minefield must be divided into squad minefields according to figure 1, which are then appropriately aligned with the entire minefield. For a squad minefield one needs a squad with a strength of 1/12 (i.e. 1 non-commissioned officer and 12 enlisted soldiers). Each man lays 2 mines. Prerequisite for exact and fast mine emplacement is careful training, practice and experience within the squad. Each man must stop at a certain direction and exact pace count. In the case of nocturnal employment, particularly on dark nights, experience indicates that these difficulties result in inaccurate emplacement or a significant reduction of speed.

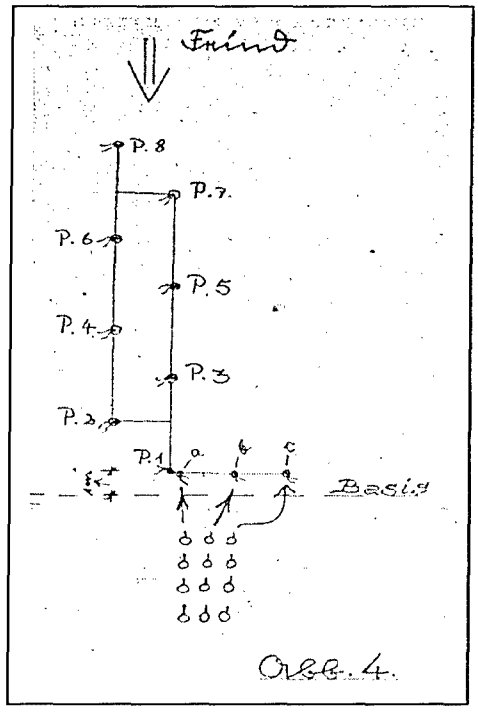
For this reason the company created and tested a Tellermine doctrine for 1 mine per meter. The instructions are given by a teaching troop of 1/6. The carrier troop of 1/12 lays the mines as directed at places marked by loops of white engineer tape. Since the squad minefield is too large to be covered by this instruction, it is divided in two.

The first part (figure 2) gives the distances. The markers are made of linen bindings, parachute cords or the like. To that, according to the illustration, place and fasten the white loops. The first part of the lesson is demonstrated by 4 men according to the process of the minefield.

Figure 3

The second part of the instruction covers the gaps. It is produced like the first part, and is continued by two men.

Emplacement occurs in the following manner. After the basis of the minefield is fixed, the first part of the mine lesson is laid out by figure 4.



Now Part 2 of the teaching troop (2 men) follows and behind it the carrier troop 1/12 (figure 4). Part 2 of the lesson now puts point "a" on point 1 parallel to the basis. The first file of the carrier troop puts its first mines on to the points a, b, c.
Part 2 of the lesson one takes up and again places it parallel to the basis at point 2. The first file of the carrier troop puts down its second mine. Thus Part 2 of the lesson up to the point 8 is always placed in the same manner and the carrier troop in each case lays its mines.

Then Parts 1 and 2 of the lesson is taken up and placed on the left or right, with the next squad minefield, while the carrier troop prepares new mines to lie according to the lesson.

In the same manner one can also lay 2 Tellermines per meter with appropriate changes to the Tellermine doctrine.

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Anlage 2 zu Pz.Pi.Btl. 200, Br.B.Nr. 247/42 geh. Copy

Description of the Emplacement of 1 S-Mine per Meter

Since with emplacement by S-Mine doctrine one often does not know the local soil conditions in the places where the mines are to be placed, which the S-Mine doctrine determines, one developed the following types of emplacement.

Placement of the base line [*Basislinie*], fixed points [*Festpunkte*] and auxiliary points [*Hilfspunkte*] occurs as with the emplacement according to the S-Mine doctrine. 2x [paces] from the first corner mine is the safety stake [*Sicherheitspfahl*] struck. At a distance of 20 meters the numbered intermediate stakes [*Zwischenpfähle*] are placed up to fixed point 1. The fixed point is specified and marked by a large stake and stones lying about.

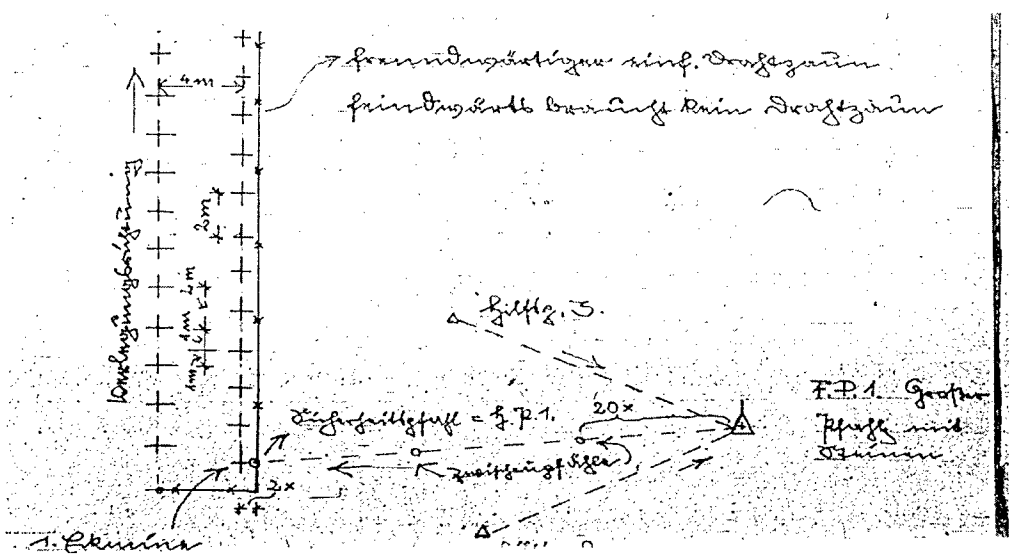
The fixed point is secured by three auxiliary points. They are placed at a predetermined distance and pace count from the fixed point to the safety stake and from fixed point to the auxiliary points. In the same way, at the ends of the minefield, safety stakes, auxiliary points and fixed points are set.

Troop organization:

a) Survey Troop
b) Fencing Troop
c) Layout Troop
d) Digging Troop
e) Emplacement Troop
f) Security Troop

The strength of these troops depends on the number of non-commissioned officers and crews available.

For the method of emplacement, see the following sketch.



In the same manner, 2 S-Mines can be emplaced per meter, by doubling the number of S-Mine rows.

In opinion of the company, sympathetic detonation seems impossible with this manner of emplacement.

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Pz. Br. 2(J) Br.Br.Gef.St., den 8.8.42

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Br.Br.Nr. 247/42 geh.

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Geheim

Erfahrungen im Mineneinsatz der letzten Monate.

I. Taktisches:

Die Einsatzgrundsätze haben sich erneut voll bewährt. Eine Aufteilung von Pionieren unter Zugstärke hat sich stets als unzweckmäßig erwiesen. Pioniere, vorallem wenn nur wenig Kräfte zur Verfügung stehen, auf Zusammenarbeit anzuweisen hat sich als vorteilhafter gezeigt als eine Unterstellung.

II. Technisches:

1. Minenarten. Außer den deutschen T- und S-Minen wurden engl. Mark II, IV u. V ohne Schwierigkeiten verlegt.
   Bei den ägyptischen Minen wurde eine geringe Handhabungssicherheit festgestellt.
2. Einbauzeiten. Die Masse der Minen wurde im Nachteinsatz verlegt. Besondere Schwierigkeiten bereitete dabei das Verlegen nach Schema, vorallem bedingt durch Feindeinwirkung und Geländeschwierigkeiten (Felsboden).
   Einbau von S-Minen bei Nacht und in Feindnähe erscheint nur ratsam, wenn ein späteres Aufnehmen nicht mehr in Frage kommt.
3. Verlegungsarten. Die bisherigen Schemen haben sich bewährt. Bei unmittelbarer Feindeinwirkung und bei Nacht hat sich das in der Anlage skizzierte Schema bestens bewährt (Anlage 1,8)
   Hierbei konnten vorallen Dingen die zum Teil kurzfristig ausgebildeten Ersatzmannschaften voll zum Einsatz gebracht werden.
   Das doppelte Verlegen von Mark II-Minen, sowie der Einbau von Bomben stößt bei felsigem Boden auf große Schwierigkeiten. Die Zeit, die dafür in Ansatz gebracht werden muß, steht nicht immer im Verhältnis zu der Zahl der eingebauten Minen.
4. Kennzeichnung der Minenfelder. Begrenzung freund- und feindwärts mit hohem Drahtzaun ist am zweckmäßigsten, niederer Zaun wird zu leicht übersehen und damit überfahren.
   Freund- und feindwärtige Begrenzung 500 - 800 mtr. auseinander zu legen erscheint zur Täuschung des Gegners zweckmäßig. In diesem Abstand zu bauen ist bei Nacht oft nicht einfach, vorallem wenn die Minenfelder nicht geradlinig verlaufen. Als gut brauchbar - weil schnell auszulegen - haben sich K- und S-Rollen erwiesen.

5. Minenräumen. Die engl. Minen waren im allgemeinen wegen ihrer schlechten Tarnung bei Tag gut zu erkennen. Das Btl. hat größere personelle Ausfälle dadurch erlitten, daß die zum Minenräumen eingesetzten Kräfte in allen Fällen sich erst die Voraussetzungen zu ihrer eigentlichen Arbeit, d.h. Niederkämpfung des unmittelbar auf die Minensperre einwirkenden Feindes, schaffen mußte.
Das Minensuchgerät hat sich gut bewährt, wenn gleich sich erneut gezeigt hat, daß es im Feuerbereich äußerst empfindlich ist.

6. Erfolge durch Mineneinsatz. Die Abwehrkraft der Minen hat sich bei den engl. Angriffen um den 21.7. herum erneut gezeigt. Die fdl. Kräfte wurden nicht nur in ihrer Bewegungsfreiheit gehindert, sondern zahlreiche fdl.Panzer und Kraftfahrzeuge wurden durch Minen außer Gefecht gesetzt.

gez. Andres.

Hauptmann und Btl. - Kdr.

F.d.R.d.A.:

Oberleutnant

7. Anlage zu Pz.Pi.Btl. 200, Br.B.Nr. 247/42 geh. Abschrift

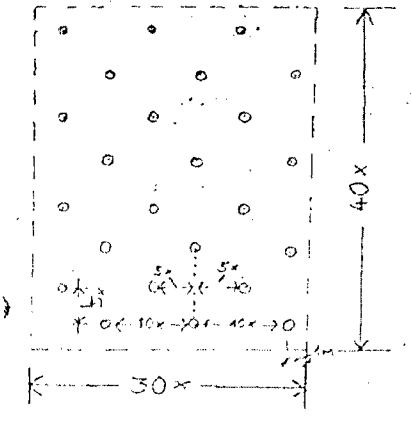
Beschreibung einer Minenlehre zur Verlegung von 1 T-Mine auf 1 m, oder 1 engl. Rundmine

Geheim

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Feind

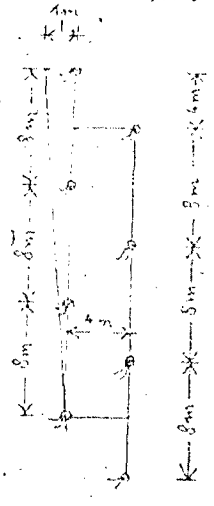
Abb. 1.



Gruppenminenfeld 1 T-Mine auf 1 m

Bei der Verlegungsart 1 T-Mine auf 1 m muß das Minenfeld in Gruppenminenfelder Abb. 1 aufgeteilt werden, die dann dem entsprechenden Verlauf des Gesamtminenfeldes aneinandergereiht werden. Zu einem Gruppenminenfeld benötigt man eine Gruppe in Stärke 1/12. Jeder Mann verlegt 2 Minen. Voraussetzung für ein genaues und schnelles Verlegen der Minen ist sorgfältige Ausbildung, Übung und Erfahrung innerhalb der Gruppe. Jeder Mann muß eine bestimmte Richtung und genaue Schrittzahlen innehalten. Bei nächtlichem Einsatz, insbesondere in den dunklen Nächten, ergeben sich erfahrungsgemäß dabei Schwierigkeiten, die zu ungenauem Verlegen oder zu bedeutender Herabsetzung des Tempos führen.

Abb. 2.



Aus diesem Grunde hat die Kompanie eine T-Minenlehre für 1 Mine auf 1 m geschaffen und ausprobiert. Die Lehre wird von einem Lehrentrupp 1/6 gehalten. Der Trägertrupp 1/12 verlegt dann die Minen an den, an der Lehre durch Schleifen aus weißem Trassierband gekennzeichneten Stellen. Da das Gruppenminenfeld zu groß ist, um durch eine Lehre überdeckt zu werden, ist diese in zwei Teile zergliedert.

Der erste Teil (Abb. 2) gibt die Abstände an. Die Lehre wird aus Bindeleinen, Fallschirmschnüren oder ähnlichem angefertigt. An den, aus der Abbildung ersichtlichen Stellen werden weiße Schleifen befestigt. Der erste Teil der Lehre wird von 4 Mann entsprechend dem Verlauf des Minenfeldes angelegt.

Abb. 3

Der zweite Teil der Lehre gibt die Zwischenräume an. Er ist gefertigt wie der erste Teil, und wird von 2 Mann angehalten.

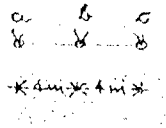


Abb. 3.

Das Verlegen geschieht auf folgende Art. Nachdem die Basis des Minenfeldes festgelegt ist, wird der Teil 1 der Minenlehre angelegt Abb. 4.

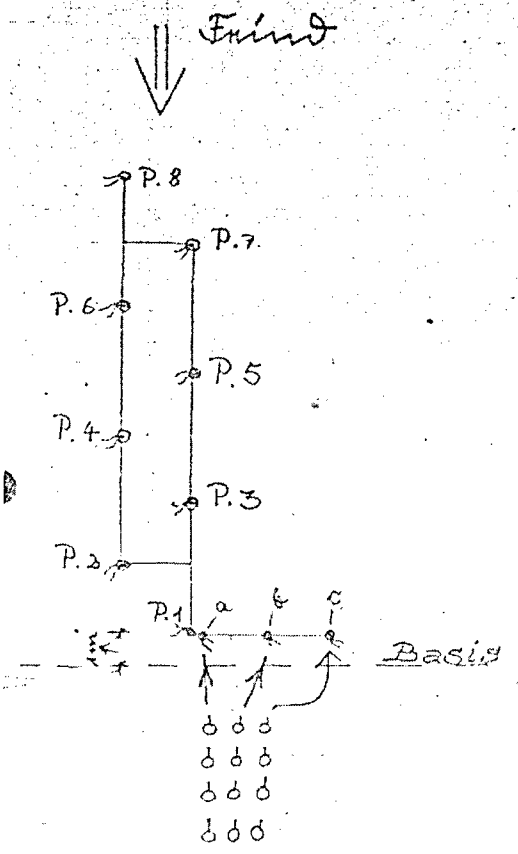


Abb. 4.

Nun folgt Teil 2 der Lehrentrupp (2 Mann) und hinter ihm der Trägertrupp 1/12 (Abb. 4) Teil 2 der Lehre wird jetzt mit Punkt a an Punkt 1 parallel zur Basis gelegt. Die erste Rotte des Trägertrupps legt ihre erste Mine in die Punkte a,b,c.
Teil 2 der Lehre wird aufgenommen und wieder parallel zur Basis an Punkt 2 angelegt. Die erste Rotte des Trägertrupps legt ihre zweite Mine ab. So wird Teil 2 der Lehre bis zum Punkt 8 immer in gleicher Art angelegt und der Trägertrupp legt jeweils seine Minen hinein.

Dann wird Teil 1 und 2 der Lehre aufgenommen und links oder rechts, beim nächsten Gruppenminenfeld angelegt. Während der Trägertrupp die von ihm verlegten Minen einbaut, werden vom nächsten Trägertrupp bereits neue Minen nach der Lehre verlegt.

In gleicher Art kann man nach entsprechenden Umbau der T-Minenlehre auch 2 T-Minen auf 1 m verlegen.

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Beschreibung über das Verlegen von S-Minen 1 Mine auf 1 m

Da bei dem Verlegen mit der S-Minenlehre die Minen bei den hiesigen Bodenverhältnissen öfters nicht an den Stellen eingebaut werden können, welche die S-Minenlehre bestimmt, ist folgende Verlegungsart entwickelt worden.

Das Anlegen der Basislinie, der Festpunkte und Hilfspunkte geschieht wie beim Verlegen mit der S-Minenlehre. 2x von der ersten Eckmine wird der Sicherheitspfahl geschlagen. Im Abstand von 20 m erfolgen die nummerierten Zwischenpfähle bis zum Festpunkt 1. Der Festpunkt wird mit einem großen Pfahl und umherliegenden Steinen festgelegt und gekennzeichnet.

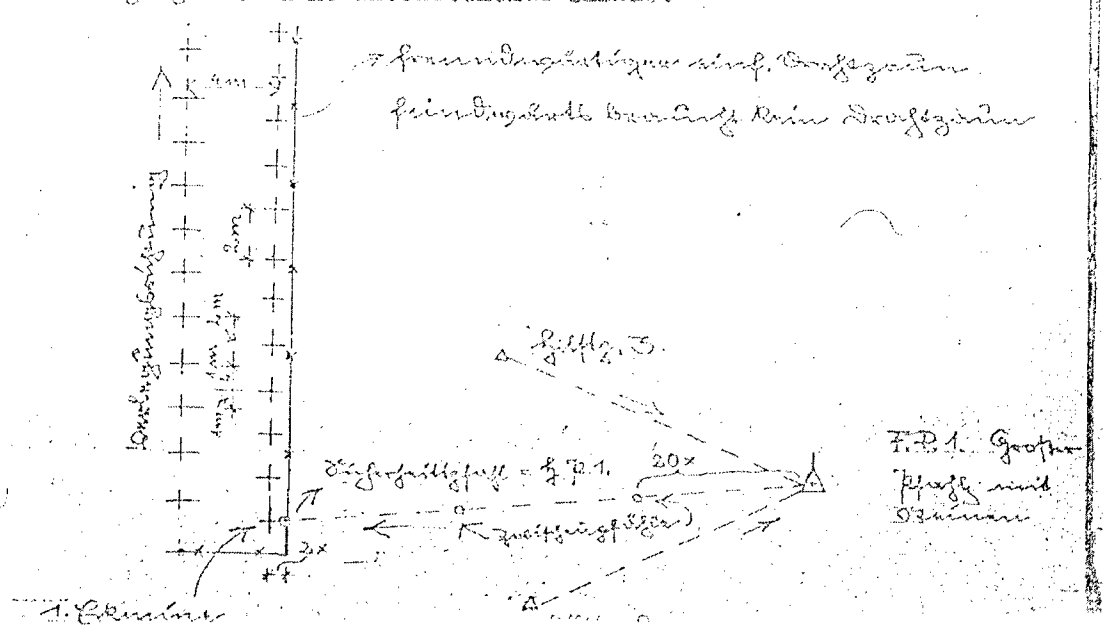
Der Festpunkt wird durch drei Hilfspunkte gesichert. Es wird festgestellt Entfernung und Marschzahl vom Festpunkt zu den Hilfspunkten. Nach gleicher Art werden am Ende des Feldes Sicherheitspfahl, Hilfs- und Festpunkte angelegt.

Truppeneinteilung:

a) Vermessungstrupp
b) Zeuntrupp
c) Ablegetrupp
d) Lochtrupp
e) Verlegungstrupp
f) Entsicherungstrupp

Die Stärke des Trupps richtet sich nach der zur Verfügung stehenden Anzahl der Uffs. und Mannschaften.

Verlegungsart siehe untenstehende Skizze.



den, indem die Anzahl der S-Minenreihen verdoppelt wird. 15 (45)

Nach Ansicht der Kompanie scheint eine Detonationsübertragung bei dieser Verlegungsart ausgeschlossen.

F.d.R.d.A.:

Oberleutnant

Annex 3.
Chapter IV. "Tactics," Section VII. "Minefields,"
(Extracted from Handbook on German Military Forces, TM-E 30-451, War Department, Washington, D. C., 15 March 1945.) [5]

Section VII. MINEFIELDS

1. General

The Germans make extensive use of mines which they consider a most effective defensive weapon. Minefields are utilized chiefly to cover defensive actions and retreats, although limited use is made of them in offensive actions for flank protection. In a static situation the Germans regard minefields as an element of the front-line position, laid out according to an over-all mine plan developed in close conjunction with that for the fields of fire of all weapons. Within recent months, standard German doctrine for minefield location has been modified. Instead of laying dense minefields in front of the main line of resistance, dispersed mines are laid there, while the minefields proper are sited within the main battle position.

2. Surveying of Minefields

The Germans consider it necessary to survey the location of minefields and individual mines within the minefields. German engineers are instructed to choose reference points (*Festpunkte or FP*) for minefields which easily can be identified. At a grade crossing, at the intersection of two improved roads, at the edge of a village, or some such favorable location, this can be done without any difficulty. In some instances, however, the Germans are forced to use "guide wire" and auxiliary fixed points (*Vermessungspunkte or VP*). A type of auxiliary fixed point that has proved practicable is the center of an equilateral triangle with sides 15 to 25 feet long. The corner points and the fixed point itself may be stakes, rails, or concrete or steel girders about 3 feet in length connected with barbed wire. Such a fixed point can be reestablished easily because even heavy shelling will rarely destroy more than one or two stakes.

A minefield is limited by the four corner points A_1, A_2, A_3, and A_4. The corner points are marked clockwise, A_1 and A_2 forming the base line on the German side. The survey of the field refers to one or both points of the base line. Auxiliary fixed points, called "mine stakes" (*Minenpfähle*), are used if necessary. Fixed points may be reference points found on the map or auxiliary fixed points established by the troops. Distances are measured in meters; azimuth readings are taken on the German issue compass—divided into 6,400 mils like the U. S. compass but read counterclockwise, and marked with the letters *KZ* (*Kompasszahl*). The new-type compass called "march compass" has clockwise graduation and is indicated with the letters *MKZ*. The Germans use the magnetic azimuth and always proceed in their survey from the friendly toward the enemy side.

The Germans believe that it is advantageous to lay a continuous chain of reference points 600 to 900 feet apart, through a division sector. This chain can be used to determine the location of ditches, trenches, obstacles, and pillboxes, as well as minefields. Individual points are designated with Roman numerals, starting on the right flank of the division sector.

3. Laying of Minefields

a. PATTERNS. To assure the greatest possible effect, minefields normally are laid out in definite patterns. The Germans make an exception to this practice, however, in sectors where they do not intend to undertake offensive actions. There they disperse the mines irregularly in the areas between defensive positions.

The main belts of a major antitank minefield laid in uniform pattern normally consist of antitank mines with a sprinkling of antipersonnel mines in the forward edge of the field. Both types may be fitted with anti-lifting devices, and some of the antipersonnel mines have trip wires attached. In some instances, these mines are placed in the intervals between the diagonal wires of a double-apron fence, with trip wires fastened to the diagonals.

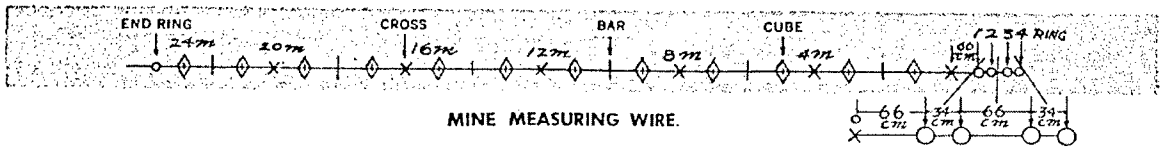
A number of antitank mines are laid in the forward edge of antipersonnel minefields to prevent armored vehicles from detonating the main belt of antipersonnel mines. The forward edges of minefields of all types often are sown with explosive charges placed in wooden boxes fitted with pressure fuzes. These act as both antitank and antipersonnel mines, and discourage the use of detectors to locate the mines.

Forward of most regular fields, and particularly in front of lanes, mines may be found widely spaced or scattered at random in unmarked groups. Mines also are laid in spaces running out at right angles from the forward edge of the minefield to damage vehicles moving along the field in search of lanes.

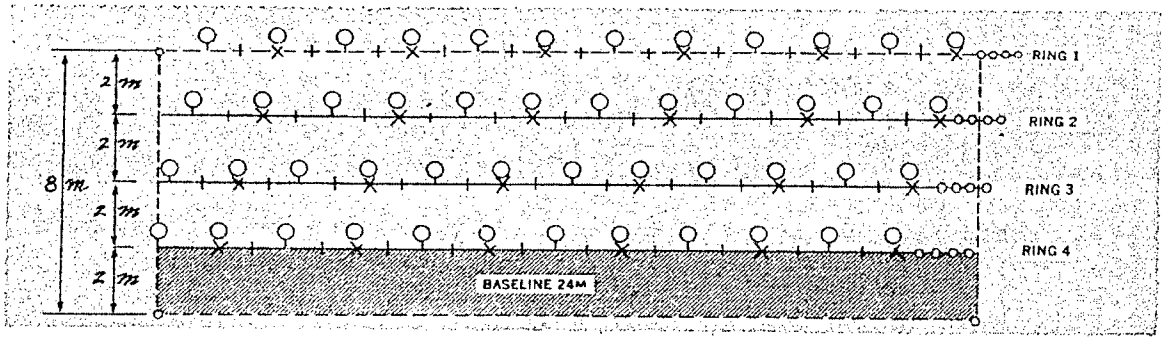
All pressure-type antitank and antipersonnel mines are laid in lines. For measuring distances and spaces, the troops use a mine-measuring wire (*Minenmessdraht*) which they themselves make

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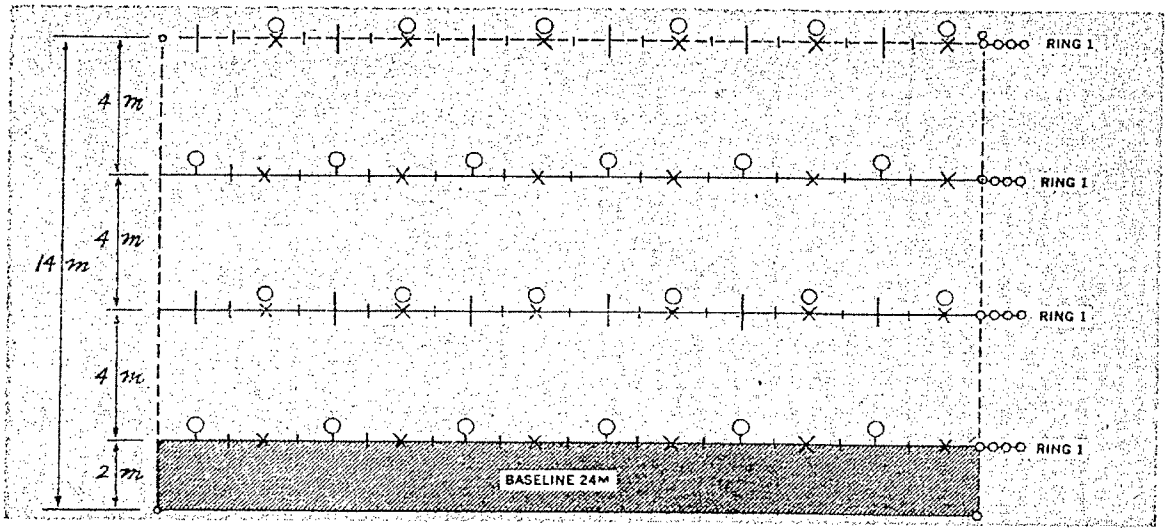
[5] See also Land Mines and Boobytraps, FM 5-31, War Department, Washington, D. C., 1 November 1943.



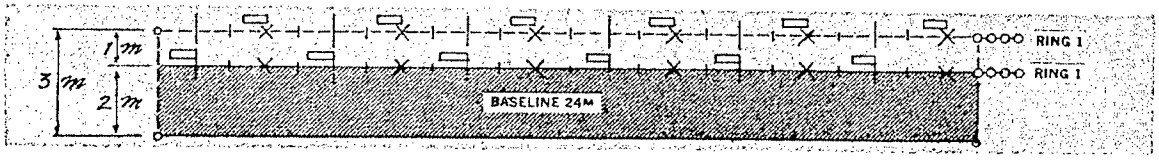
MINE MEASURING WIRE.



BURIED T-MINES (T-MINE 42 OR T-MINE 43), WITH 2-METER SPACING BOTH LATERALLY AND IN DEPTH.



T-MINES (T-MINE 42 OR T-MINE 43) LAID ON SURFACE, WITH 4-METER SPACING BOTH LATERALLY AND IN DEPTH.



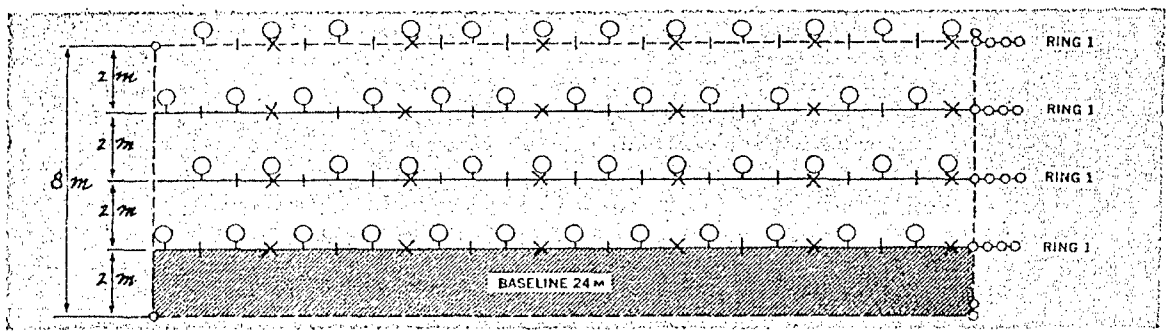
RIEGEL-MINES 43, BURIED OR LAID ON SURFACE.

AS A RULE TWO ROWS OF MINES ARE USED, BUT FOR EXTRA PROTECTION IN SPECIAL SECTORS FOUR ROWS ARE LAID, WITH THE THIRD AND FOURTH ROWS MOVED TWO "RINGS" TO THE LEFT WITH REFERENCE TO THE FIRST AND SECOND LINES.

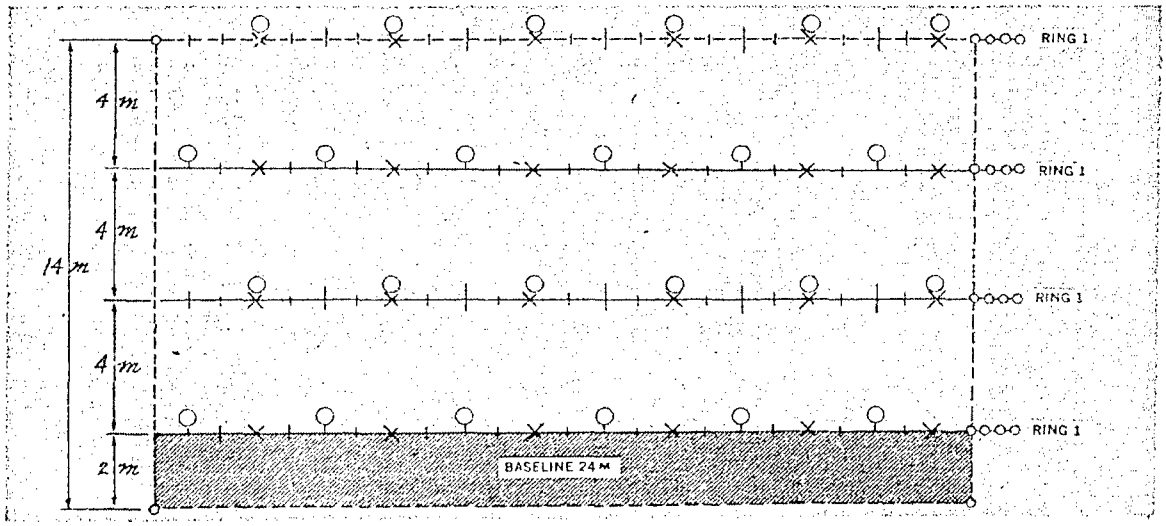
Figure 17.—Mine Measuring Wire and Minefield Patterns.

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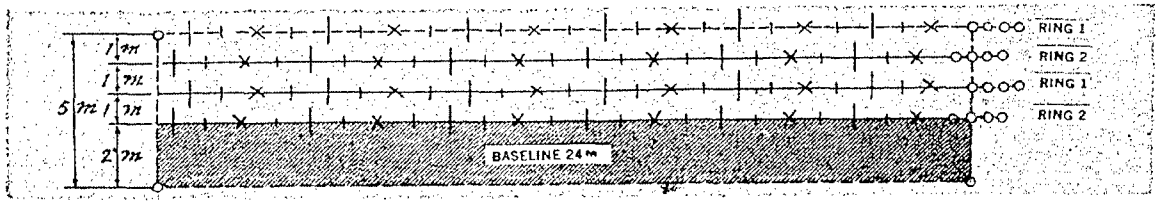
from old telephone wire. (See *Figure 15.*) The mine-measuring wire is 24 meters (about 25 yards) long, and every meter (3 feet 3 inches) is marked with a piece of wood. The rings on the ends are about 5 inches in diameter. The measuring wire, in addition to measuring the distance between fixed points, serves to lay out right angles by staking out a triangle with sides of 6, 8, and 10 meters respectively. Spaces between mines are determined by reference to the marks on wire; the four rings on one end are used to offset the rows.



5-MINES WITH 2-METER SPACING BOTH LATERALLY AND IN DEPTH.



5-MINES WITH 4-METER SPACING BOTH LATERALLY AND IN DEPTH.



SCHU-MINES 42, SPACED ½-METER LATERALLY AND 1-METER IN DEPTH. THE MINES ARE PLACED AT ½-METER INTERVALS ALONG THE MEASURING WIRE.

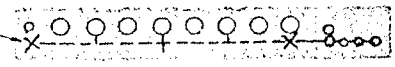


Figure 18.—Minefield Patterns.

Type of Mine	How Laid	Interval between Mines	Number of Rows	Density per 1 Meter of Front
T-Mine 35	Buried	4 m (4.4 yds)	8	2
			12	3
			16	4
T-Mine 42 T-Mine 43	Laid on surface	4 m (4.4 yds)	8	2
			12	3
			16	4
	Buried	2 m (2.2 yds)	4	2
			6	3
			8	4
R-Mine 43	Buried or laid on surface	about 4 m (4.4 yds)	2	½
			4	1
S-Mine 35	Buried	4 m (4.4 yds)	4	1
			8	2
			12	3
		2 m (2.2 yds)	2	1
			4	2
			6	3
Schü-Mine 42	Buried	1 m (1.1 yds)	1	1
			2	2
			3	3
		½ m (0.55 yd)	1	2
			2	4

The density of a minefield depends upon the interval between mines and the number of rows. The table above represents the density.

Mine lanes are left open for patrols, and passage lanes for assault troops. For permanent patrols new lanes are made from time to time, and the old ones closed. A mine-free safety strip is provided on the Germans' side.

The Germans normally lay mine belts in individual sections 80 by 105 feet. The sections usually are staggered, and, for extensive mine belts, they are combined in units of three or four to form forward or reverse arrowheads, or echelons. Minefields arranged in echelon are surveyed by using corner posts on the hostile side of intermediate minefields as survey points.

The Germans emphasize that minefields must be covered by fire, although during a hasty withdrawal they often do not follow this principle. It is common for a regular minefield to have a listening post with two men at the rearward edge; about 70 or 80 yards farther to the rear there usually is a covering party of four or five men armed with one or two light machine guns.

When the Germans are in hasty withdrawal, they usually lay a large number of small nuisance minefields. These fields contain many different types of mines, which often are unmarked and show every evidence of hurried laying. The consequent lack of pattern uniformity makes their detection and clearance a laborious and dangerous task. Though no consistency is noted in layout and types of mines used in such fields, the Germans show certain preferences in their choice of sites for them.

b. LOCATION. In general, mines are laid either close to, or on, roads; on airfields and railways; and along telegraph routes. Surfaced portions of roads usually are avoided by the hasty mine layer, but khaki-painted T-Mines sometimes are placed on the surface at dips in the road, in the hope that drivers will be unable to check their vehicles in time to avoid them. The Germans also place mines along the shoulders of the road opposite narrow places where drivers have to detour to pass, and at the entrances to defiles where they have to pull off the road to wait for vehicles moving in the opposite direction. Other places usually sown with antitank mines are turnouts, sharp bends, the unsurfaced islands sometimes found at crossroads, berms, and well worn wheel ruts.

c. CONCEALMENT. The Germans, with great ingenuity, attempt to make their mines difficult

to detect. They bury them as much as 24 inches below the surface where they explode only after passage of a number of vehicles has compacted the earth cover sufficiently to operate the fuze. They put explosives in wooden boxes to prevent the effective operation of ordinary mine detectors, and mark tire prints in the earth on top of the mine by drawing a detached axle and wheels over it.

The Germans also show considerable ingenuity in siting random antipersonnel mines on the line of the hostile advance. Road demolitions are plentifully sown with S-Mines, and kilometer posts at points where vehicular drivers have to dismount to read directions are similarly treated. S-Mines also are placed in ditches, often close to to the trip-wire peg of another mine.

Nuisance fields on lines of communication generally are closely spaced, occasionally so closely as to cause sympathetic detonation. This is particularly possible when mines are laid with their pressure plates almost flush with the surface of the ground and only lightly covered with earth.

German dummy minefields take various forms. In some cases a trip wire is laid to give the appearance of a minefield perimeter wire, with the usual lanes, and the ground is disturbed at regular intervals. Scrap metal, often dispersed with real mines, is placed in shallow holes to cause a reaction in the mine detector. Dummy mines often are wired in and connected with booby traps.

4. Marking of Minefields

The Germans stress the marking of minefields and attempt to mark them in such a manner that they cannot be recognized by the enemy but can easily be found by their own troops. Their methods of marking minefields are not uniform. The front edge of a field often is unmarked and unwired; the rear edge seldom so. Some fields have been found unmarked, but because of many accidents caused by their own minefields, the Germans issued orders within recent months making proper marking obligatory.

The following are typical examples of markings by the Germans, the type used depending on the situation and terrain: corner-post marking stakes; double-apron fence on the enemy side and a single trip wire on the friendly side, or the reverse; single knee-high wires; cattle fencing; empty mine crates; and signs.

The length of marking stakes varies with the terrain. They are flattened on one side for a length of about 8 inches. The flat surface is painted red, with the letter *M* (*Minen*) in black.

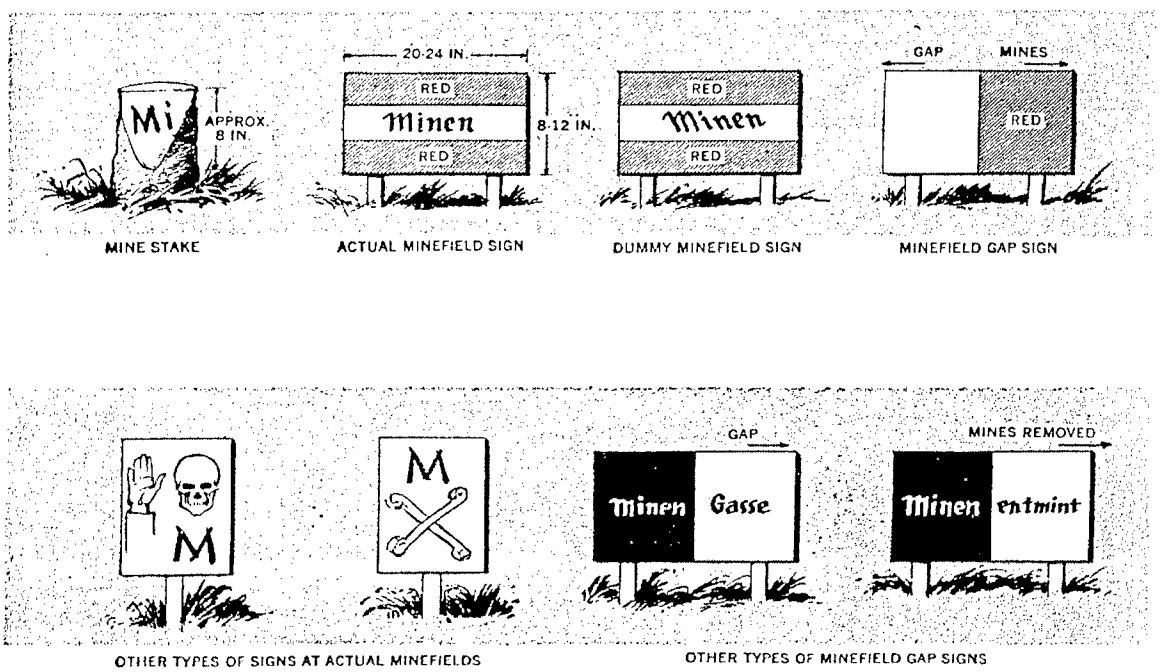
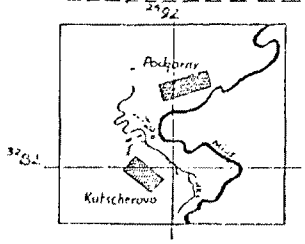


Figure 19.—Minefield signs.

Mine Obstacle: "JoAnn" 1st Engr Co 53rd Engr Bn

Location: Miusfront 32-92



Map Reference: Captured Russian Map L-37-6
Scale: 1:100,000 3 June 1942

Mine Plan: 189

Restricted	Co	Bn	Regt	Div Engr
	1	74		

Mines: No. Types and Igniters

120 S-Mines with S-Mine Igniter 35

21 Stock-Mines Caution, only 50 meters distance

How laid: dug in

Mine Pattern: Pressure type minefield (A, B, C) *)

Warning Fence: on friendly side

Distinguishing Features:

*) Trip wire field D

date mine field was laid 2 May 1943
by Sgt Krautkopf

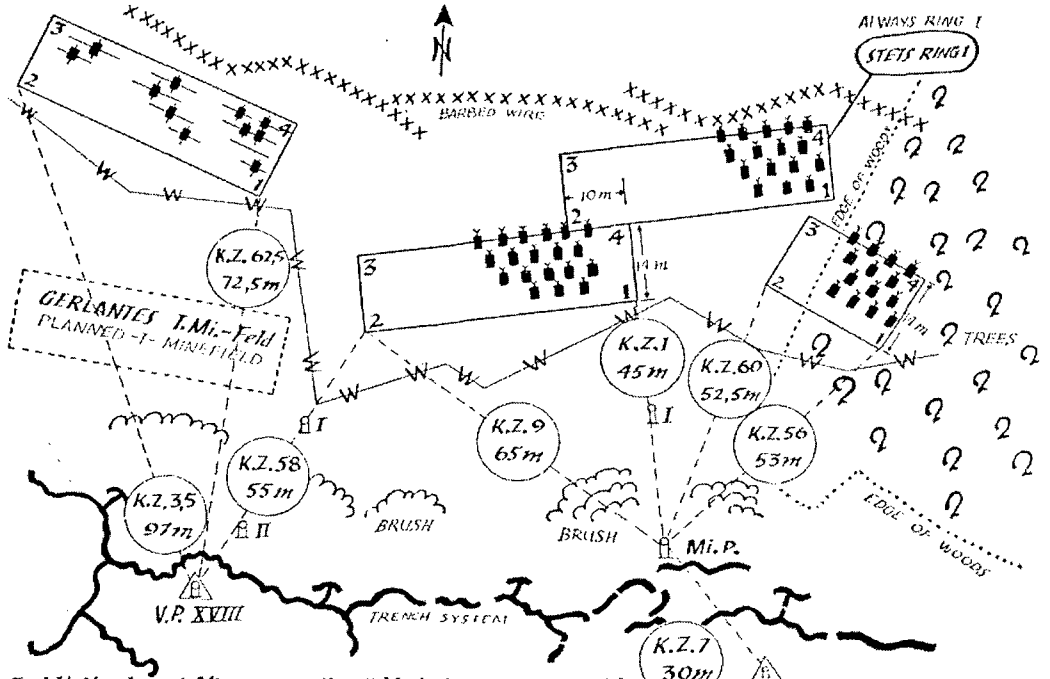
date drawn 4 May 1943
by Cpl Sturm

date surveyed on 4 May 1943 with March Compass
by Sgt Verloren

date checked 4 May 1943
by Lt. Besserwisser

Scale: 1:1000

Distribution:



Mine Field	Number of Mines
A	24
B	48
C	48
Total	120 S-Mines
D	21 Stock Mines

Mine field A, B and C 14m wide, 4 lines with 4m interval and distance.

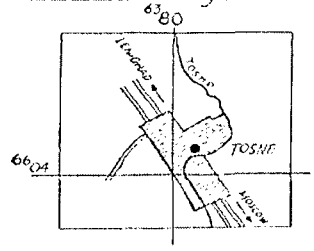
Mine field D 14m wide, 7 lines each line with 3 mines with trip wire.

Figure 20.—German mine plan.

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Mine Obstacle: "Pauline"

Location: South of Ladoga Lake



Map Reference: Russia 0-36-34

Scale: 1:100,000 July 1941

Mine Plan: 578

Co	Bn	Regt	Div Engr
3	122		

Restricted

Mines: No. Types and Igniters

17 Concealed charges with 17 Clockwork long delay igniters

How laid: —

Mine Pattern: —

Warning Fence: —

Distinguishing Features: —

date mine field was laid 26 and 27 August 43
by Capt. Wurst

date surveyed on 26 Aug 43 with —
by Capt. Wurst

date drawn 27 Aug 43
by Cpl Schlegel

date checked 28 Aug 43
by Maj. Knopf, Bn Co

Scale: approx 1:5000

Distribution:

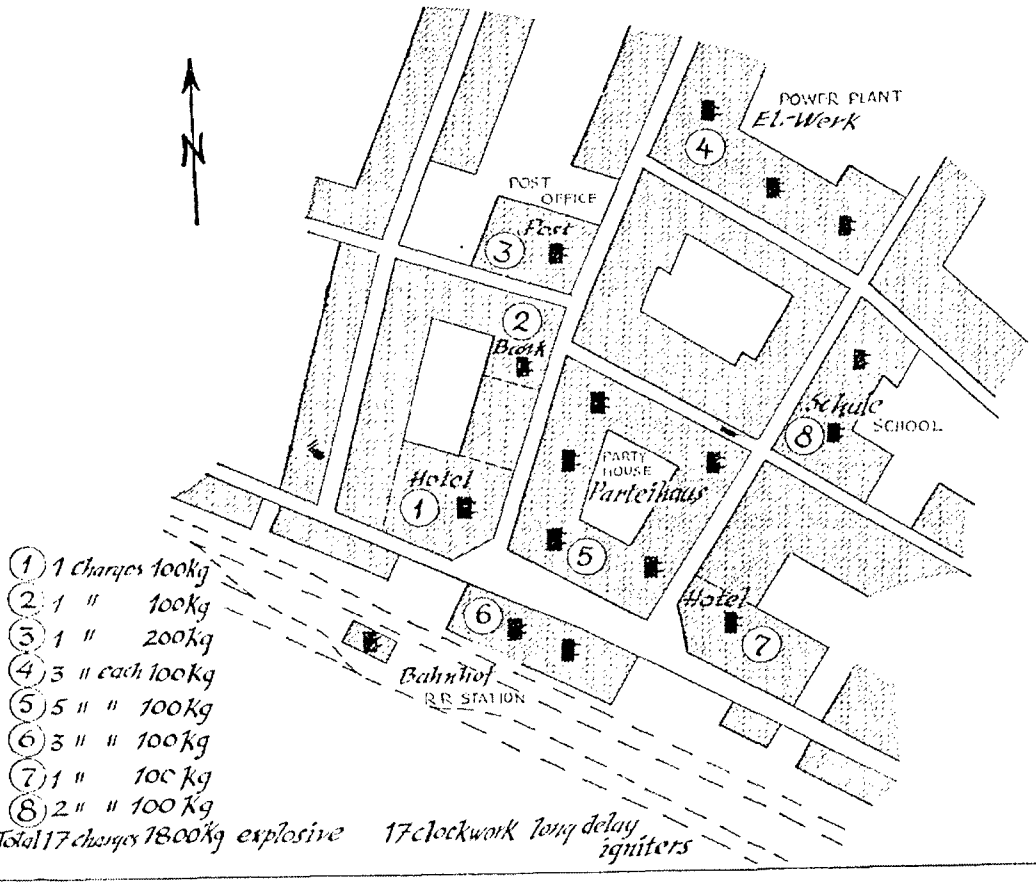


Figure 21.—German mine plan.

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Such stakes are used only on the friendly edges of minefields.

Signs are painted in red and white on boards or pieces of sheet metal, and fastened to two stakes. The edges of minefields are marked with signs showing horizontal stripes. Edges of lanes through the fields are shown by vertically divided signs with the white portion on the side of the lane, and the red portion on the side of the minefield (danger). The reverse side of the signs (the side toward the enemy) is painted olive drab. If red paint is not available, the Germans substitute black-and-white signs. They are painted with the following words:

Minen—for mines
Gasse or *Gassen*—for mine lanes
Entminnt—for an area cleared of mines.

Minefields are marked with vertical lettering, dummy minefields with slanting letters. This distinction, however, is supposed to be made known only to the German engineer troops because other troops may divulge the location of dummy minefields by crossing them.

5. Mine Plans, Sketches, and Reports

A German mine plan shows one or more fields in all necessary technical details. A German mine map, on the other hand, shows all mine obstacles within one front sector and their tactical significance, but without technical details.

The Germans use a number of different forms for their reports and sketches, although all are based on the same principle. Figure 17 shows a very commonly used form. The upper third of the mine map form provides space for written specifications and a small situation sketch. The drawing is made on the blank space provided. It is the engineers' responsibility to draw up mine maps, and to keep them up to date. Additional remarks sometimes are placed on the back of the sheet.

a. Details of Mine Map. The German mine map usually shows the following details:

(1) Name of the obstacle and designation of the unit which laid it.

(2) Name of the area in which the obstacle is located.

(3) Grid reference and particulars of the map sheet referred to.

(4) Obstacle shown in the little sketch in red.

(5) Date minefield was laid.

(6) Name and rank of officer or noncommissioned officer in charge of laying field.

(7) Day of survey and instrument used (old or new compass—German issue).

(8) Name and rank of officer or noncommissioned officer in charge of survey.

b. Mine Data in Map. The following data are given on the mines:

(1) Number, type and igniter. (Example: 72 T-Mine with *T-Mi.Z. 42*, booby-trapped.)

(2) Whether or not the mines are dug in.

(3) Number of rows, and number of mines per row.

(4) Fence (Example: warning fence on friendly side.)

(5) Special features (Example: destroyed enemy tank in center, on enemy side.)

c. Minefield-Type Identification in Map. Colored lines drawn diagonally across the upper right-hand field of the mine map identify the type of the minefield as follows:

(1) A red diagonal line designates fields which cannot be cleared because some or all mines are booby-trapped.

(2) A yellow diagonal line designates fields which can be cleared by using data from mine document.

(3) A green diagonal line designates dummy minefields.

(4) Mines taken up or exploded are marked in red.

The number of the minefield plan and unit designation appears on the upper right-hand corner of the sheet. Battalion, regiment, and division engineers make their notes in the space provided for them.

For S-Mines laid 50 meters (55 yards) from the German lines, a note is made in red letters: *VORSICHT, NUR 50 METER ABSTAND!* (Caution, only 50 meters distance!)

In case electrical ignition is provided, a note is made showing how the igniters will be disposed of, if the unit which has laid the minefield is relieved.

d. Information in Minefield Drawing. The drawing of the minefield is made in the blank space on the lower part of the sheet. The scale is from 1:500 to 1:2,000 whenever possible. The following information is included:

(1) Shape and size of minefield.

(2) Pattern.

(3) Location of booby-trapped mines.

(4) Location of survey points with azimuth and distances.

(5) Type and location of warning fence.

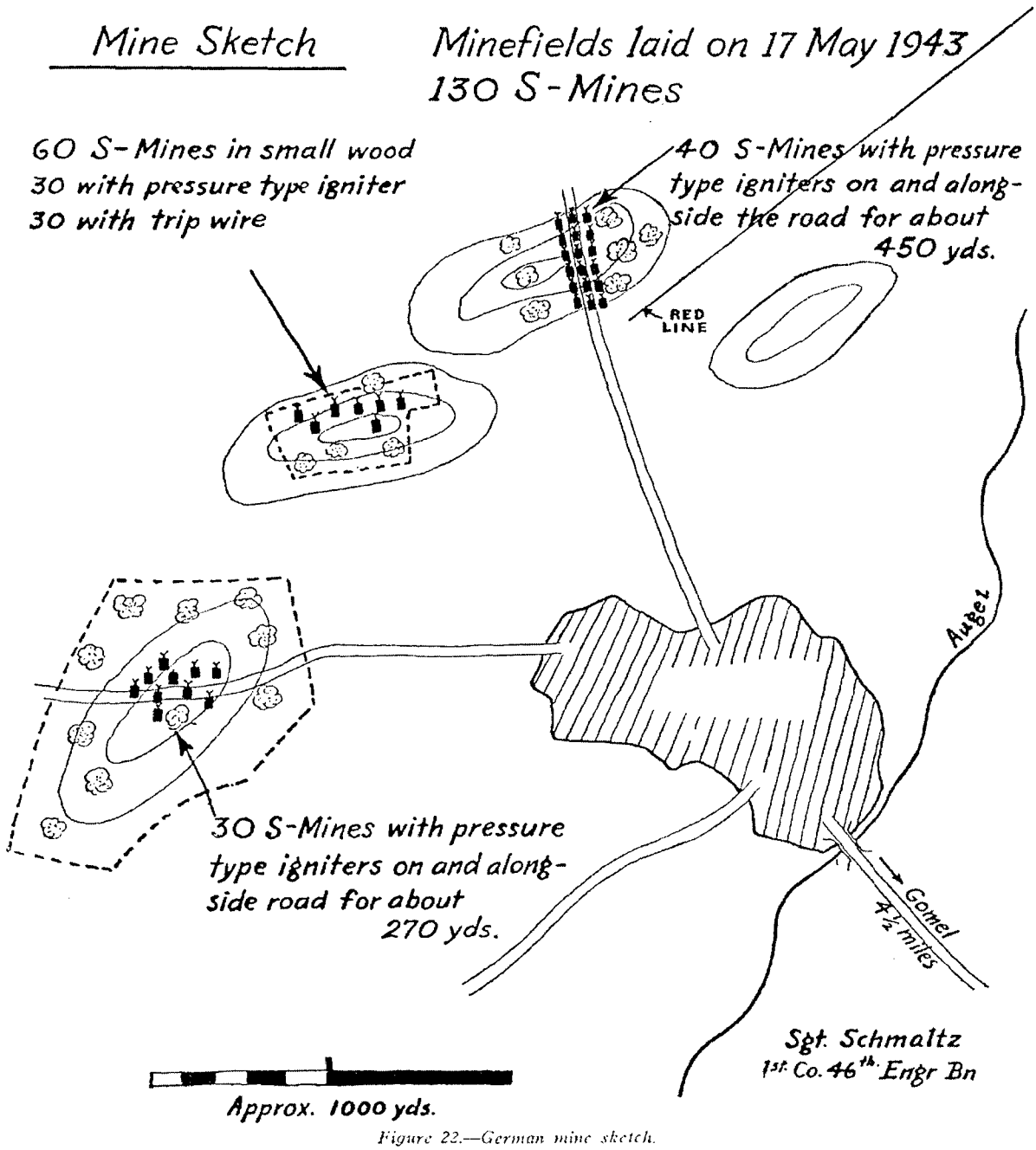
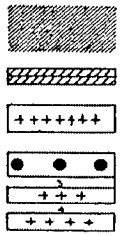


Figure 22.—German mine sketch.

CONVENTIONAL SIGNS FOR MINE MAPS



CONVENTIONAL SIGNS FOR MINE PLANS AND SKETCHES



(6) Location of the front lines and fortifications.

(7) Neighboring minefields, mine lanes, terrain features, special features.

The Germans believe that it is not necessary to mark on the minefield drawing the location of every single mine, if a partial drawing is sufficient. The German mine plans contain the detail symbols shown in Figure 18, while simple tactical signs are sufficient for minefield maps.

The Germans complete their mine plans at company or battalion command posts, based on sketches and data compiled while the field is being laid out. They make five copies of all mine plans and distribute them as follows: One for engineer company which is in charge of the minefield; two for division; one for army; one for central file in *Dessau-Rosslau*.

Changes in the minefield are recorded on the back of the mine plan. After three changes a new mine plan is drawn.

A mine sketch is a simplified mine plan used to transmit information on a minefield as rapidly as possible. It is not drawn to scale, and is drawn whenever the tactical situation, bad weather, or other circumstances prevent the preparation of mine plans.

Front-line troops receive from the engineers instructions or sketches showing the approximate location and extent of the minefield. These sketches, as a rule, do not contain details on types of mines or igniters, pattern, and survey points.

Engineer units in charge of minefields keep records of changes in minefields under their care and keep these records with their units, while mine plans are turned over to the relieving units.

e. MINE REPORTS. Armies generally designate certain areas for fields of scattered mines. In this case mine reports take the place of mine plans. Normally, mine reports contain:

(1) Number of the order authorizing scattering of mines.

(2) Designation of units scattering the mines.

(3) Name and number of field containing scattered mines.

(4) Map location of scattered minefield.

(5) Number of mines scattered, subdivided by types and igniters.

(6) Number and type of booby-trapped mines, kind of booby trap.

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APPENDIX G
MINES AND FUZES USED BY THE AXIS AT EL ALAMEIN[1]

Annex 1. German
- a) Anti-tank Mines
  - Tellermine 35
  - Tellermine 35 (Stahl)
  - Tellermine 42
- b) Anti-personnel Mines
  - S-Mine 35
  - SD-2 ("Butterfly Bomb")
  - W-1
- c) Fuzes
  - T.Mi.Z.35
  - T.Mi.Z.42
  - S.Mi.Z.35
  - Z.Z.35
  - Z.u.Z.Z.35
  - B.Z.39

Annex 2. Italian
- a) Anti-tank Mines
  - B-2
  - V-3 and N-5
  - CS 42/2
- b) Anti-personnel mines
  - B-4

Annex 3. British
- a) Anti-tank Mines
  - A.T. MK II
  - A.T. L.P. (Local Pattern) MK II
  - A.T. MK III
  - A.T. MK IV
  - A.T. MK V (Models G.S. and H.C.)
  - A.T. MK V (Models G.S. and C.)
  - A.T. E.P. MK V
  - Hawkins Grenade Mine, No. 75, MK I and MK II
- b) Anti-personnel Mines
  - Shrapnel Mine, MK I
  - Shrapnel Mine, MK II
- c) Fuzes
  - Pressure Fuze, No. 1, MK I
  - Pressure Fuze, No. 3, MK I

Annex 4. French
- a) Anti-tank Mines
  - M-1935
  - M-1936
- b) Fuzes
  - M-1935 and M-1936

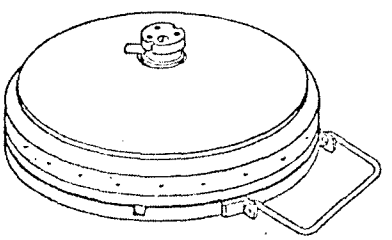
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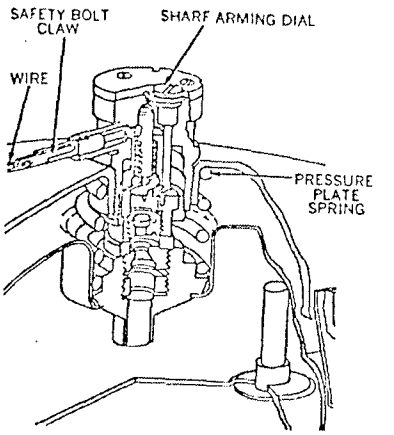
[1] Extracted from: North Africa, 1940-1943, Appendices, Landmine and Countermine Warfare, by Robert Thomsen, Engineer Agency for Resources Inventories, Washington, D.C., June 1972, Appendix O.

Appendix G, Annex 1
German Mines and Fuzes

A) GERMAN ANTI-TANK MINES

Tellermine 35 (T.Mi.35)





This steel mine is 31.7 centimeters in diameter and 8.2 centimeters high. The large, circular, steel pressure plate has a spring between it and the mine body. This spring is placed in the centrally located main fuze well. It has two secondary fuze wells. One is located in the side directly across from the carrying handle and the other is located in the bottom in the center.

Characteristics.

Shape	Fuze	Operating force	Explosive	
			Main charge	Booster
Circular..	35	200 to 400 lb. pressure.	11 lb. TNT or 65/35 amatol or 50/50 tetrytol.	9 oz. Penthrite. (PETN/TNT 50/50).

Fuze hazards	Remarks
Percussion cap.....	A pressure bar to interconnect mines may be used.

Use. The Tellermine 35 is used as an antitank mine. This mine may be found encased in a waterproof jacket.

Functioning. Pressure on the pressure plate is transferred to the top of the fuze. This pressure forces the striker-shaft down, shears on the shear pin, and fires the percussion cap. The percussion cap in turn fires the detonator, booster, and mine.

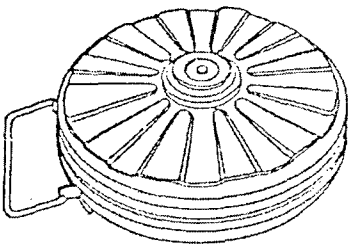
Installing and Arming.

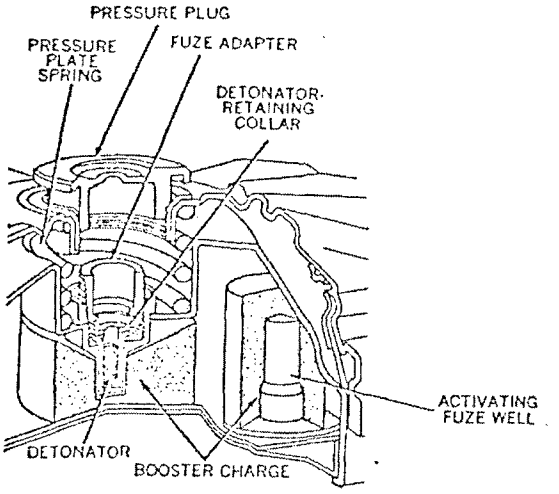
(1) Place the mine in a hole with the carrying handle in the horizontal or down position.
(2) Unscrew the wooden shipping plug from the main fuze well and insert a detonator in the fuze well.
(3) Screw in the threaded washer to hold the detonator in place and then screw in the adjusting collar (a special wrench is provided for this and the threaded washer).
(4) Place the rubber or leather washer in the groove of the adjusting collar.
(5) Screw the Tellermine fuze 35 into the main fuze well until it bears on the rubber or leather washer.
(6) If a secondary fuze is used, screw any pull fuze with standard threads into the secondary fuze well.
(7) Turn the screw head arming dial in the top of the Tellerfuze 35 so that the red dot points to *scharf* (armed).
(8) Pull out the safety bolt by the wire attached to the safety bolt claw.

Disarming Procedure.

(1) Check for and remove any secondary fuzes or antilift devices.
(2) Carefully press in the safety bolt. If it does not move easily, do not force it.
(3) Carefully unscrew the fuze from the mine.
(4) Separate the detonator from the fuze. Turn the arming dial to sicher (safe).
(5) Transport the mine and fuze to a safe storage or disposal area.

Tellermine 35 (Steel) (T.Mi.35 [Steel])





This steel mine is 31.7 centimeters in diameter and 8.8 centimeters high. It differs from the Tellermine 35 by having a fluted pressure plate to keep the sand from blowing off in desert areas. It has one centrally located main fuze well that is hidden by a pressure plug when either the Tellermine 42 or 43 fuze is used, but is not used with the Tellermine 35 fuze. One secondary fuze well is located in the bottom of the mine case directly in line with the carrying handle, and another in the side of the mine case in the vicinity of the carrying handle.

Characteristics.

Shape	Fuze	Operating force	Explosive		Secondary fuze wells
			Main charge	Booster	
Circular..	T.Mi 35 T.Mi 42 T.Mi 43	200 lb. pressure.	12 lb. TNT	9 oz. penthrite (penthrite is PETN/TNT 50/50).	2

Fuze hazards	Markings	Remarks
Percussion cap.	"T.Mi.35/T.Mi. Z." 42" in white.	Lugs are added to late models for attaching trip-wires.

Use. This mine used as an antitank mine in desert areas. It may also be encased in an earthenware waterproof jacket.

Functioning. Pressure on the pressure plug or the pressure plate is transmitted to the top of the fuze. This forces the striker shaft down, shears the shear pin, and fires the percussion cap, detonator booster, and the mine.

Installing and Arming.

(1) *Tellermine fuze 35.*

(*a*) Place the mine in the ground.

(*b*) Unscrew the pressure plug from the main fuze well and insert a detonator. The pressure plug is not used.

(*c*) Screw in the threaded washer to hold the detonator in place and then screw in the adjusting collar. A special wrench is provided in the fuze packing box for screwing in the threaded washer and the adjusting collar.

(*d*) Place the rubber or leather washer in the groove of the adjusting collar.

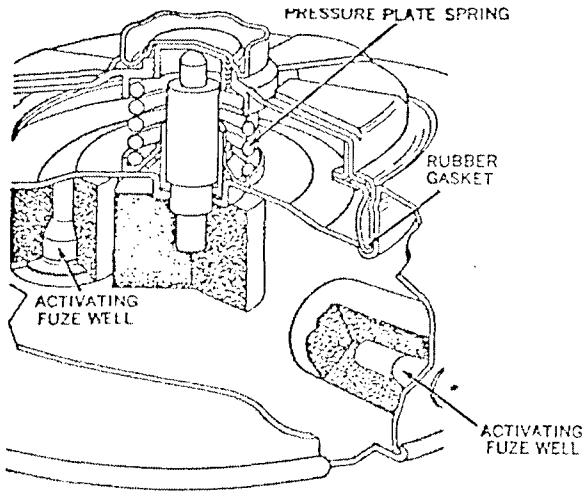
(*e*) Screw the Tellermine fuze 35 into the main fuze well until it bears on the rubber or leather washer.

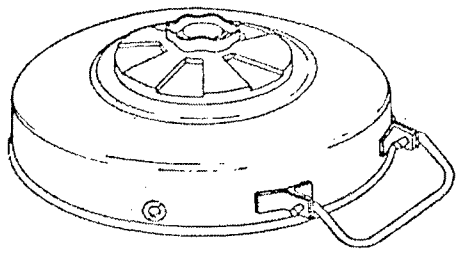
(*f*) If a secondary fuze is used, screw any pull fuze with standard threads into a secondary fuze well and arm as specified.

(*g*) Turn the screw head arming dial in the top of the Tellermine fuze 35 so that the red dot points to *scharf* (armed).

(*h*) Pull the safety bolt out by the wire attached to the safety bolt claw.

Tellermine 42 (T.Mi.42)





This steel mine is 32.2 centimeters in diameter and 10.1 centimeters high. It has a circular steel pressure plate 15.2 centimeters in diameter. A scalloped pressure plug in the center of the pressure plate covers the main fuze well. There are two secondary fuze wells—one in the side of the mine case close to the carrying handle, the other in the bottom of the mine case slightly off-center in the direction of the carrying handle.

Characteristics.

Shape	Fuze	Operating force	Explosive		Secondary fuze wells
			Main charge	Booster	
Circular..	T.Mi 42 or T.Mi 43	250 to 400 lb. pressure.	12 lb. TNT	12 oz. PETN/ Wax 91/9 (approx).	2

Fuze hazards	Markings
Percussion cap, and two secondary fuze wells.	Manufacturer's date and number in white on the top.

Use. This antitank mine is laid in roads and minefields.

Functioning.

(1) *Tellermine fuze 43.* Pressure applied on the pressure plate forces the pressure sleeve down, shearing the main shear pin, then permitting the retaining balls to escape and releasing the striker against the percussion cap. Pressure release action is initiated by the unscrewing of the hexagonal pressure plug, which releases the striker against the percussion cap.

(2) *Tellermine fuze 42.* Pressure on the pressure plate shears the shear pin, releasing the striker against the percussion cap.

Installing and Arming.

(1) Place the mine in the ground with the carrying handle horizontal or down.
(2) Unscrew the hexagonal pressure plug from the main fuze well.
(3) Screw detonator retaining collar with detonator to the fuze.
(4) Insert the fuze with detonator into the main fuze well.
(5) Screw in the hexagonal pressure plug. If the Tellermine fuze 43 is used, screw the hexagonal pressure plug down until a click is heard. This assures that the fuze is armed.

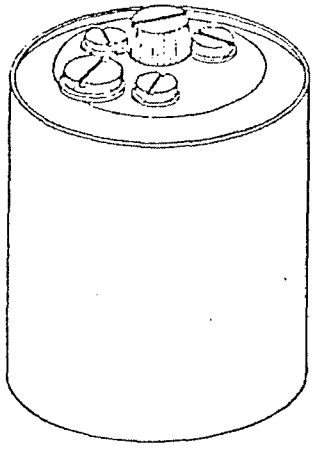
Disarming Procedure. **Do not attempt to disarm this mine,** as the pressure plug cannot be removed in order to identify the fuze. **Blow the mine in place.**

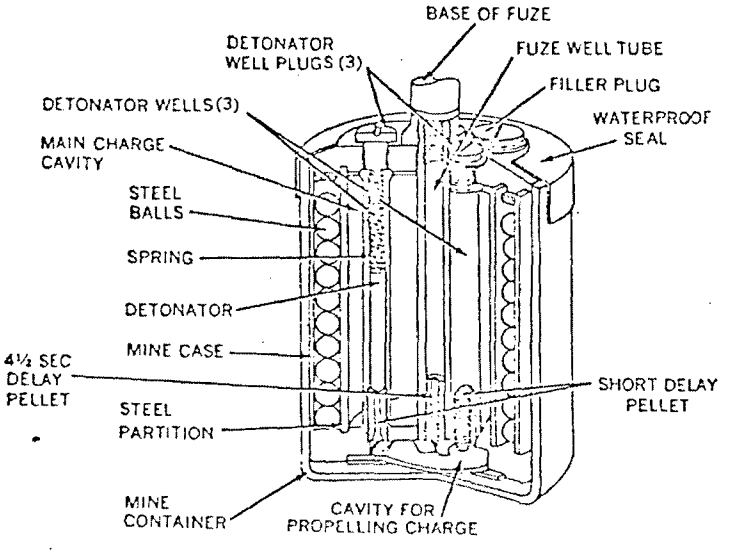
Additional Precautions. If for any reason the mine cannot be blown in place, check for and remove any secondary fuzes or antilift devices and carefully pick up the mine and carry it to the closest safe disposal area.

B) GERMAN ANTI-PERSONNEL MINES

B) GERMAN ANTI-PERSONNEL MINES

S-Mine 35 (S.Mi.35)





This is a steel cased mine 10.1 centimeters in diameter and 12.7 centimeters high. It has a pressure fuze, detonator, main charge, propellant charge, and a 4½—second delay pellet, which permits the mine to jump about 1 meter into the air before it explodes, scattering its 300 to 350 steel balls or shrapnel in all directions.

a. Characteristics.

Shape	Fuze	Operating force	Explosive	
			Main charge	Propellant
Circular...	S.Mi.Z-35 and E.S. Mi.Z-35 pressure; Z.Z-35 and Z.U. Z.Z-35 pull.	4 to 5 lb.	8 to 14 oz. cast or powdered TNT.	20 grms. black powder.

b. Use. This mine is laid as an antipersonnel obstacle, either singly or in groups of 2 to 5 mines, with one pressure fuze or 2 or 3 fuzes and rigged with tripwires or with an electrical circuit with up to 8 electric fuzes laid around the mine in parallel.

Functioning. Ignition of the fuze sets off the 4½-second delay pellet. The pellet ignites the propelling charge which projects the mine upward and at the same time ignites the short-delay pellets. The short-delay pellets set off the detonators and main charge when the mine is from 1 to 1½ meters in the air.

Installing and Arming.

(1) Remove the three screw plugs from the detonator wells and insert three detonators OPEN END DOWN.
(2) Replace screw plugs.
(3) Remove fuze-well plug and screw in a pressure fuze (or a Y or W adapter for two or three pull and/or pressure fuzes).
(4) Place mine in a hole so that the ends of the pressure prongs or pull rings are just above ground livel.

Disarming Procedure.

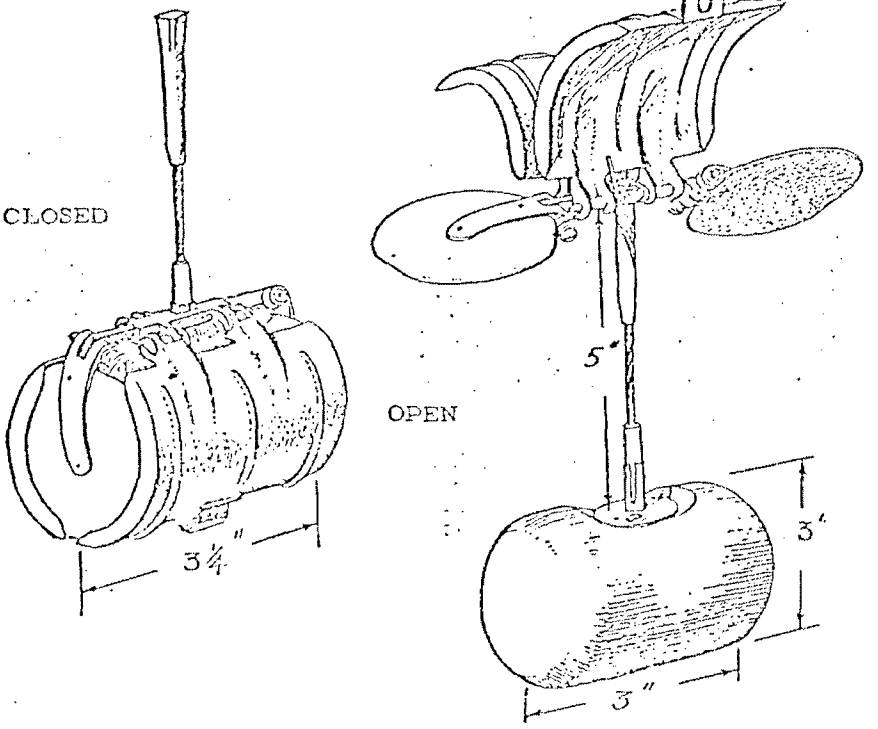
(1) *Pressure fuze:* Insert a nail or other safety pin through the safety-pin hole in the fuze and unscrew the fuze from the mine. Unscrew the detonator well plugs and slide the detonators out of the mine.
(2) *Pull fuzes and trip wires.* Trace and cut all *slack* trip wires attached to fuzes and unscrew fuzes from the mine Remove detonators.

Note.. If a *taut* trip wire is attached to one of the fuzes, DO NOT CUT IT but insert a safety pin through the safety-pin hole in the fuze first, then cut the wire and proceed as above.

(3) Remove the mine and fuzes to a safe storage or disposal area.

Additional Precautions. Some, but not all, models of this mine have a supplementary fuze well in the bottom for inserting a pull fuze for boobytrapping purposes.

German Butterfly Bomb



TYPE. Antipersonnel bomb

COLOR. Green-gray

CASE. Sheet metal

WEIGHT. 4½ pounds

EXPLOSIVE. Yellow TNT (7.5 oz.)

EFFECT. Causes casualties within a radius of 50 feet

EMPLOYMENT. Dropped from low-flying aircraft.

PACKING AND TRANSPORTING

Container holds 23 bombs.

CAUTION

Three types of fuze have been found in bomb. In 41 fuze, selector screw can be set at ZEIT to explode bomb 3 seconds after arming, or at AZ to explode on impact. Clockwork in 67 fuze is adjustable for delays of 10, 20, or 30 minutes. ZEIT and AZ often are stamped on this fuze for deception. Fuzes 70 (A) and 70 (B) are antihandling devices, probably similar in action to that in Italian thermos bomb. Bombs extremely dangerous when armed with them.

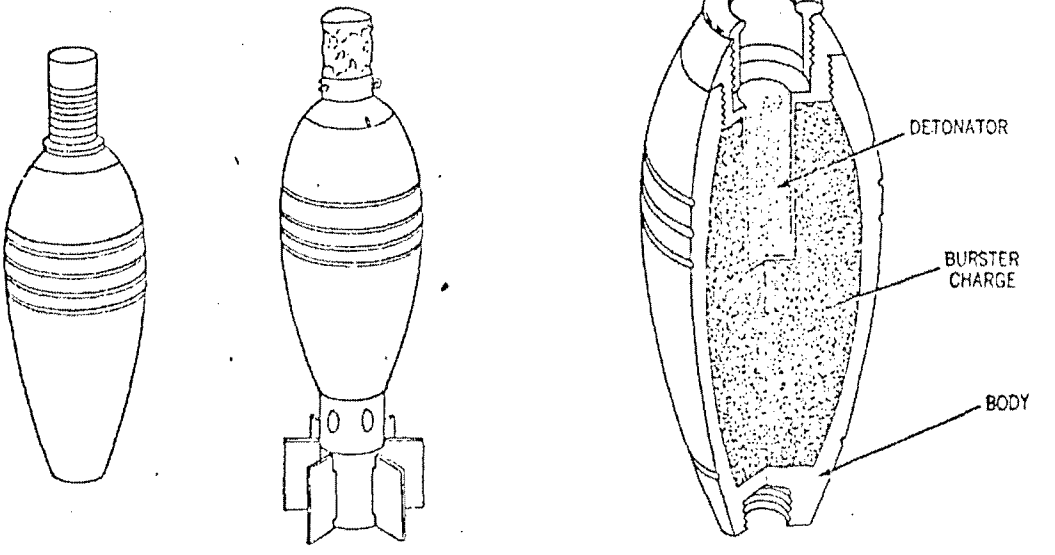
FUNCTIONING

1. Container holding 23 bombs opens after falling predetermined distances, allowing bombs to scatter.
2. Springs force apart two halves of bomb case.
3. Halves of case and two butterfly vanes move to top of spindle wire, arming bomb.
4. Bomb explodes at predetermined time, on impact, or when handled, depending on type of fuze installed.

DEFUZING

If case still is closed, bomb is unarmed and fuze may be removed. If bomb is armed, wait 45 minutes To destroy bomb, build sandbag wall around it and, from behind sandbags, pull bomb with rope; or, set off small charge next to it.

Antipersonnel Mine W–1



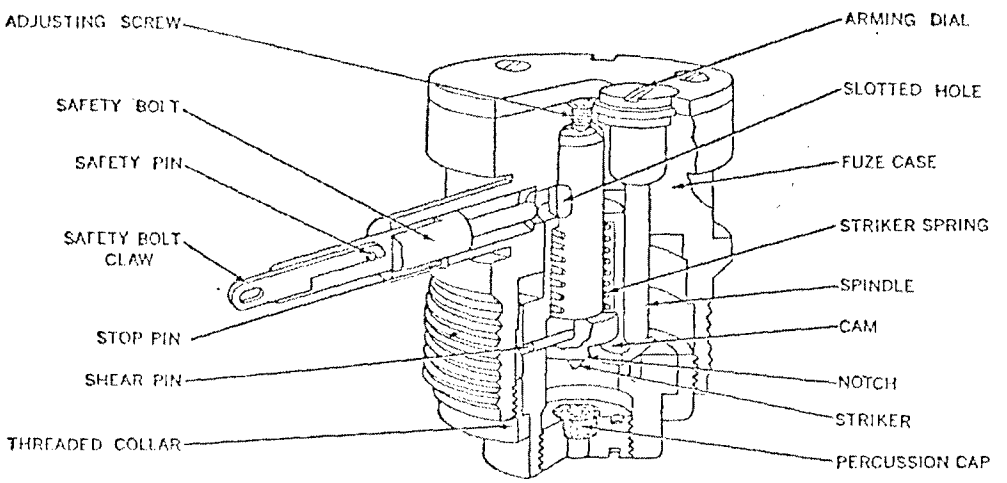
a. Description. The improvised antipersonnel mine W–1 is made from a French 50-mm mortar shell. The tail fins and the nose fuze are removed. A Buck chemical fuze is inserted in the nose by means of a plastic adapter.

b. Employment. This mine is used in antitank mine fields to hinder reconnaissance and breaching parties. It is laid in paths, ditches, and other places where foot soldiers are most likely to walk.

c. Functioning. A pressure of about 15 pounds crushes the corrugated aluminum cylinder of the Buck chemical fuze, exploding the mine.

C) GERMAN MINE FUZES

Pressure Fuze T.Mi.Z.35



Section of T.Mi.Z.35
(see page 1 for overall of markings)

Characteristics.

Shape	Case	Internal action	Operating force	Remarks
Cylindrical.	Brass. .	Mechanical, with shear pin release.	250 to 400 lb.	In disarming mines containing this fuze, the dial indications *sicher* and *scharf* should be disregarded, as they have been known to be purposely in error.

Employment. This fuze was designed especially for use in the Tellermine 35.

This Tellermine fuze is 5.3 centimeters high and 4.0 centimeters in diameter. It is composed of a case that contains a spring-loaded striker fastened by a shear pin to a cylindrical housing loosely retained in the fuze case by a threaded collar. The percussion cap screws into the base of the striker housing. The fuze has two safety devices—a horizontal safety bolt that passes through a hole in the striker, and a rod attached to a slotted screw head on the arming dial in the top of the fuze, with a cam at the lower end. When the screw head is turned to *sicher* (safe), the cam engages the striker and takes the pressure of the striker spring off the shear pin. When the screw head is turned to *scharf* (armed), the cam is disengaged from the striker.

Functioning. After arming, proper pressure on any part of the lid of the mine will move the igniter body downward until it ruptures the shear pin, which permits the spring to force the striker against the percussion cap to undertake the firing chain.

Installing and Arming.

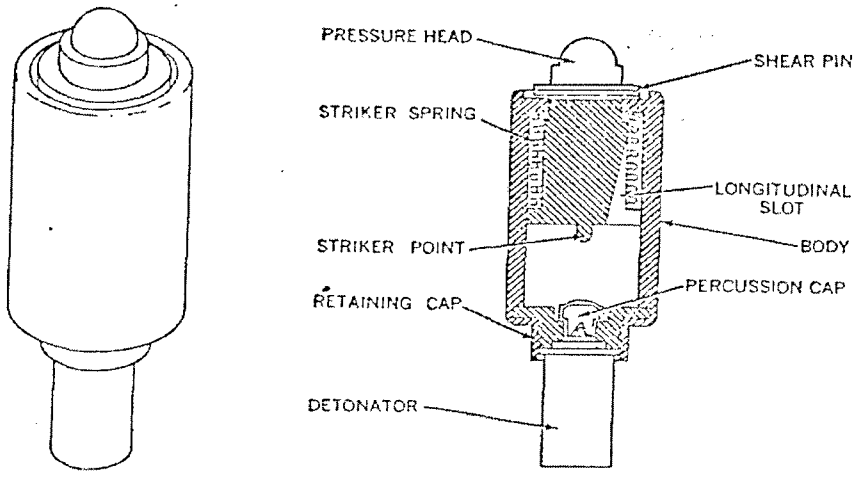
(1) Screw the fuze into the fuze well of the mine.

(2) Turn the setting dial counterclockwise until the red spot is opposite the red line under *scharf*.

(3) Withdraw the safety bolt until it is latched by the stop pin.

Disarming Procedure. Unscrew the fuze from the mine and remove it to a safe storage or disposal area.

Pressure Fuze T.Mi.Z.42



External and sectional view of T.Mi.Z.42 pressure fuze

This is a Tellermine fuze with a body 5.2 centimeters long and 2.1 centimeters in diameter, bored to receive the striker, striker spring, and detonator cap housing. The striker is dome-shaped at the upper end. The lower end has a collar that forms a seat for the striker spring. A longitudinal inclined slot is machined in the lower end to prevent air cushioning. A retaining cap, screwed to the detonator cap housing, holds the detonator in a central position.

Characteristics.

Shape	Case	Internal action	Operating force
Cylindrical...	Steel.....	Pressure mechanical, with shear pin release.	250 to 400 lb.

Use. This igniter was designed to actuate the steel Tellermine 35, Tellermine 42, and mushroom Tellermine 43. The fuze has nonstandard German threading.

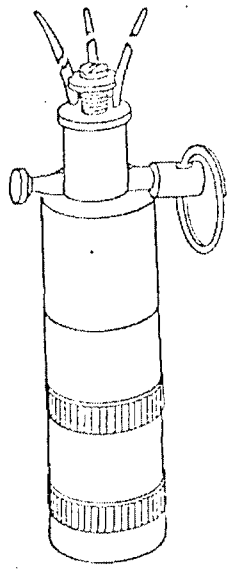
Functioning. Pressure applied to the striker head breaks the shear pin and releases the striker to fire the percussion cap and initiate the firing train.

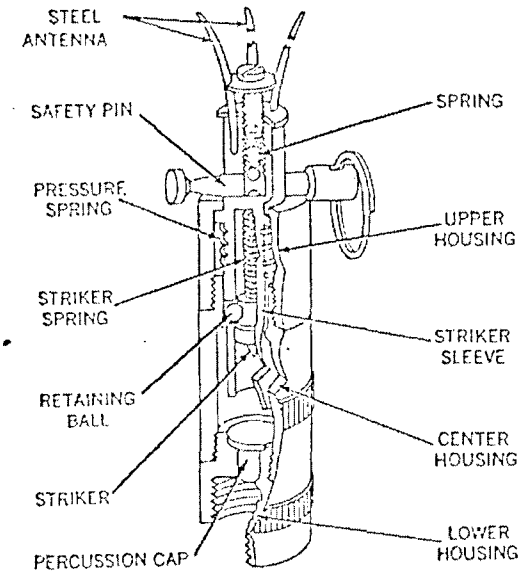
Installing and Arming. As this fuze has no safety, installing and arming are no more than to screw the detonator retaining collar with the detonator to the base of the fuze and insert the assembly into the mine.

Disarming Procedure.

(1) Remove the fuze from the mine.
(2) Unscrew the detonator retaining collar from the base of the fuze and remove the detonator.
(3) Remove the fuze to a safe storage or disposal area.

Pressure Fuze S.Mi.Z. 35





The S.Mi.Z. 35 is a prong-topped pressure fuze in three parts—upper housing, center housing, and lower housing. The upper housing contains the pressure spring and plunger which has three prongs attached to its upper end. The central housing serves as a guide for the plunger; and the lower part contains the percussion cap and threads for attachment to the mine. The fuze is 9.5 centimeters long and 1.8 centimeters in diameter.

Characteristics.

Shape	Case	Internal action	Operating force
Cylindrical...	Aluminum..	Pressure mechanical, with ball release.	8 to 10 lb.

Use. This is a specially designed fuze for the S or bounding mine. Usually the tips of the prongs or antennae extend above the ground.

Functioning. Pressure applied on the prongs overcomes the resistance of the pressure spring and depresses the plunger. At a certain point, this depression frees the retaining balls and releases the striker, which is then driven into the percussion cap. This fires the percussion cap and continues the firing chain.

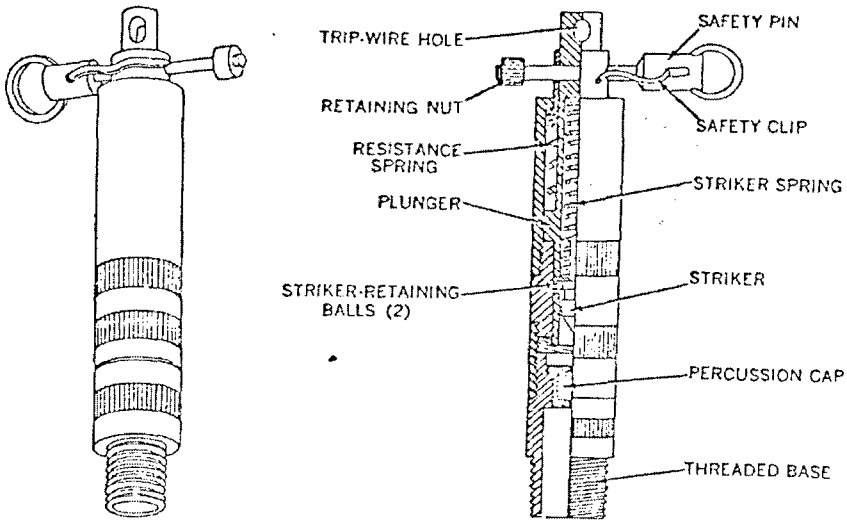
Installing and Arming.

(1) Screw the fuze into the mine.
(2) Place the mine in the ground.
(3) Unscrew the retaining nut from the end of the safety pin and withdraw the safety pin.

Disarming Procedure.

(1) Insert a nail or wire in the safety-pin hole.
(2) Remove the fuze from the mine and unscrew the percussion cap.
(3) Take the fuze to a safe storage or disposal area.

Pull Fuze Z.Z.35



The body of this fuze is in four parts: the main housing; the guide piece, which is screwed to the main housing; the space piece, which is screwed to the guide piece; and the lower piece, which is screwed to the space piece. The main housing contains the sliding cylinder and the compression spring. Within the sliding cylinder are the striker spring, the striker, and the two retaining balls that hold the striker in place. The lower piece contains the percussion cap. The fuze measures 7.2 centimeters in length and 3.0 centimeters in diameter.

Characteristics.

Shape	Case	Internal action	Operating force
Cylindrical...	Brass.....	Mechanical, with locking pin release.	15 to 20 lb.

Use. This fuze is the standard igniter for S-mine and prepared charges, boobytrapping Tellermine, and boobytraps with tripwires. The threaded base fits all standard charges, grenades, and mines.

Functioning. A pull on the tripwire pulls the plunger upward against the resistance of the compression spring. The two locking balls are forced outward, when they come opposite to the open spaces, releasing the striker. The striker then, under the force of its spring, sets off the percussion cap.

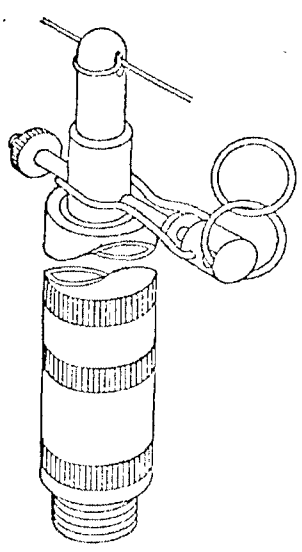
Installing and Arming.

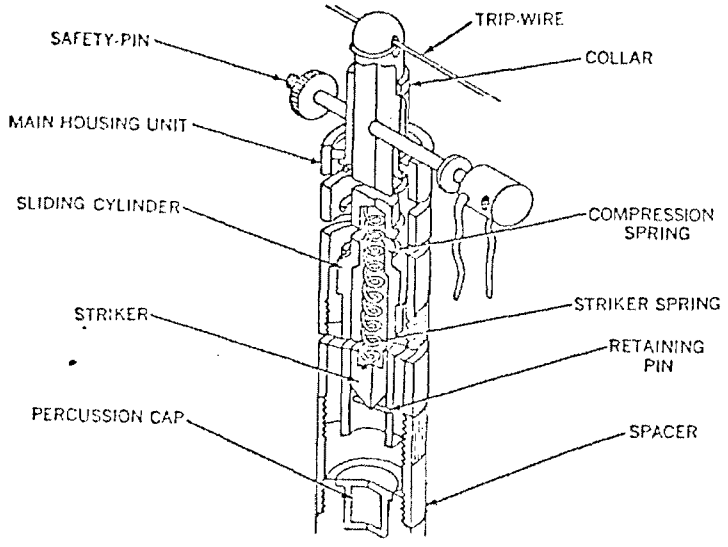
(1) Insert a standard detonator in the base of the fuze.
(2) Screw the fuze into the mine or charge.
(3) Attach a slack tripwire to an anchor and then to the hole in the top of the fuze.
(4) Unscrew the retaining nut from the end of the safety pin and remove the safety pin.

Disarming Procedure.

(1) Insert a wire or nail in the safety pin hole.
(2) Cut any slack tripwires and remove the fuze from the mine or charge. (Taut wires must be checked first.)
(3) Separate the percussion cap and detonator from the fuze.
(4) Take the fuze to a safe storage or disposal area.

Pull and Tension Release Fuze Z.u.Z.Z.35





This fuze has a spring loaded striker with a pin release. It has four parts, the main housing with the sliding cylinder and compression spring, the guide piece, the spacer piece, and the lower piece, which contains the percussion cap. At the top of the sliding cylinder is a hole for tying the tripwire or tension wire. The length of the fuze is 11.0 centimeters; and the diameter, 1.2 centimeters.

Characteristics.

Shape	Case	Color	Internal action	Operating force
Cylindrical.	Brass. .	Field gray.	Mechanical with taut tripwire and locking pin release.	9 to 13 lb.

Functioning. A pull on the taut trip wire pulls out the sliding cylinder against the resistance of the compression spring. This also forces the retaining pins into the upper open space and frees the striker. Cutting or breaking the trip wire permits the compression spring to force the sliding cylinder downwards, freeing the retaining pins into the lower open space and releasing the striker. In both cases the freed striker hits and fires the percussion cap.

Use. This type of igniter is generally installed in mines and charges actuated by wires in tension.

Installing and Arming.

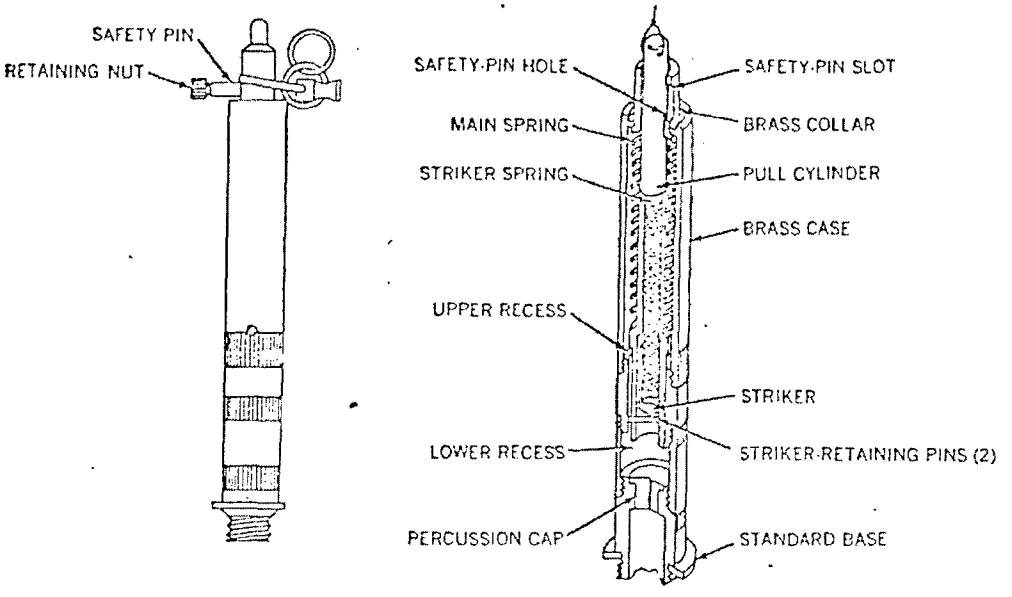
(1) Insert a detonator into the base of the fuze.
(2) Screw the fuze into the mine or charge.
(3) Attach a taut tripwire to an anchor and to the safety pin hole.
(4) Unscrew the retaining nut from the end of the safety pin and remove the safety pin.

Note. This igniter proves so dangerous to use that a number were returned to the factory and modified. In these, the tension release feature was removed by cutting the trip wire slot from the end of the sliding cylinder and attaching the tripwire to the safety pin.

Disarming Procedure.

(1) Cut any slack trip wires and wire or tape the safety pin or nail or wire securely in place.
(2) Unscrew the fuze from the mine and remove the detonator.
(3) Take the fuze to a safe storage or disposal area.

Modified Z.u.Z.Z.35 (functions on pull only)



The modified fuze is identical with the pull-tension-release fuze 35 except that the tripwire hole at the end of the pull cylinder is cut off. This prevents the fuze from functioning by tension-release and permits functioning only by pull.

Characteristics.

Shape	Case	Internal action	Operating force	Marking
Cylindrical.	Metal.	Mechanical, with pull pin and retaining pin release.	40 lb (approx).	NUR ZUG-ZUNDER stamped on the case.

Use. This fuze has a variety of uses—in the stake mine, S-mines, side fuze wells of Tellermines, and boobytraps with pull wires.

Functioning. A tug on the tripwire pulls out the safety pin. The pull cylinder, under pressure of the main spring, then moves downward until the striker retaining pins escape into the lower recesses, releasing the spring-loaded striker to fire the percussion cap and detonator.

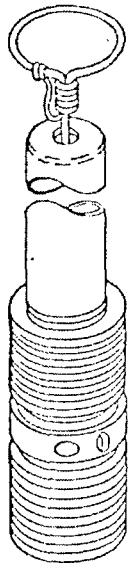
Installing and Arming.

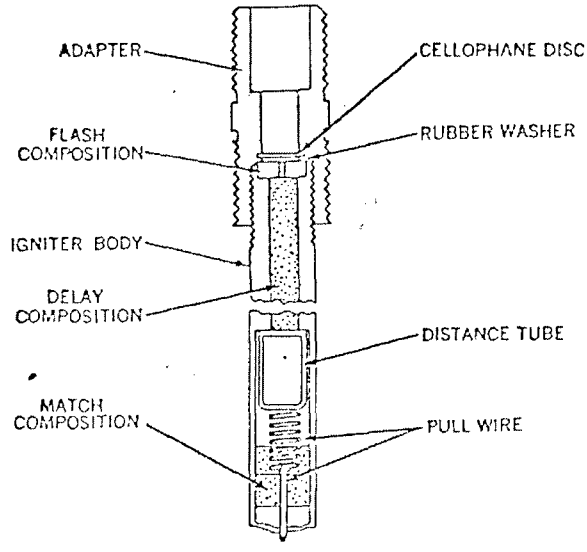
(1) Insert a detonator in the base of the fuze and screw the fuze into the mine or charge.
(2) Attach a slack tripwire to an anchor and to the safety pin ring.
(3) Unscrew the retaining nut from the end of the safety pin.

Disarming Procedure.

(1) Cut any slack tripwires.
(2) Wire or tape the safety pin securely in place.
(3) Unscrew the fuze from the mine.
(4) Separate the detonator from the fuze.
(5) Remove the fuze and mine to a safe storage or disposal area.

Friction-pull fuze B.Z.39





The body of this friction fuze has a wall of two thicknesses forming a shoulder on which rests the distance tube that prevents the longitudinal movement of the coated part of the pull wire. The 7-second delay composition is black powder covered with a small quantity of flash compound. The whole filling is protected by a cellophane disk held in place by a rubber washer. The fuze is 7.6 centimeters long and 0.6 centimeters in diameter.

Characteristics.

Shape	Case	Internal action	Operating force
Cylindrical...	Aluminum..	Pull-friction..	20 lb (approx).

Use. The BZ–39 fuze is used primarily in hand grenades, but is adaptable to use as a pull fuze in Tellermines, S-mines and booby-traps.

Functioning. The coiled part of the pull wire is drawn through the friction compound, producing a flash that ignites the delay composition, which after 7 seconds sets off the grenade or mine.

Installing and Arming.

(1) Attach a detonator to the base of the fuze.
(2) Place the fuze and detonator into the mine charge or boobytrap.
(3) Attach a pull wire.

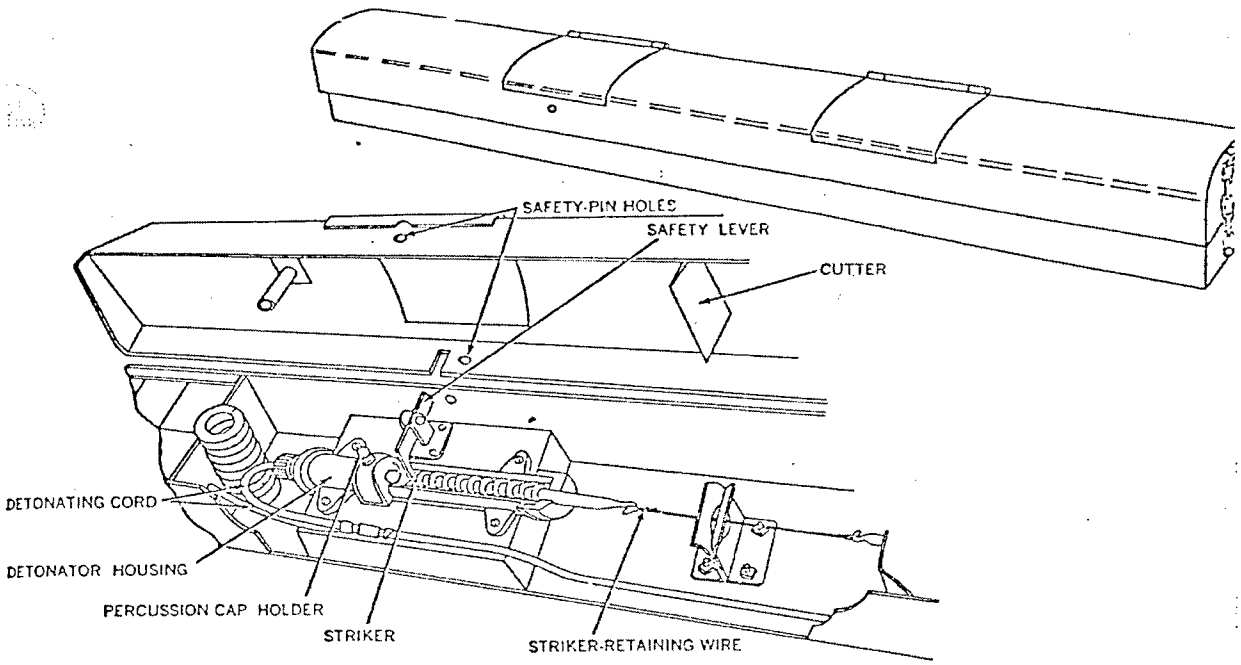
Disarming Procedure.

(1) Remove the fuze from the mine, charge, or boobytrap.
(2) Separate the detonator and fuze.
(3) Remove the fuze and mine or charge to a safe storage or disposal area.

Appendix G, Annex 2
Italian Mines

A) ITALIAN ANTI-TANK MINES

Antitank Mine, B-2



The Italian B-2 and Spanish B-2 antitank mines are almost identical. They consist of a metal case, 106, 66 by 12.7 by 12.7 centimeters, with a detachable lid or pressure cover supported on two coil springs. The two fuzes are retained cocked by a retaining wire that is sheared by a cutter fastened to the under side of the pressure cover. The two explosive charges are placed one at each end.

Characteristics.

Shape	Fuze	Operating force	Explosive
Rectangular....	Integral, pull.	300 lb. or more.	6 lb.

Use. This mine is used against tanks. It must be emplaced at a distance of at least 2 meters between mines, to avoid sympathetic detonation.

Functioning. Pressure on the pressure cover moves it downward against the compression springs, clearing the safety levers from the strikers and cutting the retaining wire. This releases the strikers to fire the mine.

Installing and Arming.

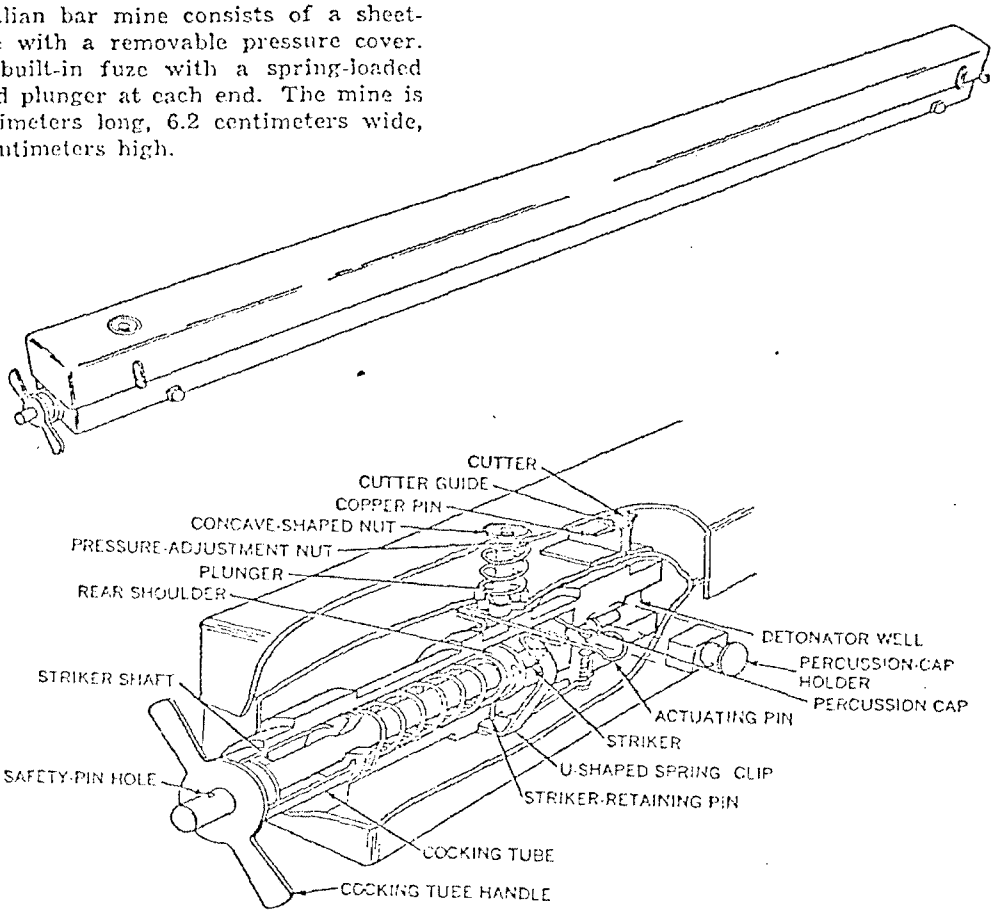
(1) Remove the cover.
(2) Cock the striker by turning the wire tensioning nut in a clockwise direction until the safety lever falls into the notch in the striker.
(3) Insert the safety pin into the hole through the side of the mine and into the fuze case.
(4) Screw on the detonator and attach the detonating cord.
(5) Insert the percussion cap holder into the hole in the housing in front of the detonator.
(6) Replace the detachable cover, cover the mine with earth, and from a safe distance, withdraw the safety pin.

Disarming Procedure.

(1) Check for and remove any antilift devices.
(2) Carefully lift the mine cover.
(3) Insert a safety wire through the safety-pin hole in the side of the mine case.
(4) Cut the detonating cord at the fuze end and unscrew the percussion cap holder.
(5) Unscrew the detonator from the fuze.
(6) Allow the striker to go forward.
(7) Transport the mine and fuze to a safe storage or disposal area.

Antitank Mine, V-3 and N-5
German nomenclature: Sprengmine V-3 u. V-5

This Italian bar mine consists of a sheet-metal case with a removable pressure cover. It has a built-in fuze with a spring-loaded striker and plunger at each end. The mine is 114.3 centimeters long, 6.2 centimeters wide, and 6.8 centimeters high.



Characteristics.

Shape	Fuze	Operating force	Explosive
Rectangular....	Integral....	264 lb. antitank 22 lb. antipersonnel.	6 lb.

Remarks

If the copper pin is left out and the pressure adjustment nut is not used, it becomes an antipersonnel mine.

Use. This mine is usually laid in road blocks and at road junctions because of its large-area coverage.

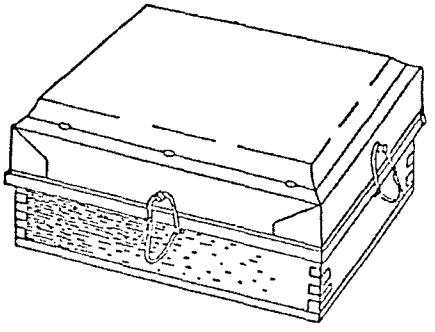
Functioning.

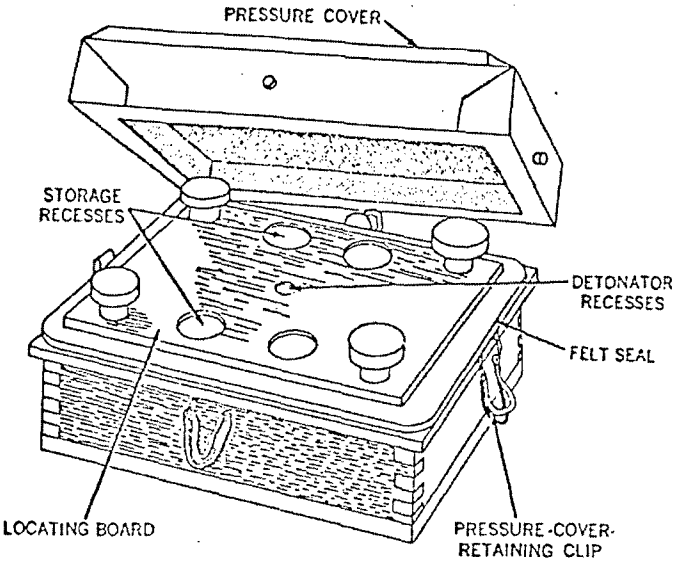
(1) Pressure on the pressure cover forces the cover downward causing the cutter to cut the copper pin in the cutter guide.

(2) The plunger in one or both fuzes is depressed against the resistance of the coil spring onto the actuating pin, which in turn depresses the U-shaped spring clip.

(3) The U-shaped spring clip then depresses the striker retaining pin end of the flat retaining spring, releasing the striker to fire the percussion cap and the mine.

Wooden Antitank Mine, CS 42/2





This is a wooden box-type unit with four plastic fuzes, but with enough metal to make it detectable. It has three parts—a box for the explosive, a frame to support the pressure board, and the pressure board. The top is covered with cloth painted or dyed in a camouflage pattern. This mine is no longer produced, but will remain in service until present stocks are consumed. The mine measures 34.0 by 28.9 by 16.0 centimeters.

Characteristics.

Shape	Fuze	Operating force	Explosive
Rectangular box.	Pressure..	220 lb. (approx).	11.0 lb. TNT in cartridge form —25 7 oz. cartridges.

Use. It is laid in pattern in minefields to damage tracks of armored vehicles by concussion. By the substitution of the Model PMC 43 button type fuze for the Model 42/2 pressure fuze and by weakening the pressure board supports so that they fail under a man's weight, it may be converted to an antipersonnel mine.

Functioning. Pressure on the top breaks the fragile supports of the pressure board and forces it down on the fuzes, actuating them and detonating the mine.

Installing and Arming.

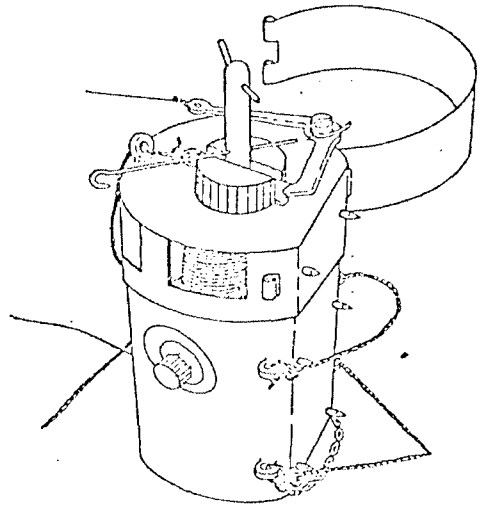
(1) Remove the lid.
(2) Remove the four wooden cylinders (false fuzes) from the fuze wells.
(3) Remove the fuzes from their transport recesses.
(4) Attach OTO detonators to the fuzes (42/2) and place the fuzes in the wells.
(5) Replace and lock the lid on all four sides.

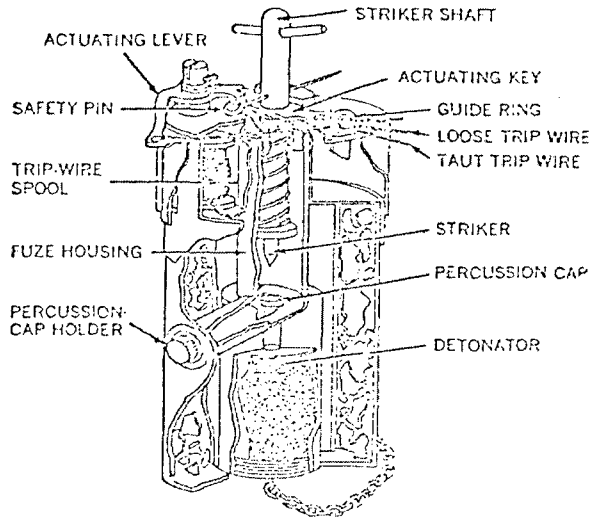
Disarming Procedures.

(1) Check for and remove any antilift devices.
(2) Remove the lid and the fuzes from the fuze wells.
(3) Separate the detonators from the fuzes.
(4) Remove the mine and fuzes to a safe storage or disposal area.

B) ITALIAN ANTI-PERSONNEL MINES

Antipersonnel Mine, B-4
German nomenclature: Reisz-(Stolper-)Mine B-4





The B–4 is composed of two concentric steel cylinders with a common base and superimposed top cover. The mine is 6.8 centimeters in diameter and 12.9 centimeters high. In the flattened portion of the outer cylinder are six spikes for fastening the mine against a tree or post. A percussion-cap holder is inserted diametrically through the side of the mine case. The detonator and booster are inserted in a well in the bottom of the fuze housing. Tripwires, wound on spools, are carried in recesses in the top portion of the case and covered by a hinged flap closed by a pin. This pin also serves as a safety pin for arming the mine. On some models, an auxiliary firing mechanism is provided—a spring-loaded actuating lever held cocked by a taut tripwire.

Characteristics.

Shape	Fuze	Operating force	Explosive
Cylindrical flattened on one side.	Integral pull.....	10 to 20 lb.....	0.25 lb. TNT.

Use. This mine is employed in antitank minefields in an irregular line in the front. It may also be found in antipersonnel minefields and wire obstacles along with other mines.

Functioning.

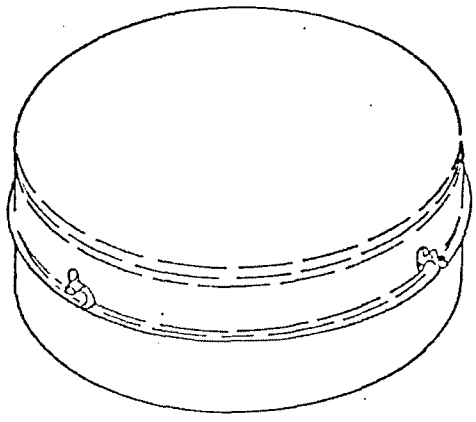
(1) *With slack tripwire.* A pull on the slack tripwire pulls the actuating key away from the striker shaft permitting the striker shaft to slip through the circular hole in the actuating key. The released striker then sets off the percussion cap and fires the mine.

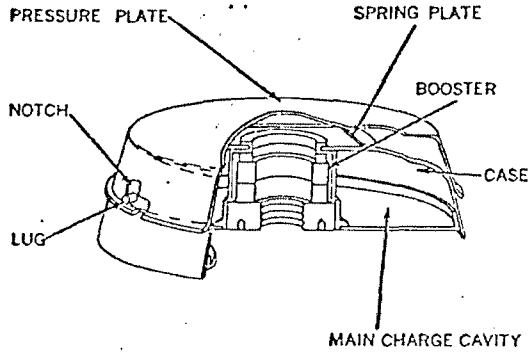
(2) *With taut tripwire.* The cutting or breaking of the taut trip wire releases the spring-loaded actuating lever against the actuating key. The actuating key is then pushed outward until the striker shaft slides through the circular hole in the key. After this the released striker sets off the percussion cap and fires the mine.

Appendix G, Annex 3
British Mines and Fuzes

A) BRITISH ANTI-TANK MINES

Mine, A.T.Mk II.
German nomenclature: Pz.Mi.402(e)





a. Description. The British G. S. (general service) antitank mine, Mark II consists of a steel case, 7½ inches in diameter and 3¼ inches high, with a rounded top and a flat bottom. The case is dark green in color, except for the bottom, which is yellow with a red and green cross. The fuze well is centrally located in the bottom of the case and is surrounded by a booster charge. Two filler plugs are also located in the bottom of the case. This mine uses the pressure fuze, antitank, No. 1, Mark I . A pressure cover fits over the case, and is held in place by four locking cover pins on the side of the case. A spring-like plate riveted to the underside of the cover exerts a light pressure on the case so as to hold the cover firmly against the locking cover pins. The mine weighs a total of 8.25 pounds, including 4 pounds of explosive.

b. Employment. This mine is employed against vehicles and light tanks in tactical and hasty mine fields and in road blocks.

c. Functioning.

(1) A pressure of 350 pounds, or more, on the pressure cover crushes the brass pressure cap of the fuze.

(2) The pressure head and the plunger of the fuze are forced down, pushing aside the four prongs on the brass safety sleeve and compressing the striker spring.

(3) The striker-retaining balls are forced outward into a recess in the plunger, releasing the spring-loaded striker against the percussion cap and firing the mine.

d. Installing and Arming.

(1) Unscrew the shipping plug from the fuze well in the bottom of the mine.

(2) Insert the fuze in the fuze well and screw it in finger-tight.

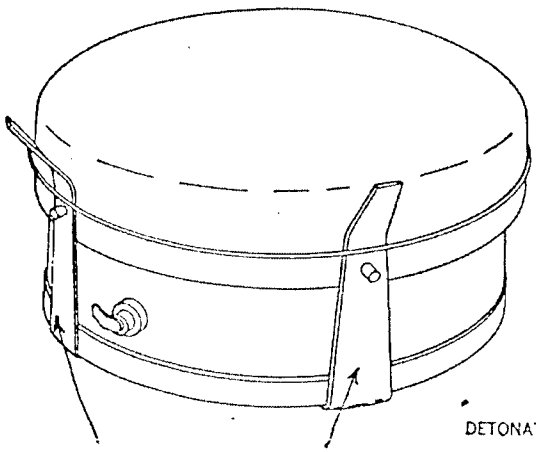
(3) Place the mine in a hole so the cover is flush with the surface of the ground.

e. Neutralizing.

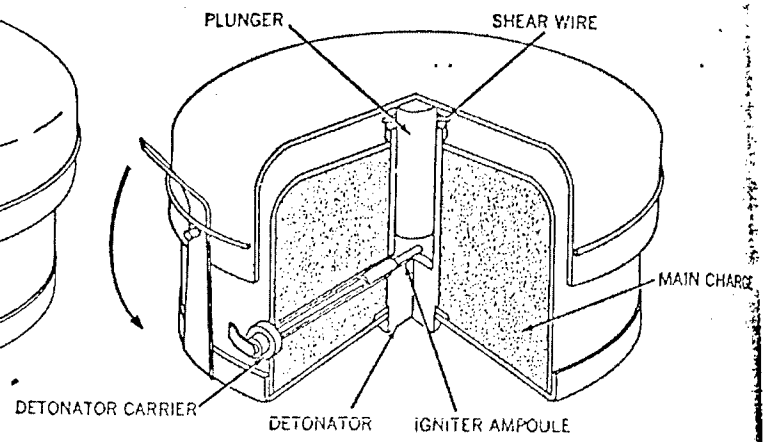
(1) Search for and neutralize any activating fuzes.

(2) Unscrew the fuze from the bottom of the mine.

Mine, A.T.L.P. (local pattern) Mk.II (Egypt)



Cover retaining straps



Section of "Egyptian" pattern mine

This antitank mine consists of the steel mine body, mine cover, and mine fuzing arrangement. The mushroom-shaped mine cover is attached by four hooked straps. The mine has a central fuze well. On the side near the base is a channel that leads to the central well, which is closed by a small metal tab during shipment and storage. The fuze (E.P. Mark 2) consists of a plunger inserted into the central well and retained by a shear pin, and a detonator and ampoule cartridge inserted in the side channel. The mine is 25.4 centimeters in diameter and 10.1 centimeters high.

Characteristics.

Shape	Fuze	Operating force	Explosive	Remarks
Mushroom..	Integral, percussion type.	200 lb. (approx).	4 ½ lb.	Once laid, these mines should not be used again, even if disarmed.

Use. This mine is used in defense against armored cars, tanks, and other vehicles.

Functioning. Pressure on the mushroom-shaped top forces the plunger through the shear pin and down against the ampoule cartridge, crushing it and causing a chemical reaction that fires the detonator.

Installing and Arming.

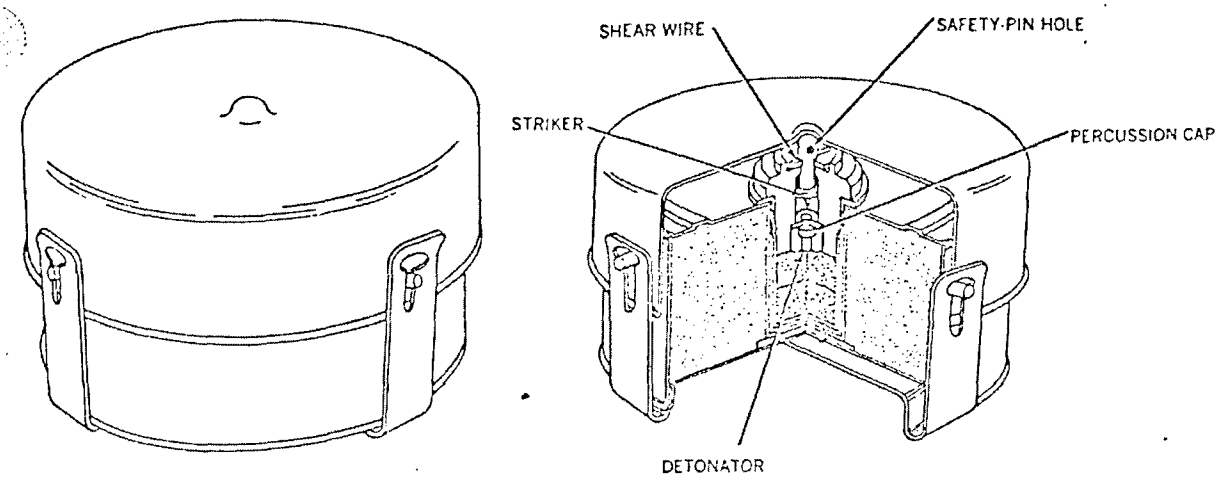
(1) Insert the ampoule cartridge, red end first into the open end of a detonator No. 8 and seal with luting.
(2) When ready to lay the mine, remove the steel rod from the hole in the mine body and insert the detonator assembly, ampoule end first, without using force.
(3) Bend the tab over the end of the assembly and place the mine in the ground.

Disarming Procedure.

(1) Check for and remove any antilift devices.
(2) Remove the wire holding the mine cover in place and remove the mine cover.
(3) Remove the plunger from the mine.
(4) Loosen the metal tab which covers the detonator assembly on the side of the mine case and carefully remove the detonator assembly.
(5) Destroy the detonator assembly.
(6) Transport the mine to a safe storage or disposal area.

Additional Precautions. If the detonator assembly does not come out easily, destroy the mine in place.

Mine, A.T.Mk III.
German nomenclature: Pz.Mi.403(e)



Section of Mine, A.T.Mk III

This steel mine is 15.2 centimeters in diameter and 12.8 centimeters high. It has a flat-surfaced circular steel pressure cover that fits loosely over the top of the mine case and is raised slightly in the center to form a pocket for the plunger of the fuze. The Germans manufactured a pressure igniter, the Mi.Z. 530, (e) to be used in this mine, which was an almost exact copy of the No. 2 Mark 1.

Characteristics.

Shape	Fuze	Operating force	Explosives	
			Main charge	Booster
Circular...	Contact No. 2, Mark 1.	350 lb. pressure.	4.5 lb. TNT (approx).	CE pellet (CE is Tetryl).
Fuze hazard				
Detonator assembly.				

Use. The Mark 3 G.S. was used as an antivehicular mine.

Functioning. Pressure on top of the mine cover forces it down on the striker, shearing the shear wire and releasing the striker against the percussion cap, and initiating the explosive train.

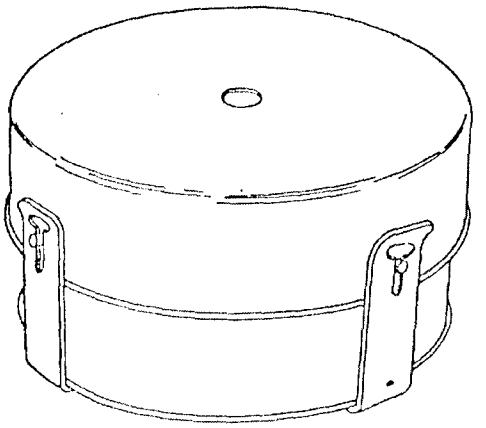
Installing and Arming.

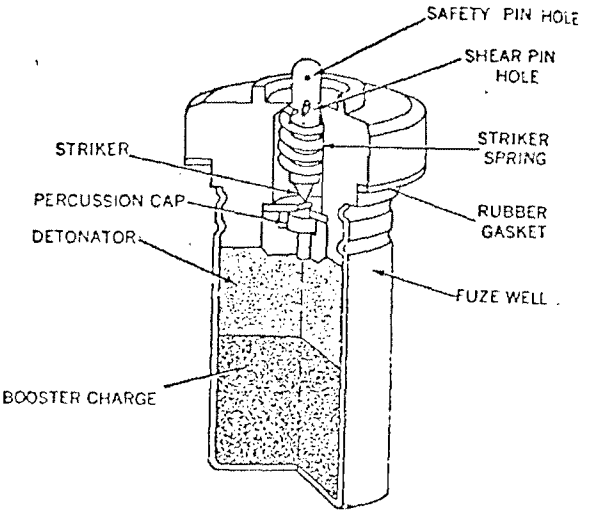
(1) Place the mine in the ground.
(2) Remove the mine cover.
(3) Insert the fuze in the fuze well.
(4) Withdraw the safety pin from the fuze.
(5) Replace the mine cover.

Disarming Procedure.

(1) Check for and remove any antilift devices.
(2) Remove the cover from the mine.
(3) Pull out the fuze from the fuze well.
(4) Remove the mine and fuze to a safe storage or disposal area.

Mine, A.T.Mk IV
German nomenclature: Pz.Mi.404(e)





Section of Pressure Fuze, No.3MkI

The British G.S. Mark 4 is fitted with the Mark 4 pressure cover and the pressure fuze No. 3, Mark 1. The steel mine case and the Mark 5 case are identical, except that the former locks the circular inner wall. The mine with its steel pressure cover is 20.3 centimeters in diameter and 12.7 centimeters high.

Characteristics.

Shape	Fuze	Operating force	Explosive
Cylindrical.....	Pressure..	350 to 450 lb.	8.25 lb.

Use. The British laid this mine in large tactical minefields and in hasty road blocks against vehicles and light tanks.

Functioning. Pressure on the pressure cover crushes the protective cap over the fuze, shears the shear pin, and thus frees the spring-driven striker to fire the percussion cap and explode the mine.

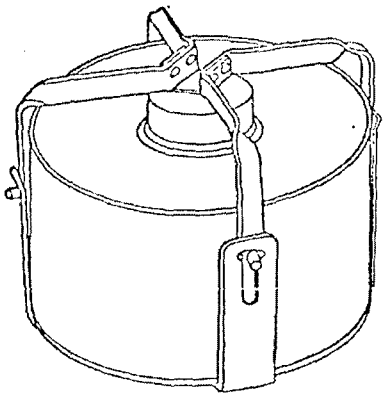
Installing and Arming.

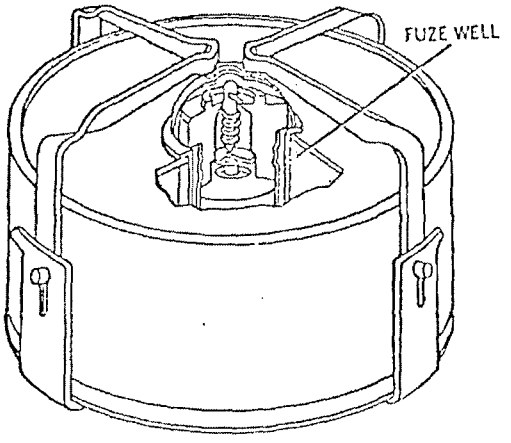
(1) Remove the pressure cover and the fuze protection cap.
(2) Place the mine in a hole so that the top of the pressure cover, when replaced, will be less than 2.5 centimeters below the ground surface.
(3) Inspect the fuze to see that the shear pin is in position.
(4) Withdraw the safety pin from the fuze.
(5) Insert the fuze into the fuze well. Do not use force; it should fit easily.
(6) Replace the fuze protective cap and the pressure cover, making sure that the locking pins engage properly in the slots in the holding straps. Be very careful to put no pressure on the top of the fuze or the pressure cover.

Disarming Procedure.

(1) Check for and remove any antilift devices.
(2) Remove the pressure cover and fuze protector cap without putting any pressure on the fuze.
(3) Insert a safety pin or a substitute in the safety pin hole.
(4) Remove the mine and fuze to a safe storage or disposal area.

Mine, A.T. Mk V (Models G.S. and H.C.)





This steel land mine may be found in two different models, the Mark 5, G.S. (general service) and the Mark 5, H.C. (higher content). The two models are identical in appearance and size (20.3 cm in dia and 10.1 cm high). The only difference is that the Model H.C. has explosive on both sides of the inner wall of the case. The fuze well, located at the top center of the case, is covered with a metal cap seated on a rubber gasket. Both models may be found fitted with either the Mark I or the Mark II pressure spider which is held in place by four slotted metal straps.

Characteristics.

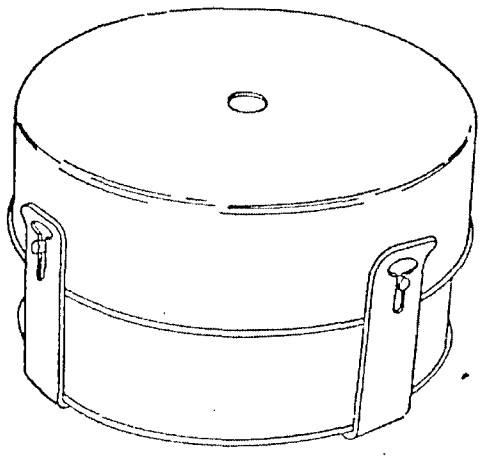
Shape	Fuze	Operating force	Explosive	
			Mark charge	Booster
Cylinderical	No. 3, Mark I	350 to 400 pounds pressure.	4.5 lb. TNT (GS) 8.3 lb. TNT (HC)	TNT/CE (HC) (CE is Tetryl)

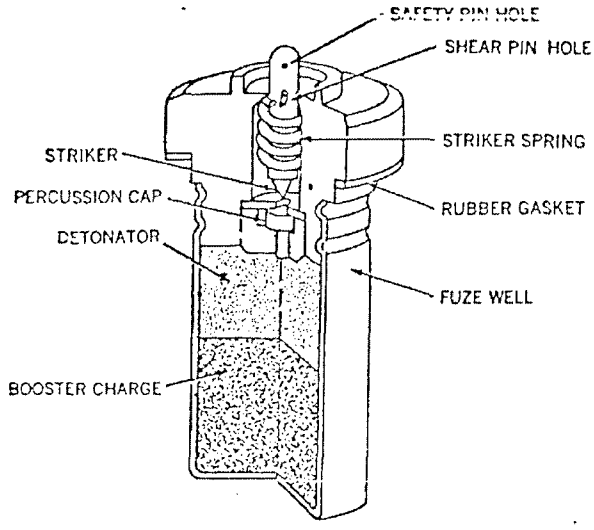
Fuze hazards	Markings	Remarks
Percussion cap, detonator, and booster.	Contractors' mark and date of assembly are stenciled on the side. 1.2 cm green band near the top of the mine case. 1.2 cm red band near the bottom of the mine case.	1. The fuze cannot be separated from the integral percussion cap detonator and booster. 2. Both models are obsolete, but as stocks still exist they may turn up anywhere.

Use. As antitank mines, these models are capable of stopping most medium tanks, but against heavy tanks they must be laid double.

Functioning. Pressure on the spider crushes the protective cap over the fuze and severs the shear pin, releasing the spring loaded striker against the percussion cap and firing the mine.

Mine, A.T. Mk. V (Models GS & C)





Section of Fuze, Pressure, No. 3 Mk I.

These steel mines are approximately 20.3 centimeters in diameter and 12.7 centimeters high. Both mines use the Mark 4 circular, steel, flat surfaced pressure cover held in place by four lugs that engage four slotted straps attached to the mine case.

Characteristics.

Shape	Fuze	Operating force	Explosive	
			Main charge	Booster
Circular...	No. 3, Mk 1.	350 lb. pressure.	Mk4 GS: 8.3 lb. TNT Mk 5c: 4.5 lb. TNT or baratol.	Mk4 GS: CE/ TNT (CE is tetryl).

Fuze hazard	Remarks
Booster assembly....	The Mark 5c is identical to the Mark 5 except that it is fitted with a Mark 4 pressure cover instead of a pressure spider.

Use. These are generally used as antivehicular mines.

Functioning. Pressure on the pressure cover crushes the protective cap over the fuze and severs the shear pin, releasing the spring-loaded striker against the percussion cap, firing it, and in turn the detonator, booster, and the mine.

Installing and Arming.

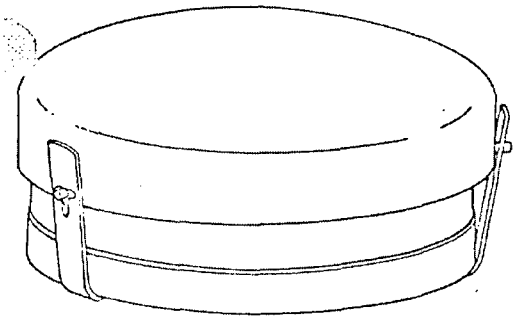
(1) Remove the adhesive tap binding the pressure plate to the mine and remove the pressure plate.
(2) Place the mine in the ground and remove the paper seal from the fuze well.
(3) Inspect the fuze to be sure that the shear pin is in position, and then insert the fuze and remove the safety pin. If it does not come away easily discard the fuze.

Disarming Procedure.

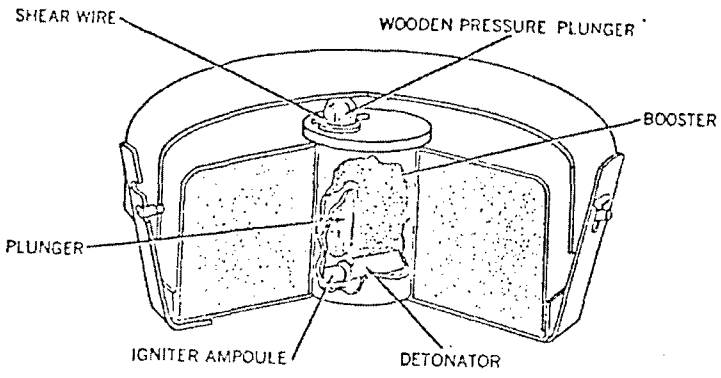
(1) Check for and remove any antilift devices.
(2) Remove the pressure cover.
(3) Insert a safety wire into the safety pin hole of the fuze.
(4) Lift the fuze out of the mine.
(5) Transport the mine and the fuze to a safe storage or disposal area.

Additional Precautions. Handle the fuze carefully even when the safety pin is present because of the integral percussion cap, detonator, and booster. Keep the fuzes separated from the mines at all times except during emplacement in the ground.

Antitank Mine, Mk.V (Egyptian Pattern)



External view



Section of A.T. Mine, Mk. V (E.P.) showing use of A.P. Mine No.5 as the detonator (Chemical pressure fuze, (E.P.) No. 2)

This metallic mine consists of a body, exploder mechanism, and cover. The cover is fastened down by three pins that engage in slots in three retaining straps attached to the mine body. The mine has a centered well for the special fuzes, exploders No. 1 and No. 2, which operate on the shear wire principle. In the side of the exploder body, near the base, is a channel for the inserting of the ampoule cartridge and detonator assembly. The mine is 20.3 centimeters in diameter and 6.2 centimeters high.

Characteristics.

Shape	Fuze	Operating force	Explosive
Mushroom.	Integral percussion exploder.	250 to 350 lb. pressure.	4½ lb. TNT

Use. The mine will break the tracks of light or medium tanks and disable vehicles.

Functioning. Pressure on the top of the mine forces the plunger through the shear wire and down onto the ampoule cartridge, crushing it and firing the detonator, booster, and main charge.

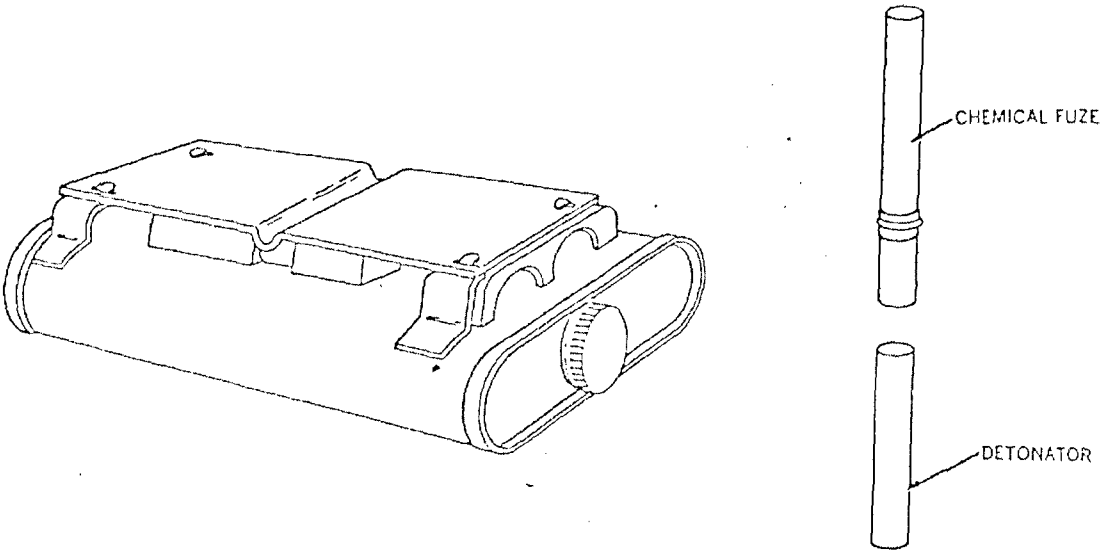
Installing and Arming.

(1) Lay the mine in the ground and remove the cover.
(2) Place an exploder in the inverted cover and insert an ampoule, red end first, into a detonator No. 8.
(3) Fill the open end of the detonator flush with luting.
(4) Insert this end with luting into the hole in the side of the exploder body.
(5) Slide the assembly home and seal in place with more luting.
(6) Grease the exploder and insert it into the fuze well.
(7) Refit the cover.

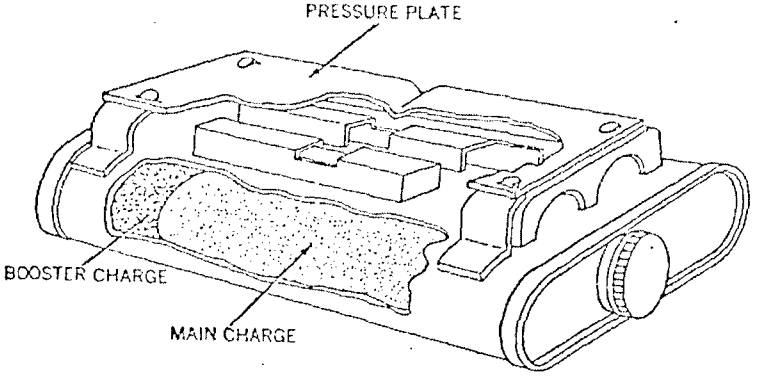
Disarming Procedure.

(1) Check for and remove any antilift devices.
(2) Remove the pressure cover.
(3) Remove the wooden pressure plunger from the fuze.
(4) Carefully remove the fuze from the mine.
(5) Pull out the detonator assembly by the tape ends projecting out of the horizontal fuze well at the bottom of the fuze case.
(6) Transport the mine and fuze to a safe storage or disposal area.

Hawkins Grenade Mine, No. 75, Mk. I.



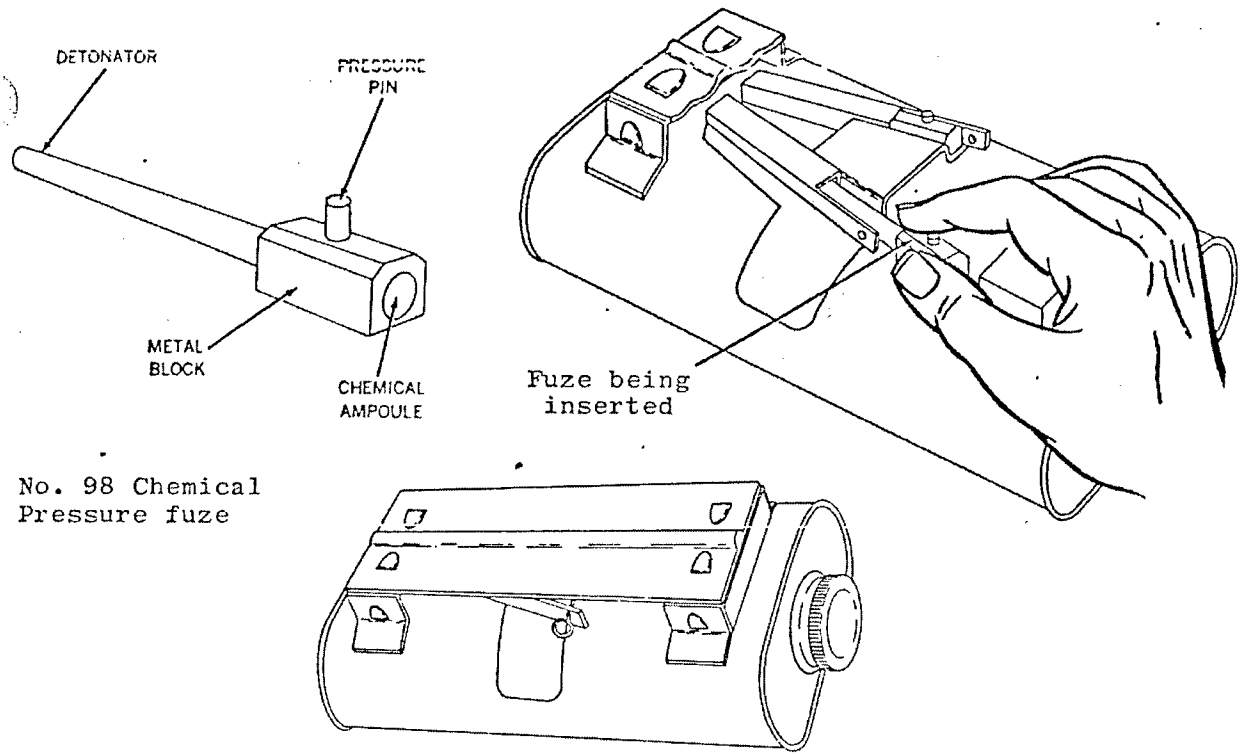
External view of Mine and fuzes



Hawkins Grenade, No. 75, Mk. I. (in section)

The Hawkin's grenade mine No. 75, Mark I, is an earlier model of the Hawkin's grenade mine No. 75, Mark II. The fuze wells are located parallel to each other, instead of in a V-shape as in the Mark II. The fuze is similar to the chemical pressure fuze No. 98, but lacks the metal block with the pressure pin. The pressure plate has a transverse groove instead of a longitudinal ridge. In all other characteristics, this mine is similar to the Hawkin's grenade mine No. 75, Mark II. Disarming is merely removing the fuzes.

Hawkins Grenade Mine, No. 75, Mk. II.



Hawkin's grenade mine No. 75, Mark II consists of a steel case containing a main charge and a booster charge. A filler cap is located in the end of the case. The top of the case is fitted with two fuze wells which lie flat in a V-shape. These fuze wells are covered with a pressure plate with a longitudinal ridge. The chemical pressure fuze No. 98 is employed with this mine. The mine is 17.7 centimeters long, 10.1 centimeters wide, and 6.2 centimeters high.

Characteristics.

Shape	Fuze	Operating force	Explosive
Tubular flattened.	Two No. 98 chemical pressure.	80 to 100 lb.	1.5 lb.

Use. This dual-purpose mine is employed in security and protective type minefields. It is also installed in tactical minefields (in pairs and groups of four) and in roadblocks. One mine will seriously injure a man stepping on it. Mines laid in pairs will disable trucks and break the tracks of light tanks. Four mines laid together may break the track of a medium tank.

Functioning. Pressure on the pressure plate causes it to bend, forcing the pressure pin of one fuze, or both, against the ampoule of chemical and crushing it. A chemical reaction takes place producing a flame which sets off the detonator, firing the mine.

Installing and Arming.

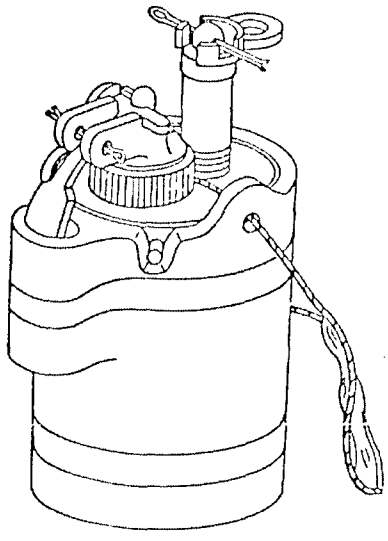
(1) Insert the ampoules and detonators in the fuzes.
(2) Insert the fuzes in the fuze wells under the pressure plate, pushing in the detonator end first.
(3) Insert the fuze pin through the holes in the ends of the fuze wells.
(4) Place the mine in the ground with the filler cap pointing in the direction of the opposing forces. When installing the mines in pairs, place one mine on top of the other. Make sure that the pressure plate of the upper mine is flush with the surface of the ground.

Disarming Procedure.

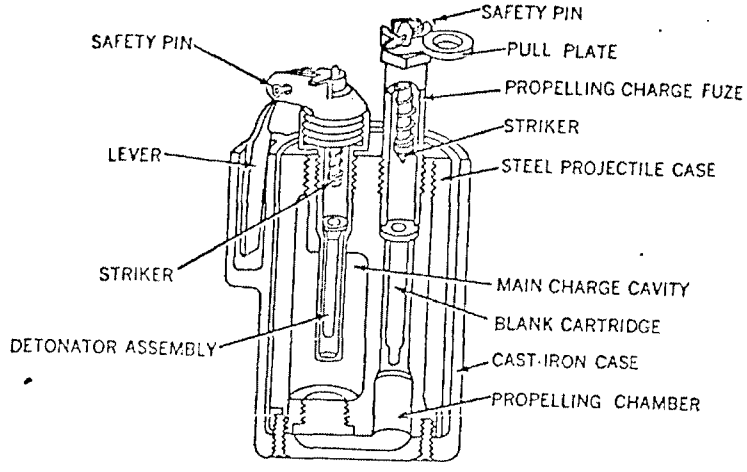
(1) Check for and remove any antilift devices.
(2) Withdraw the fuze pin and pull out the fuzes.
(3) Remove the mine and fuzes to a safe storage or disposal area.

B) BRITISH ANTI-PERSONNEL MINES

Antipersonnel Schrapnel Mine, Mk I.
German nomenclature: S.Mi.441(e)



External view



Schrapnel Mine, Mk I. (in section)

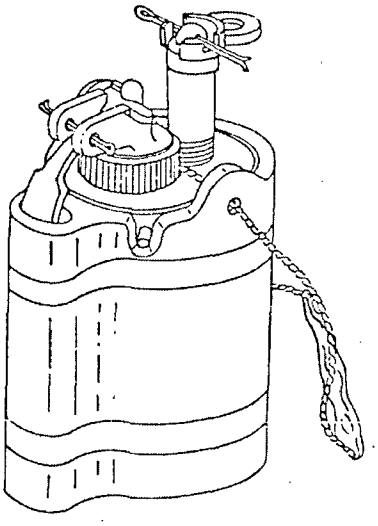
The British antipersonnel shrapnel mine, Mark I, is an earlier model of the shrapnel mine, Mark II It is identical to the Mark II except for the following differences: the lever on the detonating fuze in the Mark I is short and does not extend the full depth of the mine case; the percussion-cap-and-detonator assembly in the Mark I has a delay pellet; the mine case of the Mark I has "71A" stenciled on it in black, and the Mark I has a leather carrying strap instead of a wire handle.

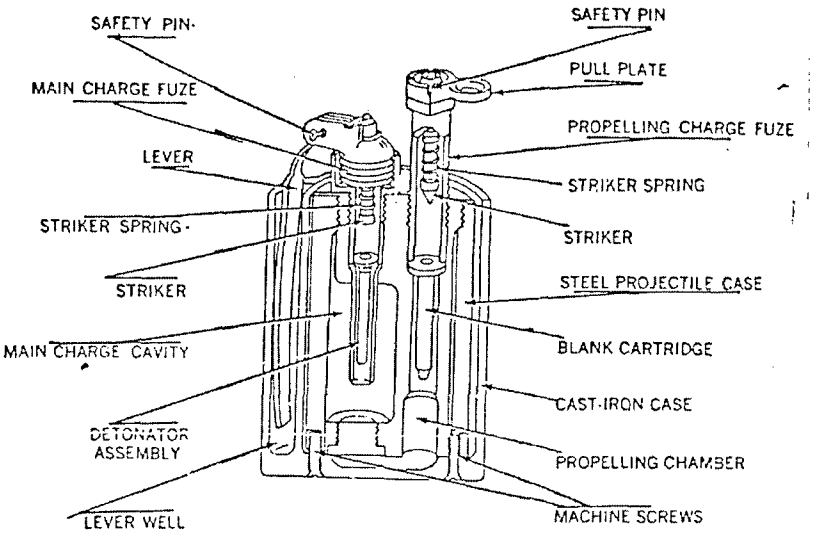
Characteristics.

Shape	Case	Operating force	Fuze		Explosive
			Main charge	Propellant	
Cylindrical with a bulge on one side for the lever case.	Cast iron.	4 lb. pull.	Mechanical lever-release.	Pull, requiring 4 lb. force for release.	1 lb. amatol.

Markings
Two red stripes are painted around the case.

Bounding Antipersonnel Mine, Mk II.





Exterior view

Bounding A.P. Mine Mk II (in section)

This is a bounding fragmentation mine consisting of a cast iron case 13.9 centimeters high and 8.8 centimeters in diameter, containing a steel-cased cylindrical projectile fastened to the bottom of the case by two machine screws. The mine has two mechanical fuzes, one for firing the propelling charge and one for the main charge. Although the effective casualty radius is 9 to 14 meters, it is dangerous to personnel at distances up to 46 meters.

Use. This mine is laid in antipersonnel minefields for security and in antitank minefields to hinder reconnaissance and breaching parties.

Functioning. Force applied to the tripwire of the propelling fuze pull-plate pulls out the plate releasing the spring-driven striker against the blank cartridge. The pressure from the blank cartridge explosion breaks the screws holding the projectile to the case and propels it into the air. The lever retaining the striker of the main charge fuze clears the well on the side of the case and springs outward, which releases the spring-actuated striker against the detonator assembly and fires the main charge at about 1 meter above the ground.

Installing and Arming.

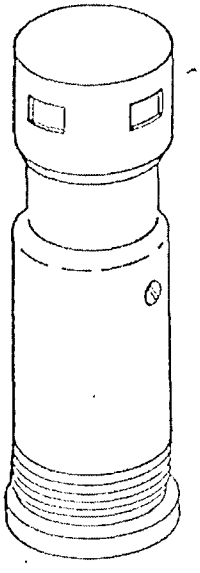
(1) Unscrew the propelling charge fuze with a wrench.
(2) Insert the blank cartridge in the fuze well and replace the fuze.
(3) Unscrew the main charge fuze.
(4) Insert the detonator assembly with with the percussion cap uppermost and replace the fuze with its striker retaining lever extended downward into its well.
(5) Place the mine in the hole so that the pull plate of the propelling charge fuze is just above ground level.
(6) Attach the tripwire to an anchor and to the pull plate.
(7) Remove the safety pins from both fuzes.

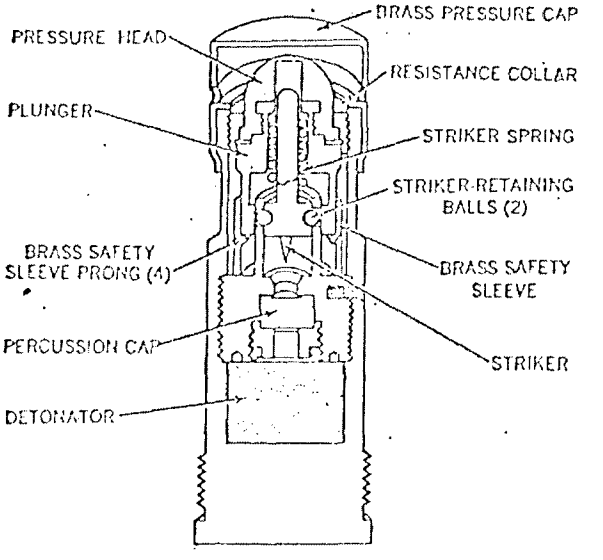
Disarming Procedure.

(1) Check for and remove any antilift devices.
(2) Insert a safety pin or rail in the safety-pin hole of each fuze.
(3) Trace and cut the tripwire.
(4) Unscrew the propelling charge fuze and remove the blank cartridge.
(5) Unscrew the main charge fuze and remove the detonator assembly.
(6) Transport mine and fuzes to a safe storage or disposal area.

C) BRITISH MINE FUZES

Pressure fuze, No.1, Mk I.





a. Description. The British pressure fuze, antitank, No. 1, Mark I is of the instantaneous, mechanical type and contains a spring-loaded striker with a ball release. It consists of a cylindrical brass case housing a pressure head, a plunger, a brass safety sleeve with four prongs that retain the plunger and the pressure head, a spring-loaded striker held in place by two striker-retaining balls, and a brass resistance collar surrounding the pressure head. A percussion cap and a detonator are built into the base of the fuze. A brass pressure cap covers the pressure head.

b. Employment. This fuze was designed specifically for use with the G. S. (general service) antitank mine, Mark II

c. Functioning.

(1) A pressure of 350 pounds crushes the brass pressure cap.

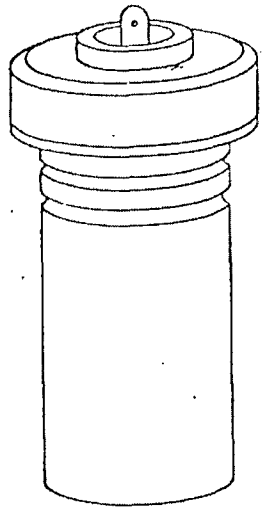
(2) The pressure head and the plunger are forced down, pushing aside the four prongs on the brass safety sleeve and compressing the striker spring.

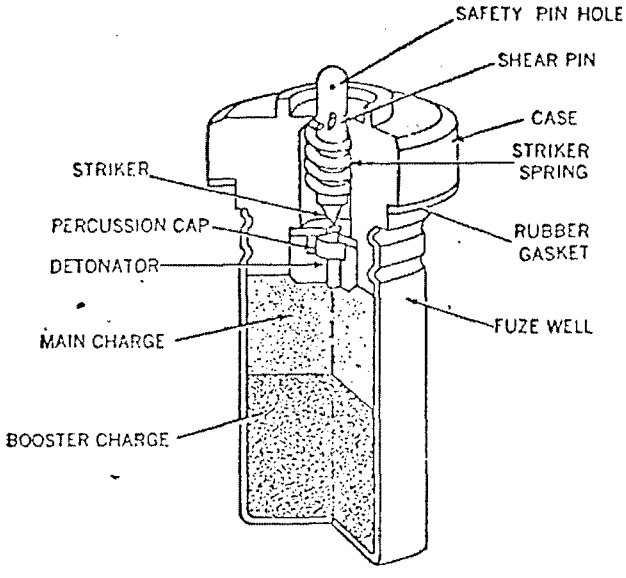
(3) The striker-retaining balls are forced outward into a recess in the plunger, releasing the spring-loaded striker against the percussion cap.

d. Installing and Arming. This fuze has no safety devices. Screw the fuze into fuze well of the G. S. antitank mine, Mark II.

e. Neutralizing. Although this fuze has no safety devices, the high pressure required to actuate it makes it fairly safe to handle. Unscrew the fuze from the mine.

Pressure Fuze No. 3 MkI





a. Description. The British pressure fuze, antitank, No. 3, Mark I is of the instantaneous, mechanical type and contains a spring-loaded striker with a shear-pin release. The striker is held in place by a shear pin that is inserted through the striker shaft so as to bear against the top of the case. A cotter-pin type safety pin is inserted through the striker shaft just above the shear pin. The top of the cylindrical steel case is larger in diameter than the base. Crimped onto the base of the fuze is a cup that holds a detonator and a booster charge.

b. Employment. This fuze is used in the G. S. antitank mine, Mark V the G. S. antitank mine, Mark V HC the G. S. antitank mine, Mark Ve and the G. S. antitank mine, Mark IV

c. Functioning. A pressure of from 400 to 500 pounds on the end of the striker shaft shears the shear pin, releasing the spring-loaded striker against the percussion cap and firing the detonator and the booster charge.

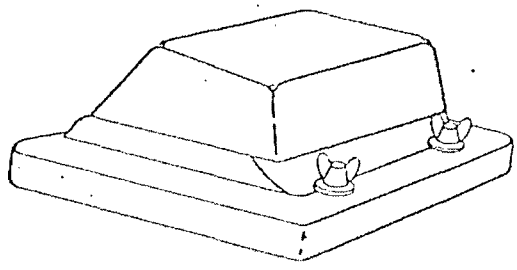
d. Installing and Arming. Place the fuze in the mine and withdraw the safety pin.

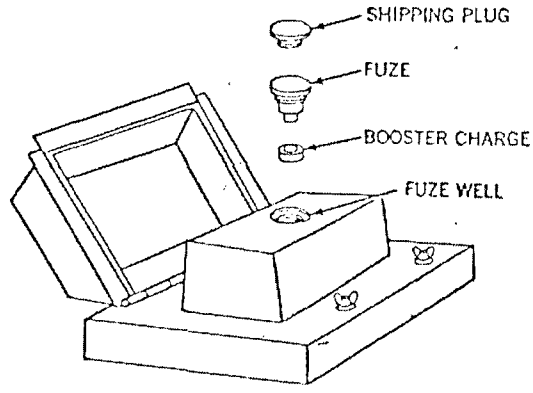
e. Neutralizing. Insert a safety pin or a nail in the safety-pin hole. Because of the high pressure necessary to shear the shear pin, the fuze would be safe to handle if it were not for the built-in detonator and booster charge. Because of the detonator and the booster charge, extreme care should be taken while handling the fuze, even when the safety pin is in place.

Appendix G, Annex 4
French Mines and Fuzes

A) FRENCH ANTI-TANKS MINES

M-1935 Heavy AT-mine





a. Description. The French heavy antitank mine, M-1935 has a rectangular steel charge container welded to a steel base. The mine is 16⅛ inches long, 10 inches wide, and 4¾ inches high. It weighs 27 pounds including 3.25 pounds of explosive. A hinged steel pressure cover fits over the charge container and is held in place by two wing nuts. In the top of the charge container is a single fuze well. The fuze used in this mine is the pressure fuze, antitank, M-1935 and 1936

A doughnut-shaped metal-cased booster charge is provided and is placed in the fuze well when the mine is armed. A threaded shipping plug closes the fuze well. A metal safety collar

b. Employment. This mine was designed for employment in permanent defensive installations.

c. Functioning. A pressure of about 800 pounds on the pressure cover crushes the cover until it bears against the striker shaft of the fuze, shearing the shear pin. Shearing the pin releases the spring-loaded striker against the percussion cap, firing the mine.

d. Installing and Arming.

(1) Place the mine in a hole deep enough for the top of the mine to be flush with the ground surface or a little below it. When laying mine fields or belts, keep 6-foot intervals, at least, between mines.

(2) Lift up the pressure cover and unscrew the shipping plug from the fuze well, or remove the safety collar from around the fuze if the mine is shipped with the fuze in place.

(3) Insert the booster charge in the fuze well and screw in a pressure fuze, antitank, M-1935 and 1936, with percussion-cap-and-detonator assembly.

(4) Lower the pressure cover and fasten it with the wing nuts.

e. Neutralizing.

(1) Check for and neutralize activating fuzes.

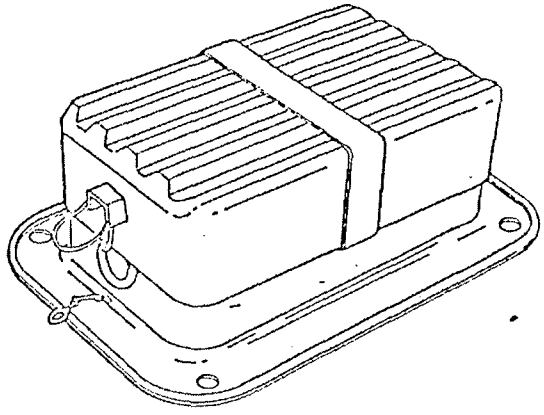
(2) The pressure cover may have an activating fuze attached. After unfastening the wing nuts, pull the cover up with a rope or wire. Stay a distance of 50 yards from the mine.

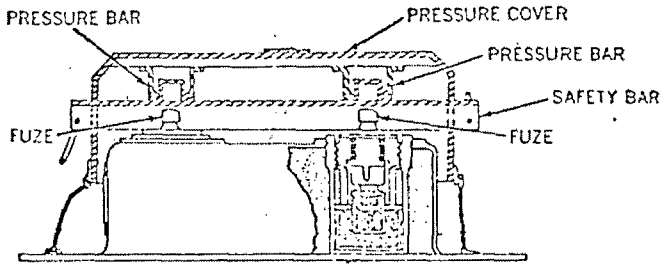
(3) Unscrew the fuze.

(4) Unscrew the percussion-cap-and-detonator assembly from the bottom of the fuze.

(5) Lift out the booster charge.

M-1936 Light AT-mine





a. Description. The French light antitank mine, M-1936 has a rectangular steel charge container, 9½ inches long, 5½ inches wide, and 4½ inches high. The mine weighs 14.5 pounds, including 5.75 pounds of explosive. It uses the pressure fuze, antitank, M-1935 and 1936 Two fuze wells are located in the top of the charge container. The flanged base plate has a hole in each corner for hold-down bolts when the mine is laid in permanent defensive positions. A corrugated pressure cover fits over the charge container and is strengthened by a metal strip. Two metal pressure bars are welded to the underside of the pressure cover and are positioned above the fuzes when the cover is in place. A channel-shaped aluminum safety bar passes longitudinally through the pressure cover and rests over the fuzes, preventing them from being actuated. Wires or chains attached to both ends of the base plate fit over hooks on the pressure cover to hold the cover in place. One of the wires or chains is permanently attached to the pressure cover and the base plate.

b. Employment. This mine was designed for employment in antitank mine fields and in permanent defensive positions.

c. Functioning. A pressure of from 300 to 500 pounds on the pressure cover causes downward movement of the attached pressure bars against the striker shaft of one or both of the fuzes shearing the shear pin. Shearing the pin releases the spring-loaded striker against the percussion cap, firing the mine.

d. Installing and Arming.

(1) Place the mine in a hole deep enough for the top of the mine to be flush with the ground surface or a little below it. When laying a mine field or belt, keep 6-foot intervals, at least, between mines.

(2) Remove the pressure cover and screw two pressure fuzes, antitank, M-1935 and 1936, with percussion-cap-and-detonator assemblies, into the fuze wells.

(3) Insert the safety bar through the holes in the ends of the pressure cover.

(4) Replace the pressure cover and put the wire or chain over the hook to hold it in place.

(5) Withdraw the safety bar.

e. Neutralizing.

(1) Check for and neutralize any activating fuzes. The pressure cover may have an activating fuze attached. Examine the pressure cover carefully and then take the wire or chain off the hook.

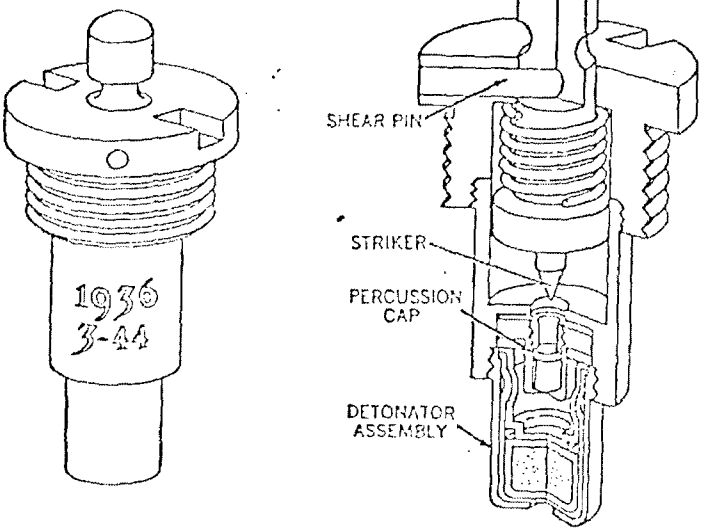
(2) Lift the pressure cover. If there is any evidence of activation, pull the pressure cover off with a rope or wire. Stay a distance of 50 yards from the mine.

(3) Unscrew and remove both fuzes.

(4) Unscrew the percussion-cap-and-detonator assemblies from the bottoms of the fuzes.

B) FRENCH MINE FUZES

Pressure fuzes, M-1935 and M-1936



a. Description. The French antitank mine pressure fuze, M-1935 and 1936 is of the instantaneous, mechanical type and contains a spring-loaded striker with a shear-pin release. The shear pin passes through the striker shaft and the top of the fuze case. The percussion cap is contained in the detonator holder and is held in place by a hollow screw which gives the striker access to the cap. The detonator holder fits into the bottom of the fuze and is held in place by the detonator assembly which screws into the bottom of the fuze. The M-1935 fuze is made of steel with a brass percussion-cap holder and detonator assembly, while the M-1936 fuze is made of aluminum with an aluminum percussion-cap holder and detonator assembly.

b. Employment. This fuze is used in both the light and the heavy French antitank mines

c. Functioning. A pressure of 400 pounds, or more, on the striker shaft shears the shear pin and releases the spring-loaded striker against the percussion cap, firing the detonator.

APPENDIX H
TERRAIN ANALYSIS

TERRAIN OVERVIEW

Generalfeldmarshall Rommel remarked that at El Alamein, "*Rivers of blood were poured out over miserable strips of land which, in normal times, not even the poorest Arab would have bothered his head about.*"[1] The Sahara Desert is mainly characterized by vast, hot, dry, and barren plains with large diurnal ranges in temperature with a few widely spaced settlements. The terrain has many large flat plain surfaces, thousands of square miles of sand dunes; several fairly large areas of rugged, rocky hills and mountains; numerous steep-sided escarpments, wadis, and depressions with salt marshes. Ever since the British occupation of Egypt, the El Alamein Line had been recognized as the best position on which to defend the cultivated area along the Nile River and the Suez Canal against attack from the west. The line was sited between the Mediterranean Sea coast northeast of El Alamein and the northern edge of the Qattara Depression at Naqb Abu Dweis. It straddled the narrowest part of the coast belt on a front of about 60 kilometers and rested its flanks on the Sea and the impassable depression. The few natural obstacles and marked features on the line had an importance, which explains much of the course of the fighting. Afternoon temperatures in the summer (June through September) usually ranged from 90° to 120° F (32 to 49° C) or more. The nights are cool while winters are mild.

OBSERVATION

Generally, observation was excellent in the desert. The dust clouds raised by moving vehicles were particularly obvious and favored the defender.

RIDGES

Low-lying ridges in the area provided a degree of improved observation. Miteiriya Ridge (5 to 6 meters above the surrounding desert) was southwest of El Alamein while the Ruweisat Ridge (10 to 20 meters above the surrounding desert) ran eastward from near Deir el Shein. Towards the Qattara Depression, the ground along the escarpment is broken into small flat-topped hills such as Qaret el Himeimat (215 meters), the El Taqa Plateau (218m), and Qaret el Khadim (174 meters). Qaret el Himeimat towered 100 meters over the surrounding desert. On a clear day, one could see the Mediterranean Sea, 49 kilometers to the north.

DESERT HAZE

The high daytime temperatures in the desert cause an atmospheric haze that adversely affects visibility. When this haze condition is at its height, usually in mid-afternoon, a crawling man is obscured or his figure completely distorted at 200 meters. This haze phenomenon was often used as a cover for reconnaissance.

WIND

The winds of the Sahara Desert affected operations in several ways. Fast moving winds heavily laden with sand and dust often reduced visibility. In other situations, sand and dust storms (variously called Shamals, Khamsins, or Ghiblis) restricted visibility to only tens of meters.

COVER AND CONCEALMENT

DEPRESSIONS

Of the sparse terrain features in the area, some of the most notable were the depressions such as Deir el Shein, Deir el Mreir and Deir el Munassib. These shallow depressions, typically about 10 to 20 meters below the surrounding desert, were located near the middle of the front and provided some cover to their occupants.

FIELD FORTIFICATIONS

The open desert was generally devoid of any cover or concealment. Therefore, soldiers were forced to make their own. Throughout the length of the line, the ground was generally rocky, requiring power tools and explosives for entrenchment. In the few areas of sand or sandy soil, field fortification was relatively easy to

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[1] The Rommel Papers, by Erwin Rommel (edited by B. H. Liddell Hart), Harcourt Brace and Company, New York, 1953, page 306.

establish. Such conditions, however, did not exist over wide stretches of the desert plateaus. In many areas, the ground is flat and stony with barely a covering of dust to hide the rocky sub-mantel. In some places, even the dust cover is missing and nothing but solid rock exists.

OBSTACLES

Inland from the seacoast, there is a strip of salt marsh and then a belt of sand and dunes about 200 meters wide. The land then rises about 20 meters in a ridge along which the coast road runs. South of the road is the Egyptian Republic Railway, which runs along an elevated embankment for portions of its length in the battle area. This embankment formed a significant obstacle to north-south movement in places. From the road and railway, the ground gradually rises over a wide and rather featureless plain to the escarpment, which has an elevation of about 210 meters above sea level. From the escarpment, the ground drops precipitously some 230 meters into the impassable Qattara Depression (10 to 20 meters below sea level). This relatively narrow strip, between the Mediterranean Sea and the Qattara Depression, canalized all land traffic. This line could be penetrated, but not turned.

QATTARA DEPRESSION

This terrain feature is the reason the panzerarmee and the 8th Army fought at El Alamein. The salt marshes and sand dunes of the Qattara Depression make it impassable to vehicle columns of any size. Consequently, it was the only position in Egypt and Libya that could not be outflanked to the south. Nevertheless, small raiding parties in light vehicles could and did traverse the area on fragile caravan routes over the soft ground.

WADIS

A wadi is normally a dry, steep sided ravine. These frequently constituted a natural obstacle in its own right. Many of the Saharan wadis were sufficiently wide and deep to significantly effect military operations. Wadis were nearly always mined, particularly at likely crossing places. In several instances, they were used as a structural part of defensive positions with minefields in front, within and sometimes behind their course. When it rained, the wadi could become a rivulet or a torrent. Their mined bottoms were affected accordingly.

RAINFALL

The Sahara Desert has no season of regular rains. The rain that it does receive it owes to the passage of storms, the dates of which are entirely erratic and the effects more or less confined to single localities. The Saharan rainfall is characterized primarily by its irregularity. It might rain for only short periods but it could be a heavy deluge.

ESCARPMENTS

The various escarpments, located south of the coastal plains of the Sahara Desert, rise sometimes abruptly, sometimes in several tiers, but always steeply and up to heights of about 200 meters above sea level. They effectively block traffic wishing to move from the coast to the desert plateau above. Access can be gained only along a few roads or tracks that climb steeply through certain passes. The escarpment itself is almost impassable to wheeled or tracked vehicles for about 200 kilometers west of Naqb Abu Dweis. These passes up the escarpments consistently received the attention of opposing sappers and miners. The passes in Egypt, situated nearest the frontier, were mined very early in the conflict. The Italians, for example, hit their first British mines at Halfaya Pass at the start of their 1940 invasion of Egypt.

MILITARY (REINFORCING) OBSTACLES

The vast openness of the North African plateau environment, in conjunction with a very early recognition of the effectiveness of mines, encouraged the use of mines on a massive scale. Mass mining was first employed by the British 8th Army in the construction of its line at Gazala in March, April and May of 1942. The 8th Army applied the same mine tactics at El Alamein in July and August of the same year. An estimated half million or more mines were emplaced in each of these lines. *Generalfeldmarshall* Rommel, obviously impressed by the British "Mine Marsh" tactics at Gazala and El Alamein, employed the same concept, with added dimensions, in his own defense of the El Alamein position against the 8th Army. The panzerarmee's defenses contained no fewer than 481,000 mine devices by the time they were attacked on 23 October 1942. Mine-laying was relatively easy and routine in sand or sandy soils with depths of 30 centimeters or more. Such sand and soil depths, however, do not exist over wide stretches of the desert plateaus. In many areas, the ground is flat and stony with barely a covering of dust to hide the

rocky sub-mantel. In some places, even the dust cover is missing and nothing but solid rock exists. Conditions can vary even in areas with shallow soil depths. Mine-laying was a very difficult task under such circumstances.

KEY TERRAIN

The vast and barren desert plains of the El Alamein region have relatively little key terrain. Aside from the Qattara Depression in the south, Qaret Himeimat and Miteiriya Ridge were the most significant terrain features of the battlefield. These low-lying ridges provided a degree of observation. As stated earlier, Miteiriya Ridge (5 to 6 meters above the surrounding desert) was southwest of Alamein while the Ruweisat Ridge (10 to 20 meters above the surrounding desert) ran eastward from near Deir el Shein. Towards the Qattara Depression, the ground along the escarpment is broken into small flat-topped hills such as Qaret Himeimat (215 meters), the El Taqa Plateau (218m), and Qaret el Khadim (174 meters). After the Battle of Alam Halfa in September, General Montgomery directed that the panzerarmee be allowed to retain control of Qaret Himeimat. This hill towered 100meters over the surrounding desert. As part of his deception plan, General Montgomery wanted the panzerarmee to see the activities of XIII Corps in order to convince them that this was the main effort. Once the battle was underway, it was imperative for XIII Corps to force the Axis off of Qaret Himeimat. If they remained on the hill, they would be able to observe and interfere with the British breaches of the minefields to the east and to direct artillery fire on to them.

Although the low-lying Miteiriya Ridge was only 5 to 6 meters above the surrounding desert, it was nevertheless, key terrain to the Axis forces because it provided a reverse slope defense against the Commonwealth armored units. However, while the position provided some initial protection against Allied direct fire, defending from the reverse slope also prevented the Axis units from covering their forward obstacles with effective direct fire. Later, during the battle, the ridge provided the defenders a critical advantage over the British armor, which was attempting to exploit the initial success of the 2nd New Zealand Division.

AVENUES OF APPROACH

The approaches to the position follow three main lines – 1) the coast road and railway, 2) the Barrel Track from Fuka through the Deir el Munassib and 3) the Qaret el Himeimat to Cairo Road then along a narrow, trafficable strip running north of the escarpment. Patches of camel thorn scrub, soft sand, and rocky outcroppings complicate movements by wheeled transport.

COASTAL PLAINS

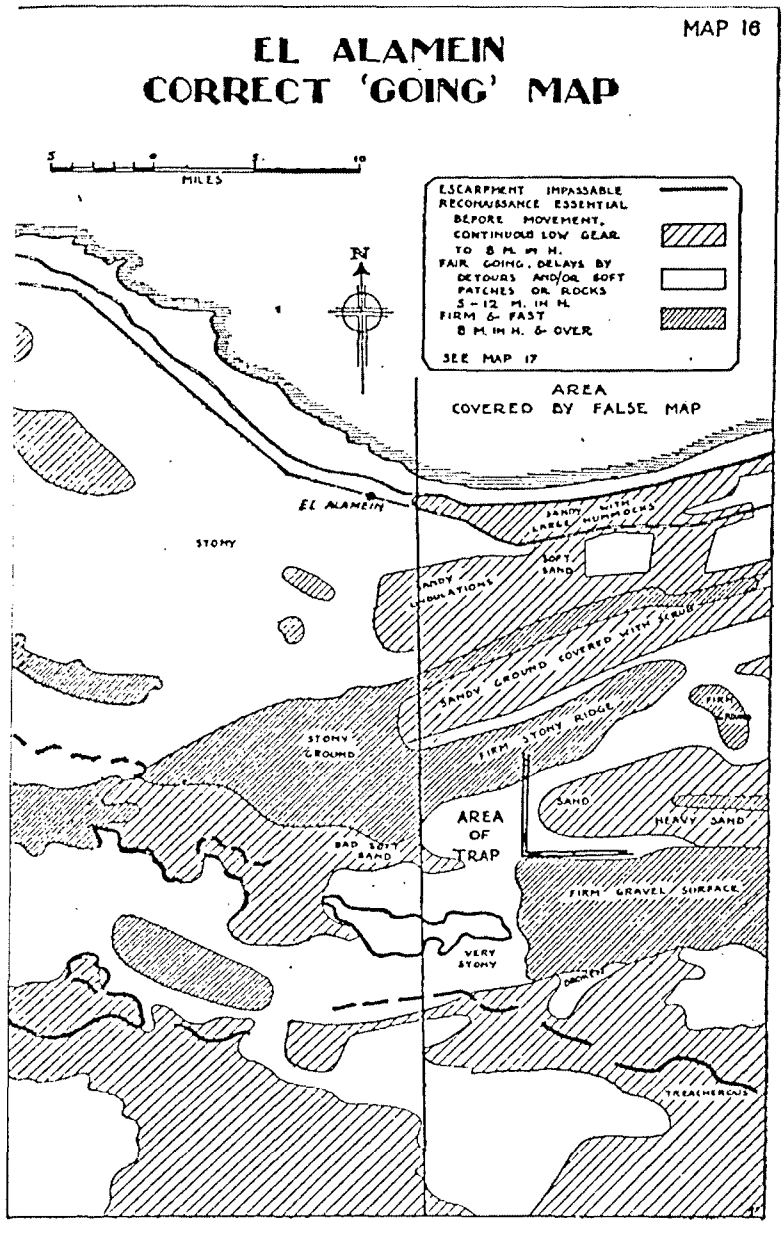
The coastal plains carried the main lines of communications, including the all important 3000-kilometer long main east/west coast road running from Alexandria in Egypt to Tunis. This road ran near the coast, occasionally swerving inland, to touch the bigger towns. At several points, these inland swerves crossed rather formidable escarpments. Among the towns and other localities situated along this main road, and of military importance, were El Alamein, El Daba, Fuka, Matruh, Sidi Barrani, Sollum, Bardia, Tobruk, Gazala, Benghazi, Agedabia, El Agheila, Tripoli, and Medenine. The harbor facilities at Tobruk, Benghazi and Tripoli increased the military importance of the coastal plains. The only railroad located within the fighting zone of the region also ran along the coastal plain proceeding westward from Alexandria. From time to time this line was extended to serve the operational needs of the British forces and eventually reached Tobruk.

The coastal road and its adjacent verges were constantly mined because of its military importance in pursuit or retreat. Off-route mining was usually tied to the salt marsh obstacles that were also mined on a number of occasions. The road and off-road mining and countermining incidences related in Chapter 7, are representative of some of the most intense mining and countermining operations that were carried out in the coastal plains area. Off the main road in the coastal plain, motorized going ran the gamut from good to bad. Patches of deep sand and salt marshes were the principle obstacles.

DESERT PLATEAUS

The desert plateaus lying south of the escarpments provided space enough for sweeping maneuver. Natural terrain obstacles constraining such movements were few, particularly obstacles blocking movement eastward and westward. As *Generalfeldmarshall* Rommel observed in his survey of the North African battlegrounds, that there was only one position in Egypt or Libya, the one at El Alamein, which could not be turned at its southern flank. The

first real obstacle to east and west movement, the Qattara Depression, was some 60 kilometers inland from El Alamein.



APPENDIX I. AXIS ORDER OF BATTLE[1]

(As of 23 OCT 1942, unless otherwise noted)

Panzerarmee Afrika: commanded by *General Der Kavallerie* Georg Stumme (until KIA 24 OCT) then *Generalfeldmarshall* Erwin Rommel, senior Pioneer: *Oberst* Hans Hecker replaced *Oberst* Gerhard Jordan, 29 Oct 41, later (8 Nov 42) replaced by *Generalmajor* Karl Buelowius. For many units of the panzerarmee, the most current equipment strength report predates the Battle of Alam Halfa. During this battle, the Germans lost 1,859 men and 38 tanks, while the Italians lost 1,051 men, 50 guns (47mm or larger) and about 400 trucks. The Germans had 12,600 vehicles (including the Luftwaffe), while the Italians had 3,500 vehicles.

Afrika Korps, *Generalleutnant* Ritter von Thoma page I-3
XX Italian Motorized Corps, Lieutenant General Giuseppe de Stephanis page I-18
X Italian Corps, Lieutenant General Enrico Frattini (acting) page I-28
XXI Italian Corps, General Alessandro Gloria (acting) page I-33
Panzerarmee Afrika Troops page I-36
II Fliegerkorps, *Generaloberst* Bruno Loerzer, in support page I-40
5th *Squadra, Regia Aeronautica*, in support page I-43

PANZERARMEE AFRIKA STRENGTH

		DAK	X CORPS	XX CORPS	XXI CORPS	ARMY TROOPS	ARMY Total
Personnel		35,335	11,301	11,670	10,176	10,036	104,000*
Infantry Battalions		24	17	9 (-)	14	3	67 (-)
Tanks	Pz IVf2	30	-	-	-	-	30
	Pz IV (kz)	10	-	-	-	-	10
	Pz IIIj	87	-	-	-	-	87
	Pz III (kz)	96	-	-	-	-	96
	M14	-	-	279	-	-	279
	TOTAL MED. TANKS	223	-	279	-	-	502
	L 6	-	-	22	-	-	22
	Stuart (captured)	-	-	-	-	10	10
	Pz II	33	-	-	-	-	33
	MK VI (captured)	-	-	-	-	2	2
	Pz Bef	8	-	-	-	-	8
	TOTAL	264	-	301	-	-	565
Artillery (Divisional)	7.5 cm leIG 18	17	-	-	-	-	17
	75/18 Semovente SP	-	-	30	-	5	35
	15 cm sIG 33	8	-	-	-	-	8
	15cm sIG SP	19	-	-	-	-	19
	65/17 gun	-	-	-	-	36	36
	7.5 cm LG40	8	-	-	-	-	8
	7.5 cm GK15	8	-	-	-	-	8
	75/27 gun	-	60	60	47	-	167
	7.62 cm Russian	-	-	-	-	5	5
	77/28 guns	-	-	-	24	-	24
	8.75 cm British	29	-	-	-	21	50
	100/17 howitzer	-	24	20	38	8	90
	105/28 gun	-	12	24	-	-	36
	10.5 cm LG40	8	-	-	-	-	8
	10.5 cm French	4	-	-	-	-	4
	10.5 cm leFH 18	60	-	-	-	-	60
	15 cm sFH 18	16	-	-	-	4	20
	15 cm sFH13 SP	8	-	-	-	-	8
(Corps & Army)	10 cm K17	8	-	-	-	-	8
	10 cm K18	-	-	-	-	8	8
	11.4 cm gun (captured)	-	-	-	-	3	3
	149/28 gun	-	-	-	5	-	5
	149/40 gun	-	-	-	9	-	9
	15 cm K16	-	-	-	-	18	18
	152/37 guns	-	-	-	2	-	2

[1] The Axis order of battle was compiled from numerous sources. The most useful were the following: 1) US National Archives, Captured German Records Division, Series T-313, Rolls 430, 431 (particularly frames 8723688-8723703) and 470; Series T-314, Roll 16, Series T-315, Rolls 666, 1156, and 1474, 2) "Orders of Battle, El Alamein, 23 October 1942," by Doctor Leo Niehorster, available online at: http://www.orbat.com/site/ww2/drleo/500_eto/42-10-23_north-africa.html , 3) The Afrika Korps, An Organizational History, 1941-1943, by George F. Nafziger, privately published, Pisgah, Ohio, 1997, 4) Italian Order of Battle, World War II, Volume 1, (Armored, Motorized, Alpini, and Cavalry Divisions), by George F. Nafziger, privately published, Pisgah, Ohio, 1996, and 5) Italian Order of Battle, World War II, Volume 3, (Black Shirt, Mountain, Assault and Landing Divisions, Corps Troops, and 1944 Liberation Army), by George F. Nafziger, privately published, Pisgah, Ohio, 1996.

	15.5 cm French	-	-	-	-	10	10
	17 cm K18	-	-	-	-	7	7
	21 cm Morser 18	-	-	-	-	6	6
	TOTAL	192	96	134	125	131	678
Anti-Tank Rifles	PzBu39	54 (?)	-	-	-	-	54 (?)
	PzBu41	23 (?)	-	-	-	-	23 (?)
	20mm Soluthurn	-	129	28	126	-	283
	TOTAL	77	129	28	126	-	360
		DAK	X CORPS	XX CORPS	XXI CORPS	ARMY TROOPS	ARMY Total
Anti-Tank Artillery	3.7 cm Pak 36	108	-	-	-	-	108
	4 cm Pak (c)(captured)	-	-	-	-	6	6
	47/32 AT gun	-	142	128	111	-	381
	4.7 cm Pak (t)	14	-	-	-	-	14
	4.7 cm Pak (t) SP	-	-	-	-	11	11
	5 cm Pak 38	109	-	-	-	3	112 (290?)
	5.7 cm Pak (c) (captured)	4	-	-	-	5	9
	7.62 cm Pak (r)	3	-	-	-	-	3
	7.62 cm Pak (r) SP	4	-	-	-	2	6(?) 68 total?
	TOTAL	242	142	128	111	27	650, 522, 744?
Anti-Aircraft Artillery	8.8 cm Flak 18	8	12	24	-	42	86**
	90/53 AA/AT gun	-	-	8	-	-	8
	75/50 AA/AT gun	-	-	10 (?)	-	-	10 (?)
	2 cm Flak 38	42	-	-	-	191	233
	2 cm Flakvierling 38	6	-	-	-	6	6
	Italian 20mm AA gun	-	14	26	2	-	42
	TOTAL	56	26	68 (?)	2	239	397 (?)***
Armored Cars	Light (Sd Kfz 222 & 223)	20	-	-	-	-	20
	Hvy (Sd Kfz 231 & 232)	4	-	-	-	-	4
	Autoblinda 41	-	-	18	-	-	18
	TOTAL	24****	-	18*****	-	-	42******
Engineer Companies	Pioneer	13	10	5	2	-	30
	Construction	-	-	-	-	4	4

Note: The numbers in this and subsequent tables may not necessarily tally up as the unit reports and roll ups changed from day-to-day due to maintenance and other considerations, thus making exact numbers impossible to determine.
*Not including 77,000 Italian troops in Africa, but not under *Generalfeldmarshall* Rommel command.
** Not including 52 guns employed around the airfields and port facilities
***1264 according to Italian sources (*Le Operazioni in Africa Settentrionale, Vol. III-El Alamein*).
****47 according to Italian sources (*Le Operazioni in Africa Settentrionale, Vol. III-El Alamein*)
*****72 according to Italian sources (*Le Operazioni in Africa Settentrionale, Vol. III-El Alamein*)
******192 according to British sources (The Destruction of Axis Forces in Africa, The Mediterranean and Middle East, Volume IV)

PANZERARMEE AFRIKA STAFF[2]

POSITION	INDIVIDUAL	DATE ASSUMED POSITION
Chief of Staff	*Oberstleutnant* Siegfried Westphal	10 SEP 42
Ia (Operations)	Major Feige (acting)	After 14 AUG 42
Ib (Quartermaster)	Major Otto	DEC 41
Ic (Intelligence)	Major Zolling	APR 42 (Westphal indicates 9 SEP 42)
IIa (Adjutant)	Major Schraepler	
IVb (Medical)	*Oberstartzt* Dr. Asal	
Artilleriekommandeur	*Generalmajor* Fritz Krause	DEC 41
Pionierkommandeir	*Oberst* Hermann-Hans Hecker	OCT 41
Nachrichtungsfuhrer	*Oberst* Buchting	JUL 41
Fliegerfuhrer Afrika	*General der Flieger* Hans Seidemann	JUL 42

[2] "The Campaign in North Africa 1941/3, Volume 2, The Campaign in the Year 1942," by *General der Panzertruppe* Walther Nehring, MS # T-3, Foreign Military Studies, Headquarters, US Army Europe, 1948, Anlage (Appendix) 18, pages 2 and 3. See also *Erinnerungen*, by Siegfried Westphal, v. Hase & Kochler Verlag., ISBN 3-7758-0886-8, Mainz, 1975, page 174.

Afrika Korps: commanded by *Generalleutnant* Ritter von Thoma, assumed command 20 Sep, replaced *Generalleutnant* Walther Nehring WIA 30 Aug, senior Pioneer: Major Bloch KIA 2 SEP 42 (no replacement has been identified).

- 15th Panzer Division, *Generalmajor* Gustav von Vaerst — page I-5
- 21st Panzer Division, *Generalmajor* Heinz von Randow — page I-8
- 90th Light Division, *Generalmajor* Theodor von Sponeck — page I-11
- 164th Light Division, *Generalmajor* Karl Lungerhausen — page I-15
- 22nd (Ramcke) *Fallschirmjager* (Airborne) Brigade (*Generalmajor* Bernard Ramcke) — page I-18
- Corps Troops (about 3,000 in late August)
  - 475th Motorized Signal Battalion
    - 1st Motorized Wire Construction Company
    - 2nd Motorized Wire Construction Company
    - 3rd Motorized Telephone Company
    - 4th Panzer Radio Interception Company
    - one motorized light signal transport column
  - 572nd Panzer Supply Battalion
    - 1st through 6th 60 Ton Motorized Transport Columns
    - W651 60 Ton Motorized Transport Column
    - 7th 50 cubic meter Motorized POL Transport Column
    - one motorized maintenance company
    - 609th Munitions Supply Company
    - 668th Supply Company
  - 576th Mapping Section (attached to Corps Headquarters)

AFRIKA CORPS STRENGTH

		15 Pz Div	21 Pz Div	164 Div	90 Div	Ramcke Bde	Corps Total
Personnel		3,940	3,972	6,342	2,827	3,379	27,175*
Infantry Battalions		3	3	9	6	3	24
Tanks	Pz IVf2	15	15	-	-	-	30
	Pz IV (kz)	7	3	-	-	-	10
	Pz IIIj	43	44	-	-	-	87
	Pz III (kz)	53	43	-	-	-	96
	Stuart (captured)	-	-	-	-	-	-
	Pz II	19	14	-	-	-	33
	Pz Bef	6	2	-	-	-	8
	TOTAL	143	121	-	-	-	264
Artillery	7.5 cm leIG 18	4	1	12	-	-	17
	15 cm sIG 33	4	3	4	-	-	11
	15cm sIG SP	8 (?)	6	-	-	-	14(?)
	7.5 cm LG40	-	-	-	-	8	8
	7.5 cm GK15	-	-	8	-	-	8
	7.5 cm French	-	-	-	-	-	-
	8.75 cm British	5	10	-	14	-	29
	10.5 cm LG40	-	-	-	-	8	8
	10.5 cm French	-	-	4	-	-	4
	10.5 cm leFH 18	28	20	12	-	-	60
	15 cm sFH K18	8	8	-	-	-	16
	15 cm sFH13 SP	8	-	-	-	-	8
	10 cm K17	4	4	-	-	-	8
	TOTAL	69	52	40	14	16	191
Anti-Tank Rifles	PzBu39	-	-	9	45	-	54
	PzBu41	1	4(PzBu39?)	-	18	-	23 (?)
	TOTAL	1	4	9	63	-	77
Anti-Tank Artillery	3.7 cm Pak 36	2	2	33	35	36	108
	4 cm Pak (c)	-	-	-	-	-	-
	4.7 cm Pak (t)	-	-	-	14	-	14
	5 cm Pak 38	7	35	56	11	-	109
	5.7 cm Pak (c)	4	-	-	-	-	4
	7.62 cm Pak (r)	3	-	-	-	-	3
	7.62 cm Pak (r) SP	-	4	-	-	-	4
	TOTAL	16	41	89	60	36	242
Anti-Aircraft Artillery	8.8 cm Flak 18	8	-	-	-	-	8
	2 cm Flak 38	24	-	-	18	-	42
	2 cm Flakvierling 38	6	-	-	-	-	6
	TOTAL	38	-	-	18	-	56
Armored Cars	Light (Sd Kfz 222 & 223)	9	11	-	-	-	20
	Hvy (Sd Kfz 231 & 232)	2	2	-	-	-	4

	TOTAL	11	13	-	-	-	24
Engineer Companies		3	3	3	3	1	13

*Of these, 12,147 were infantry, 11,217 artillery (including flak and AT gunners), 1,464 panzer troops, 1,420 recon, and 1,322 pioneers.

AFRIKA KORPS STAFF[3]

POSITION	INDIVIDUAL	DATE ASSUMED POSITION
Chief of Staff	*Oberst* Fritz Bayerlein	3 OCT 41
Ia (Operations)	Major Frevert	5 JAN 42
Ib (Quartermaster)	Major Willers	OCT 41
Ic (Intelligence)	?	
Pionier Führer	Vacant?	
Nachrichtungsführer	Major Baron Behr	

[3] "The Campaign in North Africa 1941/3, Volume 2, The Campaign in the Year 1942," by *General der Panzertruppe* Walther Nehring, MS # T-3, Foreign Military Studies, Headquarters, US Army Europe, 1948, Anlage (Appendix) 18, pages 2 and 3. See also *Erinnerungen*, by Siegfried Westphal, v. Hase & Kochler Verlag., ISBN 3-7758-0886-8, Mainz, 1975, page 174.

15th Panzer Division: commanded by *Generalmajor* Gustav von Vaerst, wounded May 1942, returned to duty 25 AUG 1942, combat strength of 171/696/3073 out of ration strength of 237/87/1571/6106 as of 21 Oct 42 out of approximately 12,000 men authorized.[4] The men of this division were primarily from Kaiserlautern (except 8th Pz Rgt from Stuttgart). By 1 Nov, the division was down to 12 Sd Kfz 251s of 33 authorized, 0 Sd Kfz 251/6 of 4 authorized, 1 Sd Kfz 250 of 2 authorized, and 1 Sd Kfz 250/3 of 2 authorized). In addition the division had the following major items of equipment available as of 21 Oct 42: 12 Pz II, 38 Pz III kz, 43 Pz IIIj, 2 Pz IV (kz), 14 Pz IVf2 (lg), 1 Command Pz, 336 MGs, 3 light mortars, 16 8 cm mortars, 1 sPzBu, 4 sIGs, 7 3.7cm PAK, 71 5cm PAK, 4 5.7cm antitank guns (Captured British 6 Pounders), 19 7.62 cm self-propelled anti-tank guns, 24 leFH 18s, 8 sFH 18s, 4 10 cm K17 guns, 8 sFH 13 (self-propelled), and 5 8.76 cm gun-howitzers (captured British 25 Pounders). In addition, 8 8.8cm FLAK, 24 2 cm FLAK and 6 quad 2cm FLAK guns were attached to the division.

8th Panzer Regiment commanded by *Oberst* Willy Teege (arrived Spring 1942) (combat strength of 43/230/698 with a ration strength of 57/505/6101 and 32 LMGs as of 21 Oct 42)

	Pz II	Pz III kz	Pz III lg	Pz IV kz	Pz IV lg	PzBef	Total
Authorized	25	-	111	-	30	6	172
Available	19	53	43	7	15	6	143
Operational	12	38	43	2	14	1	110

Headquarters section
- one light panzer platoon (authorized 5 20mm and 5 LMGs, available 4 20mm and 2 LMGs)
- one panzer signals section (assigned 2 50mm Pak 38s and 2 LMGs)

one panzer maintenance company

1st Panzer Battalion (*Hauptmann* Otto Stiefelmayer, available 3 Pz II, 23 Pz III kz, 14 Pz IIIj, 8 Pz IVf2 (lg))
- Headquarters
  - one light panzer platoon
  - one panzer pioneer platoon
  - one motorcycle platoon
  - one 20mm FLAK section (authorized 5 20mm guns)
  - one panzer signals platoon
- 1st – 3rd Light Panzer Companies
- 4th Medium Panzer Company

2nd Panzer Battalion (*Hauptmann* Siemens, available 5 Pz II, 14 Pz III kz, 18 Pz IIIj, 2 Pz IV kz, 7 Pz IVf2 (lg))
- Headquarters
  - one light panzer platoon
  - one panzer pioneer platoon
  - one motorcycle platoon
  - one 20mm FLAK section (authorized 5 20mm guns)
  - one panzer signals platoon
- 5th – 7th Light Panzer Companies
- 8th Medium Panzer Company

115th Panzer Grenadier Regiment commanded by *Oberstleutnant* Freiherr von Eckardtstein replaced *Oberstleutnant* Baade (JUL 42), combat strength of 49/218/1126 with a ration strength of 63/9/404/1632, assigned 178 MGs, 16 80mm mortars, 4 150mm Heavy Infantry Guns, 2 37mm Pak 36, 56 50mm Pak 38, 3 76.2mm Pak (r), 4 6-pdr, 4 25-pdr gun-how., and 1 28mm Pz Bu 41, as of 21 Oct 42)

Headquarters Section

One motorized support company
- one motorized signals platoon
- one motorized pioneer platoon (authorized and assigned 3 LMGs)
- one motorcycle messenger platoon (authorized 6 LMGs)
- one motorized panzerjager platoon (authorized & assigned 3 50mm Pak 38 AT guns and 3 (1 assigned) LMGs)

1st Battalion (Major Busch) (4 companies (1st – 4th), each authorized 18 LMGs, 2 HMGs, 3 28mm PzBu41, 3 80mm mortars, 6 50mm Pak 38s)

2nd Battalion (*Hauptmann* Weichsel) (4 companies (5th – 8th), each authorized 18 LMGs, 2 HMGs, 3 28mm PzBu41, 3 80mm mortars, 6 50mm Pak38s)

3rd Battalion (4 companies (9th – 12th), each authorized 18 LMGs, 2 HMGs, 3 28mm PzBu41, 3 80mm mortars, 6 50mm Pak 38s)

13th Company (assigned 4 20mm self-propelled FLAK guns and 3 LMGs)

14th (Motorized) Pioneer Company (not available? authorized 10 LMGs, 2 HMGs, 3 28mm PzBu41, 3 80mm mortars, 3 50mm Pak 38s)

15th (Motorized) Heavy Infantry Support Gun Company (assigned 4 150mm sIG33, 4 8.75 cm guns (c))

33rd Panzer Artillery Regiment commanded by *Oberstleutnant* Eduard Crasemann (JUL 41), acting division commander during MG Vaerst's absence, May-Aug '42), combat strength of 56/154/785 with a ration strength of 63/11/262/1017, assigned 32 MGs, 24 leFH 18s, 8 sFH 18s, 4 10 cm K17 guns, 8 sFH 13 (self-propelled), and 1 8.76 cm gun-howitzers (captured British 25 Pounders) as of 21 Oct 42.)

One motorized regimental staff battery

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[4] *Die 5. (lei.)/21. Panzer Division in Nordafrika, 1941-1943*, by Heinz-Dietrich Aberger, Preussischer Militar-Verlag, Reutlingen, 1994, pages 279, states that 15th Panzer Division had an actual strength (*tatsachliche starke*) of only 3,940 men KTB Nr. 26, Pz.AOK/Ia (RH-19 VIII/20) on the morning of 23 October 1942. See also US National Archives, Captured German Records Division, Series T-315, Roll 666, Frame 315. Personnel strengths will be annotated either aa/bb/cce (indicating the numbers of officers/non-commissioned officers/enlisted respectively) or aa/bbb (indicating the numbers of officers/enlisted respectively).

1st Battalion, (*Hauptmann* Freiherr Grote) one motorized staff battery and 1st through 3rd Batteries (each authorized and assigned 4 105mm leFH 18s and 2 LMGs)
2nd Battalion, one motorized staff battery and 4th through 6th Batteries (each authorized and assigned 4 105mm leFH 18s and 2 LMGs)
3rd Battalion (*Hauptmann* Broeckerhoff), one motorized headquarters battery, 7th Battery (authorized and assigned 4 10 cm K17 guns and 2 LMGs), 8th & 9th Batteries (each authorized and assigned 4 150mm sFH K18s and 2 LMGs)
4th Battalion (available 8 self-propelled 150mm sFH 13s)
33rd Motorized Artillery Observation Battery
one motorized heavy munitions supply column (60 ton)
707th Self-Propelled Infantry Support Gun Company (attached?, authorized 6 150mm sIG (2 assigned) and 3 LMGs)

1st Battalion (Motorized), 43rd Luftwaffe Flak Regiment (combat strength of 18/51/382 with ration strength of 21/2/144/944, assigned 8 8.8cm FLAK, 24 2cm FLAK, and 6 Quad 2cm FLAK, attached from Panzerarmee Afrika)
1st–2nd Motorized Flak Batteries (assigned/authorized 4-88mm guns each)
4th –5th Motorized Flak Batteries (assigned 24 20mm guns, 6 4X20mm guns)

33rd Panzer Reconnaissance Battalion (Major Linau replaced *Rittmeister der Reserve* Heraucourt in the summer of 1942, 17/492 assigned (as of 22 Aug), detached, placed behind the Folgore Div. in the southern sector)
one Armored Car Company (0 Sd Kfz 221 assigned, 10 authorized, 7 Sd Kfz 222 assigned, 7 authorized, 2 Sd Kfz 223 assigned, 4 authorized, 1 Sd Kfz 231 assigned, 3 authorized, 1 Sd Kfz 232 assigned, 3 authorized, also available 18 37mm pak 36, 24 MGs)
one (halftrack) infantry company (available 5 50mm PAK 38 SPs (on Sd. Kfz. 251s?), 2 HMGs, 3 80mm mortars)
one (motorized) support company with, one heavy weapons platoon (assigned 3 50mm Pak 38s, 5 37mm Pak 36s), one pioneer platoon (assigned 2 LMGs), one signals section
one (motorized) 105mm leFH battery (assigned 4 105mm leFH 18, 2 LMGs)
one light reconnaissance supply column

33rd *Panzerjäger* Battalion (*Hauptmann* Dr. Zahn (*Oberleutnant* Beil?) since May 41, combat strength of 9/48/158 with a ration strength of 11/3/57/296, authorized 3 companies each with 14 antitank guns, assigned 20 LMGs, 12 5cm PAK, and 16 7.62cm self-propelled anti-tank guns)
one headquarters section (with a motorized signals platoon (available 2 LMGs))
1st Motorized Panzerjager Company (assigned 12 50mm PAK 38, 12 LMGs)
2nd-3rd Self-Propelled Panzerjager Companies (assigned 16 Marder Is (captured Russian 76.2mm Pak on a Czech T-38 hull) and 6 LMGs)

33rd Panzer Pioneer Battalion (*Hauptmann* Hinrichs replaced *Oberstleutnant* Oberembt (KIA early JUN 42), combat strength of 9/22/179 with a ration strength of 11/3/57/296 of 22/834 authorized, assigned 31 LMGs, 2 50mm Pak 38s, 3 20cm *leichter Ladunswerfer* (spigot mortars, literally "light charge throwers"), organized in 3 companies (authorized Sd Kfz 251half-tracks). On average, each pioneer battalion in the Afrika Korps was authorized 170 vehicles (53 motorcycles, 25 PKW, 92 LKW, and 18 panzers (33rd and 200th pioneer battalions only), close combat material (28 flamethrowers, demolition sets 28 (a), 10 (b), 40 (c), 25 (d), *Sprengmittel satz* a,b,c,d, Detonator sets (*zündmittel kasten satz*) 12 (a), 20 (b), 6 (c) and 3 *zündmittel für "S" minen*,) power tools (21 power saws, 8 compressors, 8 well drilling equipment sets, 2 welding sets (33rd and 200th pioneer battalions only), bridging equipment (7 large rubber rafts, 9 small rubber rafts, various rope), and entrenching tools (270 spades, 122 axes, 133 hatchets, 65 wire cutters, 73 mattocks, 42 e-tools, 34 augers(?), 43 tape measures. The nominal basic load of ammunition was 351 kilograms of explosive (in 100, 200, 1000, and 3000 gram blocks), 2600 meters of detonating cord, 936 smoke grenades, 1140 Tellermines, 1934 "S" mines. The nominal basic load of barrier material was: 306 rolls of K-roll (plain (unbarbed) concertina), 100 rolls of S-roll (barbed wire concertina, each 6-8 meters in length), 73 rolls of barbed wire, 21 rolls of plain wire, and 1550 sandbags).[5]
No.1 Company (*Leutnant* Weiss (as of 15 April 42), authorized 18 LMGs, 3 28mm PzBu41, 6 50mm Pak 38s, assigned 2 37mm Pak 36, 9 LMGs)
No.2 Company (*Oberleutnant* Gamon (as of 15 April 42), authorized 18 LMGs, 3 28mm PzBu41, 6 50mm Pak 38s, assigned 1 37mm Pak 36, 9 LMGs)
No. 3 Company (*Oberleutnant* Beheim-Schwarbach (as of 15 April 42), authorized 18 LMGs, 3 28mm PzBu41, 6 50mm Pak 38s, assigned 1 37mm Pak 36, 1 28mm PzBu41, 9 LMGs)
one motorized light pioneer supply column

33rd Field Replacement Bn (authorized 4 replacement infantry companies each with 1 50mm Pak 38 and 6 LMGs, not available)

78th Panzer Signal Battalion (combat strength of 5/24/127 with a ration strength of 7/2/44/230, assigned 19 LMGs, 1 37mm PAK 36 as of 21 Oct 42)
one panzer radio company
one panzer telephone company
one light (motorized) signals supply column

33rd Supply Battalion, (assigned 22/15/134/1900 18 LMGs, 4 37mm PAK 36, as of 21 Oct 42)
33rd (Motorized) Light Supply Company
1st (Motorized) Maintenance Company
1st - 8th Light Supply Columns (each with 1 LMG)
9th – 11th Heavy (Motorized) POL Supply Columns (each with 1 LMG)
12th & 13th Heavy (Motorized) Supply Columns (each with 1 LMG)

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[5] See US National Archives, Captured German Records Division, Series T-313, Roll 430, frames 8,722,655-8,722,656; The German Infantry Handbook, 1939-1945, by Alex Buchner, Schiffer Military History, Atglen, Pennsylvania, 1991, pages 95-96; Handbook of the German Army, December 1940, published by Battery Press, ISBN 0-89839-258-6, Nashville, Tennessee, reprint of "Notes on the German Army in War," General Staff, War Office, London, pages 127-136; and Handbook on German Military Forces, TM-E 30-451, 1 September 1943, Military Intelligence Division, War Department, Washington, D.C., pages 128-158.

two motorized motor vehicle repair companies
Medical (assigned 8/3/28/152 and 6 MGs as of 21 Oct 42)
1/2/3/33rd Ambulance Companies, 1/2/33rd Motorized Medical Companies
36th Motorized Field Hospital
Other Support Troops (assigned 4/14/53/290): 33rd Motorized Field Post Office (assigned 0/19/1/11), 33rd Motorized Military Police Platoon, 33rd Motorized Division Quartermaster Company, 33rd Motorized Bakery Company, 33rd Motorized Butcher Platoon, 33rd Mapping Section (assigned to division headquarters)

15th PANZER DIVISION STAFF[6]

POSITION	INDIVIDUAL	DATE ASSUMED POSITION
Ia (Operations)	Major Heinrich Mueller	15 JAN 42
Ib (Quartermaster)	Major Freiherr von Loeffelholz	15 JAN 42
Ic (Intelligence)	*Hauptmann* Kirchner	JUN 41
Division Adjutant	Major von Meyer	Mid 1942

Task Organization of the 15th Panzer Division with the Italian 133rd Littorio Armored Division[7]

Kampfgruppe Nord (*Oberst* Crasemann)
Staff/33rd Panzer Artillery Regiment (with Staff Battery)
I/115th Panzer Grenadier Regiment
II/33rd Panzer Artillery Regiment
3rd Co., 617th FLAK Battalion
LI (Italian) Armored Battalion, 133rd Armored Regiment
Kampfgruppe Mitte (Major Schemel)
Staff/115th Panzer Grenadier Regiment (with Staff Company)
II/8th Panzer Regiment
III/115th Panzer Grenadier Regiment
13th (Infantry Support Gun) Company, 115th Panzer Grenadier Regiment
15th Company, 115th Panzer Grenadier Regiment (captured guns)
III/33rd Panzer Artillery Regiment
Staff/ 133rd (Italian) Armored Battalion
IV (Italian) Armored Battalion, 133rd Armored Regiment
XXIII Battalion, 12th (Italian) Bersaglieri Regiment
XXIX Battalion, 3rd (Italian) Artillery Regiment
556th (Italian) Self-Propelled Artillery Battalion
Kampfgruppe Sud (*Oberst* Teege)
Staff/8th Panzer Regiment
I/8th Panzer Regiment
II/115th Panzer Grenadier Regiment
I/33rd Panzer Artillery Regiment
Staff/12th (Italian) Bersaglieri Regiment
XII (Italian) Armored Battalion, 133rd Armored Regiment
XXXVI Battalion, 12th (Italian) Bersaglieri Regiment
II Battalion, 3rd (Italian) Celere Artillery Regiment
554th (Italian) Self-Propelled Artillery Battalion
15th Panzer Division Reserve (*Hauptmann* Hinrichs)
33rd Panzer Pioneer Battalion
33rd *Panzerjäger* Battalion
10th Battery, 33rd Panzer Artillery Regiment (sfl)

Equipment available: 70 50mm PAK 38s, 8 88mm FLAK, 4 100mm K17, 24 100mm (105mm?) howitzers, 8 150mm howitzers, 4 150mm sIG 33, 5 25-pdr (captured), 4 6-pdr (captured), 16 Marder Is, 8 150mm SP Howitzers, 41 Italian guns

I/43rd FLAK Battalion remained under the direct control of the Headquarters, 15th Panzer Division.

[6] "The Campaign in North Africa 1941/3, Volume 2, The Campaign in the Year 1942," by *General der Panzertruppe* Walther Nehring, MS # T-3, Foreign Military Studies, Headquarters, US Army Europe, 1948, Anlage (Appendix) 18, pages 9 and 10.

[7] See the order of battle for the Littorio Armored Division in this appendix (page I-23) for a more detailed breakout of this unit at the beginning of the Second Battle of El Alamein.

21st Panzer Division: commanded by *Generalmajor* Heinz von Randow assumed command on 20 Sep from *Generalmajor* Karl Lungerhausen, acting commander since 1 Sep, when *Generalmajor* Georg von Bismarck, was killed by a mine) (ration strength of 9,312 of 11,418 authorized (9,208 combat soldiers and 2210 support soldiers) as of 20 OCT 42, primarily from Prussia and Silesia, note: most of the data for this division is from Aug 22 and may be out dated)

5th Panzer Regiment commanded by *Oberst* Gerhard Muller, combat strength of 824 men (as of 20 OCT 42), authorized 82/441/1920.

	Pz II	Pz III kz	Pz III lg	Pz IV kz	Pz IV lg	PzBef	Total
Authorized	46	-	111	-	30	6	193
Available	14	43	44	3	15	2	121
Operational	12	38	43	2	15	1	111

Regimental HQs
- two light panzer platoons
- one panzer signals section
- one regimental band

one panzer maintenance company

1st Panzer Battalion (available 3 Pz II, 23 Pz III kz, 14 Pz IIIj, 8 Pz IVf2 (lg))
- Headquarters
  - one panzer platoon
  - one panzer replacement platoon
  - one panzer pioneer platoon (not on-hand)
  - one motorcycle platoon (not on-hand)
  - one 20mm FLAK section (not on-hand)
  - one panzer signals platoon (not on-hand)
- 1st – 3rd Light Panzer Companies
- 4th Medium Panzer Company

2nd Panzer Battalion (available 5 Pz II, 14 Pz III kz, 18 Pz IIIj, 2 Pz IV kz, 7 Pz IVf2 (lg))
- Headquarters
  - one light panzer platoon
  - one panzer replacement platoon
  - one panzer pioneer platoon (not on-hand)
  - one motorcycle platoon (not on-hand)
  - one 20mm FLAK section (not on-hand)
  - one panzer signals platoon (not on-hand)
- 5th – 7th Light Panzer Companies
- 8th Medium Panzer Company

104th Panzer Grenadier Regiment commanded by *Oberst* Ewert (MAR 42) combat strength of 1,792 men (as of 20 OCT 42), authorized 28/240/1015 per battalion)

headquarters company
- one motorized pioneer platoon (authorized 3 LMGs)
- one motorcycle messenger platoon (authorized 6 LMGs)
- one motorized panzerjager platoon (authorized 3 50mm Pak 38 AT guns and 3 LMGs)
- one motorized signals platoon

1st Battalion (authorized 4 companies (1st – 4th), total 20 LMGs, 14 HMGs, 4 80mm mortars, 9 50mm Pak 38s)

2nd Battalion (authorized 4 companies (5th – 8th), total 36 LMGs, 6 HMGs, 3 80mm mortars, 7 50mm Pak 38s)

3rd Battalion (authorized 4 companies (19th – 12th), total 42 LMGs, 7 HMGs, 5 80mm mortars, 5 50mm Pak 38s)

13th Company (authorized 4 20mm self-propelled FLAK guns and 3 LMGs, not on-hand?)

14th (Motorized) Pioneer Company (authorized 10 LMGs, 2 HMGs, 3 80mm mortars, 3 50mm Pak 38s, 3 28mm PzBu41)

15th (Motorized) Heavy Infantry Support Gun Company (assigned 3 150mm sIG33s and 1 7.5 cm leIG 18)

708th Self-Propelled Infantry Support Gun Company (attached, authorized and assigned 6 150mm sIG and 3 LMGs)

155th Panzer Artillery Regiment commanded by *Oberst* Bruer (JUN 41), combat strength of 1,180 men (as of 20 OCT 42) of 49/204/1076 authorized.

One motorized regimental staff battery

1st Battalion
- one motorized staff battery
- 1st through 3rd Batteries (each authorized and assigned 4 105mm leFH K18s and 2 LMGs)

2nd Battalion
- one motorized staff battery
- 4th & 5th Batteries (each authorized and assigned 4 105mm leFH K18s and 2 LMGs)
- 6th Battery (authorized 4 105mm leFH K18s, assigned 4 8.76 cm Gun (e) (captured 25-pdr))

3rd Battalion
- one motorized staff battery
- 7th Battery (authorized and assigned 4 100mm K17 guns and 2 LMGs),
- 8th Battery (authorized and assigned 4 150mm sFH K18s and 2 LMGs)
- 9th Battery (authorized 4, assigned 3 150mm sFH K18s and 2 LMGs)

one self Propelled Battery (11 sFH 13s available on 23 OCT 42)

one self propelled flak battery (not on-hand)

one motorized heavy munitions supply column (60 ton)

155th Motorized Artillery Observation Battery

3rd Panzer Reconnaissance Battalion (*Oberstleutnant* Hans von Luck, combat strength of 430 men (as of 20 OCT 42), 23/124/632 authorized) (detached, at Siwa Oasis)

- 1st Armored Car Company (4 Sd Kfz 221 assigned, 10 authorized, 5 Sd Kfz 222 assigned, 14 authorized, 2 Sd Kfz 223 assigned, 4 authorized, 1 Sd Kfz 231 assigned, 3 authorized, 1 Sd Kfz 232 assigned, 3 authorized)
- 2nd (halftrack mounted) Infantry Company (assigned 3 Sd Kfz 251s (as of 1 Nov), 4 50mm PAK 38, 13 LMGs, 2 HMGs, 2 AT rifles)
- 3rd (motorized) Support Company (assigned 9 LMGs, 12 HMGs, with one pioneer platoon, one heavy weapons platoon, one signals platoon)
- one (motorized) battery (authorized 4 105mm leFH 18, assigned 6 8.76 cm (c) (captured 25-pdrs))
- one light armored car supply column

39th *Panzerjäger* Battalion (Major Pfeiffer, combat strength of 824 men (as of 20 OCT 42) authorized 20/111/491)

- one headquarters section (with a motorized signals platoon)
- two self-propelled Panzerjager companies (assigned 4 Marder Is (Czech T-38 mounting captured Russian 76.2mm Paks) and 14 50mm Pak 38s (as of 22 Aug), authorized 6 Marder Is and 6 LMGs per company (as of 20 Sep))

200th Panzer Pioneer Battalion (*Hauptmann* Endres (as of 15 April 42), combat strength of 221 men (as of 20 OCT 42) assigned 8/45/344 (as of 1 Nov), 2 37mm Pak 36, 15 LMGs, 2 AT rifles, authorized 22/834. On average, each pioneer battalion in the Afrika Korps was authorized 170 vehicles (53 motorcycles, 25 PKW, 92 LKW, and 18 panzers (33rd and 200th pioneer battalions only), close combat material (28 flamethrowers, demolition sets 28 (a), 10 (b), 40 (c), 25 (d), *Sprengmittel satz* a,b,c,d, Detonator sets (*zündmittel kasten satz*) 12 (a), 20 (b), 6 (c) and 3 *zündmittel für "S" minen*,) power tools (21 power saws, 8 compressors, 8 well drilling equipment sets, 2 welding sets (33rd and 200th pioneer battalions only), bridging equipment (7 large rubber rafts, 9 small rubber rafts, various rope), and entrenching tools (270 spades, 122 axes, 133 hatchets, 65 wire cutters, 73 mattocks, 42 e-tools, 34 augers(?), 43 tape measures. The nominal basic load of ammunition was 351 kilograms of explosive (in 100, 200, 1000, and 3000 gram blocks), 2600 meters of detonating cord, 936 smoke grenades, 1140 Tellermines, 1934 "S" mines. The nominal basic load of barrier material was: 306 rolls of K-roll (plain (unbarbed) concertina), 100 rolls of S-roll (barbed wire concertina, each 6-8 meters in length), 73 rolls of barbed wire, 21 rolls of plain wire, and 1550 sandbags).[8]

- No.1 (Motorized) Company (*Leutnant* Biedermann (as of 15 April 42) authorized 18 LMGs, 3 28mm PzBu41, 6 50mm Pak 38s)
- No.2 (Motorized) Company (*Hauptmann* Hundet (as of 15 April 42) authorized 18 LMGs, 3 28mm PzBu41, 6 50mm Pak 38s)
- No. 3 (Motorized) Company (arrived in North Africa in the summer of 1942, authorized 18 LMGs, 3 28mm PzBu41, 6 50mm Pak 38s)
- One motorized light pioneer supply column

200th Field Replacement Battalion (authorized 4 replacement infantry companies each with 1 50mm Pak 38 and 6 LMGs, not on-hand)

200th Panzer Signal Battalion (combat strength of 287 men as of 20 OCT 42, authorized 8/58/274)

- one panzer radio company
- one panzer telephone company (authorized 6 LMGs)
- one light (motorized) signals supply column (authorized 3 LMGs)

200th Supply Battalion (ration strength 5/143 as of 20 OCT 42)

- 1st - 3rd (Motorized) Maintenance Companies
- 3rd – 8th & 12th Light Supply Columns
- 1st, 2nd, 10th, 11th Heavy (Motorized) Supply Columns
- 9th Heavy (Motorized) POL Supply Column)
- 200th (Motorized) Supply Company
- 200th (Motorized) Panzer Replacement Transport Column
- 579th (Motorized) LW (transportation?) Company
- 589th Light Water Filtration Column

Other Support Units (total support units authorized 20/164/1131)

- 200th Motorized Military Police Detachment
- 1/2/200th Ambulance Companies
- 1/2/200th Motorized Medical Companies
- 200th Motorized Field Hospital
- 200th Motorized Field Post Office z.b.V.
- 200th Motorized Division Quartermaster Company
- 200th Motorized Bakery Company
- 200th Motorized Butcher Company
- 200th Mapping Section (assigned to division headquarters)

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[8] See US National Archives, Captured German Records Division, Series T-313, Roll 430, frames 8,722,655-8,722,656; The German Infantry Handbook, 1939-1945, by Alex Buchner, Schiffer Military History, Atglen, Pennsylvania, 1991, pages 95-96; Handbook of the German Army, December 1940, published by Battery Press, ISBN 0-89839-258-6, Nashville, Tennessee, reprint of "Notes on the German Army in War<" General Staff, War Office, London, pages 127-136; and Handbook on German Military Forces, TM-E 30-451, 1 September 1943, Military Intelligence Division, War Department, Washington, D.C., pages 128-158.

21st PANZER DIVISION STAFF[9]

POSITION	INDIVIDUAL	DATE ASSUMED POSITION
Ia (Operations)	Major von Heuduck	JAN 42
Ib (Quartermaster)	Major Boehles	NOV 41
Ic (Intelligence)	?	
IIa Adjutant	Major Garke	DEC 41

Task Organization of the 21st Panzer Division with the Italian 132nd Ariete Armored Division[10]

Kampfgruppe Nord (*Oberst* Ewert)
- 1/5th Panzer Regiment
- IX/132nd (Italian) Armored Regiment
- I/104th Panzer Grenadier Regiment
- V/8th Bersaglieri Regiment
- VI (Italian) Self-Propelled Artillery Battalion

Kampfgruppe Mitte (Major Pfeiffer)
- XIII/132nd (Italian) Armored Regiment
- II/104th Panzer Grenadier Regiment
- III/8th Bersaglieri Regiment
- No. 1 Company, 39th *Panzerjäger* Battalion

Kampfgruppe Sud (*Oberst* Muller)
- II/5th Panzer Regiment
- X/132nd (Italian) Armored Regiment
- III/104th Panzer Grenadier Regiment
- XII/8th Bersaglieri Regiment
- No. 2 Company, 39th *Panzerjäger* Battalion

Still under 21st Panzer Division control
- 155th Panzer Artillery Regiment
- 200th Panzer Pioneer Battalion
- 1st and 2nd Batteries, 617th Flak Battalion
- Divisional Recon Platoon

[9] "The Campaign in North Africa 1941/3, Volume 2, The Campaign in the Year 1942," by *General der Panzertruppe* Walther Nehring, MS # T-3, Foreign Military Studies, Headquarters, US Army Europe, 1948, Anlage (Appendix) 18, pages 9 and 10.

[10] See the order of battle for the Ariete Armored Division in this appendix (page I-15) for a more detailed breakout of this unit at the beginning of the Second Battle of El Alamein.

90th *Leicht Afrika* Division: commanded by *Generalmajor* Theodor von Sponeck from 22 SEP replaced *Generalmajor* Kleeman, WIA 1 SEP (in the interim, *Generalmajor* Ramcke, and *Oberst* Schulte-Heuthaus commanded the division), combat strength of 99/352/1989 out of a ration strength of 181/60/843/3955 as of 20 OCT 42 (not including SV 288) of approximately 8,000 authorized.[11]

Division HQs (authorized 34 medium motorcycles, 7 Kfz 1, 9 Kfz 15, 1 Kfz 21, 5 light trucks, 11 medium trucks, 3 medium columns, 1 Sd Kfz 261)
- Signals Company (Motorized) (authorized 8 motorcycles, 1 Kfz 2, 1 Kfz 2/40, 1 Kfz 12, 9 Kfz 15, 18 Kfz 17, 2 Lt. Pkw. (o), 20 medium trucks)
- Mapping Detachment (Motorized) (authorized 1 Kfz 1, 1 Lt. Command Car)

155th Motorized Grenadier Regiment commanded by *Oberstleutnant* Kolbeck (OCT 42, replaced *Oberst* Marks), combat strength of 22/96/51/1145 of 20 OCT 42.
- Regimental HHC (authorized 15 medium motorcycles, 3 heavy motorcycles, 26 heavy motorcycles with sidecar, 4 Kfz 2, 1 Kfz 2/40, 13 Kfz 15, 4 Lt. Pkw. (o), 10 Lt. Trucks, 10 medium trucks, 1 medium command car)
  - Motorcycle Platoon
  - Motorized Engineer Platoon
  - Motorized Signal Platoon
- 1st Battalion (*Oberstleutnant* Kaiser)
  - Battalion Staff (authorized 8 medium motorcycles, 4 medium motorcycles with sidecars, 5 Kfz 1, 2 Kfz 2, 5 Kfz 15, 1 Kfz 31, 5 lt trucks 4 medium trucks)
  - three rifle companies (each authorized 12 LMGs, 3 PzBu39, 3 28mm PzBu41, 1 50mm mortar, 6 76.2mm Russian PAK guns, 1 Kfz 1, 3 lt. Trucks, 8 medium trucks)
  - one heavy company (authorized 6 HMGs, 6 80mm mortars, 2 37mm PAK 36, 2 50mm PAK 38, 1 Kfz 15, 3 Kfz 1, 3 lt trucks, 8 medium trucks)
- *2nd Battalion* (Major Kost)
  - Battalion Staff (authorized 8 medium motorcycles, 4 medium motorcycles with sidecars, 5 Kfz 1, 2 Kfz 2, 5 Kfz 15, 1 Kfz 31, 5 lt trucks 4 medium trucks)
  - three rifle companies (each authorized 12 LMGs, 3 PzBu39, 3 28mm PzBu41, 1 50mm mortar, 6 76.2mm Russian PAK guns, 1 Kfz 1, 3 lt. Trucks, 8 medium trucks)
  - one heavy company (authorized 6 HMGs, 6 80mm mortars, 2 37mm PAK 36, 2 50mm PAK 38, 1 Kfz 15, 3 Kfz 1, 3 lt trucks, 8 medium trucks)
- 13th Motorized Infantry Gun Company (2 150mm guns, 4 75mm L18 guns, 3 LMGs, 3 Kfz 1, 1 Kfz 15, 8 lt. Trucks, 4 medium trucks, 2 Sd Kfz 2)
- 14th Pioneer Company (6 75mm or 76.2mm AT guns) (on-hand?)

200th Motorized Grenadier Regiment commanded by *Oberst* Koester (OCT 42, replaced *Oberst* Geissler), combat strength of 19/78/401 of 20 OCT 42.
- Regimental HHC
  - Motorcycle Platoon
  - Motorized Engineer Platoon
  - Motorized Signal Platoon
- 1st Battalion
  - three rifle companies (each authorized 12 LMGs, 3 PzBu39, 3 28mm PzBu41, 3 50mm mortar, 6 76.2mm Russian PAK guns, 1 Kfz 15, 3 Kfz 1, 3 lt. Trucks, 8 medium trucks)
  - one heavy company (authorized 6 HMGs, 6 80mm mortars, 2 37mm PAK 36, 2 50mm PAK 38, 1 Kfz 15, 3 Kfz 1, 3 lt trucks, 8 medium trucks)
- 2nd Battalion
  - three rifle companies (each authorized 12 LMGs, 3 PzBu39, 3 28mm PzBu41, 3 50mm mortar, 6 76.2mm Russian PAK guns, 1 Kfz 15, 3 Kfz 1, 3 lt. Trucks, 8 medium trucks)
  - one heavy company (authorized 6 HMGs, 6 80mm mortars, 2 37mm PAK 36, 2 50mm PAK 38, 1 Kfz 15, 3 Kfz 1, 3 lt trucks, 8 medium trucks)
- 13th Motorized Infantry Gun Company (2 150mm guns, 4 75mm L18 guns, 3 LMGs, 3 Kfz 1, 1 Kfz 15, 8 lt. Trucks, 4 medium trucks, 2 Sd Kfz 2)
- 14th Pioneer Company (6 75mm or 76.2mm AT guns) (on-hand?)

361st Motorized Grenadier Regiment commanded by *Oberstleutnant* Panzenhagen (1 JUL 42, replaced Oberst Menny), combat strength of 24/79/309 as of 20 OCT 42, composed of repatriated Germans who had served in the French Foreign Legion before the war.
- Regimental HHC (authorized 27 Kfz 1, 3 Kfz 2, 11 Kfz 12, 5 Kfz 17 radio trucks, 1 Kfz 23, 1 Lt. Truck, 20 medium trucks, 1 medium command car, 35/919 assigned as of 22 Aug)
  - Motorcycle Platoon
  - Motorized Engineer Platoon
  - Motorized Signal Platoon
- 1st Battalion (Major Ryll, replaced *Oberstleutnant* Panzenhagen)
  - three rifle companies (each authorized 12 LMGs, 3 PzBu39, 3 28mm PzBu41, 3 50mm mortar, 4 French 75mm guns, (or 4 37mm PAK 36), 2 37mm PAK 36, 1 Kfz 15, 3 Kfz 1, 3 lt. Trucks, 8 medium trucks)

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[11] *Die 5. (lei.)/21. Panzer Division in Nordafrika, 1941-1943*, by Heinz-Dietrich Aberger, Preussischer Militar-Verlag, Reutlingen, 1994, page 279, states that 90th *Leicht Afrika* Division had an actual strength (*tatsachliche starke*) of 2,827 men, based on KTB Nr. 26, Pz.AOK/Ia (RH-19 VIII/20) on the morning of 23 October 1942. See also *Kriegstagebuch Nr.3, 90th Leicht Afrika Division*, US National Archives, Captured German Records Division, Series T-315, Rolls 1155-1159, starting on frame 405.

one heavy company (authorized 6 HMGs, 6 80mm mortars, 2 37mm PAK 36, 2 50mm PAK 38, 1 Kfz 15, 3 Kfz 1, 3 lt trucks, 8 medium trucks)

2nd Battalion (*Hauptmann* Rotschuh, SEP 42)

three rifle companies (each authorized 12 LMGs, 3 PzBu39, 3 28mm PzBu41, 3 50mm mortar, 4 French 75mm guns, (or 4 37mm PAK 36), 2 37mm PAK 36, 1 Kfz 15, 3 Kfz 1, 3 lt. Trucks, 8 medium trucks)

one heavy company (authorized 6 HMGs, 6 80mm mortars, 2 37mm PAK 36, 2 50mm PAK 38, 1 Kfz 15, 3 Kfz 1, 3 lt trucks, 8 medium trucks)

13th Motorized Infantry Gun Company (2 150mm guns, 4 75mm L18 guns, 3 LMGs, 3 Kfz 1, 1 Kfz 15, 8 lt. Trucks, 4 medium trucks, 2 Sd Kfz 2)

14th Pioneer Company (6 75mm or 76.2mm AT guns) (on-hand?)

190th Panzer Battalion (three companies of light tanks and one of mediums, not in Africa)

190th Artillery Regiment (combat strength of 328 men as of 20 Oct 42, not officially on hand until NOV 42)

Regimental Staff Battery

1st Battalion (*Hauptmann* Kreupa (JUL 42, replaced Hauptmann von Schrimpff, captured JUL 42) combat strength 16/39/273 as of 20 OCT 42 (including 190th Motorized FLAK Company), authorized 2 motorized 105mm leFH 18 batteries & one motorized 100mm K17 gun battery, each with 2 LMGs)

190th Motorized FLAK Company (authorized 12 20mm FLAK guns)

2nd Battalion (authorized 2 motorized 105mm leFH 18 batteries & one motorized 100mm K17 gun battery, each with 2 LMGs, apparently not on hand at this time)

580th Reconnaissance Battalion (Major Voss, detached from the division, combat strength 387 men as of 20 Oct 42)

one armored car platoon (on-hand 2 Armored Cars, 4 MTW, 2 self-propelled gun carriages, as of 15 August)

one motorized reconnaissance company (on-hand 18 LMGs, 2 HMGs, 3 PzBu 39, 4 50mm PAK 38s, as of 15 August)

one heavy reconnaissance company (on-hand 21 LMGs, 2 HMGs, 1 80mm mortar, 8 50mm PAK 38, as of 15 August)

one panzerjager platoon (3 self-propelled 75mm or 76.2mm AT guns, as of 15 August)

one pioneer platoon

signals platoon

one motorized artillery battery (7 British 25-pdrs, as of 15 August)

190th Panzerjäger Battalion (combat strength of 7/21/144 as of 20 OCT 42, authorized 2 motorized AT companies each with 7 50mm PAK 38s)

900th Motorized Pioneer Battalion (Major Kuba, combat strength 8/21/211 of 17/545 authorized as of 20 OCT 42, authorized 12 5 cm PAK (4 on-hand) and 28 machine guns (9 on-hand), also, 4 s. PzBu41 and 7 20cm *leichter Ladungswerfer* (spigot mortars, literally "light charge throwers") on-hand. On average, each pioneer battalion in the Afrika Korps was authorized 170 vehicles (53 motorcycles, 25 PKW, 92 LKW, and 18 panzers (33rd and 200th pioneer battalions only), close combat material (28 flamethrowers, demolition sets 28 (a), 10 (b), 40 (c), 25 (d), *Sprengmittel satz* a,b,c,d, Detonator sets (*zündmittel kasten satz*) 12 (a), 20 (b), 6 (c) and 3 *zündmittel für "S" minen*,) power tools (21 power saws, 8 compressors, 8 well drilling equipment sets, 2 welding sets (33rd and 200th pioneer battalions only), bridging equipment (7 large rubber rafts, 9 small rubber rafts, various rope), and entrenching tools (270 spades, 122 axes, 133 hatchets, 65 wire cutters, 73 mattocks, 42 e-tools, 34 augers(?), 43 tape measures. The nominal basic load of ammunition was 351 kilograms of explosive (in 100, 200, 1000, and 3000 gram blocks), 2600 meters of detonating cord, 936 smoke grenades, 1140 Tellermines, 1934 "S" mines. The nominal basic load of barrier material was: 306 rolls of K-roll (plain (unbarbed) concertina), 100 rolls of S-roll (barbed wire concertina, each 6-8 meters in length), 73 rolls of barbed wire, 21 rolls of plain wire, and 1550 sandbags).[12]

Staff (5 medium motorcycles, 4 heavy motorcycles with sidecars, 3 Kfz 1, 2 Kfz 2, 3 Kfz 15, 1 Kfz 31, 4 lt trucks, 6 medium trucks)

No.1 Company (*Oberleutnant* Besant (as of 15 April 42) authorized 12 LMGs, 1 PzBu39, 2 28mm PzBu41, 2 37mm PAK 36, 4 medium motorcycles, 10 heavy motorcycles with sidecars, 1 Kfz 1, 2 Kfz 2, 4 Kfz 15, 2 lt. Trucks, 18 medium trucks)

No.2 Company (*Hauptmann* Streitz assumed command of 220th Pioneer Battalion before the battle, authorized 12 LMGs, 1 PzBu39, 2 28mm PzBu41, 2 37mm PAK 36, 4 medium motorcycles, 10 heavy motorcycles with sidecars, 1 Kfz 1, 2 Kfz 2, 4 Kfz 15, 2 lt. Trucks, 18 medium trucks)

No. 3 Company (*Oberleutnant* Knees, arrived in North Africa in the summer of 1942, authorized 12 LMGs, 1 PzBu39, 2 28mm PzBu41, 2 37mm PAK 36, 4 medium motorcycles, 10 heavy motorcycles with sidecars, 1 Kfz 1, 2 Kfz 2, 4 Kfz 15, 2 lt. Trucks, 18 medium trucks), 850th Pioneer Sturm Company (re-designated 3/900th Pioneer Battalion, attached from *Panzerarmee Afrika*) further detached to SV 288)

one light pioneer column (authorized 5 medium motorcycles, 4 heavy motorcycles with sidecars, 1 Kfz 1, 2 lt trucks, 15 medium trucks, 2 compressors, 1 long wood trailer)

190th Panzer Signal Battalion (only one company on hand, apparently the battalion headquarters was not yet in North Africa, as of 20 OCT 42)

one panzer telephone company (newly raised 1 Aug 42, apparently not in North Africa as of 20 OCT 42)

one panzer radio company (190th *Nachrichten* Company, combat strength of 3/18/173 as of 20 OCT 42)

one motorized light signals supply column (newly raised 1 Aug 42, apparently not in North Africa as of 20 OCT 42)

SV (*Sonderverband*, Special Unit) 288 (*Oberst* Daumiller (replaced *Oberst* Menton), attached, on 31 Oct. 42, re-designated Panzer Grenadier Regiment Afrika, a special unit with an assigned strength of 37/1042 (as of 22 Aug), assigned equipment included 6

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[12] See US National Archives, Captured German Records Division, Series T-313, Roll 430, frames 8,722,655-8,722,656; The German Infantry Handbook, 1939-1945, by Alex Buchner, Schiffer Military History, Atglen, Pennsylvania, 1991, pages 95-96; Handbook of the German Army, December 1940, published by Battery Press, ISBN 0-89839-258-6, Nashville, Tennessee, reprint of "Notes on the German Army in War<" General Staff, War Office, London, pages 127-136; and Handbook on German Military Forces, TM-E 30-451, 1 September 1943, Military Intelligence Division, War Department, Washington, D.C., pages 128-158.

3.7 cm Pak 36, 2 PzBu39, and 21 LMGs (as of 1 Oct))
Headquarters Company
one armored car platoon
one motorized pioneer platoon
one motorcycle platoon
1st Motorized Battalion (four motorized companies (1st through 4th) assigned a total of 7 5 cm Pak 38s, 5 80mm mortars, 10 HMGs, 37 LMGs)
2nd Motorized Battalion (four motorized companies (5th through 8th) assigned with a total of 24 5 cm Pak 38s, 4 37mm Pak 36s, 8 80mm mortars, 8 HMGs, 72 LMGs)
9th Motorized Infantry Gun Company
10th Motorized Pioneer Company
11th Motorized Flak Company (with 8 (reduced to 0 by 1 Oct) 20mm Flak guns of 12 authorized)
288th Motorized Signal Company
one medical platoon
one maintenance platoon
288th Motorized 30 Ton Transport Column
Supply (ration strength of 3/214 as of 20 OCT 42)
Staff (7 light motorcycles, 5 heavy motorcycles with sidecars, 7 Kfz 1, 3 Kfz 2/40, 3 medium Pkw., 1 Lt command car, 9 medium trucks, 1 medium command car)
one motorized supply company (authorized 1 medium motorcycle, 1 Kfz 12, 2 Lt trucks, 11 medium trucks
four motorized heavy columns (1 medium motorcycle, 2 heavy motorcycles with sidecars, 1 Lt Pkw (o), 1 lt truck, 21 medium trucks)
one motorized heavy column (water)
four light columns (authorized 1 medium motorcycle, 2 heavy motorcycles with sidecars, 1 Kfz 1, 1 lt truck, 10 medium trucks
one motorized light column (filtration)
two motorized fuel columns (authorized 1 medium motorcycle, 1 Kfz 1, 1 lt truck, 10 medium trucks, 5 Sd. Ahn 106 trailers, 1 Sd 35, 1 generator, 3 medium command cars)
Administration
Staff (authorized 1 lt motorcycle, 1 medium motorcycle,2 Kfz 1, 10 medium trucks
One motorized bakery company (authorized 4 medium motorcycles, 3 heavy motorcycles with sidecars, 1 Kfz 1, 1 Kfz 2/40, 1 medium Pkw. (o), 1 lt truck, 17+ medium trucks)
one butcher company (authorized 1 lt motorcycle, 1 heavy motorcycle with sidecar, 1 Kfz 1, 4 heavy trucks, 1 medium command car, 1 Ahn 24 heavy machine)
one field post office (authorized 1 Kfz 15, 2 lt trucks, 1 heavy command car (33 seats))
one motorized field hospital (authorized 2 heavy motorcycles with sidecars, 2 Kfz 1, 1 heavy Pkw (o), 2 Kfz 321, 1 lt truck, 8 medium trucks, 3 lt command cars)
two medical companies (authorized 1 medium motorcycle, 4 heavy motorcycles with sidecars, 1 Kfz 1, 1 Kfz 2/40, 4 Kfz 15, 8 Kfz 31, 3 lt trucks, 12 medium trucks, 1 lt command car (15 seat))
two ambulance companies (authorized 4 heavy motorcycles with sidecars, 1 Kfz 1, 15 Kfz 31, 2 lt trucks)
one workshop company (3 platoons, authorized 1 medium motorcycle, 5 heavy motorcycles with sidecars, 4 Kfz 1, 6 lt trucks, 7 medium trucks, 2 heavy trucks, 2 Kfz 79, 2 medium command cars, 2 Zgkw Sd. 7, 2 heavy machine shops)
one workshop company (2 platoons, authorized 1 medium motorcycle, 3 heavy motorcycles with sidecars, 4 Kfz 1, 5 lt trucks, 2 medium trucks, 2 heavy trucks, 2 Kfz 79, 2 Zgkw Sd. 7, 2 Sd 24 heavy machine shops)
one motorized military police troop (authorized 14 medium motorcycles, 4 heavy motorcycles with sidecars, 14 Kfz 1, 2 lt trucks)

Attachments (ration strength 203/67/955/4515, as of 20 OCT 42)
605th *Panzerjäger* Battalion (combat strength 10/21/100 of ration strength of 12/2/58/263, as of 20 OCT 42)
606th FLAK Battalion (ration strength 7/4/41/207, as of 20 OCT 42)
Versuchs-Kdo. F. L. Tropen (ration strength 3/1/13/90, as of 20 OCT 42)

Panzerarmee Afrika Troops in the Area of Operation of the 90th *Leicht Afrika* Division (ration strength 1685)
10th Panzer Signals Regiment (-) (965 men as of 20 OCT 42)
475th Motorized Signal Battalion (605 men as of 20 OCT 42)
Panzer Propaganda Company *Afrika* (43 men as of 20 OCT 42)
Kr. Kw. 1/33 (20 men as of 20 OCT 42)

EQUIPMENT ROLE UP FOR THE 90th *LEICHT AFRIKA* DIVISION

Equipment	Authorized	Available	Short	Remarks
LMGs	341	229 (67%)	112 (33%)	Includes 21 with SV 288
HMGs	42	38 (90%)	4 (10%)	
PzBu39	66	45 (68%)	21 (32%)	Includes 2 with SV 288
PzBu41	69	18 (26%)	51 (74%)	
20 mm FLAK	12	18 (150%)	0	
37mm PAK 36	68	41 (60%)	27 (40%)	Includes 6 with SV 288
47mm PAK (t) Czech	27	14 (52%)	13 (48%)	
50mm PAK 38	14	11 (79%)	3 (21%)	
75mm PAK (f) French M1897	24	0	24 (100%)	
76.2mm PAK (r) Russian SP	9	0	9 (100%)	
76.2mm PAK (r) Russian	54	0	54 (100%)	
50mm mortar	63	2 (3%)	61 (97%)	Includes 2 with SV 288
80mm mortar	42	15 (36%)	27 (64%)	
75mm leIG	12	4 (33%)	8 (67%)	4 in 11th Co/104 Inf. Rgt
150mm sIG 33	6	1 (17%)	5 (83%)	1 in 11th Co/104 Inf. Rgt
75mm FK 18	12	0	12 (100%)	
Light motorcycle	9	3 (33%)	6 (67%)	
Medium motorcycle	193	6 (3 %)	187 (97%)	4 captured from Allies
Heavy motorcycle	3	3 (100%)	0	
Heavy motorcycle with sidecar	199	32 (16%)	167 (84%)	
Lt. Pkw Kfz 1	270	20 (7%)	250 (93%)	
Lt. Pkw Kfz 2	36	4 (11%)	32 (89%)	
Lt. Pkw Kfz 2/2	1	1 (100%)	0	
Kfz 2/40	8	6 (75%)	2 (25%)	
Kfz 3	1	0	1 (100%)	
Kfz 12	23	5 (22%)	18 (78%)	
Kfz 15	150	17 (11%)	133 (89%)	
Telephone Truck Kfz 17	18	0	18 (100%)	
Radio Truck Kfz 17	11	2 (18%)	9 (82%)	
Kfz 21	1	0	1 (100%)	
Lt. Pkw (o)	0	29	0	1 captured from Allies
Medium Pkw (o)	5	5 (100%)	0	4 captured from Allies
Heavy Pkw (o)	0	3	0	
Kfz 23	3	0	3 (100%)	
Kfz 31	60	4 (7%)	56 (93%)	1 captured from Allies
Lt truck	285	25 (9%)	260 (91%)	25 captured from Allies
Medium truck	705	149 (21%)	556 (79%)	27 captured from Allies
Heavy truck	8	1 (13%)	7 (87%)	1 captured from Allies
Trailer 106	5	0	5 (100%)	
Trailer An Sd 35	1	0	1 (100%)	
Generators	1	0	1 (100%)	
Air Compressor	2	0	2 (100%)	
Water trailer	0	1	0	1 captured from Allies
Workshop truck	0	1	0	1 captured from Allies
Kfz 79 workshop	5	1 (20%)	4 (80%)	
Workshop equipment	1	1 (100%)	0	
Light compressor	6	1 (17%)	5 (83%)	
Medium compressor	18	2 (11%)	16 (89%)	
Heavy compressor	1	0	1 (100%)	
Sd Kfz 10	10	11 (110%)	0	
Sd Kfz 7	15	9 (60%)	6 (40%)	
Sd Kfz 261	1	1 (100%)	0	
Sd Ahn 32	9	4 (44%)	5 (56%)	Ammunition trailer
Sd Ahn 24	6	0	6 (100%)	Heavy machine set
Sd Ahn 115	10	9 (90%)	1 (10%)	

90th *LEICHT AFRIKA* DIVISION STAFF[13]

POSITION	INDIVIDUAL	DATE ASSUMED POSITION
Ia (Operations)	Major Schumann	JUL 42
Ib (Quartermaster)	*Hauptmann* Moeller	AUG 42
Ic (Intelligence)	*Oberleutnant* Hiltmann	1 AUG 42
Adjutant	*Hauptmann* Mattes	7 OCT 42
Pioneer Officer	Major Mueller	1942

[13] "The Campaign in North Africa 1941/3, Volume 2, The Campaign in the Year 1942," by *General der Panzertruppe* Walther Nehring, MS # T-3, Foreign Military Studies, Headquarters, US Army Europe, 1948, Anlage (Appendix) 18, pages 9 and 10.

164th *Leicht Afrika* Division: commanded by *Generalmajor* Karl Lungerhausen, assumed temporary command of 21st Panzer Division on 31 Aug. after *Generalmajor* Bismarck was killed by a mine, *Oberst* Hecker, the *panzerarmee* pioneer officer, assumed temporary command from 31 Aug to 20 Sep when *Generalmajor* Lungerhausen returned) (242 officers and 10,490 men assigned, primarily from Wehrkreis XII, except 125th Regiment from Saarbrucken, only 300 vehicles on-hand including captured ones, note: most data for this unit is from Aug 22 and may be out dated)[14]

125th Panzer Grenadier Regiment commanded by Major Nobel, acting commander after *Oberst* Graf Hardenberg was killed during the summer of 1942; 65 officers and 2,895men assigned as of 22 Aug 42

Regimental HHC
- Pioneer Platoon
- Bicycle Platoon
- Signal Platoon
- Regimental Band

1st Battalion (four infantry companies with a total of 6 (2 authorized) 80mm mortars, and 3 37mm PAK 36 (in place of the 3 authorized PzBu 41), 5 (6 authorized) 50mm PAK 38, 37 LMGs (18 authorized), 12 (2 authorized) HMGs on-hand)

2nd Battalion (Major Phillip Wendel, four infantry companies with a total of 6 (2 authorized) 80mm mortars, and 3 37mm PAK 36 (in place of the 3 authorized PzBu 41), 5 (6 authorized) 50mm PAK 38, 37 LMGs (18 authorized), 12 (2 authorized) HMGs on-hand)

3rd Battalion (four infantry companies with a total of 6 (2 authorized) 80mm mortars, and 3 37mm PAK 36 (in place of the 3 authorized PzBu 41), 5 (6 authorized) 50mm PAK 38, 37 LMGs (18 authorized), 12 (2 authorized) HMGs on-hand)

13th Infantry Gun Company (6 (6 authorized) 75mm leIG, 2 (none authorized)150mm sIG 33 guns, on hand)

one motorized infantry supply column

382nd Panzer Grenadier Regiment commanded by *Oberst* Hirsch, 55 officers and 2452men assigned as of 22 Aug 42.

Regimental HHC
- Pioneer Platoon
- Bicycle Platoon
- Signal Platoon
- Regimental Band

1st Battalion (*Hauptmann* Julius Pieper, four infantry companies with a total of 6 (2 authorized) 80mm mortars, and 3 37mm PAK 36 (in place of the 3 authorized PzBu 41), 5 (6 authorized) 50mm PAK 38, 32 LMGs (18 authorized), 10 (2 authorized) HMGs on-hand)

2nd Battalion (*Hauptmann* Alfred Krupfganz, four infantry companies with a total of 6 (2 authorized) 80mm mortars, and 4 37mm PAK 36 (in place of the 3 authorized PzBu 41), 5 (6 authorized) 50mm PAK 38, 36 LMGs (18 authorized), 12 (2 authorized) HMGs on-hand)

3rd Battalion (four infantry companies with a total of 5 (2 authorized) 80mm mortars, and 3 37mm PAK 36 (in place of the 3 authorized PzBu 41), 5 (6 authorized) 50mm PAK 38, 22 LMGs (18 authorized), 10 (2 authorized) HMGs on-hand)

13th Infantry Gun Company (6 (6 authorized) leIG 75mm, 2 (none authorized) 150mm sIG 33 guns)

one motorized infantry supply column

433rd Panzer Grenadier Regiment commanded by *Oberstleutant* von Neindorf; 41officers and 1689men assigned as of 22 Aug 42.

Regimental HHC
- Pioneer Platoon
- Bicycle Platoon
- Signal Platoon
- Regimental Band

1st Battalion (four infantry companies with a total of 6 (2 authorized) 80mm mortars, and 3 37mm PAK 36 (in place of the 3 authorized PzBu 41), 9 (6 authorized) 50mm PAK 38, 37 LMGs (18 authorized), 12 (2 authorized) HMGs on-hand)

2nd Battalion (Major Otto Koppitsch, four infantry companies with a total of 6 (2 authorized) 80mm mortars, and 3 37mm PAK 36 (in place of the 3 authorized PzBu 41), 0 (6 authorized) 50mm PAK 38, 37 LMGs (18 authorized), 12 (2 authorized) MGs on-hand)

3rd Battalion (four infantry companies with a total of 6 (2 authorized) 80mm mortars, and 3 37mm PAK 36 (in place of the 3 authorized PzBu 41), 9 (6 authorized) 50mm PAK 38, 37 LMGs (18 authorized), 12 (2 authorized) MGs on-hand)

13th Infantry Gun Company (6 (6 authorized) leIG 75mm, 2 (none authorized) 150mm sIG 33 guns)

one motorized infantry supply column

220th Artillery Regiment commanded by *Oberst* Becker, assigned 38 officers and 898 men assigned as of 22 Aug 42, reduced to a combat strength of 587 as of 20 Oct 42.

Regimental Staff Battery

1st Battalion (battalion staff battery and 3 motorized 105mm leFH 18 batteries each with 4 howitzers (authorized and assigned)

2nd Battalion (2 mountain batteries each with 4 7.5 cm GK 15 pack guns (authorized and assigned) and one battery of 4 French 105mm guns (not authorized))

220th Reconnaissance Battalion (arrived 10 Oct 42) (three reconnaissance companies, a signal detachment and one motorized light reconnaissance column with a total assigned strength of 6 37mm PAK 36, 8 50mm PAK 38, 12 50mm mortars, 22 LMGs, combat strength of 272 as of 20 Oct 42)

one armored car company (authorized 20 37mm and 40 LMGs)

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[14] *Die 5. (lei.)/21. Panzer Division in Nordafrika, 1941-1943*, by Heinz-Dietrich Aberger, Preussischer Militar-Verlag, Reutlingen, 1994, page 279, states that 164th *Leicht Afrika* Division had an actual strength (*tatsachliche starke*) of only 6,342 men, based on KTB Nr. 26, Pz.AOK/Ia (RH-19 VIII/20) on the morning of 23 October 1942. *Panzeramee Afrika* reported ration strength of 8,814 (plus 809 attachments) for this division as of 20 October 1942, with the infantry reporting a combat strength of 5,076 men (see US National Archives, Captured German Records Division, Series T-313, frames 8,769,112 to 8,769,114).

one (half-track) recon company (authorized 18 LMGs, 2 HMGs, 3 28mm PzBu41, 9 50mm PAK 38)
one heavy (motorized) reconnaissance company
one panzerjager platoon (authorized 3 50mm PAK 38, 1 28mm PzBu41)
one pioneer platoon (authorized 3 LMGs)
one light (motorized) reconnaissance column

220th Panzerjäger Battalion (authorized 2 antitank companies each with 9 50mm AT guns and 6 LMGs)

220th Panzer Pioneer Battalion (*Hauptmann* Streitz replaced *Oberstleutant* Springorum after 6 Sep 42)(combat strength of 304 men (as of 20 Oct 42) of 11 officers and 315 men available of 21 officers and 637 men authorized, 37 LMGs and 9 PzBu 39 on-hand. On average, each pioneer battalion in the Afrika Korps was authorized 170 vehicles (53 motorcycles, 25 PKW, 92 LKW, and 18 panzers (33rd and 200th pioneer battalions only), close combat material (28 flamethrowers, demolition sets 28 (a), 10 (b), 40 (c), 25 (d), *Sprengmittel satz* a,b,c,d, Detonator sets (*zündmittel kasten satz*) 12 (a), 20 (b), 6 (c) and 3 *zündmittel für "S" minen*,) power tools (21 power saws, 8 compressors, 8 well drilling equipment sets, 2 welding sets (33rd and 200th pioneer battalions only), bridging equipment (7 large rubber rafts, 9 small rubber rafts, various rope), and entrenching tools (270 spades, 122 axes, 133 hatchets, 65 wire cutters, 73 mattocks, 42 e-tools, 34 augers(?), 43 tape measures. The nominal basic load of ammunition was 351 kilograms of explosive (in 100, 200, 1000, and 3000 gram blocks), 2600 meters of detonating cord, 936 smoke grenades, 1140 Tellermines, 1934 "S" mines. The nominal basic load of barrier material was: 306 rolls of K-roll (plain (unbarbed) concertina), 100 rolls of S-roll (barbed wire concertina, each 6-8 meters in length), 73 rolls of barbed wire, 21 rolls of plain wire, 1550 sandbags)).[15]

No.1 Company (*Leutnant* Junkersdorf (authorized 3 50mm PAK 38, 3 PzBu 39, 9 LMGs)
No.2 Company (*Leutnant* Laurenz later Lieutenant Pfanzagel (authorized 3 50mm PAK 38, 3 PzBu 39, 9 LMGs)
No.3 Company (*Leutnant* Drexel (authorized 3 50mm PAK 38, 3 PzBu 39, 9 LMGs))
One light (motorized) pioneer column

220th Signal Battalion (*Hauptmann* Kulle?, authorized one panzer telephone company, one panzer radio company and one light motorized signals column, only one company with a combat strength of 194 men was on hand as of 20 Oct 42)

Supply (Major Oberlander, 7 officers, 123 men as of 20 Oct 42)
1st - 3rd/220th Light Supply Columns
220th Maintenance Company
220th Supply Company

Other Support Units (total support units authorized 20 officers, 164 non-commissioned officers and 1131men)
220th Motorized Military Police Detachment
1/2/220th Ambulance Companies
1/2/220th Motorized Medical Companies
220th Motorized Field Post Office z.b.V.
220th Motorized Divisional Administration
220th Motorized Bakery Company

220th Motorized Butcher Company

164th *LEICHT AFRIKA* DIVISION STAFF[16]

POSITION	INDIVIDUAL	DATE ASSUMED POSITION
Ia (Operations)	*Oberstleutnant* Markert	
Ib (Quartermaster)	Major Gerhardt (Major Eltrich?)	

[15] See US National Archives, Captured German Records Division, Series T-313, Roll 430, frames 8,722,655-8,722,656; The German Infantry Handbook, 1939-1945, by Alex Buchner, Schiffer Military History, Atglen, Pennsylvania, 1991, pages 95-96; Handbook of the German Army, December 1940, published by Battery Press, ISBN 0-89839-258-6, Nashville, Tennessee, reprint of "Notes on the German Army in War," General Staff, War Office, London, pages 127-136; and Handbook on German Military Forces, TM-E 30-451, 1 September 1943, Military Intelligence Division, War Department, Washington, D.C., pages 128-158.

[16] "The Campaign in North Africa 1941/3, Volume 2, The Campaign in the Year 1942," by *General der Panzertruppe* Walther Nehring, MS # T-3, Foreign Military Studies, Headquarters, US Army Europe, 1948, Anlage (Appendix) 18, page 14.

Task Organization of the Artillery of the 164th *Leicht Afrika* Division with that of the Italian 102nd Trento Division[17]

220th Artillery Regiment
- 5th Battery, 220th Artillery Regiment (equipped with 2 10.5 cm leFH 18s)
- Artillery Group Rossi (LTC Vincenzo Rossi, commander of IV Battalion, 46th Artillery Regiment)
  - II Battalion, 220th Artillery Regiment (*Hauptmann* Kaiser)
    - 4th Battery (equipped with one 7.5 cm gun with a reported range of 10 kilometers (FK 38?))
    - 6th Battery (equipped with four 15.5 cm (French?) guns)
    - 7th (?) Battery (equipped with four 7.5 cm GK 15 Mountain Pack Guns)
  - 357th (Italian) Artillery Battalion "Frontier Guards" (Captain Macri, attached from XXI Corps)
    - 1st Battery (equipped with four 77/28 guns)
    - 2nd Battery (equipped with three 77/28 guns)
    - 3rd Battery (equipped with three 77/28 guns)
  - IV (Italian) Battalion, 46th Artillery Regiment (Captain Cena (acting commander for LTC Vincenzo Rossi), from Trento Division)
    - 10th Battery (equipped with four 75/27 guns)
    - 11th Battery (equipped with four 75/27 guns)
    - 12th Battery (equipped with four 75/27 guns)
- Artillery Group Gennero
  - I Battalion, 220th Artillery Regiment
    - 1st Battery (equipped with three 10.5 cm leFH 18s)
    - 2nd Battery (equipped with three 10.5 cm leFH 18s)
    - 3rd Battery (equipped with two 8.76 cm guns (captured British 25 pounders), not combat ready)
  - II (Italian) Battalion, 46th Artillery Regiment (Captain Oggeri, from Trento Division)
    - One battery (equipped with four 100/17 guns)
- Artillery Group Randi (Colonel Randi)
  - I (Italian) Battalion, 46th Artillery Regiment (Captain Bortolani, from Trento Division)
    - One battery (equipped with two 100/17 guns)
    - One battery (equipped with three 8.76 cm guns (captured British 25 pounders))
  - III (Italian) Battalion, 46th Artillery Regiment (Captain Casini, from Trento Division)
    - One battery (equipped with one 75/27 gun)
    - One battery (equipped with three 8.76 cm guns (captured British 25 pounders))
- Heavy Artillery Group Falconi (Colonel Falconi)
  - 1st Battery, LII (Motorized) Artillery Battalion (equipped with two 152/37 guns, attached from XXI Corps)
  - 1st Battery, CXXXI (Motorized) Artillery Battalion (equipped with three Krupp 149/28 guns, attached from XXI Corps)
  - 2nd Battery, CXXXI (Motorized) Artillery Battalion (equipped with two Krupp 149/28 guns, attached from XXI Corps)
- Artillery Group Vignali
  - One battery, XXXIII (Motorized) Artillery Battalion (equipped with two 149/40 guns, attached from XXI Corps)
  - One battery, XXXIII (Motorized) Artillery Battalion (equipped with three 149/40 guns, attached from XXI Corps)
- III Battalion, 2nd Africa Artillery Regiment (Schade, formerly the German 523rd Artillery Battalion, 104th Artillery Command, attached from *Panzerarmee Afrika*)
  - 7th Battery (equipped with three 11.4 cm guns (captured British 4.5 inch guns), formerly the 1st Battery, 523rd Artillery Battalion, 104th Artillery Command, attached from *Panzerarmee Afrika*)
  - 9th Battery (equipped with six 15.5 cm French guns, formerly the 3rd Battery, 523rd Artillery Battalion, 104th Artillery Command, attached from *Panzerarmee Afrika*)
- III Battalion, 1st Africa Artillery Regiment (formerly the German 408th Artillery Battalion, 104th Artillery Command)
  - 7th Battery (equipped with three 8.76 cm guns (captured British 25 pounders), formerly 2nd Battery, 533rd Artillery Battalion, 104th Artillery Command, attached from *Panzerarmee Afrika*)
  - 8th Battery (equipped with four 15 cm sFH18s, formerly 1st Battery, 408th Artillery Battalion, 104th Artillery Command, attached from *Panzerarmee Afrika*)
  - 9th Battery (equipped with three 21 cm Mrs 18 howitzers, formerly 7th Battery, II Battalion, 115th Artillery Regiment, 104th Artillery Command, attached from *Panzerarmee Afrika*)
  - 10th Battery (equipped with six 7.62 cm guns (captured Soviet guns), formerly the 364th Battery, 104th Artillery Command, attached from *Panzerarmee Afrika*)
- 3rd Battery, I Battalion, 2nd Africa Artillery Regiment (equipped with two 17 cm K18 in Mrs Laf (?), formerly the 362nd Artillery Battery, 104th Artillery Command, attached from *Panzerarmee Afrika*)

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[17] *Kriegstagebuch Nr. 5, des Kommandos der 15. Panzer-Division-Fuehrungsabteilung-vom 23.10. bis 25.11.1942*. Anlage 9, Captured German Records. U. S. National Archives. Series T-315, Roll 666.. See also the orders of battle for the 104th Artillery Command, XXI Corps, and 102nd Trento Division in this appendix for a more detailed breakout of this unit at the beginning of the Second Battle of El Alamein.

22nd (Ramcke) *Fallschirmjäger* (Airborne) Brigade: commanded by *Generalmajor* Bernard Ramcke, also called 1st Luftwaffe Jäger Brigade, 47/2,241 assigned (as of 22 Aug), 'ration strength' of 4,610 on 20 Oct 42 and an actual strength of 3,379 on 23 Oct 42, with the infantry reporting a combat strength of 2,380 men as of 20 Oct 42)[18]

Kampfgruppe von der Heydte (Major von der Heydte, 1st Battalion, 3rd *Fallschirmjäger* Regiment, a signals platoon, 5 companies with a total of 4 7.5 cm LG 40 (?), 6 3.7 cm Pak 36, 7 8cm mortars, 6 HMGs, 70 LMGs, (as of 22 Aug))

Kampfgruppe Hubner (Major Huebner, 2nd Battalion, 5th *Fallschirmjäger* Regiment, 4 companies with a total of 2 7.5 cm LG 40 (?), 6 3.7 cm Pak 36, 7 8cm mortars, 14 HMGs, 54 LMGs, (as of 22 Aug))

Kampfgruppe Burckhardt (Major Burckhardt, *Fallschirmjäger* Lehr Battalion XI *Fliegerkorps*, 4 companies with a total of 2 7.5 cm LG 40 (?), 6 3.7 cm Pak 36, 7 8cm mortars, 14 HMGs, 54 LMGs, (as of 22 Aug))

Kampfgruppe Schweiger (Schweiger replaced Major Hans Kroh, 1st Battalion, 2nd *Fallschirmjäger* Regiment, 4 companies with a total of 2 7.5 cm LG 40 (?), 6 3.7 cm Pak 36, 7 8cm mortars, 14 HMGs, 54 LMGs, (as of 22 Aug))

2nd Battalion, 2nd (?) *Fallschirmjäger* Artillery Regiment (Fenski? Kagerer?, 6 10.5 cm LG 40 Recoilless Rifles (in 3 batteries of 4 guns?), with a combat strength of 652 men as of 20 Oct 42)

Panzerjäger Company (Hasender, assigned 12 3.7cm Pak 36 (as of 22 Aug), combat strength of 175 men as of 20 Oct 42)

2nd Pioneer Company, (from Major Rudolf Witzig's 11th (Corps) *Fallschirmpioniere* Battalion) (*Hauptmann* Cord Tietjen, combat strength of 85 men as of 20 Oct 42)

Signal Company (only one platoon of 54 men on hand as of 20 Oct 42)

one light supply column

[18] As of 29 Oct 42, the Brigade had the following vehicles on hand: 201 motorcycles, 60 Kettenkrader, 55 Kfz 1, 17 Kfz. 2, 13 Kfz. 4, 22 Kfz. 12, 15 Kfz. 15, 3 Kfz. 17, 2 le. PKW (o), 11 m. PKW (o), 2 s. PKW (o), 2 le. LKW (o), 82 M. LKW (o), 5 s. LKW (o), 15 captured LKW, plus 9 others. 19 LKW class vehicles were only useable on roads. The brigade had another 300 vehicles awaiting shipment in Greece.

XX Italian Motorized Corps (Lieutenant General Giuseppe de Stephanis replaced Gen Ettore Baldassare (KIA 25 Jun), Senior Engineer COL Vittorio Raffaelli (KIA 25 Jun), 279 M14s (as of 23 Oct), plus 16 command tanks (as of 23 Oct) and 22 L6 light tanks on-hand as of 22 Aug)

- 132nd Ariete Armored Division (Gen Francesco Arena) page I-20
- 133rd Littorio Armored Division (Gen Gervasio Bitossi) page I-23
- 101st Trieste Motorized Infantry Division (Gen Francesco Ferla) page I-26
- "Corps Troops" (service troops about 1,500)
  - one motorized Bersaglieri regiment (authorized two motorized infantry battalions of 3 companies, only two motorcycles companies of the 2nd Bersaglieri Regiment on-hand as of 22 Aug, authorized 3 47/32 AT guns, 3 20mm AT guns, 3 HMGs, 6 LMGs)
  - one tank battalion (authorized three companies with 52 medium tanks, not on-hand as of 22 Aug)
  - one motorized artillery regiment (assigned 16/320[19] as of 22 Aug, regimental headquarters not on-hand as of 22 Aug, Corps Artillery Commander COL Salvatore Nicolini)
    - XV (Motorized) Artillery Battalion (detached to the Ariete, authorized 12 105/28 guns, in three batteries of 4 guns)
      - 1st Motorized Artillery Battery (assigned 4 105/28 guns as of 22 Aug)
      - 2nd Motorized Artillery Battery (assigned 4 105/28 guns as of 22 Aug)
      - 3rd Motorized Artillery Battery (assigned 4 105/28 guns as of 22 Aug)
    - II (Motorized) Artillery Battalion (authorized 12 105/28 guns, in three batteries of 4 guns, not on-hand as of 22 Aug)
      - 1st Motorized Artillery Battery (authorized 4 105/28 guns, not on-hand as of 22 Aug)
      - 2nd Motorized Artillery Battery (authorized 4 105/28 guns, not on-hand as of 22 Aug)
      - 3rd Motorized Artillery Battery (authorized 4 105/28 guns, not on-hand as of 22 Aug)
    - III (Motorized) Artillery Battalion (authorized 12 105/28 guns, in three batteries of 4 guns, not on-hand as of 22 Aug)
      - 1st Motorized Artillery Battery (authorized 4 105/28 guns, not on-hand as of 22 Aug)
      - 2nd Motorized Artillery Battery (authorized 4 105/28 guns, not on-hand as of 22 Aug)
      - 3rd Motorized Artillery Battery (authorized 4 105/28 guns, not on-hand as of 22 Aug)
    - one AA battery/132nd Artillery Regiment (attached from the Ariete, assigned 8 20mm AA guns as of 22 Aug)
  - 24th Motorized Engineer Battalion (battaglione del genio) (CPT Fasano)
    - 1st Motorized Engineer Company
    - 2nd Motorized Engineer Company
  - one motorized engineer communications battalion
    - one motorized telephone company (not on-hand as of 22 Aug)
    - one motorized radio company
  - one supply battalion
    - one 60 cubic meter water transport column
    - one 50 cubic meter POL transport column
    - one 30 ton motorized transport column
    - one motorized ambulance platoon
    - one motorized administration company

XX CORPS STRENGTH

		Ariete	Littorio	Trieste	Corps Troops	Corps Total
Personnel		4,872	3,225	3,573	-	11,670
Infantry Battalions		2	2	4	1 (-)	9 (-)
Tanks	M 14	129	116	34	-	279
	L6	-	22	-	-	22
	TOTAL	129	138	34	-	301
Artillery	75/18 Semovente SPs	14	16	-	-	30
	75/27 Guns	19	12	19	-	60
	100/17 Howitzers	-	8	12	-	20
	105/28 Guns	24	-	-	-	24
	TOTAL	57	36	31	-	124
Anti-Tank Artillery	47/32 AT Guns	51	54	23	-	128
Anti-Tank Rifles	20mm Soluthurn AT Rifle	8	12	8	-	28
Anti-Aircraft Artillery	88/55 AA/AT Guns	12	12	-	-	24
	90/53 AA/AT Guns	8	-	-	-	8
	75/50 AA guns	-	-	10?	-	10?
	20mm	10	-	8	8	26
	TOTAL	30	12	18?	8	68?
Armored Cars	Autoblinda 41	12	-	6	-	18
Engineer Companies		1	1	1	2	5

[19] Personnel strengths will be annotated either aa/bb/ccc (indicating the numbers of officers/non-commissioned officers/enlisted respectively) or aa/bbb (indicating the numbers of officers/enlisted respectively).

132nd Ariete Armored Division (*divisione corazzata*) (Gen Francesco Arena (replaced Gen Adolfo Infante in Sep) authorized 8,600 men, 189 medium tanks, 250 anti-tank guns, 18 AT rifles, 70 artillery pieces (including 20 Semovente SP guns), 34 medium mortars, 900 automatic weapons (MGs & SMGs), 918 trucks, 54 tractors (prime movers), 205 miscellaneous vehicles, 40 armored cars, 504 motorcycles), assigned 196/4676 (as of 22 Aug), 129 M14s (as of 23 Oct) and 14 Semovente (as of 22 Aug))[20]

132nd Armored Regiment (LTC de Flamineis replaced COL Enrico Marcetti (replaced Colonel Pasquale Prestissimone, captured at Bir Hacheim on 27 May, authorized 78/218/1511 and 179 M14s, assigned 42/989 (as of 22 Aug) and 129 M14 tanks (as of 23 Oct))
Command Company and Reserve Tanks (authorized 6/38/272 and 33 M14s (including 6 radio tanks))
command section (authorized a signals platoon, service squad, field office radio, 2/7/50)
radio platoon (authorized 6 radio central 'M' tanks, radio squad, courier and batman squad,1/6/67)
three reserve tank platoons (each authorized 9 M14s, 9 heavy trucks, 9 trailers, 1/8/44)
transport detachment (authorized 2 command cars, 5 light trucks, 3 heavy trucks, 1 ambulance, 1 trailer, 6 motorcycles with sidecars, 0/1/20)

IX Armored Battalion (LTC Lasagna, authorized 24/60/413 and 52 M14 tanks in three companies, only two companies and 28 tanks on-hand as of 22 Aug)
Command Company (authorized 9/15/155 and 4 M14s (including 2 with radios))
Command Platoon (authorized 2 M14s and 2 M14s with radio, 1/8/62)
Staff Squad (authorized 4 motorcycles)
Service Squad
Transportation Detachment (authorized 2 cars, 3 all-terrain trucks, 5 heavy trucks, 1 trailer, 1 tank truck, 6 motorcycles, 4 motorcycles with sidecars)
Maintenance Platoon (authorized 2 maintenance squads, total: 1/4/42)
Recovery Platoon (authorized 3 recovery squads each with 1 heavy truck, 1 repair truck, 1 special carriage, total: 1/3/51)
three tank companies (each authorized 16 M14 tanks and 5/15/86)
Command Platoon (each authorized 1 M14 tank, 4 motorcycles, 2 motorcycles with sidecars, a car, 1 all-terrain truck, 3 heavy trucks, 1 light truck)
three tank platoons (each authorized 5 M14 tanks)

X Armored Battalion (Captain Grata, authorized 24/60/413 and 52 M14 tanks, three companies and 38 tanks assigned as of 22 Aug)
Command Company (authorized 9/15/155 and 4 M14s (including 2 with radios))
Command Platoon (authorized 2 M14s and 2 M14s with radio, 1/8/62)
Staff Squad (authorized 4 motorcycles)
Service Squad
Transportation Detachment (authorized 2 cars, 3 all-terrain trucks, 5 heavy trucks, 1 trailer, 1 tank truck, 6 motorcycles, 4 motorcycles with sidecars)
Maintenance Platoon (authorized 2 maintenance squads, total: 1/4/42)
Recovery Platoon (authorized 3 recovery squads each with 1 heavy truck, 1 repair truck, 1 special carriage, total: 1/3/51)
three tank companies (each authorized 16 M14 tanks and 5/15/86)
Command Platoon (each authorized 1 M14 tank, 4 motorcycles, 2 motorcycles with sidecars, a car, 1 all-terrain truck, 3 heavy trucks, 1 light truck)
three tank platoons (each authorized 5 M14 tanks)

XIII Armored Battalion (LTC Baldini, authorized 24/60/413, three companies assigned as of 22 Aug, none on-hand)
Command Company (authorized 9/15/155 and 4 M14s (including 2 with radios))
Command Platoon (authorized 2 M14s and 2 M14s with radio, 1/8/42)
Staff Squad (authorized 4 motorcycles)
Service Squad
Transportation Detachment (authorized 2 cars, 3 all-terrain trucks, 5 heavy trucks, 1 trailer, 1 tank truck, 6 motorcycles, 4 motorcycles with sidecars)
Maintenance Platoon (authorized 2 maintenance squads, total 1/4/42)
Recovery Platoon (authorized 3 recovery squads each with 1 heavy truck, 1 repair truck, 1 special carriage, total: 1/3/51)
three tank companies (each authorized 16 M14s and 5/15/86)
Command Platoon (each authorized 1 M14 tank, 4 motorcycles, 2 motorcycles with sidecars, a car, 1 all-terrain truck, 3 heavy trucks, 1 light truck)
three tank platoons (each authorized 5 M14 tanks)

one 20mm AA company (8 guns assigned as of 22 Aug)
one maintenance company

8th (Motorized) Bersaglieri Regiment (COL de Gherardini, 28/969 assigned as of 22 Aug, authorized 63/124/1204)
Command Company (authorized 3/10/88)

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[20] See the order of battle for the 21st Panzer Division in this appendix (page I-8) for the task organization of these two divisions at the beginning of the Second Battle of El Alamein.

Command Platoon (authorized a clerical squad and an information squad)
Communications Platoon (authorized one radio squad (3 light trucks), one telephone/lineman squad (1 light truck), one observer/signal squad, one motorcycle courier squad (9 motorcycles))
Service Platoon (authorized 1 car, 2 light trucks, 2 heavy trucks)

V Motorized Bersaglieri Battalion (Major Ferrari, assigned three motorized infantry companies with a total of 13 47/32 Model 37 antitank guns (12 authorized), 4 20mm antitank rifles (12 authorized), 12 HMGs (12 authorized), 13 LMGs (12 authorized), as of 22 Aug, authorized 20/43/389)
Command Platoon (authorized one command squad, one signals squad (4 motorcycles), one service squad (6 light trucks), 5/4/56)
three infantry companies (each authorized 1 command platoon (3 heavy trucks), one rifle platoon (three squads), one machine gun platoon (three squads with one machine gun each), 20mm AT platoon (three squads each with 1 20mm AT rifle), 47/32 AT platoon (three squads each with 1 47/32 AT gun), total 5/13/111)

XII Motorized Bersaglieri Battalion (Major Cantella, assigned three motorized infantry companies with a total of 14 47/32 Model 37 antitank guns (12 authorized), 4 20mm antitank rifles (12 authorized), 12 HMGs (12 authorized), 11 LMGs (12 authorized), as of 22 Aug, authorized 20/43/389)
Command Platoon (authorized one command squad, one signals squad (4 motorcycles), one service squad (6 light trucks), 5/4/56)
three infantry companies (each authorized 1 command platoon (3 heavy trucks), one rifle platoon (three squads), one machine gun platoon (three squads with one machine gun each), 20 mm AT platoon (three squads each with 1 20mm AT rifle), 47/32 AT platoon (three squads each with 1 47/32 AT gun), total 5/13/111)

III Motorized (Anti-Tank) Bersaglieri Battalion (Major Pani, authorized 20/31/338)
Command Platoon (authorized one command squad, one signals squad (4 motorcycles), one service squad (6 light trucks) 5/4/56)
three antitank companies (each assigned 8 47/32 Model 37 antitank guns (8 authorized) as of 22 Aug, authorized 5/9/94, 11 medium trucks, 7 motorcycles, authorized one command squad (3 motorcycles (one with side car), 3 light trucks), four gun platoons (each with 1 motorcycle, 2 gun squads (each with 1 47/32 AT gun and 1 light truck))

132nd Armored Artillery Regiment (COL Mameli, assigned 101/2223 and 14 total 75/18 Semovente as of 22 Aug:)
Regimental Staff Battery
one staff platoon (authorized 1 observation section, 1 calibration section, 1 signals section, 1 reserve section)
three observer platoons (each authorized 1 observation section, 1 signals section)

I (Motorized) Artillery Battalion (authorized 12 75/27 guns, in three batteries of 4 guns)
1st Motorized Artillery Battery (assigned 3 75/27 guns as of 22 Aug)
2nd Motorized Artillery Battery (assigned 2 75/27 guns as of 22 Aug)
3rd Motorized Artillery Battery (assigned 4 75/27 guns as of 22 Aug)

II (Motorized) Artillery Battalion (authorized 12 75/27 guns, in three batteries of 4 guns)
1st Motorized Artillery Battery (assigned 3 75/27 guns as of 22 Aug)
2nd Motorized Artillery Battery (assigned 3 75/27 guns as of 22 Aug)
3rd Motorized Artillery Battery (assigned 4 75/27 guns as of 22 Aug)

III (Motorized) Artillery Battalion (authorized 12 105/28 guns, in three batteries of 4 guns)
1st Motorized Artillery Battery (assigned 6 105/28 guns as of 22 Aug)
2nd Motorized Artillery Battery (assigned 6 105/28 guns as of 22 Aug)
3rd Motorized Artillery Battery (authorized 4 105/28 guns, none on-hand as of 22 Aug)
one 20mm AA platoon (2 guns assigned as of 22 Aug)

501st (Motorized) Anti-Aircraft Artillery Battalion (sometimes identified as the IV/132nd Artillery Regiment, authorized 12 90/53 guns, in three batteries of 4 guns, & two batteries of 8 20mm AA guns (one battery detached to XX Corps Troops)
1st Motorized Battery (assigned 4 90/53 AA/AT guns as of 22 Aug)
2nd Motorized Battery (assigned 4 90/53 AA/AT guns as of 22 Aug)
3rd Motorized Battery (assigned 8 20mm AA guns as of 22 Aug)
4th Motorized Battery (assigned 8 20mm AA guns as of 22 Aug)

551st Self-Propelled Artillery Battalion (sometimes identified as the V/132nd Artillery Regiment, 10 75/18 Semovente assault guns authorized in 2 batteries of 4 and 2 with the battalion headquarters)
Headquarters Battery (authorized 2 75/18 Semovente assault guns, not on-hand as of 22 Aug)
1st Battery (assigned 4 75/18 Semovente assault guns as of 22 Aug)
2nd Battery (assigned 4 75/18 Semovente assault guns as of 22 Aug)

552nd Self-Propelled Artillery Battalion (sometimes identified as the VI/132nd Artillery Regiment, 10 75/18 Semovente assault guns authorized in 2 batteries of 4 and 2 with the battalion headquarters)
Headquarters Battery (authorized 2 75/18 Semovente assault guns, not on-hand as of 22 Aug)

1st Battery (assigned 3 75/18 Semovente assault guns as of 22 Aug)
2nd Battery (assigned 3 75/18 Semovente assault guns as of 22 Aug)

XV (Motorized) Artillery Battalion (attached from XX Corps, authorized 12 105/28mm guns, in three batteries of 4 guns)
1st Motorized Battery (assigned 4 105/28mm guns as of 22 Aug)
2nd Motorized Battery (assigned 4 105/28mm guns as of 22 Aug)
3rd Motorized Battery (assigned 4 105/28mm guns as of 22 Aug)

XXXI Motorized Anti-Aircraft Artillery Bn (authorized 12 88/55 AA/AT (German) guns, in three batteries of 4 guns)
1st Motorized Artillery Battery (assigned 4 88/55 AA/AT guns as of 22 Aug)
2nd Motorized Artillery Battery (assigned 4 88/55 AA/AT guns as of 22 Aug)
3rd Motorized Artillery Battery (assigned 4 88/55 AA/AT guns as of 22 Aug)

3rd (Recon) Battalion of Nizza Cavalleria Regiment (assigned 12 Autoblinda 41 (?) armored cars (39 authorized) and 15/259 as of 22 Aug, 20/43/243 authorized)
Command Company
Armored Car Couriers (authorized 1 armored car)
Staff Squad (authorized 4 motorcycles)
Service Squad
Transportation Detachment (authorized 2 command cars, 4 light trucks, 2 heavy trucks, 2 recovery trucks, 2 motorcycles)
Reserve Armored Car Platoon
Maintenance Squad (1 heavy truck, 1 workshop truck)
Armored Car Section (4 reserve armored cars)
4th Armored Car Company
Command Platoon (1 armored car, service squad (authorized 10 motorcycles, 1 command car, 2 light trucks, 1 heavy truck))
four armored car platoons (each authorized four armoured cars)
5th Armored Car Company (assigned 12 Autoblinda 41 (?) armored cars as of 22 Aug)
Command Platoon (1 armored car, service squad (authorized 10 motorcycles, 1 command car, 2 light trucks, 1 heavy truck))
four armored car platoons (each authorized four armoured cars)

32nd Motorized Mixed Engineer Battalion (*battaglione del genio e di collegamenti*) (LTC Franceschini, assigned 10/236 men (as of 22 Aug) of 16/465 authorized)
132nd Motorized Engineer Company
132nd Motorized Signal Company

42nd Supply Regiment
I Battalion (assigned 3 HMGs as of 22 Aug)
four 30 ton motorized transport columns (assigned as of 22 Aug)
II Battalion (assigned 2 HMGs as of 22 Aug)
two 30 ton motorized transport columns (assigned as of 22 Aug)
two 50 cubic meter motorized POL columns

132nd Motorized Medical Company

132nd Motorized Administration Platoon

one motorized vehicle maintenance company

133rd Littorio Armored Division (*divisione corazzata*) (Gen Gervasio Bitossi, authorized 8,600 men, 189 medium tanks (not including 58 L6 light tanks, these appear to have been substituted for the Autoblinda 41 armored cars in the recon battalion), 250 anti-tank guns, 18 AT rifles, 70 artillery pieces (including 20 75/18 Semovente SP guns), 34 medium mortars, 900 automatic weapons (MGs & SMGs), 918 trucks, 54 tractors (prime movers), 205 miscellaneous vehicles, 40 armored cars, 504 motorcycles), assigned 116 M14s (as of 23Oct), 22 L6s and 16 Semovente (as of 22 Aug), and 183/3042 (as of 22 Aug)) [21]

- 133rd Armored Regiment (COL Giuseppe Bonini, assigned 76/1041 as of 22 Aug)
  - Command Company and Reserve Tanks (authorized 6/38/272 and 33 M14s (including 6 radio tanks))
    - command section (authorized a signals platoon, service squad, field office radio, 2/7/50)
    - radio platoon (authorized 6 radio central 'M' tanks, radio squad, courier and batman squad,1/6/67)
    - three reserve tank platoons (each authorized 9 M14s, 9 heavy trucks, 9 trailers, 1/8/44)
    - transport detachment (authorized 2 command cars, 5 light trucks, 3 heavy trucks, 1 ambulance, 1 trailer, 6 motorcycles with sidecars, 0/1/20)
  - IV Armored Battalion (LTC Casamassima, authorized 24/60/413, 40 M14s on-hand as of 22 Aug)
    - Command Company (authorized 9/15/155 and 4 M14s (including 2 with radios))
      - Command Platoon (authorized 2 M14s and 2 M14s with radio, 1/8/62)
        - Staff Squad (authorized 4 motorcycles)
        - Service Squad
        - Transportation Detachment (authorized 2 cars, 3 all-terrain trucks, 5 heavy trucks, 1 trailer, 1 tank truck, 6 motorcycles, 4 motorcycles with sidecars)
      - Maintenance Platoon (authorized 2 maintenance squads, total: 1/4/42)
      - Recovery Platoon (authorized 3 recovery squads each with 1 heavy truck, 1 repair truck, 1 special carriage, total: 1/3/51)
    - three tank companies (each authorized 16 M14 tanks and 5/15/86)
      - Command Platoon (each authorized 1 M14 tank, 4 motorcycles, 2 motorcycles with sidecars, a car, 1 all-terrain truck, 3 heavy trucks, 1 light truck)
      - three tank platoons (each authorized 5 M14 tanks)
  - XII Armored Battalion (authorized 24/60/413, three companies assigned, 34 M14s on-hand as of 22 Aug)
    - Command Company (authorized 9/15/155 and 4 M14s (including 2 with radios))
      - Command Platoon (authorized 2 M14s and 2 M14s with radio, 1/8/62)
        - Staff Squad (authorized 4 motorcycles)
        - Service Squad
        - Transportation Detachment (authorized 2 cars, 3 all-terrain trucks, 5 heavy trucks, 1 trailer, 1 tank truck, 6 motorcycles, 4 motorcycles with sidecars)
      - Maintenance Platoon (authorized 2 maintenance squads, total: 1/4/42)
      - Recovery Platoon (authorized 3 recovery squads each with 1 heavy truck, 1 repair truck, 1 special carriage, total: 1/3/51)
    - three tank companies (each authorized 16 M14 tanks and 5/15/86)
      - Command Platoon (each authorized 1 M14 tank, 4 motorcycles, 2 motorcycles with sidecars, a car, 1 all-terrain truck, 3 heavy trucks, 1 light truck)
      - three tank platoons (each authorized 5 M14 tanks)
  - LI Armored Battalion (LTC Zappala KIA 30 Jun, authorized 24/60/413, 29 M14s assigned as of 22 Aug)
    - Command Company (authorized 9/15/155 and 4 M14s (including 2 with radios))
      - Command Platoon (authorized 2 M14s and 2 M14s with radio, 1/8/62)
        - Staff Squad (authorized 4 motorcycles)
        - Service Squad
        - Transportation Detachment (authorized 2 cars, 3 all-terrain trucks, 5 heavy trucks, 1 trailer, 1 tank truck, 6 motorcycles, 4 motorcycles with sidecars)
      - Maintenance Platoon (authorized 2 maintenance squads, total: 1/4/42)
      - Recovery Platoon (authorized 3 recovery squads each with 1 heavy truck, 1 repair truck, 1 special carriage, total: 1/3/51)
    - three tank companies (each authorized 16 M14 tanks and 5/15/86)
      - Command Platoon (each authorized 1 M14 tank, 4 motorcycles, 2 motorcycles with sidecars, a car, 1 all-terrain truck, 3 heavy trucks, 1 light truck)
      - three tank platoons (each authorized 5 M14 tanks)
  - III Armored (Recon) Battalion of Lancieric (authorized 20/60/286 and 58 L6 Light Tanks in two companies, 22 on hand as of 22 Aug)
    - Command Company (authorized 6/10/78 and 2 L6s (including 2 with radios))
      - Command Platoon (authorized 2 L6s and 2 L6s with radio, 1/10/78)
        - Staff Squad (authorized 4 motorcycles)
        - Service Squad (authorized 1 car, 1 light truck, 3 heavy trucks)
        - Maintenance Squad (authorized 1 car, 2 heavy trucks)

[21] See the order of battle for the 15th Panzer Division in this appendix (page I-5) for the task organization of these two divisions at the beginning of the Second Battle of El Alamein.

two light tank companies (each authorized 27 L6 tanks and 7/25/104)
Command Platoon (each authorized 2 L6 tanks (1 with radio), 8 motorcycles (2 with sidecar), 1 command car, 5 heavy trucks, 3 light trucks, 1 recovery truck)
four tank platoons (each authorized 5 L6 tanks)
reserve tank platoon (each authorized 4 L6 tanks and 2 trains (each with 1 heavy truck, 1 trailer, 1 ramp)
one 20mm AA company (8 guns assigned as of 22 Aug)
one maintenance company (not on-hand as of 22 Aug)

12th (Motorized) Bersaglieri Regiment (COL Amoroso, infantry battalions from Milan, assigned 31/790 as of 22 Aug)
Command Company (authorized 3/10/88)
Command Platoon (authorized a clerical squad and an information squad)
Communications Platoon (authorized one radio squad (3 light trucks), one telephone/lineman squad (1 light truck), one observer/signal squad, one motorcycle courier squad (9 motorcycles))
Service Platoon (authorized 1 car, 2 light trucks, 2 heavy trucks)

XXIII Motorized Bersaglieri Battalion (assigned three motorized infantry companies with a total of 14 47/32 "Model-37" antitank guns (12 authorized), 2 20mm antitank rifles (12 authorized), 7 HMGs (12 authorized), 8 LMGs (12 authorized), as of 22 Aug, authorized 20/43/389)
Command Platoon (authorized one command squad, one signals squad (4 motorcycles), one service squad (6 light trucks), 5/4/56)
three infantry companies (each authorized 1 command platoon (3 heavy trucks), one rifle platoon (three squads), one machine gun platoon (three squads with one machine gun each), 20mm AT platoon (three squads each with 1 20mm AT rifle), 47/32 AT platoon (three squads each with 1 47/32 AT gun), total 5/13/111)

XXXVI Motorized Bersaglieri Battalion (assigned three motorized infantry companies with a total of 6 47/32 "Model-37" antitank guns (12 authorized), 5 20mm antitank rifles (12 authorized), 6 HMGs (12 authorized), 7 LMGs (12 authorized), as of 22 Aug, authorized 20/43/389)
Command Platoon (authorized one command squad, one signals squad (4 motorcycles), one service squad (6 light trucks), 5/4/56)
three infantry companies (each authorized 1 command platoon (3 heavy trucks), one rifle platoon (three squads), one machine gun platoon (three squads with one machine gun each), 20mm AT platoon (three squads each with 1 20mm AT rifle), 47/32 AT platoon (three squads each with 1 47/32 AT gun), total 5/13/111)

XXI Motorized (Anti-Tank) Bersaglieri Battalion (authorized 20/31/338)
Command Platoon (authorized one command squad, one signals squad (4 motorcycles), one service squad (6 light trucks) 5/4/56)
three antitank companies (each assigned 8 47/32 Model 37 antitank guns (8 authorized) as of 22 Aug, authorized 5/9/94, 11 medium trucks, 7 motorcycles, authorized one command squad (3 motorcycles (one with side car), 3 light trucks), four gun platoons (each with 1 motorcycle, 2 gun squads (each with 1 47/32 AT gun and 1 light truck))

3rd Celere Artillery Regiment (assigned 76/1211 as of 22 Aug, 41 guns total (?), originally the divisional artillery regiment to the Sabratha Infantry Division, assigned to the Littorio while that division was forming after the destruction of the Sabratha in July)
Regimental Staff Battery
one staff platoon (authorized 1 observation section, 1 calibration section, 1 signals section, 1 reserve section)
three observer platoons (each authorized 1 observation section, 1 signals section)

II/3rd Celere Artillery Battalion (authorized 12 75/27 guns, in three batteries of 4 guns)
1st Celere Artillery Battery (assigned 4 75/27 guns as of 22 Aug)
2nd Celere Artillery Battery (assigned 4 75/27 guns as of 22 Aug)
3rd Celere Artillery Battery (assigned 4 75/27 guns as of 22 Aug)

CCCXXXII Motorized Artillery Battalion (authorized 12 100/17 howitzers, in three batteries of 4 howitzers)
1st Battery (assigned 4 100/17 howitzers as of 22 Aug)
2nd Battery (assigned 4 100/17 howitzers as of 22 Aug)
3rd Battery (authorized 4 100/17 howitzers, not on-hand as of 22 Aug)

XXIX Motorized Anti-Aircraft Artillery Battalion (authorized 12 88/55 AA/AT guns, in three batteries of 4 guns)
1st Motorized Anti-Aircraft Battery (assigned 6 88/55mm AA/AT guns as of 22 Aug)
2nd Motorized Anti-Aircraft Battery (assigned 6 88/55mm AA/AT guns as of 22 Aug)
5th Motorized Anti-Aircraft Battery/133rd Artillery Regiment (assigned 6 20mm AA guns (as of 22 Aug))

DLIV Self-propelled Artillery Battalion (sometimes identified as the V/3rd Celere Artillery Regiment or CLIV Self-Propelled Artillery Bn , 10 75/18 Semovente self-propelled assault guns authorized, 2 batteries of 4 & 2 with Bn HQs)
Headquarters Battery (authorized 2 75/18 Semovente assault guns, not on-hand as of 22 Aug)
1st Battery (assigned 4 75/18 Semovente assault guns as of 22 Aug)
2nd Battery (assigned 4 75/18 Semovente assault guns as of 22 Aug)

DLVI Self-propelled Artillery Battalion (sometimes identified as the VI/3rd Celere Artillery Regiment or CLVI Self-Propelled Artillery Bn , 10 75/18 Semovente self-propelled assault guns authorized, 2 batteries of 4 & 2 with Bn HQs)
Headquarters Battery (authorized 2 75/18 Semovente assault guns, not on-hand as of 22 Aug)
1st Battery (assigned 4 75/18 Semovente assault guns as of 22 Aug)
2nd Battery (assigned 4 75/18 Semovente assault guns as of 22 Aug)
406th Anti-Aircraft Battery (20mm AA guns)

XXXIII Motorized Mixed Engineer Battalion (*battaglione del genio e di collegamenti*) (authorized 16/465, not on-hand as of 22 Aug, not mentioned in any correspondence prior to 23 Oct, however, it is listed in the Order of Battle for 23 Oct 42 in the Italian official history, (*Le Operazioni in Africa Settentrionale, Vol. III-El Alamein*, page 681), organized with one motorized engineer company and one motorized communications company

one motorized medical company

one motorized maintenance company and one administration platoon

one motorized supply regiment
I Motorized Supply Battalion (authorized four 30 ton motorized transport columns, not on-hand as of 22 Aug)
II Motorized Supply Battalion (authorized two 30 ton motorized transport columns and two 50 cubic meter motorized POL columns, not on-hand as of 22 Aug)

101st Trieste Motorized Infantry Division (Gen Francesco La Ferla, assigned 181/3392 (as of 22 Aug) and 34 M14 tanks (as of 23 Oct), authorized 5,932, 322 vehicles, 244 motorcycles, 74 LMGs, 74 HMGs, 18 81mm mortars, 36 47mm AT guns, 12 88/55 AA/AT guns, 54 20mm AA guns, 24 75mm guns, 24 105mm howitzers, and 52 medium tanks)

- one motorized division staff company (authorized 2 20mm AA guns, 2 HMGs, 2 LMGs)

- 65th Motorized Infantry Regiment (COL Gherado Vaiarini KIA 17 July, from Valtellina, 34/586 assigned as of 22 Aug)
  - I Motorized Infantry Battalion (assigned two companies with a total of 6 47/32 AT guns (9 authorized), 6 anti-tank rifles (9 20mm ATRs authorized), 6 HMGs (9 authorized), 12 LMGs (18 authorized) as of 22 Aug)
  - II Motorized Infantry Battalion (assigned two companies with a total of 6 47/32 AT guns (9 authorized), 6 anti-tank rifles (9 20mm ATRs authorized), 6 HMGs (9 authorized), 12 LMGs (18 authorized) as of 22 Aug)
  - motorized mortar company (authorized 9 81mm mortars, not on-hand as of 22 Aug)

- 66th Motorized Infantry Regiment (COL Umberto Zanetti KIA 22 July, from Valtellina, 29/551 assigned as of 22 Aug)
  - I Motorized Infantry Battalion (assigned two companies with a total of 5 47/32 AT guns (9 authorized), 6 anti-tank rifles (9 20mm ATRs authorized), 6 HMGs (9 authorized), 12 LMGs (18 authorized) as of 22 Aug)
  - II Motorized Infantry Battalion (assigned two companies with a total of 6 47/32 AT guns (9 authorized), 6 anti-tank rifles (9 20mm ATRs authorized), 6 HMGs (9 authorized), 12 LMGs (18 authorized) as of 22 Aug)
  - motorized mortar company (authorized 9 81mm mortars, not on-hand as of 22 Aug?)

- XI Armored Battalion (MAJ Gabriele Verri, 29/478 assigned as of 22 Aug, authorized 52 (40?) M14, 34 on hand (as of 23 Oct))
  - Command Company (authorized 9/15/155 and 4 M14s (including 2 with radios))
    - Command Platoon (authorized 2 M14s and 2 M14s with radio, 1/8/62)
      - Staff Squad (authorized 4 motorcycles)
      - Service Squad
      - Transportation Detachment (authorized 2 cars, 3 all-terrain trucks, 5 heavy trucks, 1 trailer, 1 tank truck, 6 motorcycles, 4 motorcycles with sidecars)
    - Maintenance Platoon (authorized 2 maintenance squads, total: 1/4/42)
    - Recovery Platoon (authorized 3 recovery squads each with 1 heavy truck, 1 repair truck, 1 special carriage, total: 1/3/51)
  - three tank companies (each authorized 16 M14 tanks and 5/15/86)
    - Command Platoon (each authorized 1 M14 tank, 4 motorcycles, 2 motorcycles with sidecars, a car, 1 all-terrain truck, 3 heavy trucks, 1 light truck)
    - three tank platoons (each authorized 5 M14 tanks)

- 21st Motorized Po Artillery Regiment (assigned 59/1200 as of 22 Aug, authorized approximately 2,300 men and 275 vehicles)
  - one headquarters company (authorized 13/125)
  - I Motorized Artillery Battalion (detached to 185th Folgore Division, authorized 21/808, 12 100/17 howitzers and 6 HMGs)
    - 1st Motorized Artillery Battery (assigned 4 (4 authorized) 100/17 howitzers as of 22 Aug)
    - 2nd Motorized Artillery Battery (assigned 4 (4 authorized) 100/17 howitzers as of 22 Aug)
    - 3rd Motorized Artillery Battery (assigned 4 (4 authorized) 100/17 howitzers as of 22 Aug)
  - II Motorized Artillery Battalion (authorized 21/808, 12 100/17 howitzers and 6 HMGs)
    - 1st Motorized Artillery Battery (assigned 4 (4 authorized) 100/17 howitzers as of 22 Aug)
    - 2nd Motorized Artillery Battery (assigned 4 (4 authorized) 100/17 howitzers as of 22 Aug)
    - 3rd Motorized Artillery Battery (assigned 4 (4 authorized) 100/17 howitzers as of 22 Aug)
  - III Motorized Artillery Battalion (authorized 21/808, 12 75/27 guns and 6 HMGs)
    - 1st Motorized Artillery Battery (assigned 3 (4 authorized) 75/27 guns as of 22 Aug)
    - 2nd Motorized Artillery Battery (assigned 3 (4 authorized) 75/27 guns as of 22 Aug)
    - 3rd Motorized Artillery Battery (assigned 4 (4 authorized) 75/27 guns as of 22 Aug)
  - IV Motorized Artillery Battalion (authorized 21/808, 12 75/27 guns and 6 HMGs)
    - 1st Motorized Artillery Battery (assigned 3 (4 authorized) 75/27 guns as of 22 Aug)
    - 2nd Motorized Artillery Battery (assigned 2 (4 authorized) 75/27 guns as of 22 Aug)
    - 3rd Motorized Artillery Battery (assigned 4 (4 authorized) 75/27 guns as of 22 Aug)
  - V Motorized Anti-Aircraft Artillery Battalion (not on-hand as of 23 Oct?)
    - 1st Motorized Anti-Aircraft Artillery Battery (assigned 4 (4 authorized) 75/50 AA guns as of 22 Aug)
    - 2nd Motorized Anti-Aircraft Artillery Battery (assigned 3 (4 authorized) 75/50 AA guns as of 22 Aug)
    - 3rd Motorized Anti-Aircraft Artillery Battery (assigned 3 (4 authorized) 75/50 AA guns as of 22 Aug)
  - 146th Motorized Anti-Aircraft Artillery Battery (assigned 8 (Christian-5?) 20mm guns (8 authorized) as of 22 Aug, in support of 1st Bn/21st Artillery?)
  - 411th Motorized AA Artillery Battery (detached to the Folgore Div., assigned 5 20mm guns (8 authorized) as of 22 Aug)

- VII Bersaglieri Armored Car Battalion (assigned 15/272 and 6 Autoblinda 41 armored cars as of 22 Aug, 20/43/243 and 39 Autoblinda 41s authorized)
  - Command Company
    - Armored Car Couriers (authorized 1 armored car)
    - Staff Squad (authorized 4 motorcycles)
    - Service Squad
    - Transportation Detachment (authorized 2 command cars, 4 light trucks, 2 heavy trucks, 2 recovery trucks, 2 motorcycles)
  - Reserve Armored Car Platoon

Maintenance Squad (1 heavy truck, 1 workshop truck)
Armored Car Section (4 reserve armored cars)
one armored Car Company (6 Autoblinda 41s assigned as of 22 Aug)
Command Platoon (1 armored car, service squad (authorized 10 motorcycles, 1 command car, 2 light trucks, 1 heavy truck))
four armored car platoons (each authorized four armoured cars)
one armored car company (not on-hand as of 22 Aug)
Command Platoon (1 armored car, service squad (authorized 10 motorcycles, 1 command car, 2 light trucks, 1 heavy truck))
four armored car platoons (each authorized four armoured cars)

LII Motorized Mixed Engineer Battalion (*Misto Genio*) (assigned 13/305 as of 22 Aug of 522 authorized)
28th Motorized Engineer Company
91st Motorized Communications Company

90th Medical Company

Supply Regiment (assigned 14 30 ton motorized supply columns in three battalions plus 1 50 cubic meter POL column)

176th Administration Platoon

one motorized cavalry reconnaissance platoon (not on-hand?)

one motorized field post office (not on-hand?)

X Italian Corps (Lieutenant General Enrico Frattini (acting) after GEN Federico Orsi was killed by a mine 18 Oct)(Senior Engineer COL Converso)

- 17th Pavia Infantry Division (Gen Nazareno Scattaglia) page I-29
- 27th Brescia Infantry Division (Gen Brunetto Brunetti) page I-30
- 185th Folgore Parachute Infantry Division (Gen Enrico Frattini, also acting X Corps Commander) page I-31
- "Corps troops" (assigned 62/1255 (however, officer totals are included in the strength of the XXXI Combat Engineer Battalion))
  - 9th Motorized Bersaglieri Regiment (assigned 22/511 as of 22 Aug)
    - XXVIII Motorized Bersaglieri Battalion (assigned 3 companies with 8 47/32mm AT guns, 2 AT Rifles, 2 HMGs, 15 LMGs as of 22 Aug)
    - XXX Motorized Bersaglieri Battalion (authorized 3 companies with 9 47/32mm AT guns, 9 AT Rifles, 9 HMGs, 18 LMGs, not on-hand as of 22 Aug)
  - one tank battalion (authorized three companies with 52 medium tanks, not on-hand as of 22 Aug)
  - 16th Motorized Artillery Regiment (assigned 23/348 as of 22 Aug)
    - XLIX Motorized Artillery Battalion
      - 1st Motorized Battery (assigned 4 105/28 guns as of 22 Aug)
      - 2nd Motorized Battery (assigned 4 105/28 guns as of 22 Aug)
      - 3rd Motorized Battery (assigned 4 105/28 guns as of 22 Aug)
    - CXLVII Motorized Artillery Battalion
      - 1st Motorized Battery (assigned 4 149/28 guns as of 22 Aug)
      - 2nd Motorized Battery (assigned 3 149/28 guns as of 22 Aug)
  - XXXI Combat Engineer (*battaglione guastatori*) Battalion (Major Paolo de Sillavengo replaced LTC Dante Caprivi 21 Aug, elements detached to Folgore and ?, assigned 610 as of 22 OCT including 300 replacements that arrived that date)
    - 1st Company (1LT De Rita)
    - 7th Company (CPT Piero Santini)
    - 8th Company (CPT Renato Amoretti)
  - 10th Engineer Regiment
    - X Motorized Engineer Mechanics Battalion (*battaglione del genio artieri*, assigned 17/224 as of 22 Aug)
      - 1st Motorized Engineer Mechanics Company
      - 2nd Motorized Engineer Mechanics Company
    - 15th Company Defense Engineers (LT Procacci, assigned 3/129 as of 1 Aug)
    - X Motorized Engineer Communications Battalion (*Genio Collegamenti*)
      - 89th Motorized Telephone Company
      - 124th Motorized Radio Company
  - one supply battalion
    - one 60 cubic meter water transport column
    - one 50 cubic meter POL transport column
    - one 30 ton motorized transport column
  - one motorized ambulance platoon
  - one motorized administration company

X CORPS STRENGTH

		Pavia	Brescia	Folgore	Corps Troops	Corps Total
Personnel*		1,077**	4,094	4,375	1,255	11,301
Infantry Battalions		4	5	6	2	17
Tanks	M 14	-	-	-	-	-
	L6	-	-	-	-	-
	TOTAL	-	-	-	-	-
Artillery	75/18 Semovente SPs	-	-	-	-	-
	75/27 Guns	12	24	24	-	60
	77/28 Guns	-	-	-	-	-
	100/17 Howitzers	-	12	12	-	24
	105/28 Guns	-	-	-	12	12
	149/28 Guns	-	-	-	7	7
	TOTAL	12	36	36	19	103
Anti-Tank Artillery	47/32 AT Guns	37	54	34	17	142
Anti-Tank Rifles	20mm Soluthurn AT Rifle	48	34	36	11	129
Anti-Aircraft Artillery	88/55 AA/AT Guns	-	12	-	-	12
	90/53 AA/AT Guns	-	-	-	-	-
	75/50 AA guns	-	-	-	-	-
	20mm	14	-	-	-	14
	TOTAL	14	12	-	-	36
Armored Cars	Autoblinda 41	-	-	-	-	-
Engineer Companies		1	1	4	5	12

*Does not include attachments/detachments

**Includes only the manpower strength of the infantry regiments

17th Pavia Infantry Division (Gen Nazareno Scattaglia, assigned 74/1003 (this is only the total strength in the infantry regiments) as of 22 Aug, authorized 7,000 men, 72 anti-tank guns, 72 AT rifles, 60 artillery pieces, 16 light AA guns, 146 light mortars, (rifle grenade launchers? Fucili mtr), 18 medium mortars, 92 MGs, 142 trucks, 72 tractors (prime movers), 35 miscellaneous vehicles, 147 motorcycles)

- 27th Infantry Regiment (assigned 25/425 as of 22 Aug (reorganized into of two battalions by 23 Oct according to Massoglia & Nofziger))
  - I Infantry Battalion (assigned 4 companies with a total of 12 47/32 AT guns (12 authorized), 12 20mm AT rifles (12 authorized), 12 HMGs (12 authorized), 24 LMGs (24 authorized) as of 22 Aug)
  - II Infantry Battalion (assigned 4 companies with a total of 12 47/32 AT guns (12 authorized), 12 20mm AT rifles (12 authorized), 12 HMGs (12 authorized), 24 LMGs (24 authorized) as of 22 Aug)
  - III Infantry Battalion (assigned 4 companies with a total of 12 47/32 AT guns (12 authorized), 12 20mm AT rifles (12 authorized), 12 HMGs (12 authorized), 24 LMGs (24 authorized) as of 22 Aug, disbanded by 23 Oct?)
  - one mortar company (assigned 9 81mm mortars as of 22 Aug, not on-hand?)
- 28th Infantry Regiment (assigned 47/578 as of 22 Aug (reorganized into two battalions by 23 Oct according to Massoglia and Nofziger))
  - I Infantry Battalion (assigned 4 companies with a total of 3 47/32 AT guns (12 authorized), 5 20mm AT rifles (12 authorized), 6 HMGs (12 authorized), 12 LMGs (24 authorized) as of 22 Aug)
  - II Infantry Battalion (assigned 4 companies with a total of 10 47/32 AT guns (12 authorized), 5 20mm AT rifles (12 authorized), 11 HMGs (12 authorized), 22 LMGs (24 authorized) as of 22 Aug)
  - III Infantry Battalion (assigned 4 companies with a total of 12 47/32 AT guns (12 authorized), 12 20mm AT rifles (12 authorized), 12 HMGs (12 authorized), 24 LMGs (24 authorized) as of 22 Aug, disbanded by 23 Oct?)
  - one mortar company (assigned 6 81mm mortars as of 22 Aug)
- 26th Motorized Rubicone Artillery Regiment
  - I Motorized Artillery Battalion (not on-hand as of 23 Oct)
    - 1st Motorized Artillery Battery (authorized 4 100/17 howitzers or 105/28 guns, not on hand as of 23 Oct)
    - 2nd Motorized Artillery Battery (authorized 4 100/17 howitzers or 105/28 guns, not on-hand as of 23 Oct)
    - 3rd Motorized Artillery Battery (authorized 4 100/17 howitzers or 105/28 guns, not on-hand as of 23 Oct)
  - II Motorized Artillery Battalion
    - 1st Motorized Artillery Battery (assigned 4 (4 authorized) 75/27 Model 06 guns as of 22 Aug)
    - 2nd Motorized Artillery Battery (assigned 4 (4 authorized) 75/27 Model 06 guns as of 22 Aug)
    - 3rd Motorized Artillery Battery (assigned 4 (4 authorized) 75/27 Model 06 guns as of 22 Aug)
  - III Motorized Artillery Battalion (supporting the Folgore Division)
    - 1st Motorized Artillery Battery (assigned 4 (4 authorized) 75/27 Model 06 guns as of 22 Aug)
    - 2nd Motorized Artillery Battery (assigned 4 (4 authorized) 75/27 Model 06 guns as of 22 Aug)
    - 3rd Motorized Artillery Battery (assigned 4 (4 authorized) 75/27 Model 06 guns as of 22 Aug)
  - IV Motorized Artillery Battalion (supporting the Folgore Division)
    - 1st Motorized Artillery Battery (assigned 4 (4 authorized) 75/27 Model 06 guns as of 22 Aug)
    - 2nd Motorized Artillery Battery (assigned 4 (4 authorized) 75/27 Model 06 guns as of 22 Aug)
    - 3rd Motorized Artillery Battery (assigned 4 (4 authorized) 75/27 Model 06 guns as of 22 Aug)
  - V Motorized Anti-Aircraft Artillery Battalion (not on-hand as of 23 Oct)
    - 1st Motorized Anti-Aircraft Artillery Battery (4 authorized 88/55 AA/AT guns)
    - 2nd Motorized Anti-Aircraft Artillery Battery (4 authorized 88/55 AA/AT guns)
    - 3rd Motorized Anti-Aircraft Artillery Battery (4 authorized 88/55 AA/AT guns)
  - 77th Motorized Anti-Aircraft Artillery Battery (assigned 6 20mm guns (8 authorized) as of 22 Aug)
  - 432nd Motorized Anti-Aircraft Artillery Battery (assigned 8 20mm guns (8 authorized) as of 22 Aug)
- 18th (17th ?) Semi-Motorized Mixed Engineer Battalion (*battaglione del genio e di collegamenti*)
  - 46th Semi-Motorized Engineer Company (assigned 5/83 as of 1 Aug)
  - 17th Semi-Motorized Engineer Communications Company (assigned 1/104 as of 1 Aug)
- 21st Medical Company (Semi-Motorized)
- 3rd Motorized Administration Company

27th Brescia Infantry Division (Gen Brunetto Brunetti replaced Gen Alessandro Predieri, KIA mine 13 Oct, assigned 214/3880 as of 22 Aug, authorized 7,000 men, 72 anti-tank guns, 72 AT rifles, 60 artillery pieces, 16 light AA guns, 146 light mortars, (rifle grenade launchers? Fucili mtr), 18 medium mortars, 92 MGs, 142 trucks, 72 tractors (prime movers), 35 miscellaneous vehicles, 147 motorcycles)

- 19th Infantry Regiment (68/1067assigned as of 22 Aug)
  - I Infantry Battalion (assigned 4 companies with a total of 11 47/32 AT guns (12 authorized), 7 20mm AT rifles (12 authorized), 11 HMGs (12 authorized), 24 LMGs (24 authorized) as of 22 Aug)
  - II Infantry Battalion (assigned 4 companies with a total of 11 47/32 AT guns (12 authorized), 7 20mm AT rifles (12 authorized), 13 HMGs (12 authorized), 25 LMGs(24 authorized), as of 22 Aug)
  - III Infantry Battalion (authorized 4 companies with a total of 12 47/32 AT guns, 12 20mm AT rifles, 12 HMGs, 24 LMGs, not on-hand as of 22 Aug)
  - one mortar company (assigned 9 81mm mortars (9 authorized) as of 22 Aug)
- 20th Infantry Regiment (82/1365 assigned as of 22 Aug)
  - I Infantry Battalion (assigned 4 companies with a total of 8 47/32 AT guns (12 authorized), 10 20mm AT rifles (12 authorized), 12 HMGs (12 authorized), 24 LMGs (24 authorized) as of 22 Aug)
  - II Infantry Battalion (assigned 4 companies with a total of 12 47/32 AT guns (12 authorized), 7 20mm AT rifles (12 authorized), 12 HMGs (12 authorized), 19 LMGs (24 authorized) as of 22 Aug)
  - III Infantry Battalion (assigned 4 companies with a total of no 47/32 AT guns (12 authorized), 3 20mm AT rifles (12 authorized), 7 HMGs (12 authorized), 20 LMGs (24 authorized), as of 22 Aug)
  - one mortar company (authorized 9 81mm mortars, not on-hand as of 22 Aug)
- 1st Celere Artillery Regiment (50/1105 assigned as of 22 Aug)
  - I Motorized Artillery Battalion (authorized 12 100/17 Model 14 howitzers in three batteries of four)
    - 1st Motorized Artillery Battery (assigned 4 (4 authorized) 100/17 Model 14 howitzers as of 22 Aug)
    - 2nd Motorized Artillery Battery (assigned 4 (4 authorized) 100/17 Model 14 howitzers as of 22 Aug)
    - 3rd Motorized Artillery Battery (assigned 4 (4 authorized) 100/17 Model 14 howitzers as of 22 Aug)
  - II Motorized Artillery Bn (authorized 12 100/17 Model 14 howitzers in three batteries of four, not on-hand as of 23 Oct?)
    - 1st Motorized Artillery Battery (4 authorized 100/17 howitzers)
    - 2nd Motorized Artillery Battery (4 authorized 100/17 howitzers)
    - 3rd Motorized Artillery Battery (4 authorized 100/17 howitzers)
  - III Motorized Artillery Battalion (3rd/1st Light Eugenio di Savona?, in support of the Folgore Division)
    - 1st Motorized Artillery Battery (assigned 4 (4 authorized) 75/27 Model 06 guns as of 22 Aug)
    - 2nd Motorized Artillery Battery (assigned 4 (4 authorized) 75/27 Model 06 guns as of 22 Aug)
    - 3rd Motorized Artillery Battery (assigned 4 (4 authorized) 75/27 Model 06 guns as of 22 Aug)
  - IV Motorized Artillery Battalion
    - 1st Motorized Artillery Battery (assigned 4 (4 authorized) 75/27 Model 06 guns as of 22 Aug)
    - 2nd Motorized Artillery Battery (assigned 4 (4 authorized) 75/27 Model 06 guns as of 22 Aug)
    - 3rd Motorized Artillery Battery (assigned 4 (4 authorized) 75/27 Model 06 guns as of 22 Aug)
  - V Motorized Anti-Aircraft Artillery Battalion
    - 1st Motorized Artillery Battery (assigned 4 (4 authorized) 88/55 AA/AT guns as of 22 Aug)
    - 2nd Motorized Artillery Battery (assigned 4 (4 authorized) 88/55 AA/AT guns as of 22 Aug)
    - 3rd Motorized Artillery Battery (assigned 4 (4 authorized) 88/55 AA/AT guns as of 22 Aug)
  - 401st Anti-Aircraft Artillery Battery (authorized 8 20mm AA guns)
  - 404th Anti-Aircraft Artillery Battery (authorized 8 20mm AA guns)
- 26th Semi-Motorized Mixed Engineer Battalion (*battaglione del genio e di collegamenti*) (assigned 14/343 as of 22 Aug of 522 authorized)
  - 52nd Semi-Motorized Engineer Company
  - 27th Semi-Motorized Communications Company
- 34th Semi-Motorized Medical Company
- 34th Motorized Administration Company

185th Folgore Parachute Division (Gen Enrico Frattini, assigned 369/4006 as of 22 Aug, II/28th Pavia attached?, 31st Sappers attached?) update based on 22 AUG OB)

185th Parachute Infantry Regiment (82/962 available in two battalions) (regimental headquarters not available as of 23 Oct?)

186th Parachute Infantry Regiment (COL Tantillo, 125/1394 available in three battalions)
- Headquarters Detachment
- 5th Parachute Infantry Battalion (authorized three companies with a total of 3 47/32 AT guns, 6 20mm Soluthurn AT rifles, 10 HMGs and 60 LMGs, assigned 13th, 14th & 15th Parachute Infantry Companies as of Aug, not on-hand as of 22 Aug? see 2nd battalion)
- 6th Parachute Infantry Battalion (authorized three companies with a total of 3 47/32 AT guns, 6 20mm Soluthurn AT rifles, 10 HMGs and 60 LMGs, assigned 16th, 17th & 18th Parachute Infantry Companies as of Aug)
- 186th Anti-Tank Company (authorized two platoons of 4 47/32 AT guns each)

187th Parachute Infantry Regiment (COL Bechi Luserna replaced COL Camorosso, WIA, 82/962 available in three battalions)
- Headquarters Detachment
- 2nd Parachute Infantry Battalion (authorized three companies with a total of 3 47/32 AT guns, 6 20mm Soluthurn AT rifles, 10 HMGs and 60 LMGs, assigned 4th, 5th & 6th Parachute Infantry Companies as of Aug)
- 4th Parachute Infantry Battalion (authorized three companies with a total of 3 47/32 AT guns, 6 20mm Soluthurn AT rifles, 10 HMGs and 60 LMGs, assigned 12th, 13th & 14th Parachute Infantry Companies as of Aug? see 5th battalion)
- 9th Parachute Infantry Battalion (authorized three companies with a total of 3 47/32 AT guns, 6 20mm Soluthurn AT rifles, 10 HMGs and 60 LMGs, assigned 25th, 26th & 27th Parachute Infantry Companies as of Aug, not on-hand as of 22 Aug)
- 10th Parachute Infantry Battalion (authorized three companies with a total of 3 47/32 AT guns, 6 20mm Soluthurn AT rifles, 10 HMGs and 60 LMGs, assigned 28th, 29th & 30th Parachute Infantry Companies as of Aug, not on hand on 23 Oct?)
- 187th Anti-Tank Company (authorized two platoons of 4 47/32 AT guns each)

Ruspoli Group
- 7th Parachute Infantry Battalion (authorized three companies with a total of 3 47/32 AT guns, 6 20mm Soluthurn AT rifles, 10 HMGs and 60 LMGs, assigned 19th, 20th & 21st Parachute Infantry Companies as of Aug)
- 8th Parachute (?) Combat Engineer Battalion (*battaglione guastatori*) (attached, assigned 22/237 as of 22 Aug, authorized 18/630 in the line companies)
- battalion headquarters
- 22nd Parachute (?) Combat Engineer Company (authorized 6/210)
  - headquarters section (authorized 2/19)
  - three combat engineer platoons (3/144 total authorized)
  - one labor platoon (authorized 1/47)
  - MT (Motor Transportation?) Park (authorized a headquarters, and one section each for the company headquarters, labor platoon, and each combat engineer platoon)
- 23rd Parachute (?) Combat Engineer Company (authorized 6/210)
  - headquarters section (authorized 2/19)
  - three combat engineer platoons (3/144 total authorized)
  - one labor platoon (authorized 1/47)
  - MT (Motor Transportation?) Park (authorized a headquarters, and one section each for the company headquarters, labor platoon, and each combat engineer platoon)
- 24th Parachute (?) Combat Engineer Company (authorized 6/210)
  - headquarters section (authorized 2/19)
  - three combat engineer platoons (3/144 total authorized)
  - one labor platoon (authorized 1/47)
  - MT (Motor Transportation?) Park (authorized a headquarters, and one section each for the company headquarters, labor platoon, and each combat engineer platoon)

185th Parachute Artillery Regiment (assigned 58/451 as of 22 Aug)
- 1st Parachute Artillery Battalion
  - 1st Parachute Artillery Battery (assigned 4 (4 authorized) 47/32 guns as of 22 Aug)
  - 2nd Parachute Artillery Battery (assigned 4 (4 authorized) 47/32 guns as of 22 Aug)
- 2nd Parachute Artillery Battalion
  - 3rd Parachute Artillery Battery (assigned 4 (4 authorized) 47/32 guns as of 22 Aug)
  - 4th Parachute Artillery Battery (assigned 4 (4 authorized) 47/32 guns as of 22 Aug)
- 3rd Parachute Artillery Battalion (authorized, not on-hand as of 22 Aug)
  - 5th Parachute Artillery Battery (authorized 4 47/32 guns)
  - 6th Parachute Artillery Battery (authorized 4 47/32 guns)
- III Motorized Artillery Battalion (3rd/1st Light Eugenio di Savona?, in support of the Folgore Div, from the Brescia Div)
  - 1st Motorized Artillery Battery (assigned 4 (4 authorized) 75/27 Model 06 guns as of 22 Aug)
  - 2nd Motorized Artillery Battery (assigned 4 (4 authorized) 75/27 Model 06 guns as of 22 Aug)
  - 3rd Motorized Artillery Battery (assigned 4 (4 authorized) 75/27 Model 06 guns as of 22 Aug)
- I/21st Motorized Artillery Battalion (attached from 101st Trieste Div., authorized 21/808, 12 100/17 howitzers & 6 HMGs)
  - 1st Motorized Artillery Battery (assigned 4 (4 authorized) 100/17 howitzers as of 22 Aug)
  - 2nd Motorized Artillery Battery (assigned 4 (4 authorized) 100/17 howitzers as of 22 Aug)
  - 3rd Motorized Artillery Battery (assigned 4 (4 authorized) 100/17 howitzers as of 22 Aug)

146th Motorized Anti-Aircraft Artillery Battery (assigned 8 (Christian-5?) 20mm guns (8 authorized) as of 22 Aug, in support of I Bn/21st Artillery?)

III Motorized Artillery Battalion, 26th Motorized Rubicone Artillery Regiment, 17th Pavia Infantry Division (in support of the Folgore Division)
- 1st Motorized Artillery Battery (assigned 4 (4 authorized) 75/27 Model 06 guns as of 22 Aug)
- 2nd Motorized Artillery Battery (assigned 4 (4 authorized) 75/27 Model 06 guns as of 22 Aug)
- 3rd Motorized Artillery Battery (assigned 4 (4 authorized) 75/27 Model 06 guns as of 22 Aug)

IV Motorized Artillery Battalion, 26th Motorized Rubicone Artillery Regiment, 17th Pavia Infantry Division (in support of the Folgore Division)
- 1st Motorized Artillery Battery (assigned 4 (4 authorized) 75/27 Model 06 guns as of 22 Aug)
- 2nd Motorized Artillery Battery (assigned 4 (4 authorized) 75/27 Model 06 guns as of 22 Aug)
- 3rd Motorized Artillery Battery (assigned 4 (4 authorized) 75/27 Model 06 guns as of 22 Aug)
- 411th Motorized AA Artillery Battery (attached from 101st Trieste Div., assigned 5 20mm guns (8 authorized) as of 22 Aug)

I/3rd Motorized Artillery Battalion (Light Duca D'Aosta, from the Sabratha?, authorized 21/808, 12 100/17 howitzers & 6 HMGs)
- 1st Motorized Artillery Battery (assigned 4 (4 authorized) 100/17 howitzers as of 22 Aug)
- 2nd Motorized Artillery Battery (assigned 4 (4 authorized) 100/17 howitzers as of 22 Aug)
- 3rd Motorized Artillery Battery (assigned 4 (4 authorized) 100/17 howitzers as of 22 Aug)

20th Mortar Company (assigned 12 81mm mortars (12 authorized) as of 22 Aug)

185th Parachute Engineer Company

185th Signals Company

185th Mixed Carabinieri Section

260th Field Post Office

20th Supply Section

185th Transportation Detachment

185th Medical Detachment

XXI Italian Corps (General Alessandro Gloria (temporary) later Lieutenant General Enea Navarini?) (Senior Engineer COL Formica)
- 25th Bologna Division Gen Alessandro Gloria page I-34
- 102nd Trento Division, Gen Giorgio Masina page I-35
- "Corps troops" (assigned 70/1491 as of 22 Aug, another source says 3,700 as of late Aug)
  - 7th Motorized Bersaglieri Regiment (COL Scirocco, assigned 25/579 as of 22 Aug)
    - X Motorized Bersaglieri Battalion (assigned 4 companies with 8 47/32 AT guns, 3 20mm AT Rifles, 8 HMGs, 19 LMGs as of 22 Aug)
    - XI Motorized Bersaglieri Battalion (assigned 1 company with 2 47/32 AT guns, 2 20mm AT Rifles, 2 HMGs, 6 LMGs, as of 22 Aug)
  - XVI Tank Battalion (authorized three companies with 52 medium tanks, not on-hand as of 22 Aug)
  - 8th Motorized Artillery Regiment (Raggruppamento, assigned 45/1212 as of 22 Aug) [22]
    - LII (Motorized) Artillery Battalion
      - 1st Motorized Artillery Battery (assigned 2 152/37 guns as of 22 Aug)
      - 2nd Motorized Artillery Battery (not on-hand as of 22 Aug)
    - XXXIII (Motorized) Artillery Battalion (authorized 12 149/40 guns, in three batteries of 4 guns as of 22 Aug)
      - 1st Motorized Artillery Battery (assigned 3 149/40 guns as of 22 Aug)
      - 2nd Motorized Artillery Battery (assigned 2 149/40 guns as of 22 Aug)
      - 3rd Motorized Artillery Battery (assigned 4 149/40 guns as of 22 Aug)
    - CXXXI (Motorized) Artillery Battalion (authorized 12 Krupp 149/28 guns, in three batteries of 4 guns)
      - 1st Motorized Artillery Battery (assigned 3 Krupp 149/28 guns as of 22 Aug)
      - 2nd Motorized Artillery Battery (assigned 2 Krupp 149/28 guns as of 22 Aug)
      - 3rd Motorized Artillery Battery (authorized 4 149/28 guns, not on-hand as of 22 Aug)
    - 254th Artillery Battalion (detached to the Trento Division, sometimes identified as the 354th Artillery Battalion, authorized 12 77/28 guns, in three batteries of 4 guns)
      - 1st Artillery Battery (assigned 4 77/28 guns as of 22 Aug)
      - 2nd Artillery Battery (assigned 4 77/28 guns as of 22 Aug)
      - 3rd Artillery Battery (authorized 4 77/28 guns, not on-hand as of 22 Aug)
    - 355th Artillery Battalion (detached to the Trento Division, sometimes identified as the 357th Artillery Battalion, authorized 12 77/28 guns, in three batteries of 4 guns)
      - 1st Artillery Battery (assigned 4 77/28 guns as of 22 Aug)
      - 2nd Artillery Battery (assigned 4 77/28 guns as of 22 Aug)
      - 3rd Artillery Battery (assigned 4 77/28 guns, as of 22 Aug)
    - 91st Anti-Aircraft Artillery Battery
  - XXVII Motorized Engineer Mechanics Battalion (*battaglione del genio artieri*)
    - 1st Motorized Engineer Mechanics Company (assigned 4/96 as of 1 Aug)
    - 2nd Motorized Engineer Mechanics Company (assigned 4/115 as of 1 Aug)
  - LXV Motorized Engineer Communications Battalion (*Genio Collegamenti*)
    - 127th Motorized Telephone Company
    - 113th Motorized Radio Company
  - one supply battalion
    - one 60 cubic meter water transport column
    - one 50 cubic meter POL transport column
    - one 30 ton motorized transport column
  - one motorized ambulance platoon
  - one motorized administration company

XXI CORPS STRENGTH

		Bologna	Trento	Corps Troops	Corps Total
Personnel*		4,000	4,615	3,700	10,176
Infantry Battalions		6	6	2	14
Artillery	75/27 Guns	23	24	-	47
	77/28 Guns	-	-	-	-
	100/17 Howitzers	24	14	-	38
	149/28 Guns	-	-	5	5
	149/40 Guns	-	-	9	9
	152/37 Guns	-	-	2	2
	TOTAL	47	62	16	125
Anti-Tank Artillery	47/32 AT Guns	72	39*	-	111
Anti-Tank Rifles	20mm Soluthurn AT Rifle	69	52	5	126
Anti-Aircraft Artillery	88/55 AA/AT Guns	-	-	-	-
	20mm	-	2	-	2
	TOTAL	-	2	-	2
Engineer Companies		1	1	-	2

* Strength of attached 4th Antitank Battalion not available/included

[22] See the order of battle for the 164th *Leicht Afrika* Division in this appendix (page I-15) for the task organization of the XXI Corps artillery at the beginning of the Second Battle of El Alamein.

25th Bologna Division (GEN Alessandro Gloria (also acting commander for the XXI Corps), assigned 206/3794 as of 22 Aug, authorized 7,000 men, 72 anti-tank guns, 72 AT rifles, 60 artillery pieces, 16 light AA guns, 146 light mortars, (rifle grenade launchers? "*Fucili mtr*"), 18 medium mortars, 92 MGs, 142 trucks, 72 tractors (prime movers), 35 miscellaneous vehicles, 147 motorcycles)

- 39th Infantry Regiment (assigned 74/1588 as of 22 Aug)
  - I Battalion (assigned 4 companies with a total of 12 47/32 AT guns, 12 20mm AT rifles, 12 HMGs, 24 LMGs as of 22 Aug)
  - II Battalion (assigned 4 companies with a total of 12 47/32 AT guns, 12 20mm AT rifles, 12 HMGs, 24 LMGs as of 22 Aug)
  - III Battalion (CPT Attilio Caimi, assigned 4 companies with a total of 12 47/32 AT guns, 12 20mm AT rifles, 12 HMGs, 24 LMGs as of 22 Aug)
  - one mortar company (assigned 9 81mm mortars as of 22 Aug)
- 40th Infantry Regiment (LTC Arrigo Dall'Olio, assigned 65/1162 as of 22 Aug)
  - I Battalion (assigned 4 companies with a total of 12 47/32 AT guns, 11 20mm AT rifles, 13 HMGs, 28 LMGs as of 22 Aug)
  - II Battalion (assigned 4 companies with a total of 12 47/32 AT guns, 10 20mm AT rifles, 15 HMGs, 28 LMGs as of 22 Aug)
  - III Battalion (assigned 4 companies with a total of 12 47/32 AT guns, 12 20mm AT rifles, 12 HMGs, 24 LMGs as of 22 Aug)
  - one mortar company (not on-hand as of 22 Aug)
- 205th Motorized Artillery Regiment (assigned 67/1044 as of 22 Aug)
  - I Motorized Artillery Battalion (authorized 12 100/17 Model 14 Howitzers in three batteries of 4 howitzers)
    - 1st Motorized Artillery Battery (assigned 4 100/17 Model 14 Howitzers as of 22 Aug)
    - 2nd Motorized Artillery Battery (assigned 4 100/17 Model 14 Howitzers as of 22 Aug)
    - 3rd Motorized Artillery Battery (assigned 4 100/17 Model 14 Howitzers as of 22 Aug)
  - II Motorized Artillery Battalion (LTC Fatiganti, authorized 12 100/17 Model 14 Howitzers in three batteries of 4 howitzers)
    - 1st Motorized Artillery Battery (assigned 4 100/17 Model 14 Howitzers as of 22 Aug)
    - 2nd Motorized Artillery Battery (assigned 4 100/17 Model 14 Howitzers as of 22 Aug)
    - 3rd Motorized Artillery Battery (assigned 4 100/17 Model 14 Howitzers as of 22 Aug)
  - III Motorized Artillery Battalion (this may be the CCCLVII Motorized Artillery Battalion, authorized 12 75/27 guns in three batteries of 4 howitzers)
    - 1st Motorized Artillery Battery (assigned 4 75/27 guns as of 22 Aug)
    - 2nd Motorized Artillery Battery (assigned 4 75/27 guns as of 22 Aug)
    - 3rd Motorized Artillery Battery (assigned 4 75/27 guns as of 22 Aug)
  - IV Motorized Artillery Battalion (this may be the CCCLVII Motorized Artillery Battalion, authorized 12 75/27 guns in three batteries of 4 howitzers)
    - 1st Motorized Artillery Battery (assigned 4 75/27 guns as of 22 Aug)
    - 2nd Motorized Artillery Battery (assigned 4 75/27 guns as of 22 Aug)
    - 3rd Motorized Artillery Battery (assigned 3 75/27 guns as of 22 Aug)
  - V Motorized Anti-Aircraft Artillery Battalion (authorized 12 88/55 AA/AT guns in three batteries of 4 howitzers, not on-hand as of 23 Oct)
    - 1st Motorized Anti-Aircraft Artillery Battery (authorized 4 88/55 AA/AT guns)
    - 2nd Motorized Anti-Aircraft Artillery Battery (authorized 4 88/55 AA/AT guns)
    - 3rd Motorized Anti-Aircraft Artillery Battery (authorized 4 88/55 AA/AT guns)
  - 4th Motorized Anti-Aircraft Artillery Battery (20mm, not on-hand as of 22 Aug?)
  - 437th Motorized Anti-Aircraft Artillery Battery (20mm, not on-hand as of 22 Aug?)
- 25th Semi-Motorized Mixed Engineer Battalion (*battaglione del genio e di collegamenti*, including one company (62nd?) of combat engineers (*Guastatori*), under control of *Panzerarmee*? Nofziger)
  - 63rd Semi-Motorized Engineer Company
  - 25th Semi-Motorized Communications Company
- 24th Semi-Motorized Medical Company
- 17th Motorized Administration Company

102nd Trento Division (Gen Giorgio Masina replaced Gen Scotti, assigned 252/4363, authorized 7,000 men, 72 anti-tank guns, 72 AT rifles, 60 artillery pieces, 16 light AA guns, 146 light mortars, (rifle grenade launchers? Fucili mtr), 18 medium mortars, 92 MGs, 142 trucks, 72 tractors (prime movers), 35 miscellaneous vehicles, 147 motorcycles)

- 61st Infantry Regiment (COL Menzio)(from Sicily, assigned 86/1423 as of 22 Aug)
  - I Battalion (assigned 4 companies with a total of 8 47/32mm AT guns, 9 20mm AT rifles, 12 HMGs, 26 LMGs as of 22 Aug)
  - II Battalion (assigned 4 companies with a total of 7 20mm AT rifles, 12 HMGs, 26 LMGs as of 22 Aug)
  - III Battalion (CPT Attilio Caimi, assigned 4 companies with a total of 6 47/32mm AT guns, 9 20mm AT rifles, 8 HMGs, 24 LMGs as of 22 Aug)
  - one mortar company (assigned 12 81mm mortars as of 22 Aug)
- 62nd Infantry Regiment (from Sicily, assigned 90/1521 as of 22 Aug)
  - I Battalion (MAJ Vavassori, assigned 4 companies with a total of 7 47/32mm AT guns, 10 20mm AT rifles, 11 HMGs, 27 LMGs as of 22 Aug)
  - II Battalion (CPT Manassei, assigned 4 companies with a total of 10 47/32mm AT guns, 8 20mm AT rifles, 11 HMGs, 24 LMGs as of 22 Aug)
  - III Battalion (MAJ Perotti, assigned 4 companies with a total of 8 47/32mm AT guns, 9 20mm AT rifles, 8 HMGs, 24 LMGs as of 22 Aug)
  - one mortar company (assigned 13 81mm mortars as of 22 Aug)
- 46th Motorized Artillery Regiment (assigned 64/1096 as of 22 Aug) [23]
  - I Motorized Artillery Battalion (authorized 12 100/17 Model 14 howitzers in three batteries of 4 howitzers)
    - 1st Motorized Artillery Battery (assigned 4 100/17 Model 14 Howitzers as of 22 Aug)
    - 2nd Motorized Artillery Battery (assigned 4 100/17 Model 14 Howitzers as of 22 Aug)
    - 3rd Motorized Artillery Battery (not on-hand as of 22 Aug)
  - II Motorized Artillery Battalion (authorized 12 100/17 Model 14 howitzers in three batteries of 4 howitzers)
    - 1st Motorized Artillery Battery (assigned 3 100/17 Model 14 Howitzers as of 22 Aug)
    - 2nd Motorized Artillery Battery (assigned 3 100/17 Model 14 Howitzers as of 22 Aug)
    - 3rd Motorized Artillery Battery (assigned 3 100/17 Model14 Howitzers as of 22 Aug)
  - III Motorized Artillery Battalion (authorized 12 75/27 guns in three batteries of 4 howitzers)
    - 1st Motorized Artillery Battery (assigned 4 75/27 guns as of 22 Aug)
    - 2nd Motorized Artillery Battery (assigned 4 75/27 guns as of 22 Aug)
    - 3rd Motorized Artillery Battery (assigned 4 75/27 guns as of 22 Aug)
  - IV Motorized Artillery Battalion (authorized 12 75/27 Model 06 Guns in three batteries of 4 howitzers)
    - 1st Motorized Artillery Battery (assigned 3 75/27 Model 06 Guns as of 22 Aug)
    - 2nd Motorized Artillery Battery (assigned 3 75/27 Model 06 Guns as of 22 Aug)
    - 3rd Motorized Artillery Battery (assigned 3 75/27 Model 06 Guns as of 22 Aug)
  - V Motorized Anti-Aircraft Artillery Battalion (authorized 12 88/55 AA/AT guns in three batteries of 4 guns, not on-hand as of 23 Oct)
    - 1st Motorized Artillery Battery (authorized 4 88/55 AA/AT guns)
    - 2nd Motorized Artillery Battery (authorized 4 88/55 AA/AT guns)
    - 3rd Motorized Artillery Battery (authorized 4 88/55 AA/AT guns)
  - 254th Artillery Battalion (attached from XXI Corps, sometimes identified as the 354th Artillery Battalion, authorized 12 77/28 guns, in three batteries of 4 guns)
    - 1st Artillery Battery (assigned 4 77/28 guns as of 22 Aug)
    - 2nd Artillery Battery (assigned 4 77/28 guns as of 22 Aug)
    - 3rd Artillery Battery (authorized 4 77/28 guns, not on-hand as of 22 Aug)
  - 355th Artillery Battalion (attached from XXI Corps, sometimes identified as the 357th Artillery Battalion (both shown on maps!), authorized 12 77/28 guns, in three batteries of 4 guns)
    - 1st Artillery Battery (assigned 4 77/28 guns as of 22 Aug)
    - 2nd Artillery Battery (assigned 4 77/28 guns as of 22 Aug)
    - 3rd Artillery Battery (assigned 4 77/28 guns, as of 22 Aug)
  - 412th Motorized Anti-Aircraft Artillery Battery (assigned 2 20mm AA guns as of 22 Aug)
  - 414th Motorized Anti-Aircraft Artillery Battery (20mm, not on-hand as of 22 Aug?)
- 51st Semi-Motorized Mixed Engineer Battalion (*battaglione del genio e di collegamenti*) (CPT Alberti, assigned 12/323 as of 22 Aug)
  - 15th Semi-Motorized Engineer Company
  - 96th Semi-Motorized Communications Company
- 4th Antitank Battalion (Granatieri di Sardegna) (MAJ Buraggine, attached)
- 51st Semi-Motorized Medical Company
- 51st Motorized Administration Company

[23] See the order of battle for the 164th *Leicht Afrika* Division in this appendix (page I-15) for the task organization of the Trento Division's artillery at the beginning of the Second Battle of El Alamein.

Panzerarmee Afrika Troops (325/9,711 assigned as of 22 Aug, another source states about 25,000 by late Aug, not including 104th ARKO and XIX Flak Division)

Stab der Armee (Armeeoberkommando)
Brigade Stab z.b.V. (mot) 15

Kampfgruppe Kiehl (17/416 as of 22 Aug)
- one staff section
- one panzer company (assigned 10 captured Stuart Light Tanks and 2 captured MKVI light tanks)
- one panzerjager company (assigned 3 5cm Pak 38, 5 5.7cm (c) (captured 6-pdr), 8 20mm Flak guns)
- one battery (assigned 6 8.75 cm (c) guns (captured 25-pdrs))

Giovani Fascisti Division (Gen Ismaele Di Nision)
- Giovani Fascisti Regiment (of two battalions)
- 136th Italian Artillery Regiment (Italian Senior Artillery Commander Mancadi Mores)
  - 14th Battalion (3 batteries of 65/17mm guns)
  - 15th Battalion (3 batteries of 65/17mm guns)
  - 16th Battalion (3 batteries of 65/17mm guns)
  - 17th Battalion (2 batteries of 100/17mm howitzers)
  - 88th Anti-Aircraft Battery (20mm)
  - one AT battalion

15th Italian Engineer Battalion
9th Independent Infantry Battalion
8th Bersaglieri Regiment (not on-hand, did not arrive until December)
3rd Battalion of Monferrato Armored Car Regiment (19 armored cars assigned, did not arrive until December)
707th Artillery Company (attached to 15th Panzer Division)
706th Artillery Company (attached to 21st Panzer Division)
13th Company, Lehr-Regiment "Brandenburg" 800

104th Army Artillery Command (*Generalmajor* Weber, combat strength 2,331 of ration strength of 3,069 as of 20 OCT 42. The command was reorganized on 23 SEP 42 with all equipment data as of that date. However, it would appear that the old unit designations still frequently appeared on maps and in correspondence.) [24]
- 1st Afrika Artillery Regiment (headquarters formed from the 221st Artillery Regiment)
  - I Battalion (headquarters formed from II Battalion, 115th Artillery Regiment, assigned one 30 ton transport Column)
    - 1st Battery (equipped with four 8.76 cm guns (captured British 25 pounders), formerly 3rd Battery, 533rd Artillery Battalion)
    - 2nd Battery (equipped with four 10 cm K18 guns, formerly 3rd Battery, 408th Artillery Battalion)
    - 3rd Battery (equipped with three 21 cm Mrs 18 howitzers, formerly 6th Battery, II Battalion, 115th Artillery Regiment)
  - II Battalion (headquarters formed from the 533rd Artillery Battalion)
    - 4th Battery (equipped with four 8.76 cm guns (captured British 25 pounders), formerly 1st Battery, 533rd Artillery Battalion)
    - 5th Battery (equipped with four 10 cm K18 guns, formerly 2nd Battery, 408th Artillery Battalion)
    - 6th Battery (equipped with three 21 cm Mrs 18 howitzers, formerly 5th Battery, II Battalion, 115th Artillery Regiment)
  - III Battalion (headquarters formed from the 408th Artillery Battalion, assigned one 30 ton transport column, detached to 220th Artillery Regiment, 164th *Leicht Afrika* Division)
    - 7th Battery (equipped with three 8.76 cm guns (captured British 25 pounders), formerly 2nd Battery, 533rd Artillery Battalion)
    - 8th Battery (equipped with four 15 cm sFH18s, formerly 1st Battery, 408th Artillery Battalion)
    - 9th Battery (equipped with three 21 cm Mrs 18 howitzers, formerly 7th Battery, II Battalion, 115th Artillery Regiment)
    - 10th Battery (equipped with six 7.62 cm guns (captured Soviet guns), formerly the 364th Battery)
- 2nd Afrika Artillery Regiment (newly formed headquarters)
  - 1st Battery 612th Self Propelled Flak Battalion (assigned 11 2cm Flak guns, attached from XIX Luftwaffe Flak Division)
  - I Battalion (newly formed headquarters based on the 902nd Artillery Battery)
    - 1st Battery (equipped with three 17 cm K18 in Mrs Laf (?), formerly the 902nd Artillery Battery)
    - 2nd Battery (equipped with three 17 cm K18 in Mrs Laf (?), formerly the 4th Battery, 149th Artillery Battalion)
    - 3rd Battery (equipped with three 17 cm K18 in Mrs Laf (?), formerly the 362nd Artillery Battery, detached to 220th Artillery Regiment, 164th *Leicht Afrika* Division)
  - II Battalion (headquarters formed from the 528th Artillery Battalion, assigned 14/279)
    - 4th Battery (equipped with four 15.5 cm French guns, formerly 1st Battery, 528th Artillery Battalion)
    - 5th Battery (equipped with four 15.5 cm French guns, formerly 2nd Battery, 528th Artillery Battalion)

[24] See the order of battle for the 164th *Leicht Afrika* Division in this appendix (page I-15) for the task organization of some the 104th ARKO's artillery at the beginning of the Second Battle of El Alamein.

6th Battery (equipped with four 15.5 cm French guns, formerly 3rd Battery, 528th Artillery Battalion)
III Battalion (Schade, headquarters formed from the 523rd Artillery Battalion, assigned 17/303, detached to 220th Artillery Regiment, 164th *Leicht Afrika* Division)
7th Battery (equipped with three 11.4 cm guns (captured British 4.5 inch guns), formerly the 1st Battery, 523rd Artillery Battalion)
8th Battery (equipped with four 15.5 cm French guns, formerly 2nd Battery, 523rd Artillery Battalion)
9th Battery (equipped with four 15.5 cm French guns, formerly 3rd Battery, 523rd Artillery Battalion)
IV Battalion (headquarters formed from the 529th Artillery Battalion)
10th Battery (equipped with four 15cm K16 guns, formerly 1st Battery, 529th Artillery Battalion)
11th Battery (equipped with four 15cm K16 guns, formerly 2nd Battery, 529th Artillery Battalion)
12th Battery (equipped with four 15cm K16 guns, formerly 3rd Battery, 529th Artillery Battalion)
11th Artillery Observation Battalion
one motorized staff section
1st Motorized Battery (sound ranging)
2nd Motorized Battery (flash ranging)
621st Motorized Calibration Column
Vermessungs-Trupp (mot) 722-723-724-725

Luftwaffe 19th Flak Division (commanded by *Generalmajor* Heinrich Burckhardt (since 15 August 1942) with his Ia Major Wilhelm Peter Sieber, combat strength 4,384 of ration strength 6,302 as of 20 OCT 42 of approximately 10,000 assigned, division headquarters did not arrive in Africa until Aug 42, all other data as of 22 Aug)
102nd Motorized Flak Regiment (commanded by *Oberst* Hans-Georg Nicolai since July 1942, arrived Aug 42)
1st Battalion, 43rd Flak Regiment
one signal company
1st Motorized Battery (assigned 3 8.8cm Flak guns)
2nd Motorized Battery (assigned 2 8.8cm Flak guns)
3rd Motorized Battery (assigned 3 8.8cm Flak guns)
4th Motorized Battery (assigned 7 2cm Flak and 1 2cm flakvierling)
5th Motorized Battery (assigned 7 2cm Flak and 1 2cm flakvierling)
one 30 ton transport column
1st Battalion, 53rd Flak Regiment
one signal company
1st Motorized Battery (assigned 2 8.8cm Flak guns)
2nd Motorized Battery (assigned 2 8.8cm Flak guns)
3rd Motorized Battery (assigned 4 8.8cm Flak guns)
4th Motorized Battery (assigned 9 2cm Flak and 3 2cm flakvierling)
5th Motorized Battery (assigned 9 2cm Flak and 3 2cm flakvierling)
one 30 ton transport column
1st Battalion, 33rd Flak Regiment
1st Battalion, 6th Flak Regiment
1st Motorized Battery (assigned 4 8.8cm Flak guns)
135th Motorized Flak Regiment (commanded by *Oberst* Alwin Wolz since 14 February 1942, arrived December 1941)
1st Battalion, 18th Motorized Flak Regiment
one signal company
1st Motorized Battery (assigned 4 8.8cm Flak guns)
2nd Motorized Battery (assigned 4 8.8cm Flak guns)
3rd Motorized Battery (assigned 3 8.8cm Flak guns)
4th Motorized Battery (assigned 4 2cm Flak guns)
5th Motorized Battery (assigned 10 2cm Flak guns)
one 30 ton transport column
2nd Battalion, 125th Motorized Flak Regiment
one signal company
1st Motorized Battery (assigned 4 8.8cm Flak guns)
2nd Motorized Battery (assigned 4 8.8cm Flak guns)
3rd Motorized Battery (assigned 3 8.8cm Flak guns)
4th Motorized Battery (assigned 12 2cm Flak guns)
5th Motorized Battery (assigned 12 2cm Flak guns)
one 30 ton transport column
Separate Flak Battalions
606th Self-Propelled Flak Battalion
1st Self-propelled Battery (assigned 12 2cm Flak guns)
2nd Self-propelled Battery (assigned 12 2cm Flak guns)
3rd Self-propelled Battery (assigned 10 2cm Flak guns)
609th Self-Propelled Flak Battalion (Laffetten noch nicht uberf (uberfahren?) carriages not yet across)
1st Self-propelled Battery (assigned 12 2cm Flak guns)
2nd Self-propelled Battery (assigned 12 2cm Flak guns)
3rd Self-propelled Battery (assigned 12 2cm Flak guns)
612th Self-Propelled Flak Battalion
2nd Self-propelled Battery (assigned 11 2cm Flak guns)
3rd Self-propelled Battery (assigned 11 2cm Flak guns)

4th Self-propelled Battery (assigned 12 2cm Flak guns)
617th Self-Propelled Flak Battalion
1st Self-propelled Battery (assigned 6 2cm Flak guns)
2nd Self-propelled Battery (assigned 62 2cm Flak guns)
3rd Self-propelled Battery (assigned 11 2cm Flak guns)

605th *Panzerjäger* Battalion (attached to 90th *Leicht Afrika* Division at the beginning of the Second Battle of El Alamein, combat strength 10/21/100 of ration strength 12/2/58/263 as of 20 Oct 42, authorized 27 47mm SP PAK guns (24 on-hand), 4 Pz Ib command tank (3 on-hand), Three self propelled companies (each authorized 3 medium motorcycles, 10 heavy motorcycles with sidecars, 2 Kfz 2, 2 Kfz 15, 8 lt trucks, 6 medium trucks, 1 Kgkw Sd 10, 1 Pz Ib 101 tank, 9 Pz Ib tanks with 47mm Czech guns), on-hand 6 Marder I (?))
Staff Company (authorized 3 medium motorcycles, 3 heavy motorcycles with sidecars, 4 Kfz 1, 5 Kfz 15, 1 Kfz 31, 5 lt trucks, 6 medium trucks, 1 Kfz 79, 1 equipment truck, 10 Ahn Sd 115 trailers, 2 Kfz 17, 1 medium command car, 1 Zgkw 10, 10 Zgkw 7, 1 Pz Ib Command Tank, 1 Heavy Machine Shop 24)
1st Company (assigned 6 4cm Pak (c) (captured 2-pdr) on a tank chassis(?) or towed? (as of 22 Aug))
2nd Company (assigned 11 4.7cm Pak (t) as of 22 Aug)
3rd Company (assigned 2 Marder I as of 22 Aug)
Signals Company

Engineer Troops (*Oberst* Hecker)
58th *Bau* (Construction Engineer) Battalion (*Hauptmann* Kaiser, assigned 25/138/1038 as of 30 July, of 35/193/1437 authorized)
Battalion staff (assigned 8/5/12 of 8/7/12 authorized)
No. 1 Company (assigned 3/23/182 of 4/27/231 authorized, working in Ghazal area)
No. 2 Company (assigned 3/25/177 of 4/27/231 authorized, working in Tobruk area)
No. 3 Company (assigned 3/24/184 of 4/27/231 authorized, working in Benghazi area)
No. 4 Company (assigned 2/23/170 of 4/27/231 authorized, working in Ghazal area)
778th Pioneer Landing Company (assigned 4/26/188 as of 21 July, authorized 9/62/344, equipped with 3 of 10 (authorized) Siebel Ferries, 12 of 6 SS Ferries, 3 of 2 Auboschlepper, 6 of 0 Flossack Ferries, 4 of 4 small landing boats, 1 Landwasserschlepper, and 4 of 12 large landing boats.)
one heavy construction column (assigned 2/12/105 as of 21 July of 2/16/157 authorized)
850th Pioneer Sturm Company (*Oberleutnant* Knees, detached to SV 288, 90th *Leicht Afrika* Division)
14th Italian Company Defense Engineers
twenty Italian labor companies (approx. 100 men each)

Signal Troops (*Oberst* Buchting)
10th Panzer Signals Regiment
1st Motorized Battalion
1st Motorized Company
2nd Panzer Radio Company
3rd Motorized Radio Company
one light signal transport column
2nd Motorized battalion
4th Motorized Telephone Construction Company
5th Motorized Wire Construction Company
6th Motorized Wire Construction Company
one light signal transport column
10th Signals Equipment Park
Propaganda Company Afrika
V. Heeres-Funkstelle
VII. Heeres-Funkstelle
XIII Heeres-Funkstelle
XVII. Heeres-Funkstelle
XVIII Heeres-Funkstelle
"Tripolis" Heeres-Funkstelle
Funk-Truppe z.b.V. "Afrika"

OTHER SUPPORT TROOPS

Armee-Kartenstelle (mot) 575
Stab Koluft Libyen (Kommandeur der Luftwaffe)
Aufklarungsstab 2 (Heer)/14.Panzer
Kurierstaffel
Nachrichten-Zug 937
Nachschub-Regiment (mot) 585
Stab Nachschub-Bataillon (mot) 619
Entlade-Stab z.b.V. (mot) 681
Stab Nachschub-Bataillon z.b.V. (mot) 792
Stab Nachschub-Bataillon z.b.V. (mot) 798
Nachschub-Bataillon (mot) 148 - Italian
Nachschub-Bataillon (mot) 149 - Italian
Nachschub-Bataillon (mot) 529
Nachschub-Bataillon (mot) 532
Nachschub-Bataillon (mot) 533
Nachschub-Bataillon (mot) 902
Nachschub-Bataillon (mot) 909
Kraftfahrzeuginstandsetzungs-Abteilung (mot) 548
Panzer-Berge-Zug (mot)
Reifenstaffel (mot) 13
Reifen und Ersatzteillager (mot) 548
Reifen Instandsetzungsstaffel (mot) 573
Kraftwagenwerkstatt-Zug (mot) 534
Volkswagen Kraftwagenwerkstatt-Zug (mot)

Bosch Kraftwagenwerkstatt-Zug (mot)
Munitionsverwaltung-Zug (mot) 542-543-544-545-546-547
Betriebsstoffuntersuchungs-Trupp (mot) 12
Heeres-Betriebsstoffverwaltungs-Zug (mot) 5
Betriebsstoffverwaltungs-Zug (mot) 979-980-981
Gerate-Verwaltungsdienste (mot)
Heeres-Kraftfahr-Park (mot) 560
Heeres-Kraftfahr-Park (mot) 566
Feldzeugdienst-Zug (mot) 1-2-3
1./Backerei-Kompanie (mot) 554
Schlachterei-Kompanie (mot) 445
Verpflegungsamt (mot) 445
Verpflegungsamt "Afrika" (mot)
Stab Kdt. V.A. 556
2./Sanitats-Kompanie (mot) 592
1./Krankentransport- Kompanie (mot) 705
"Tripolis"-Kriegslazarett (mot)
5./Kriegslazarett (mot) 542
Kriegslazarett (mot) 667
Leicht Kranken Kriegslazarett (mot)
Sanitatspark (mot) 531
Geheime Feldpolizei (mot)
Haupt-Streifendienste (mot)
Feldgendarmerie-rupp (mot)
Wach-Bataillon "Afrika"
Ortskommandant "Misurata" 615
Ortskommandant "Barce" 619
Ortskommandant "Tripolis" 958
Ortskommandant "Benghazi" 959
Ortskommandant "Derna"
Tripolis-Lager Kdr. (km 5)
Kriegsgefangen-Durchgangslager 782
Transport Standarte "Speer"
Feldpostamt z.b.V. (mot) 659
Feldpostamt z.b.V. (mot) 762
Feldpostamt z.b.V. (fur die Luftwaffe) (mot)
Feldpostamt z.b.V. anstelle Armee- Brief stelle (mot)

AXIS AIRPOWER[25]

Luftflotte 2: headquarters at Frascati near Rome, commanded by *Generalfeldmarschall* Albert Kesselring since 12 January 1940, with *Generalmajor* Paul Deichmann as Chief of Staff (since 25 August 1942) had 916 aircraft (of which only 528 were operational) in the entire Mediterranean Theatre) (In Outraged Skies, noted airpower historian Edward Jablonski (page 10) states, "*Kesselring on paper may have appeared to have an impressive array of air power at his disposal. But as Commander in Chief, South, the about 3000 planes under his command were dispersed quite tenuously throughout the vast Mediterranean and the Balkans. And the new Fliegerfuehrer Afrika* [*General der Flieger* Hans Seidemann since 30 August 1942 and located at Fuka]*, could count on little more than 600 of those rather widely scattered forces. On the eve of Montgomery's offensive he had about 380 fighters, of which most were Italian and only 165 Me-109Fs; he had about 150 bombers plus 75 Italian attack planes and a few seaplanes and reconnaissance aircraft. But of these only about half were operational, thanks in part to the disruption of Axis supply routes into north Africa by Allied air and sea effort.*")

II *Fliegerkorps*, commanded by *Generaloberst* Bruno Loerzer since 11 October 1939 and stationed at Taormina, with about 360 aircraft available (according to *La Regia Aeronautica, 1939-1943, Volume Terzo, 1942 L'Anno Della Speranza*: 35 Ju. 88s, 153 Bf 109 fighters, 27 Bf 109 fighter-bombers, 111 Ju. 87 Stukas, 18 Bf 110s, and 18 reconnaissance aircraft (a mix of FW 189s, Hs 126, and Bf 109fs), as well as about 40 support aircraft (medevac: Fi 156, Do. 17, Do. 24; Ju. 52 transports, W. 34 (communications), and FW 58 (liaison)). Of these, about 110 total aircraft were operational. However, The Italian Army Official History (*Le Operazioni in Africa Settentrionale, Vol. III-El Alamein*) reports 156 operational bombers and 58 operational fighters composed of four groups of ME-109s fighters and seven bomber groups, (six of JU-88s and one of HE-111s). This last source appears to include "cooperating" aircraft from X *Fliegerkorps*.

AXIS AIRCRAFT IN THE COMBAT ZONE*

	CLASS OF AIRCRAFT	UNITS	TOTAL (ON-HAND, NOT OPERATIONAL)
German (Combat aircraft)	Dive-Bombers	9 squadrons	95 aircraft
	Fighters	12 squadrons	125 aircraft
	Fighter-Bombers	9 squadrons	about 70 aircraft
	Reconnaissance	3 squadrons	29 aircraft
Subtotal (Combat aircraft)			About 320 aircraft
(thereof 50% operational)			160 aircraft
(support aircraft)	Desert rescue		10 aircraft
	Transport		15 aircraft
	Liaison		10 aircraft
	Courier		15 aircraft
Subtotal (support aircraft)			50 aircraft
Total (German)			370 aircraft
Italian	Fighters	1 wing	60 aircraft (30 operational)
	Fighter-Bombers	1 wing	60 aircraft (30 operational)
	Reconnaissance		10 aircraft (5 operational)
	Liaison		30 aircraft
	Transport		25 aircraft
Total (Italian)			185 aircraft (65 operational)
Axis Total			420 aircraft (155 operational)

* Includes eastern Cyrenaika (except Benghazi and Tripoli), does not include "cooperating" aircraft of the X *Fliegerkorps* since they seem to have played only a minor role in operations Ligthfoot and Supercharge.

[25] As noted earlier for the ground forces, the numbers in this and subsequent tables may not necessarily tally up. The best source on the German Luftwaffe's order of battle is at http://www.ww2.dk/ with an extensive bibliography at: http://www.ww2.dk/bibliography.htm . See also *La Regia Aeronautica, 1939-1943, Volume Terzo, 1942 L'Anno Della Speranza*, by Nino Arena, Stato Maggiore Aeronautica, Ufficio Storico, Rome, 1984, pages 227-233. Regia Aeronautica, Vol. 1, A Pictorial History of the Italian Air Force, 1940-1943, by Christopher Shores, ISBN 0-89747-060-5, Squadron/Signal Publications, 1976, page 43. *Le Operazioni in Africa Settentrionale, Vol. III-El Alamein*, by Mario Montanari, Official History, Rome, 1993, page 657. "The Campaign in North Africa 1941/3, Volume 2, The Campaign in the Year 1942," by *General der Panzertruppe* Walther Nehring, MS # T-3, Foreign Military Studies, Headquarters, US Army Europe, 1948, Anlage 12. *Die deutsche Luftwaffe im Afrika-Feldzug*, 1941-1943, by Werner Held and Ernst Obermaier, Motorbuch Verlag, Stuttgart, 1979. "*Der Einsatz der Luftflotte 2 (O.B. Sued) ab November 1941 bis zur alliierten Landung November 1942*," by *General der Flieger* Hans Seidemann, MS # D-160, Foreign Military Studies, Headquarters, US Army Europe, 10 April 1947, pages 41, 42. "The Luftwaffe in Libya and Cyrenaica, (Oct-Nov 1942)," by *Generalmajor* Hans-Joachim Rath, MS # D-123, German title: "*Der Einsatz der Luftwaffe im Rueckwaertigen Gebiet Libyen-Cyrenaika Oktober/November 1942*," Foreign Military Studies, Headquarters, US Army Europe, pages 3, 4. Outraged Skies, by Edward Jablonski, contained in Airwar, Doubleday & Company, Garden City, New York, 1971, page 10, lists *General der Luftwaffe* Hoffman von Waldau as the new *Fliegerfuehrer Afrika,* however, it would appear that he only held this position from 12 April to 30 August 1942 when he became the commander of X *Fliegerkorps* and was replaced by *General der Flieger* Hans Seidemann. See also Desert Warfare: German Experiences in World War II, Alfred Toppe, Combat Studies Institute, US Army Command and General Staff College, Fort Leavenworth, Kansas, August 1991, page 27.

Jagdgeschwader 27 (92 Bf 109 fighters (including 4 with the headquarters) commanded by *Oberstleutnant* Eduard Neumann since 10 June 1942, headquarters at based at Mumin Busak)

I. Gruppe (18 Bf 109F and 5 Bf 109G fighters as of 1 October 1942, commanded by *Hauptmann* Gerhard Homuth since 8 June 1942, based at Pachinothis unit included Hans-Joachim Marseille, an "ACE" with 158 kills, which died in an air crash on 30 September 1942)

1st Squadron
2nd Squadron
3rd Squadron

II. Gruppe (35 Bf 109F fighters as of 1 October 1942, commanded by *Hauptmann* Gustav Rödel since 20 May 1942, based at Quotaifiya)

4th Squadron
5th Squadron
6th Squadron

III. Gruppe (30 Bf 109F fighters as of 1 October 1942, *Hauptmann* Ernst Düllberg since 11 October 1942, based at Turbiya)

7th Squadron
8th Squadron
9th Squadron

Sturzkampfgeschwader 3 (95 Ju-87s (including 3 assigned to the headquarters) as of 1 October 1942, commanded by *Oberstleutnant* Walter Siegel since 1 September 1942, headquarters at Haggag el Qasaba)

I. Gruppe (32 Ju-87Ds as of 1 October 1942, commanded by Major Herbert Spangenberg since July 1942, based at Haggag el Quasaba)

1st Squadron
2nd Squadron
3rd Squadron

II. Gruppe (28 Ju-87Ds as of 1 October 1942, commanded by *Hauptmann* Heinrich Heine since July 1942 based at Haggag el Quasaba South or Elmas)

4th Squadron
5th Squadron
6th Squadron

III. Gruppe (32 Ju-87Ds as of 1 October 1942, commanded by *Hauptmann* Kurt Walter since 13 January 1942 replaced by Major Bernhard Hamester on 26 October for unspecified reasons, based at Haggag el Quasaba West)

7th Squadron
8th Squadron
9th Squadron

sea rescue squadron (Do. 24, based at Mersa Matruh)

Jabogruppe Afrika ("Fighter-Bomber Group Africa," organized 31 August 1942 with three squadrons of Bf 109 fighter-bombers, based at Haggag el Quasaba East)

1st Squadron (formerly 10th Squadron, *Jagdgeschwader* 27)
squadron (formerly 10th Squadron, *Jagdgeschwader* 53, with 7 Bf 109F fighter-bombers as of 31 July 1942)

III. Gruppe, *Jagdgeschwader* 53 (33 Bf 109F fighters as of 1 October 1942, commanded by *Hauptmann* Franz Götz since October 1942, based at Quotaifiya)

7th Squadron
8th Squadron
9th Squadron

III. Gruppe, *Zerstörergeschwader* 1 (24 Bf 110A/F and 2 Bf 110D/E fighter-bombers as of 1 October 1942, by 31 October the Bf 110 A/Fs had been turned in and replaced with 17 Me 210As, commanded by *Hauptmann* Fritz Hobein since September 1942, based at Bir el Abd and Trapani)

7th Squadron
8th Squadron
9th Squadron (under X *Fliegerkorps* at Kastelli in late October 1942, drawing their new Me 210s?)

8th Squadron, III. Gruppe, *Zerstörergeschwader* 26 (57 Bf 110 fighter-bombers, commanded by *Hauptmann* Georg Christl since 25 December 1941, headquarters with 10th Squadron, *Zerstörergeschwader* 26 at Kastelli Crete, 8th Squadron based at Barce/Derna)

10th Squadron, *Zerstörergeschwader* 26 (2 Do 17Z and 4 Ju 88C light bombers, based at Kastelli Crete)

12th Squadron, Experimental Bomber Wing (Ju. 88s, based at Barce/Derna)

1st Strategic Reconnaissance Squadron (F), *Aufklärungsgruppe* 121. (10 Ju. 88Ds as of 1 October 1942, based at

Fuka/Derna)
4th Tactical Reconnaissance Squadron (H), *Aufklärungsgruppe* 12. (12 Bf 109F, 1 Bf 109E, 1 Bf 110F, based at Bin el Abd)
2nd Tactical Reconnaissance Squadron (H), *Aufklärungsgruppe* 14. (received 5 Bf 109Fs during the October 1942, based at Bin el Abd)
support troops (including: one air signal battalion and one logistical support team)

X *Fliegerkorps*, commanded by *Generalleutnant* Hofmann von Waldau (since 31 August 1942) with his Chief of Staff Oberst Sigismund Freiheer von Falkenhausen (since 1 April 1942), headquarters at Kiphissa near Athens), directed to "cooperate" with *Fliegerfuhrer Afrika*, many of his units had recently been withdrawn from Sicily and were now based in Greece)

II. Gruppe, *Kampfgeschwader* 100 (27 He 111Hs and 1 Ju 88As as of 1 October 1942, commanded by Major Hermann Dickötter since 15 October 1942, based at Kalamaki near Athens with elements at Catania and Comiso)
4th Squadron
5th Squadron
6th Squadron

III. Gruppe, *Kampfgeschwader* 100 (12 He 111Hs and 18 Ar 196As as of 1 October 1942, Major Schulz since 20 September 1942 based at Salamanca and Kalamaki)
7th Squadron
8th Squadron
9th Squadron

III. Gruppe, *Zerstörergeschwader* 1 (9th Squadron? Me 210s, based at Kastelli, Crete, reinforced by 16th Squadron, *Kampfgeschwader* 6 the *Erprobungskommando* ("Experimental Command") Me 210 and reassigned in October as 11th Squadron, *Zerstörergeschwader* 1)
2nd Squadron (F), *Aufklärungsgruppe* 123. (Strategic) (3 Ju. 86Rs and 12 Ju. 88Ds as of 1 October 1942, based at Kastelli, Crete)
2nd Squadron (Sec), *Aufklärungsgruppe* 125. (Ar 196s, based at Suda Bay, Crete)
3rd Squadron (Sec), *Aufklärungsgruppe* 126. (Ar 196s, based at Skaramanga, re-designated 9th Squadron, *Kampfgeschwader* 100 on 20 September 1942)

Lehrgeschwader 1 (training unit, commanded by *Oberst* Franz von Benda since June 1942, headquarters at Eleusis and possibly at Iraklion, Crete)

I. Gruppe (Ju 88As, commanded by Major Joachim Helbig since 31 December 1941, based at Iraklion, Crete)
1st Squadron
2nd Squadron
3rd Squadron

II. Gruppe (training unit, Ju. 88As, based at Iraklion, Crete)
4th Squadron
5th Squadron
6th Squadron

IV. Gruppe (training unit, re-designated I. Gruppe, *Sturzkampfgeschwader* 5 on 27 January 1942 with 39 Ju 87Rs as of 1 October 1942, commanded by Major Erwin Schulz, based at Eleusis, Crete? Information on this unit is contradictory)

Regia Aeronautica (about 400 aircraft (26 Cant. 1007 Bis bombers, 30 SM.79 torpedo bombers, 107 CR.42 biplanes, 73 MC. 200 fighters, 60 MC 202 fighters, 43 G.50, 26 Cant. 501 and Cant. 506, and 23 Ca. 311. Of these, about 260 (65%) were operational. In addition, the Italians had about 50 auxiliary aircraft including the 103rd and 104th squadrons APC (with a mix of SM.79, SM.81, and Ca. 309 aircraft) and 145th Gruppo T. (with SM.82s) as well as three bomber groups (Cant. Z. 1007), one dive-bomber group (JU-87 Stuka), one fighter-bomber group (Re.2001), and three fighter groups (MC. 202) based in Sicily with a total of about 8 dive-bombers, 18 level bombers and 62 fighters which were operational)

5th Squadra Aerea (General Mario Bernasconi)

Eastern Sector Command (Colonel Michele Grandinetti, based at Fuka)

3rd Stormo C.T. (MC 202 fighters, based at Abu Haggag-Bir el Astas)

18th Gruppo (based at Abu Haggag)
83rd Squadron
85th Squadron
95th Squadron (MC 200 fighters)

23rd Gruppo (based at Abu Haggag)
70th Squadron
74th Squadron
75th Squadron

4th Stormo C.T. (based at Fuka South)

9th Gruppo C.T. (MC 202 fighters, based at Fuka South)
73rd Squadron
96th Squadron
97th Squadron

10th Gruppo C.T. (MC 202 fighters, based at Fuka South)
84th Squadron
90th Squadron
91st Squadron

101st Gruppo d'assalto (attached from 5th Stormo, Ju-87 Stukas, based at Abar Nimeir)
208th Squadron
238th Squadron

50th Stormo Gruppo d'assalto (attack, based at Abar Nimeir)

158th Gruppo (CR. 42s-biplane night fighters, based at Abar Nimeir)
236th Squadron
387th Squadron
388th Squadron

159th Gruppo (based at Abar Nimeir)
389th Squadron
390th Squadron
391st Squadron

191st Squadron B.T. (attached from 35th Stormo, based at Mersa Matruh)
94th Squadron C.T. (attached from 2nd Stormo, based at Sidi Barrani)
12th Squadron A.P.C. (based Siwa)

Central Sector Command (General Augusto Bacchiani)

2nd Stormo C.T. (based at Bu Amud)

8th Gruppo da Caccia (MC 200 fighters, based at Bu Amud)
92nd Squadron
93rd Squadron

13th Gruppo da Caccia (MC 200 fighters, based at Bu Amud)
77th Squadron
78th Squadron
82nd Squadron

150th Gruppo Autonomo C.T. (MC 202 fighters, being repatriated (to Italy?), based at Benghazi/ K.3)
363rd Squadron

364th Squadron
365th Squadron

15th Stormo Assaulto (CR. 42s-biplane night fighters, based at Benghazi/K.3)

46th Gruppo (based at K.3)
20th Squadron
21st Squadron

47th Gruppo (based at Abu Amud)
53rd Squadron
54th Squadron

66th Gruppo O.A. (based at Barce/Benghazi)
87th Squadron
131st Squadron

148th Squadron R.M. (based at Menelao)
196th Squadron R.M. (based at Benghazi)
614th Squadron S. (CR.42 biplanes and Cant.506/S, based at Benghazi)

35th Stormo B.T. (Z. 1007 bis medium bombers, based at Barce)

86th Gruppo (based at Barce)
190th Squadron
191st Squadron (attached to Eastern Sector Command)

89th Gruppo (based at Barce)
230th Squadron
231st Squadron

131st Gruppo Autonomo A.S. (based at Derna)
279th Squadron
284th Squadron

133rd Gruppo Autonomo A.S. (based at Derna)
174th Squadron

Air Force Command Tripolitania (General Mario Boshi, based at Tripoli?)

68th Gruppo O.A. (based at Zuara-Misurata)
24th Squadron
33rd Squadron

160th Gruppo Autonomo C. T. (CR. 42s-biplane night fighters, based at Castel Benito-Misurata)
363rd Squadron
364th Squadron
365th Squadron

175th Squadron A.S. (detached from 133rd Gruppo, based at Castel Benito)
145th Squadron R.M. (based at Pisida)

APPENDIX J. ALLIED ORDER OF BATTLE

(As of 23 Oct 1942, unless otherwise noted)

8th Army: commanded by Lieutenant General Bernard L. Montgomery (as of 15 Aug 1942), Chief of Royal Engineers (CRE): Brigadier Frederick H. Kisch.[1]

X Corps, Lieutenant General Herbert Lumsden — page J-2
XIII Corps, Lieutenant General Brian Horrocks — page J-5
XXX Corps, Lieutenant General Sir Oliver Leese — page J-10
8th Army Troops — page J-19

8th ARMY STRENGTH

		X Corps	XIII Corps	XXX Corps	8th Army Control	8th Army Total
Personnel		28,000	46,000	80,000		231,000******
Infantry Battalions	Regular	3	20	44	3 (reforming)	67+3 reforming
	Motorized	6	2	1	-	9
	Machine Gun	1(-)	2(-)	5(+)	-	8
	Reconnaissance	-	1	1	-	2
	TOTAL	10 (-)	5 (-)	7 (+)	3 (reforming)	22+3 reforming
Tanks	Shermans	216	-	36	66	318
	Grants	62	71	37	76	246
	Crusaders	173	57	64	114	408
	Valentines	-	-	186	37	223
	Stuarts	-	86	34	52	172
	Churchill	3	-	-	-	6
	Matildas	-	-	-	6	6
	Scorpions	6	6	13	0	25
	TOTAL	460	220	372	318	1373**
Field & Medium Artillery	25-pdr gun-howitzers	120	288	408	21	837
	25-pdr SP	-	-	16	-	16
	105mm SP	24	-	-	-	24
	4.5" guns	-	-	32	-	32
	5.5" guns	-	4	16	-	20
	TOTAL	144	292	472	21	939***
Anti-Tank Artillery	6-pdr AT guns	272	224	273	101	870
	2-pdr AT guns	24	172	322	86	604
	18-pdr AT guns	-	-	3	-	3
	50mm PAK 38	-	1	6	-	7
	75mm Model 1897	-	22	-	-	22
	TOTAL	296	419	604	187	1506****
Anti-Aircraft Artillery	Bofors 40mm guns	154	160	256	176	746
	3.7" AA guns	-	-	-	48	48
	TOTAL	154	160	256	224	794
Armored Cars		143	206	64	87	500*****
Universal Carriers *********		302 (est.)	678 (est.)	1570 (est.)	-	2550 (est.)
Engineer Companies	Sqdn & Field Comp.	9	11	17 (+)*	2 & 1 reforming	39+1 reforming
	Mine Detectors	180	117	202	-	499
	Field Park Comp.	4	5	5	-	14
	Pioneer & Labor Co.	-	-	-	25	25*******

*Does not include 66th Mortar Company Royal Engineers (18 4.2" mortars)

** Of this total, 1161 were fit for duty (including 25 Scorpions), the rest appear to be replacements (about 200) or in the shop (Tobruk and El Alamein estimates that 1,000 were in the workshops)

***Of this total, 908 were fit for duty

****Of this total, 50 2-pdrs and 21 6-pdrs were not available

*****Of this total, 188 Humbers, 212 Marmon-Harrington, 96 Daimler, 4 AEC, 382 were with armored car regiments, 53 as headquarters escort, and 65 in reserve/transit/workshops

******195,000 "fighting strength."

*******twenty-four additional pioneer and labor companies in General Headquarters reserve.

*********2350 universal carriers authorized (# on-hand uncertain, estimate based on Joslen's statement that on average, each infantry battalion had 31 carriers and each armoured division had 151).

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[1] Orders of Battle, Volume II, United Kingdom and Colonial Formations and Units in the Second World War, 1939-1945, by H. F. Joslen, Her Majesty's Stationery Office, London, 1960, and *Le Operazioni in Africa Settentrionale, Vol. III-El Alamein*, by Mario Montanari, Official History, Rome, 1993.

X Corps: commanded by Lieutenant General Herbert Lumsden (CRE Brigadier P. A. Clauson, Headquarters: 2 Grants, 457 total tanks, approximately 28,000 men assigned (not including corps troops, attachments and detachments))

1st Armoured Division, Major General Raymond Briggs page J-3
10th Armoured Division, Major General Alec H. Gatehouse page J-4

8th Armoured Division, Major General C. H. Gairdner (CRE Lieutenant-Colonel C. E. A. Browning, under command of 8th Army), Only the headquarters and a few attachments)

- Hammerforce (detached to 1st Armoured Division)
- 24th Armored Brigade (detached to 10th Armoured Division)
- 145th Field Park Squadron Royal Engineers (in X Corps reserve)
- HQs, 1st Battalion, The Newfoundland Regiment (Machine Gun) and Y Company (reforming)
- 6th Field Squadron Royal Engineers (detached to 10th Armoured Division)
- 9th Field Squadron Royal Engineers (detached to 1st Armoured Division)
- 143rd Field Park Squadron Royal Engineers
- 8th Armoured Division Signals

X Corps Troops

- two troops, 73rd Anti-Tank Regiment, Royal Artillery (guarding X Corps HQs, 8 6-pdr AT guns, 4 guns per troop)
- one troop, 56th Light Anti-Aircraft Regiment, Royal Artillery (guarding X Corps HQs, 4 Bofors 40mm AA guns)
- one troop, 53rd Light Anti-Aircraft Regiment, Royal Artillery (guarding X Corps HQs, 4 Bofors 40mm AA guns)
- CRE, Lieutenant-Colonel E. N. Bickford
  - 570th Corps Field Park Company Royal Engineers
  - 571st Field Company, Royal Engineers (attached to 10th Armoured Division)
  - 572nd Field Company, Royal Engineers (attached to 1st Armoured Division)
  - 573rd Field Company, Royal Engineers (attached to 10th Armoured Division)
- X Corps Signals
- 12th Light Field Ambulance (Royal Army Medical Corps)
- 151st Light Field Ambulance (Royal Army Medical Corps)

X CORPS STRENGTH

		1st AD	10th AD	8th AD	X Corps Troops	Corps Total
Personnel		14,000	14,000	-	-	28,000
Infantry Battalions	Regular	-	3	-	-	3
	Motorized	4	2	-	-	6
	Machine Gun	2 Comp.	1 Comp.	-	-	1 (-)
	Carriers					
Tanks	Shermans	92	124	-	-	216
	Grants	1	59	-	2	62
	Crusaders	76	97	-	-	173
	Valentines	-	-	-	-	-
	Churchill MK IV	3	-	-	-	3
	Stuarts	-	-	-	-	-
	Matildas	-	-	-	-	-
	Scorpions	3	3*	-	-	6*
	TOTAL	175	280	-	2	457
Field & Medium Artillery	25-pdr gun-howitzers	48	72	-	-	120
	25-pdr SP	-	-	-	-	-
	105mm SP	24	-	-	-	24
	4.5" guns	-	-	-	-	-
	5.5" guns	-	-	-	-	-
	TOTAL	72	76	-	-	144
Anti-Tank Artillery	6-pdr AT guns	168	96	-	8	272
	2-pdr AT guns	-	24	-	-	24
	18-pdr AT guns	-	-	-	-	-
	50mm PAK 38	-	-	-	-	-
	75mm Model 1897	-	-	-	-	-
	TOTAL	168	120	-	8	296
Anti-Aircraft Artillery	Bofors 40mm guns	76	70	-	8	154
	3.7" AA guns	-	-	-	-	-
Armored Cars		106	46	-	-	152
Universal Carriers (based on authorization)		151 (est.)	151(est.)	-	-	302 (est.)
Engineer Companies	Sqdns & Field Companies	4	5	-	-	9
	Field Park Companies	1	1	1	1	4

*Detached 3 Scorpions to 2nd New Zealand Division (giving them a total of six for the attack to Phase Line Oxalic), all functional Scorpions were to revert to 10th Armoured Division control for the attack to Phase Line Pierson.

1st Armoured Division: commanded by Major General Raymond Briggs (CRE Lieutenant-Colonel K. Mackay, Headquarters: 8 Crusader MK IIs, 6 Armored Cars, 172 total tanks and approximately 14,000 men assigned (not including attachments and detachments), authorized 13,235 men, 280 tanks, 64 artillery pieces, 219 antitank guns, 348 AT rifles, 88 light anti-aircraft guns, 64 armored cars, 151 universal carriers, 18 medium mortars, 60 light mortars, 868 automatic weapons, 1,415 trucks, 53 prime movers, 956 motorcycles, 134 trailers, 374 miscellaneous vehicles)

2nd Armoured Brigade commanded by Brigadier A. Frank Fisher, Headquarters: 2 armored cars, 161 tanks: 92 Shermans, 1 Grant, 39 Crusader MK IIs, 29 Crusader MK IIIs, including tanks attached to the Minefield TF.

- 2nd Dragoon Guards Regiment, "The Bays" (-)
- 9th Lancers Regiment (-)
- 10th Hussars Regiment (-)
- Yorkshire Dragoons Regiment (motorized infantry bn with 16 6-pdr anti-tank guns)
- X Company, 1st Battalion, The Newfoundland Regiment (Machine Gun), (attached from 8th Armoured Division, with 12 Vickers .303 Medium Machine Guns)

7th Motorized Brigade: commanded by Brigadier T. James B. Bosville, Headquarters: 3 Churchill MK IV, 12 tanks total, 9 included in 2nd Armoured Brigade's total.

- 7th Battalion, The Rifle Brigade (16 6-pdr anti-tank guns)
- 2nd Battalion, The King's Royal Rifle Corps (16 6-pdr anti-tank guns)
- Support Company, 2nd Battalion, The Rifle Brigade
- Minefield Task Force (9 tanks total, included in 2nd Armoured Brigade's total)
  - 2nd Battalion, The Rifle Brigade (-) (16 6-pdr anti-tank guns, support company detached to 7th Motorized Brigade)
  - one troop, 2nd Dragoon Guards Regiment (attached from 2nd Armoured Brigade, 3 tanks)
  - one troop, 9th Lancers Regiment (attached from 2nd Armoured Brigade, 3 tanks)
  - one troop, 10th Hussars Regiment (attached from 2nd Armoured Brigade, 3 tanks)
  - 7th Squadron Royal Engineers
  - 9th Field Squadron Royal Engineers (attached from 8th Armoured Division)
  - 572nd Army Field Company Royal Engineers (attached from X Corps)
  - Signals and provost detachments

Hammerforce (attached) (composed of units of 8th Armoured Division formed 18 Oct under the Command of the CRA (Chief of Royal Artillery) 8th Armoured Div)

- 4/6 South Africa Armoured Car Regiment (-) (43 armored cars, detached 1 troop (3 armored cars (?)) to XIII Corps and 3 troops (9 armored cars to XXX Corps)
- Z Company, 1st Battalion, The Newfoundland Regiment (Machine Gun), (12 Vickers .303 Medium Machine Guns)
- 146th Field Regiment Royal Artillery (detached to 9th Australian Division)
- 73rd Anti-Tank Regiment Royal Artillery (-) (40 6-pdr AT guns, 2 batteries of 16 guns & 1 battery of 8 guns, 24 guns detached to 10th Armoured Div (1 battery of 16 guns) and X Corps Troops (2 troops of 4 guns each))
- 56th Light Anti-Aircraft Regiment Royal Artillery (-) (28 Bofors 40mm guns, 1 battery of 16 guns & 1 of 12 guns, 20 guns detached to 10th Armoured Division (1 battery of 16 guns) and X Corps Troops (1 troop of 4 guns))

Division Troops

- 12th Lancers Regiment (55 armored cars)

Royal Artillery

- 2nd Regiment, Royal Horse Artillery (24 25-pdr gun-how., in 3 batteries of 8 guns)
- 4th Regiment, Royal Horse Artillery (24 25-pdr gun-how., in 3 batteries of 8 guns)
- 11th (Honorable Artillery Company) Regiment, Royal Horse Artillery (24 Priest 105mm SP (Self-Propelled) guns, in three batteries of 8 guns)
- 78th Field Regiment Royal Artillery (detached, 3 troops (12 guns) to 51st Highland Division & 3 troops (12 guns) to 2nd New Zealand Division)
- 76th Anti-Tank Regiment Royal Artillery (64 6-pdr AT guns, 4 batteries of 16 guns)
- 42nd Light Anti-Aircraft Regiment Royal Artillery (48 Bofors 40mm guns, 3 batteries of 16 guns)

Royal Engineers

- 1st Squadron Royal Engineers (one troop of three Scorpions attached)
- 1st Field Park Company Royal Engineers

- 1st Armoured Division Signals
- 1st Light Field Ambulance (Royal Army Medical Corps)
- 15th Light Field Ambulance (Royal Army Medical Corps)

10th Armoured Division: commanded by Major General Alec H. Gatehouse (CRE Lieutenant-Colonel G. R. McMeekan, Headquarters: 7 Crusader MK IIs, 280 total tanks and approx. 14,000 men assigned (not including attachments and detachments) authorized 13,235 men, 280 tanks, 64 artillery pieces, 219 antitank guns, 348 AT rifles, 88 light anti-aircraft guns, 64 armored cars, 151 universal carriers, 18 medium mortars, 60 light mortars, 868 automatic weapons, 1,415 trucks, 53 prime movers, 956 motorcycles, 134 trailers, 374 miscellaneous vehicles.

8th Armoured Brigade, commanded by Brigadier E. C. Neville Custance, 133 tanks total: 31 Shermans, 57 Grants, 33 Crusader MK IIs, and 12 Crusader MK IIIs.

- 3rd Royal Tank Regiment (Lieutenant Colonel H. E. "Pete," Pyman, estimated to have 16 Crusaders and 30 "medium" tanks (Grants and Shermans)
- Sherwood Rangers (Nottinghamshire Yeomanry) Regiment (Lieutenant Colonel "Flash" Kellett, 13 Crusaders, 20 Grants, 11 Shermans)
- Staffordshire Yeomanry Regiment (Major J. A. Eadie, replaced Lieutenant Colonel Cox on 6 OCT 42, assigned 16 Crusaders and 27 "medium" tanks (Shermans and Grants)
- 1st Battalion, Royal East Kent Regiment, "The Buffs" (motorized infantry battalion, 16 6-pdr anti-tank guns)

9th Armoured Brigade (detached to 2nd New Zealand Infantry Division)

24th Armoured Brigade, commanded by Brigadier A. G. Kenchington, attached from 8th AD, 140 tanks total: 93 Shermans, 2 Grants, 28 Crusader MK IIs, 17 Crusader MK IIIs)

- 41st Royal Tank Regiment
- 45th Royal Tank Regiment
- 47th Royal Tank Regiment
- 11th Battalion, King's Royal Rifle Corps (motorized infantry, 16 6-pdr anti-tank guns)
- one battery, 73rd Anti-Tank Regiment Royal Artillery (attached from Hammerforce, 16 6-pdr AT guns)
- one battery, 56th Light Anti-Aircraft Artillery Regiment Royal Artillery (attached from Hammerforce, 16 Bofors 40mm AA guns)

133rd Lorried Infantry Brigade, commanded by Brigadier A. W. Lee, attached from 44th Infantry Division.

- 2nd Battalion, Royal Sussex Regiment (8 2-pdr anti-tank guns)
- 4th Battalion, Royal Sussex Regiment (8 2-pdr anti-tank guns)
- 5th Battalion, Royal Sussex Regiment (8 2-pdr anti-tank guns)
- W Company, 1st Battalion, The Newfoundland Regiment (Machine Gun) (attached from 8th Armored Division, with 12 Vickers .303 Medium Machine Guns)
- Minefield Task Force (Lieutenant-Colonel G. R. McMeekan CRE, 10th Armoured Division, under command of 133rd Lorried Infantry Brigade=OPCON?)
  - 3rd (Cheshire) Field Squadron Royal Engineers (Major Peter Moore)
  - 571st Army Field Company Royal Engineers (Major Yeates, attached from 8th Army)
  - 573rd Army Field Company Royal Engineers (Major Brinsmead, attached from 8th Army)
  - detachment, 141st Field Park Squadron Royal Engineers (detached from 10th Armoured Division Troops)

Division Troops

- Royal Horse Guards Regiment (?), "The Royals" (46 armoured cars)

Royal Artillery (Douglas Packard)

- 1st Regiment, Royal Horse Artillery (24 25-pdr gun-howitzer, in 3 batteries of 8 guns)
- 104th Regiment, Royal Horse Artillery (24 25-pdr gun-how., in 3 batteries of 8 guns)
- 98th Field Regiment Royal Artillery (-) (detached 3 troops (12 guns) to 2nd NZ Div, 12 25-pdr gun-how., in 3 troops of 4 guns on-hand)
- 5th Regiment, Royal Horse Artillery (-) (detached 3 troops (12 guns) to 1st SA Div, 12 25-pdr gun-how., in 3 troops of 4 guns on-hand)
- 84th Anti-Tank Regiment Royal Artillery (64 6-pdr AT guns, 4 batteries of 16 guns)
- 53rd Light Anti-Aircraft Regiment Royal Artillery (-) (44 Bofors 40mm guns, 2 batteries of 16 guns, 1 battery of 12 guns, one troop detached to X Corps Troops)

Royal Engineers (one troop of three Scorpions attached, detached to 2nd New Zealand Division; these plus any other operational Scorpions with the 2nd New Zealand Division were to revert to 10th Armoured Division control at Phase Line Oxalic)

- 2nd Field Squadron Royal Engineers (Major Perrott, attached to 8th Armoured Brigade)
- 6th Field Squadron Royal Engineers (Major Collins, attached to 24th Armoured Brigade)
- 141st Field Park Squadron Royal Engineers (-) (Major Carr, detachments Minefield Task Force and with 133rd Lorried Infantry Bde)

- 10th Armoured Division Signals
- 3rd Light Field Ambulance (Royal Army Medical Corps)
- 8th Light Field Ambulance (Royal Army Medical Corps)
- 168th Light Field Ambulance (Royal Army Medical Corps)

XIII Corps: commanded by Lieutenant General Sir Brian G. Horrocks (C.R.E. Brigadier C. de L. Gausen, Headquarters: 13 armored cars, 220 total tanks, 46,000 men assigned (not including corps troops, attachments and detachments).

7th Armoured Division, Major General John Harding — page J-6
50th (Northumbrian) Infantry Division, Major General J. S. Nichols — page J-9
44th Infantry Division, Major General Hughes — page J-8
XIII Corps Troops
- one troop, 4/6 South African Armoured Car Regiment (3 (?) armored cars, detached from Hammerforce, 10th Armoured Division)
- 118th Royal Tank Regiment (dummy tanks)
- 124th Royal Tank Regiment (dummy tanks)
- HQs 4th Survey Regiment Royal Artillery
  - One composite Battery
- CRE Lieutenant-Colonel N. A. Armitage
  - 577th Army Field Company Royal Engineers
  - 578th Army Field Company Royal Engineers (attached from 8th Army)
  - 576th Corps Field Park Company Royal Engineers
- XIII Corps Signal
- Repair and service troops

XIII CORPS STRENGTH

		7th AD	44th Div	50th Div	XIII Corps Troops	Corps Totals
Personnel		14,000	16,000	16,000	-	46,000
Infantry Battalions	Regular	3	6	11	-	20
	Motorized	2	-	-	-	2
	Machine Gun	-	1	3 Comp.	-	2 (-)
	Reconnaissance	1	-	-	-	1
	TOTAL	6	7	12	-	25
Tanks	Shermans	-	-	-	-	-
	Grants	71	-	-	-	71
	Crusaders	57	-	-	-	57
	Valentines	-	-	-	-	-
	Stuarts	86	-	-	-	86
	Matildas	-	-	-	-	-
	Scorpions	6	-	-	-	6
	TOTAL	220	-	-	-	220
Field & Medium Artillery	25-pdr gun-howitzers	88	96	104	-	288
	25-pdr SP	-	-	-	-	-
	105mm SP	-	-	-	-	-
	4.5" guns	-	-	-	-	-
	5.5" guns	4	-	-	-	4
	TOTAL	92	96	104	-	292
Anti-Tank Artillery	6-pdr AT guns	112	48	64	-	224
	2-pdr AT guns	24	60	88	-	172
	18-pdr AT guns	-	-	-	-	-
	50mm PAK 38	1	-	-	-	1
	75mm Model 1897	6	-	16	-	22
	TOTAL	143	108	168	-	419
Anti-Aircraft Artillery	Bofors 40mm guns	64	48	48	-	160
	3.7" AA guns	-	-	-	-	-
Armored Cars		190	-	-	16	206
Universal Carriers		151 (est.)	186 (est.)	341 (est.)	-	678 (est.)
Engineer Companies	Sqdns & Field Comp.	3	4	4	-	11
	Field Park Companies	1	1	1	2	5

7th Armoured Division: commanded by Major General Sir John Harding (CRE Lieutenant-Colonel H. H. C. Withers, Headquarters: 7 Crusader MK IIs and 5 armored cars, 221 total tanks, and approximately 14,000 men assigned (not including attachments and detachments) authorized 13,235 men, 280 tanks, 64 artillery pieces, 219 antitank guns, 348 AT rifles, 8 light anti-aircraft guns, 64 armored cars, 151 universal carriers, 18 medium mortars, 60 light mortars, 868 automatic weapons, 1,415 trucks, 3 prime movers, 956 motorcycles, 134 trailers, 374 miscellaneous vehicles.)

4th Light Armoured Brigade commanded by Brigadier M. G. Roddick, Headquarters: 9 armored cars, 78 total tanks
- 4th/8th Hussars (4th Hussars Regiment and one squadron from the 8th Hussars Regiment (48 Stuarts)
- Royal Scots Greys Regt. (-) (14 Grants, 16 Stuarts, not including one troop of 3 Stuarts with 44th Reconnaissance Regt.)
- 1st Battalion, The King's Royal Rifle Corps (motorized infantry, 16 6-pdr anti-tank guns)
- 2nd Derbyshire Yeomanry Regiment (attached from Division Troops, 50 armored cars)
- 3rd Regiment, Royal Horse Artillery (attached from Division Troops, 24 25-pdr gun-how., in 3 batteries of 8 guns)
- one Ordnance Field Park
- one Workshop

22nd Armoured Brigade commanded by Brigadier G. P. B. Roberts, Headquarters: 4 Crusaders, 129 total tanks (of the 42 Crusaders, 42 were MK IIs and 8 were MK IIIs)
- 1st Battalion, Royal Tank Regiment (24 Grants, 19 Stuarts)
  - 1 Company, 1st Battalion, The Rifle Brigade (attached, plus attached 6-pounders from the 1st Battalion HQs)
- 5th Battalion, Royal Tank Regiment (24 Grants, 18 Crusaders)
  - C Company, 1st Battalion, The Rifle Brigade (attached, plus attached 6-pounders from the 1st Battalion HQs)
- 4th Clyde and Lotharshire Yeomanry Regiment (9 Grants, 28 Crusaders)
- 1st Battalion, Rifle Brigade (motorized infantry, 16 6-pdr anti-tank guns, I and C Companies (with some 6-pounders) detached to 1st and 5th Battalions, Royal Tank Regiment)
- 44th Reconnaissance Regiment (Lieutenant Colonel J. L. Corbett-Winder, attached from 44th Infantry Division, in Universal Carriers, functions as minefield task force)
  - One troop of 3 Stuarts, Royal Scots Greys Regiment (attached)
  - 4th Field Squadron Royal Engineers (attached from division troops)
  - detachment from 21st Field Squadron Royal Engineers (attached from division troops)
  - Two troops with 6 Scorpions (attached from 1st Army Tank Brigade?)
  - 4th Field Regiment Royal Artillery (attached from Div Troops, 16 25-pdr gun-how., in 2 batteries of 8 guns)
  - 97th Field Regiment Royal Artillery (attached from Div Troops, 16 25-pdr gun-how., in 2 batteries of 8 guns)
- one Ordnance Field Park
- one Workshop

131st Infantry Brigade (attached to 7th Armored Division)
- 1st /5th Battalion, The Queens Regiment (8 2-pdr anti-tank guns)
- 1st /6th Battalion, The Queens Regiment (8 2-pdr anti-tank guns)
- 1st /7th Battalion, The Queens Regiment (8 2-pdr anti-tank guns)
- 11th Field Company Royal Engineers (detached with 131st Infantry Brigade to 7th Armored Division)
  - headquarters (authorized 2/45)
  - three sections (each authorized 1/64)

1st Free French (FF) Brigade Group commanded by Brigadier Jean-Pierre Koenig, under command of 7th Armored Division = OPCON?)
- 1st Battalion Foreign Legion (8 2-pdr anti-tank guns)
- 2nd Battalion Foreign Legion (8 2-pdr anti-tank guns)
- 3rd Battalion Infantry Marine Pacifique (8 2-pdr anti-tank guns)
- 1st Free French Flying Column (under command of 1st Free French Brigade Group=OPCON?, one sqd of (12?) armored cars, 1st Moroccan Spahis)
- 1st Free French Artillery Regiment (16 25-pdr gun-how. (2 batteries of 8 guns), & 4 5.5"guns)
- 3rd Field Regiment, Royal Artillery (attached from Div troops?), 16 25-pdr gun-how. (2 batteries of 8 guns))
- 2nd Anti-Aircraft Company, 1st Fusiliers Marine (12 Bofors 40mm guns)
- 2nd Free French Anti-Tank Company (16 6-pdr anti-tank guns)
- 22nd North African Anti-Tank Company (2 (French Model 1897 MI) 75mm guns)
- 1st Free French Engineer Field Company (2nd Field Company?)
- 1st Free French Anti-Tank Company (under command of 1st Free French Brigade Group=OPCON?, Portee Troop 1st Moroccan Spahis) (4 (French Model 1897 MI) 75mm guns, one 50mm gun (German PAK 38?))
- Anti-Aircraft Troop, 1st Battalion Foreign Legion (under command of 1st Free French Brigade Group=OPCON?, 4 Bofors 40mm AA guns)

Division Troops
- Household Cavalry Regiment (53 armored cars)
- 11th Hussars Regiment (61 armored cars) (reserve)
- 2nd Derbyshire Yeomanry Regiment (detached to 4th Light Armoured Brigade, 50 armored cars)

Royal Artillery
- 3rd Regiment, Royal Horse Artillery (detached to 4th Armored Brigade, 24 25-pdr gun-how., in 3 batteries of 8

guns)
3rd Field Regiment Royal Artillery (detached to 1st Free French Brigade Group?)
4th Field Regiment Royal Artillery (detached to 22nd Armoured Brigade, 16 25-pdr gun-how., in 2 batteries of 8 guns)
97th Field Regiment Royal Artillery (detached to 22nd Armoured Brigade, 16 25-pdr gun-how., in 2 batteries of 8 guns)
65th Anti-Tank Regiment Royal Artillery (Norfolk Yeomanry, 64 6-pdr AT guns, 4 batteries of 16 guns)
15th Light Anti-Aircraft Regiment Royal Artillery (48 Bofors 40mm guns, 3 batteries of 16 guns)

Royal Engineers
4th Field Squadron Royal Engineers (detached to 44th Reconnaissance Regiment)
21st Field Squadron Royal Engineers (-) (detachment with 44th Reconnaissance Regiment)
143rd Field Park Squadron Royal Engineers

7th Armoured Division Signals
Royal Army Supply Corps
No. 5 Company
No. 10 Company
No. 58 Company
No. 67 Company
No. 287 Company
No. 432 Company
No. 507 Company
Royal Army Medical Corps
2nd Light Field Ambulance
7th Light Field Ambulance
14th Light Field Ambulance
15th Light Field Ambulance
Divisional Ordnance Field Park
15th Light A.A. Workshop

44th Infantry Division: commanded by Major General J. T. P. Hughes (CRE Lieutenant-Colonel J. M. Lambert, approximately 16,000 men assigned (not including attachments and detachments)), on average, each infantry battalion had 31 Universal Carriers and 57 other vehicles, authorized 17,300 men, 72 artillery pieces, 136 antitank guns, 444 AT rifles, 48 light anti-aircraft guns, 6 armored cars, 256 universal carriers, 56 medium mortars, 162 light mortars, 48 machine guns, 1,999 trucks, 159 prime movers, 1,064 motorcycles, 197 trailers, 268 miscellaneous vehicles).

131st Infantry Brigade (attached to 7th Armored Division)
- 1st /5th Battalion, The Queens Regiment (8 2-pdr anti-tank guns)
- 1st /6th Battalion, The Queens Regiment (8 2-pdr anti-tank guns)
- 1st /7th Battalion, The Queens Regiment (8 2-pdr anti-tank guns)

132nd Infantry Brigade
- 2nd Battalion, Royal East Kent Regiment, "The Buffs" (8 2-pdr anti-tank guns)
- 4th Battalion, Royal West Kent Regiment (8 2-pdr anti-tank guns)
- 5th Battalion, Royal West Kent Regiment (8 2-pdr anti-tank guns)

133rd Infantry Brigade (detached to 10th Armoured Division)

Division Troops
- 6th Battalion (Machine Gun), The Cheshire Regiment (48 Vickers .303 Medium Machine Guns)
- 44th Reconnaissance Regiment (detached to the 7th Armoured Division)
- Royal Artillery
  - 57th Field Regiment Royal Artillery (24 25-pdr gun-how., in 3 batteries of 8 guns)
  - 58th Field Regiment Royal Artillery (24 25-pdr gun-how., in 3 batteries of 8 guns)
  - 65th Field Regiment Royal Artillery (24 25-pdr gun-how., in 3 batteries of 8 guns)
  - 53rd Field Regiment Royal Artillery (attached from where?) (24 25-pdr gun-howitzers, in 3 batteries of 8 guns)
  - 57th Anti-Tank Regiment, Royal Artillery (48 6-pdr and 16 2-pdr AT guns, 4 batteries of 16 guns)
  - 30th Light Anti-Aircraft Regiment Royal Artillery (48 Bofors 40mm guns, 3 batteries of 16 guns)
- Royal Engineers
  - 11th Field Company Royal Engineers (detached with 131st Infantry Brigade to 7th Armoured Division)
    - headquarters (authorized 2/45)
    - three sections (each authorized 1/64)
  - 209th Field Company Royal Engineers
    - headquarters (authorized 2/45)
    - three sections (each authorized 1/64)
  - 210th Field Company Royal Engineers
    - headquarters (authorized 2/45)
    - three sections (each authorized 1/64)
  - 577th Army Field Company Royal Engineers (attached from 8th Army)
  - 211th Field Park Company Royal Engineers (authorized 3/153)
    - headquarters
    - workshop section
    - bridging section
    - field stores section
    - a light aid detachment of Electrical and Mechanical Engineers was generally attached (authorized 1/12)
- 44th Infantry Division Signals
- 131st Field Ambulance (Royal Army Medical Corps)
- 132nd Field Ambulance (Royal Army Medical Corps)

50th (Northumbrian) Infantry Division: commanded by Major General J. S. Nichols (CRE Lieutenant-Colonel K. A. Lindsay, approximately 16,000 men assigned (not including attachments and detachments), on average, each infantry battalion had 31 Universal Carriers and 57 other vehicles, authorized 17,300 men, 72 artillery pieces, 136 antitank guns, 444 AT rifles, 48 light anti-aircraft guns, 6 armored cars, 256 universal carriers, 56 medium mortars, 162 light mortars, 48 machine guns, 1,999 trucks, 159 prime movers, 1,064 motorcycles, 197 trailers, 268 miscellaneous vehicles).

69th Infantry Brigade
- 5th Battalion, East Yorkshire Regiment (8 2-pdr anti-tank guns)
- 6th Battalion, Green Howards Regiment (8 2-pdr anti-tank guns)
- 7th Battalion, Green Howards Regiment (8 2-pdr anti-tank guns)

151st Infantry Brigade, commanded by Brigadier J. E. S. Percy
- 6th Battalion, Durham Light Infantry Regiment (8 2-pdr anti-tank guns)
- 8th Battalion, Durham Light Infantry Regiment (8 2-pdr anti-tank guns)
- 9th Battalion, Durham Light Infantry Regiment (8 2-pdr anti-tank guns)

1st Greek Infantry Brigade Group
- 1st Greek Battalion (8 2-pdr anti-tank guns)
- 2nd Greek Battalion (8 2-pdr anti-tank guns)
- 3rd Greek Battalion (8 2-pdr anti-tank guns)
- 1st Greek Field Regiment Artillery (24 25-pdr gun-howitzers, in 3 batteries of 8 guns)
- 1st Greek Machine Gun Company (12 Vickers .303 Medium Machine Guns)
- 1st Greek Field Company Engineers (includes a 'stores section')
- 1st Greek Field Ambulance

2nd Free French Brigade Group (under command of 50th Infantry Division=OPCON?)
- 5th Battalion de Marche (8 2-pdr anti-tank guns)
- 11th Battalion de Marche (8 2-pdr anti-tank guns)
- 21st North African Anti-Tank Company (12 French (Model 1897 MI) 75mm guns)
- 23rd North African Anti-Tank Company (4 French (Model 1897 MI) 75mm guns)
- 2nd Free French Field Engineer Company
- 2nd Free French Field Ambulance

Division Troops
- two companies, 2nd Battalion The Cheshire Regiment (Machine Gun) (24 Vickers .303 medium machine guns)

Royal Artillery
- 74th Field Regiment Royal Artillery (16 25-pdr gun-how., 2 batteries of 8 guns)
- 111th Field Regiment Royal Artillery (24 25-pdr gun-how., 3 batteries of 8 guns)
- 124th Field Regiment Royal Artillery (16 25-pdr gun-how., 2 batteries of 8 guns)
- 154th Field Regiment Royal Artillery (attached from where?) (24 25-pdr gun-howitzers, 3 batteries of 8 guns)
- 102nd Anti-Tank Regiment Royal Artillery (64 6-pdr anti-tank guns, 4 batteries of 16 guns)
- 34th Light Anti-Aircraft Regiment Royal Artillery (48 Bofors 40mm guns, 3 batteries of 16 guns)

Royal Engineers
- 233rd Field Company Royal Engineers
  - headquarters (authorized 2/45)
  - three sections (each authorized 1/64)
- 505th Field Company Royal Engineers (? not in RE history)
  - headquarters (authorized 2/45)
  - three sections (each authorized 1/64)
- 235th Field Park Company Royal Engineers (authorized 3/153)
  - headquarters
  - workshop section
  - bridging section
  - field stores section
  - a light aid detachment of Electrical and Mechanical Engineers was generally attached (authorized 1/12)

- 50th Infantry Division Signals
- 186th Field Ambulance (Royal Army Medical Corps)
- 149th Field Ambulance (Royal Army Medical Corps)

XXX Corps: commanded by Lieutenant General Sir Oliver Leese (CRE Brigadier K. Ray (S.A.E.C.), 380 total tanks, approximately 80,000 men assigned (not including attachments and detachments).

- 4th Indian Infantry Division, Major General Sir Francis Tuker — page J-18
- 9th Australian Infantry Division, Lieutenant General Leslie Morshead — page J-12
- 51st Highland Infantry Division, Major General D. N. Wimberley — page J-14
- 2nd New Zealand Infantry Division, Lieutenant General Sir Bernard Freyberg — page J-15
- 1st South African infantry division, Major General Daniel Pienaar — page J-17
- 23rd Armored Brigade Group (Brigadier G. W. Richards, detached from?, XXX Corps reserve, 49 total tanks)
  - 46th Royal Tank Regiment (49 Valentines)
  - 8th Royal Tank Regiment (detached to 1st South African Infantry Division)
  - 40th Royal Tank Regiment (detached to 9th Australian Infantry Division)
  - 50th Royal Tank Regiment (detached to 51st Infantry Division)
  - 121st Field Regiment Royal Artillery (16 Bishop 25-pdr SP (Self-Propelled) guns)
  - 168th Battery, 56th Light Anti-Aircraft Artillery Regiment Royal Artillery (attached from Hammerforce, 16 Bofors 40mm guns)
  - 295th Army Field Company Royal Engineers (-) (3rd Troop under command of 51st Highland Infantry Division)
  - 7th Light Field Ambulance (Royal Army Medical Corps)
- XXX Corps Troops
  - XXX Corps Defence Squadron
  - 3 troops, 4/6 South African Armoured Car Regiment (9 (?) armored cars, detached from Hammerforce, 10th AD)
  - Royal Artillery, Brigadier M. E. Dennis (Chief of Royal Artillery)
    - 7th Medium Regiment, Royal Artillery (2 batteries, one of 8 4.5" guns & one of 8 5.5" guns)
    - 64th Medium Regiment, Royal Artillery (2 batteries, one of 8 4.5" guns & one of 8 5.5" guns)
    - 69th Medium Regiment, Royal Artillery (16 4.5" guns, in two batteries of 8 guns)
    - one composite battery, 4th Survey Regiment Royal Artillery
  - Royal Engineers
    - 11th South African Engineer Field Company (under CRE, 1st South African Division)
    - 13th South African Engineer Field Company (under CRE, 1st South African Division)
    - 22nd South African Engineer Field Park Company (under CRE, 1st South African Division)
    - HQs & 2nd Section, 66th Mortar Company Royal Engineers (6 4.2" mortars, smoke?)
  - XXX Corps Signals

XXX CORPS STRENGTH

		9th Aus. Div	51st Div	2nd NZ Div	1st SA Div	4th Ind. Div	23rd Armd	Corps Troops	Corps Totals
Personnel		16,000	16,000	16,000	16,000	16,000			80,000
Infantry Battalions	Regular	9	9	7	10	9	-	-	44
	Motorized	-	-	1	-	-	-	-	1
	Machine Gun	1	1	1	1 (+)	1	-	-	5(+)
	Reconnaissance	-	1	-	-	-	-	-	1
	TOTAL	10	11	9	11(+)	1	-	-	43(+)
Tanks	Shermans	-	-	36	-	-	-	-	36
	Grants	-	-	37	-	-	-	-	37
	Crusaders	15	-	49	-	-	-	-	64
	Valentines	42	44	-	51	-	49	-	186
	Stuarts	5	-	29	-	-	-	-	34
	Scorpions	3	3	6	3	-	-	-	16***
	TOTAL	65	47	157	54	-	49	-	372
Field & Medium Artillery	25-pdr gun-howitzers	96	84	96	84	48	-	-	408
	25-pdr SP	-	-	-	-	-	16	-	16
	105mm SP	-	-	-	-	-	-	-	-
	4.5" guns	-	-	-	-	-	-	32	32
	5.5" guns	-	-	-	-	-	-	16	16
	TOTAL	96	84	96	84	48	16	48	472
Anti-Tank Artillery	6-pdr AT gun	64	48	59	48	54	-	-	273
	2-pdr AT gun	72	16	56	96	82	-	-	322
	18-pdr AT gun	-	-	-	3	-	-	-	3
	50mm PAK 38	-	-	-	6	-	-	-	6
	TOTAL	136	64	115	153	136	-	-	604
Anti-Aircraft Artillery	Bofors 40mm	48	48	48	48	48	16	-	256
Armored Cars		-	-	-	55	-	-	9	64
Universal Carriers		331 (est.)	279 (est.)	271 (est.)	310 (est.)	379 (est.)	-	-	1570 (est.)
Engineer Companies	Sqdns & Field Co.	3*	3(+)	3	4	3	1 (-)	**	17 (+)
	Field Park Comp.	1	1	1	1	1	-	-	5

*Plus 2/3 Australian Pioneer Battalion and the 66th Mortar Company Royal Engineers (-) (12 4.2" mortars)

** Headquarters & 2nd Section, 66th Mortar Company Royal Engineers (6 4.2" mortars)

***Salute the Sappers, Part 1, The Formation of the South African Engineer Corps and its Operations in East Africa and the Middle East to the Battle of Alamein, by Neil Orpen with H. J. Martin, Sappers Association, Johannesburg, 1981, page 432.

9th Australian Infantry Division: commanded by Lieutenant General Leslie Morshead, (CRE Lieutenant-Colonel R. J. H. Risson, WIA during battle, replaced by Lieutenant-Colonel A. S. Gehrman, 65 total tanks, approximately 16,000 men assigned (not including attachments and detachments), infantry battalion strength varied from 30 officers, 621 enlisted to 36 officers, 740 enlisted out of an authorized strength of 36 officers and 812 enlisted, on average, each infantry battalion had 31 Universal Carriers and 57 other vehicles. In addition, the division had 71 captured "Spandau" machine guns (probably MG-34s). Authorized 17,300 men, 72 artillery pieces, 136 antitank guns, 444 AT rifles, 48 light anti-aircraft guns, 6 armored cars, 256 universal carriers, 56 medium mortars, 162 light mortars, 48 machine guns, 1,999 trucks, 159 prime movers, 1,064 motorcycles, 197 trailers, 268 miscellaneous vehicles.

20th Australian Infantry Brigade, commanded by Brigadier Wrigley (42 tanks total)
- 2nd/13th Australian Infantry Battalion, LTC Turner, (8 2-pdr anti-tank guns)
- 2nd/15th Australian Infantry Battalion, LTC Magno, (8 2-pdr anti-tank guns)
- 2nd/17th Australian Infantry Battalion, LTC Simpson, (8 2-pdr anti-tank guns)
- 40th Royal Tank Regiment, LTC J. L. T. Finigan, (under command=OPCON? of 20th Australian Brigade (42 Valentines) some had Spiked Fowler Rollers fitted)

24th Australian Infantry Brigade, commanded by Brigadier Arthur H. L. Godfrey (KIA 1 Nov)
- 2nd/28th Australian Infantry Battalion (8 2-pdr anti-tank guns)
- 2nd/32nd Australian Infantry Battalion (8 2-pdr anti-tank guns)
- 2nd/43rd Australian Infantry Battalion (8 2-pdr anti-tank guns)

26th Australian Infantry Brigade, commanded by Brigadier D. A. Whitehead
- 2nd/23rd Australian Infantry Battalion (detached to division and corps reserve, 8 2-pdr anti-tank guns)
- 2nd/24th Australian Infantry Battalion (8 2-pdr anti-tank guns)
- 2nd/48th Australian Infantry Battalion (8 2-pdr anti-tank guns)
- 2nd/7th Australian Engineer Field Company in support

Composite Force, commanded by Lieutenant Colonel E. MacArthur-Onslow (also commander of 2nd/2nd Australian Machine Gun Battalion)
- company of 2nd/2nd Australian Machine Gun Battalion (detached from div troops)
- company of 2nd/3rd Australian Pioneer Battalion (detached from div troops)
- squadron of 9th Australian Divisional Cavalry Regiment (detached from division troops)
- Anti-Tank detachment from 3rd Anti-Tank Regiment, Royal Australian Artillery (detached from division troops)

Division Troops
- 40th Royal Tank Regiment Lieutenant Colonel J. L. T. Finigan, (attached from 23rd Armoured Brigade Group, under command=OPCON? of 20th Australian Brigade (42 Valentines))
- one troop of 2 Scorpions (attached from 1st Army Tank Brigade see 2/13 Field Company)
- 9th Australian Divisional Cavalry Regiment (-) (squadron detached to Composite Force, 15 Crusader MK IIs, 5 Stuarts, 52 Universal Carriers)
- 2nd/2nd Australian Machine Gun Battalion (-), LTC E. MacArthur-Onslow (also commander of Composite Force, one co. detached to Composite Force, 48 Vickers .303 Medium Machine Guns)

Division and Corps Reserve
- 2nd/23rd Australian Infantry Battalion (attached from 26th Australian Infantry Brigade, 8 2-pdr anti-tank guns)
- 46th Royal Tank Regiment (equipment?)

Division Artillery
- 2nd /7th Field Regiment, Royal Australian Artillery (24 25-pdr gun-how., 3 batteries of 8 guns)
- 2nd /8th Field Regiment, Royal Australian Artillery (24 25-pdr gun-how., 3 batteries of 8 guns)
- 2nd /12th Field Regiment, Royal Australian Artillery (24 25-pdr gun-how., 3 batteries of 8 guns)
- 146th Field Regiment Royal Artillery (attached from 1st Armoured Division, 24 25-pdr gun-howitzers, in 3 batteries of 8 guns)
- 3rd Anti-Tank Regiment, Royal Australian Artillery (-) (detachment with Composite Force, 64 6-pdr, 4 batteries of 16 guns)
- 4th Light Anti-Aircraft Regiment, Royal Australian Artillery (48 Bofors 40mm guns, 3 batteries of 16 guns)
- 7th Medium Regiment, Royal Artillery (XXX Corps asset) in support for certain periods
- one battery of the 64th Medium Regiment, Royal Artillery (XXX Corps asset) in support for certain periods

Division Engineers commanded by Lieutenant Colonel Risson (Chief of Engineers, WIA 1 Nov, field companies used some pilot trucks)
- 2nd/3rd Australian Engineer Field Company
  - headquarters (authorized 2/45)
  - three sections (each authorized 1/64)
- 2nd/7th Australian Engineer Field Company (in support of 26th Australian Brigade)
  - headquarters (authorized 2/45)
  - three sections (each authorized 1/64)
- 2nd/13th Australian Engineer Field Company (+), Major Gehrmann (absorbed a company from 2/3 Australian

Pioneer Battalion, doubling its strength, one troop of 3 Scorpions attached)
- headquarters (authorized 2/45)
- three sections (each authorized 1/64)

2nd/24th Australian Engineer Field Park Company (authorized 3/153)
- headquarters
- workshop section
- bridging section
- field stores section
- a light aid detachment of Electrical and Mechanical Engineers was generally attached (authorized 1/12)

2nd/3rd Australian Pioneer Battalion (-) (one company detached to Composite Force, in addition to authorized weapons, this Bn also had many captured weapons including 63 Bredas (6.5mm to 47mm, 15 81mm mortars, 5 Besa machine guns, and other weapons)

1st & 3rd Sections, 66th Mortar Company Royal Engineers (attached, 12 4.2" mortars)

9th Australian Division Signals

2nd/3rd Australian Field Ambulance

2nd/8th Australian Field Ambulance

2nd/11th Australian Field Ambulance

51st Highland Infantry Division: commanded by Major General D. N. Wimberley (CRE Lieutenant-Colonel H. W. Giblin, 44 tanks total, approximately 16,000 men assigned (not including attachments and detachments), on average, each infantry battalion had 31 Universal Carriers and 57 other vehicles, authorized 17,300 men, 72 artillery pieces, 136 antitank guns, 444 AT rifles, 48 light anti-aircraft guns, 6 armored cars, 256 universal carriers, 56 medium mortars, 162 light mortars, 48 machine guns, 1,999 trucks, 159 prime movers, 1,064 motorcycles, 197 trailers, 268 miscellaneous vehicles).

152nd Infantry Brigade, commanded by Brigadier George Murray
- 2nd Battalion, Seaforth Highlanders Regiment (8 2-pdr anti-tank guns)
- 5th Battalion, Seaforth Highlanders Regiment (8 2-pdr anti-tank guns)
- 5th Battalion, Queen's Own Cameron Highlanders Regiment (8 2-pdr anti-tank guns)

153rd Infantry Brigade
- 5th Battalion, Royal Highland Regiment, "The Black Watch" (8 2-pdr anti-tank guns)
- 1st Battalion, Gordon Highlanders Regiment (8 2-pdr anti-tank guns)
- 5th/7th Battalion, Gordon Highlanders Regiment (8 2-pdr anti-tank guns)

154th Infantry Brigade, commanded by Brigadier Houldworth
- 1st Battalion, Royal Highland Regiment, "The Black Watch" (8 2-pdr anti-tank guns)
- 7th Battalion, Royal Highland Regiment, "The Black Watch" (8 2-pdr anti-tank guns)
- 7th Battalion, Argylle and Sutherland Highlanders Regiment (8 2-pdr anti-tank guns)

Division Troops
- 50th Royal Tank Regiment (attached from 23rd Armoured Brigade Group (44 Valentines))
- 1st/7th Battalion (Machine Gun), The Middlesex Regiment (48 Vickers .303 Medium Machine Guns)
- 51st Reconnaissance Regiment
- Royal Artillery
  - 126th Field Regiment, Royal Artillery (24 25-pdr gun-how., in 3 batteries of 8 guns)
  - 127th Field Regiment, Royal Artillery (24 25-pdr gun-how., in 3 batteries of 8 guns)
  - 128th Field Regiment, Royal Artillery (24 25-pdr gun-how., in 3 batteries of 8 guns)
  - three troops, 78th Field Regiment, Royal Artillery (12 25-pdr gun-howitzers, attached from 1st Armored Division)
  - 61st Anti-Tank Regiment, Royal Artillery (48 6-pdr and 16 2-pdr AT guns, 4 batteries of 16 guns)
  - 40th Light Anti-Aircraft Regiment, Royal Artillery (48 Bofors 40mm guns, 3 batteries of 16 guns)
- Royal Engineers (one troop of 3 Scorpions attached)
  - 274th Field Company Royal Engineers
    - headquarters (authorized 2/45)
    - three sections (each authorized 1/64)
  - 275th Field Company Royal Engineers
    - headquarters (authorized 2/45)
    - three sections (each authorized 1/64)
  - 276th Field Company Royal Engineers
    - headquarters (authorized 2/45)
    - three sections (each authorized 1/64)
  - 239th Field Park Company Royal Engineers (authorized 3/153)
    - headquarters
    - workshop section
    - bridging section
    - field stores section
    - a light aid detachment of Electrical and Mechanical Engineers was generally attached (authorized 1/12)
  - 3rd Troop, 295th Army Field Company Royal Engineers (under command of 51st Infantry Division=OPCON? From 23rd Armored Brigade Group)
- 51st Infantry Division Signals
- 174th Field Ambulance (Royal Army Medical Corps)
- 175th Field Ambulance (Royal Army Medical Corps)
- 176th Field Ambulance (Royal Army Medical Corps)

2nd New Zealand Infantry Division: commanded by Lieutenant General Sir Bernard C. Freyberg (CRE Lieutenant-Colonel F. M. H. Hanson, Headquarters: 4 Stuarts (from division cavalry regiment), 157 total tanks, approximately 16,000 men assigned (not including attachments and detachments), on average, each infantry battalion had 31 Universal Carriers and 57 other vehicles, authorized 17,300 men, 72 artillery pieces, 136 antitank guns, 444 AT rifles, 48 light anti-aircraft guns, 6 armored cars, 256 universal carriers, 56 medium mortars, 162 light mortars, 48 machine guns, 1,999 trucks, 159 prime movers, 1,064 motorcycles, 197 trailers, 268 miscellaneous vehicles)

- 5th New Zealand Infantry Brigade, commanded by Brigadier Sir Howard K. Kippenberger since Jan 42
  - 21st New Zealand Infantry Battalion (Lieutenant Colonel (?) Ralf Harding) (8 2-pdr anti-tank guns)
  - 22nd New Zealand Infantry Battalion (Lieutenant Colonel (?) Tom Campbell) (8 2-pdr anti-tank guns, 35/628 assigned)
  - 23rd New Zealand Infantry Battalion (Lieutenant Colonel (?) Reginald E. Romans) (8 2-pdr anti-tank guns)
  - A & B companies, 28th New Zealand Infantry Battalion (Maoris) (-) (Lieutenant Colonel F. Baker, 4 2-pdr anti-tank guns)
  - 4 Company, 27th New Zealand Machine Gun Battalion (MAJ A. W. Cooper, attached to 5th Brigade, 12 Vickers .303 Medium Machine Guns)
    - 10 Platoon (Lieutenant J. T. H. Halkett, 4 Vickers .303 Medium Machine Guns)
    - 11 Platoon (Lieutenant L. Morgan, 4 Vickers .303 Medium Machine Guns)
    - 12 Platoon (Second Lieutenant G. Kaye, 4 Vickers .303 Medium Machine Guns)
  - 2 troops (6 tanks total) of Crusaders were attached from Royal Wiltshire Yeomanry Regiment and detached to the 21st and 22nd infantry battalions (one troop per battalion)
  - 32nd Battery, 7th Anti-Tank Regiment, Royal New Zealand Artillery (3 troops of 4 6-pdr anti-tank guns each; 12 total)
  - 7th Engineer Field Company (+) (Major Jerry Skinner)(troop of 3 Scorpions in reserve (attached from 1st Army Tank Brigade) and mine roller equipped "pilot" trucks)(one section from 6th Engineer Field Company)
  - 5th Field Regiment, Royal New Zealand Artillery (Lieutenant Colonel Sprosen, in support, 29 officers & 408 enlisted assigned of 42 officers & 653 enlisted authorized, 24 25-pdr gun-howitzers, in 3 batteries of 8 guns)
- 6th New Zealand Infantry Brigade commanded by Brigadier William (Bill) G. Gentry replaced Brigadier Clifton (Royal New Zealand Engineer captured 4 Aug)
  - 24th New Zealand Infantry Battalion (Lieutenant Colonel F. J. Gwillian) (29 officers and 619 enlisted assigned, only three rifle companies, 8 2-pdr AT guns)
  - 25th New Zealand Infantry Battalion (Lieutenant Colonel Bonifant, WIA 24 Oct, replaced by MAJ Porter) (only three rifle companies, 8 2-pdr anti-tank guns)
  - 26th New Zealand Infantry Battalion (Lieutenant Colonel Den. J. Fountaine) (only three rifle companies, 8 2-pdr anti-tank guns)
  - C & D companies of 28th New Zealand Infantry Battalion (Maoris) (4 2-pdr anti-tank guns)
  - 3 Company, 27th New Zealand Machine Gun Battalion (Major E. J. Tong, attached to 6th Brigade, 12 Vickers .303 Medium Machine Guns)
    - 7 Platoon (Lieutenant D. B. Beard, 4 Vickers .303 Medium Machine Guns)
    - 8 Platoon (Lieutenant N. F. Gardiner, 4 Vickers .303 Medium Machine Guns)
    - 9 Platoon (Second Lieutenant T. K. Thomson, 4 Vickers .303 Medium Machine Guns)
  - 2 troops (6 tanks total) of Crusaders were attached from Royal Warwickshire Yeomanry Regiment and detached to the 25th and 26th infantry battalions (one troop per battalion)
  - 33rd Battery, 7th Anti-Tank Regiment, Royal New Zealand Artillery (4 troops of 4 6-pdr anti-tank guns each, 16 total)
  - 8th Engineer Field Company (+) (Major Murray Reid)(includes troop of 3 Scorpions in reserve (attached from 1st Army Tank Brigade) and mine roller equipped "pilot" trucks) (one section from 6th Engineer Field Company)
  - 6th Field Regiment, Royal New Zealand Artillery (in support, 38 officers & 474 enlisted assigned of 42 officers & 644 enlisted authorized, 24 25-pdr gun-howitzers, in 3 batteries of 8 guns)
- 9th Armoured Brigade commanded by Brigadier John C. Currie, attached from 10th Armoured Division, Headquarters: 1 Sherman, 3 Crusaders, 122 tanks total (of the Crusaders, 37 were MK IIs and 12 were MK IIIs))
  - 3rd Hussars Regiment (Lieutenant Colonel Sir Peter Farquhar (8 OCT 42), assigned 12 Shermans, 9 Grants, 16 Crusaders)
  - Royal Wiltshire Yeomanry Regiment (Peter Sykes, assigned 10 Shermans, 14 Grants, 13 Crusaders (of which 2 troops (6 tanks total) of Crusaders were attached to 21st and 22nd infantry battalions (one troop per battalion), 5th New Zealand Infantry Brigade))
  - Royal Warwick Yeomanry Regiment (Lieutenant Colonel Guy Jackson, assigned 13 Shermans, 14 Grants, 17 Crusaders (of which 2 troops (6 tanks total) of Crusaders were attached to 25th and 26th infantry battalions (one troop per battalion), 6th New Zealand Infantry Brigade)
  - 14th Battalion, Sherwood Foresters Regiment (motorized infantry battalion (16 6-pdr AT guns))
    - 31st Battery, 7th Anti-Tank Regiment, Royal New Zealand Artillery (attached, 4 troops of 4 6-pdr anti-tank guns each, 16 total)
  - 4th Field Regiment, Royal New Zealand Artillery (attached to 9th Armoured Brigade at the completion of the lifting barrage, Lieutenant Colonel Stewart, 36 officers & 497 enlisted assigned of 42 officers & 644 enlisted authorized, 24 25-pdr gun-howitzers, in 3 batteries of 8 guns)
  - 166th Light Field Ambulance (Royal Army Medical Corps)

Division Troops

- 2nd New Zealand Division Cavalry Regiment (Lieutenant Colonel J. H. Sutherland replaced Lieutenant Colonel Nicoll who was injured on 5 Oct, at least 23 Universal Carriers, 25 Stuart tanks on-hand, 4 more detached to 2nd New Zealand Infantry Division Headquarters).
  - Headquarters Squadron (Captain R. B. McQueen)
  - A Squadron (Major G. H. Stace)
  - B Squadron (Major W. G. Handley)
  - C Squadron (Major A. van Slyke)
  - Detachment, 5th Field Park Company
- 27th New Zealand Machine Gun Battalion (Lieutenant Colonel A. W. White, 48 Vickers .303 Medium Machine Guns)
  - 1 Company (Captain L. A. Joseph, 12 Vickers .303 Medium Machine Guns)

1 Platoon (Lieutenant J. E. Crisp, 4 Vickers .303 Medium Machine Guns)
2 Platoon (Lieutenant H. D. Ball, 4 Vickers .303 Medium Machine Guns)
3 Platoon (Lieutenant W. R. Lowther, 4 Vickers .303 Medium Machine Guns)

2 Company (Captain I. S. Moore, 12 Vickers .303 Medium Machine Guns)
4 Platoon (Lieutenant D. W. Farquharson, 4 Vickers .303 Medium Machine Guns)
5 Platoon (Lieutenant K. Dixon, 4 Vickers .303 Medium Machine Guns)
6 Platoon (Lieutenant N. G. Blue, 4 Vickers .303 Medium Machine Guns)

3 Company (Major E. J. Tong, detached to 6th Brigade, 12 Vickers .303 Medium Machine Guns)
7 Platoon (Lieutenant D. B. Beard, 4 Vickers .303 Medium Machine Guns)
8 Platoon (Lieutenant N. F. Gardiner, 4 Vickers .303 Medium Machine Guns)
9 Platoon (Second Lieutenant T. K. Thomson, 4 Vickers .303 Medium Machine Guns)

4 Company (Major A. W. Cooper, detached to 5th Brigade, 12 Vickers .303 Medium Machine Guns)
10 Platoon (Lieutenant J. T. H. Halkett, 4 Vickers .303 Medium Machine Guns)
11 Platoon (Lieutenant L. Morgan, 4 Vickers .303 Medium Machine Guns)
12 Platoon (Second Lieutenant G. Kaye, 4 Vickers .303 Medium Machine Guns)

28th New Zealand Infantry Battalion (Maoris) (Lieutenant Colonel Frederick Baker, line companies attached to 5th and 6th brigades)

Division Artillery commanded by CRA Brigadier "Steve" C. E. Weir, 170 officers & 2453 enlisted assigned of 218 officers & 3683 enlisted authorized, not including attachments/detachments.

4th Field Regiment, Royal New Zealand Artillery (detached to 9th Armoured Brigade at the completion of the lifting barrage, Lieutenant Colonel Stewart, 36 officers & 497 enlisted assigned of 42 officers & 644 enlisted authorized, 24 25-pdr gun-howitzers, in 3 batteries of 8 guns)

5th Field Regiment, Royal New Zealand Artillery (Lieutenant Colonel Sprosen, in support of 5th Brigade, 29 officers & 408 enlisted assigned of 42 officers & 653 enlisted authorized, 24 25-pdr gun-howitzers, in 3 batteries of 8 guns)

6th Field Regiment, Royal New Zealand Artillery (in support of 6th Brigade, 38 officers & 474 enlisted assigned of 42 officers & 644 enlisted authorized, 24 25-pdr gun-howitzers, in 3 batteries of 8 guns)

three troops, 78th Field Regiment Royal Artillery (attached from 1st Armored Division, 12 25-pdr gun-howitzers, 4 guns per troop)

three troops, 98th Field Regiment Royal Artillery (attached from 1st Armored Division, 12 25-pdr gun-howitzers, 4 guns per troop)

one battery, 69th Medium Artillery Regiment Royal Artillery (8 4.5" guns) in support (XXX Corps asset)

7th Anti-Tank Regiment, Royal New Zealand Artillery (31 officers & 462 enlisted assigned of 49 officers & 699 enlisted authorized, 61 6-pdr AT guns, 2 batteries of 16 guns and 2 of 12 guns with 5 in reserve)

14th Light Anti-Aircraft Regiment, Royal New Zealand Artillery (Lieutenant Colonel Bretherton, 27 officers & 549 enlisted assigned of 32 officers & 962 enlisted authorized, 48 40mm guns, 3 batteries of 16 guns)

Division Engineers, commanded by CRE Lieutenant Colonel Frederick M. H. Hanson, headquarters authorized 6 officers, 1 attached medical officer, 31 Enlisted, total 8/844)

6th Engineer Field Company (-) (Major Woolcott KIA 24 Oct, mine, replaced by Major Anderson, authorized 5/237) (two sections detached from 6th Field Company, one attached to each 7th and 8th field companies, the rest of the company was detached to the Division Reserve Group)
headquarters (authorized 2/45)
three sections (each authorized 1/64)

7th Engineer Field Company (+) (Major Jerry Skinner)(troop of 3 Scorpions in reserve (attached from 1st Tank Brigade) and mine roller equipped "pilot" trucks, detached to 5th New Zealand Infantry Brigade, authorized 5/237)
headquarters (authorized 2/45)
three sections (each authorized 1/64) (plus one section from 6th Engineer Field Company)

8th Engineer Field Company (+) (Major Murray Reid)(includes troop of 3 Scorpions in reserve (attached from 1st Army Tank Brigade) and 2 mine roller equipped "pilot" trucks, detached to 6th New Zealand Infantry Brigade, authorized 5/237)
headquarters (authorized 2/45)
three sections (each authorized 1/64) (plus one section from 6th Engineer Field Company)

5th Engineer Field Park Company (Major Anderson at first, later replaced by Major Rix-Trott, as of 24 October (officially 28 October), authorized 3/153)
headquarters
workshop section
bridging section
field stores section
a light aid detachment, Electrical and Mechanical Engineers was normally attached (authorized 1/12)

Division Reserve Group (under Lieutenant Colonel A. W. White, commander, 27th New Zealand Machine Gun Battalion)

27th New Zealand Machine Gun Battalion (minus 3 and 4 companies, which were attached to 5 & 6 brigades)

34th Battery, 7th Anti-Tank Regiment, Royal New Zealand Artillery (3 troops of 4 6-pdr anti-tank guns each, 12 total)

6th Engineer Field Company (-) (Major Woolcott, two sections detached from 6th Field Company, one attached to each 7th and 8th field companies, the rest of the company had been combined with elements from the 5th Engineer Field Park Company was attached to the Division Reserve Group)

2nd New Zealand Division Signals

5th New Zealand Field Ambulance

6th New Zealand Field Ambulance

1st South African Infantry Division: commanded by Major General D. H. Pienaar (CRE Lieutenant-Colonel Mill-Colman, 54 total tanks, approximately 16,000men assigned (not including attachments and detachments), on average, each infantry battalion had 31 Universal Carriers and 57 other vehicles, authorized 17,300 men, 72 artillery pieces, 136 antitank guns, 444 AT rifles, 48 light anti-aircraft guns, 6 armored cars, 256 Universal carriers, 56 medium mortars, 162 light mortars, 48 machine guns, 1,999 trucks, 159 prime movers, 1,064 motorcycles, 197 trailers, 268 miscellaneous vehicles).

1st South African Infantry Brigade
- 1st Battalion, Royal Natal Carabiniers Regiment (8 2-pdr anti-tank guns)
- 1st Battalion, Duke of Edinburgh's Own Rifles Regiment (8 2-pdr anti-tank guns)
- 1st Battalion, Transvaal Scottish Regiment (8 2-pdr anti-tank guns)
- 2nd Regiment Botha (detached to 1st SA Division Reserve Group)

2nd South African Infantry Brigade
- 1st/2nd Field Force Battalion (8 2-pdr anti-tank guns)
- 1st Battalion, Natal Mounted Rifles Regiment (8 2-pdr anti-tank guns)
- 1st Battalion, Cape Town Highlanders Regiment (8 2-pdr anti-tank guns)

3rd South African Infantry Brigade
- 1st Battalion, Imperial Light Horse Regiment (8 2-pdr anti-tank guns)
- 1st Battalion, Royal Durban Light Infantry Regiment (8 2-pdr anti-tank guns)
- 1st Battalion, Rand Light Infantry Regiment (8 2-pdr anti-tank guns)

1st South African Division Reserve Group (in effect from 23-31 Oct)
- 8th Royal Tank Regiment (attached from 23rd Armoured Brigade Group, 51 Valentines)
- 3rd South African Armoured Car Regiment (-) (31 armored cars, two squadrons with division troops)
- one Scorpion Troop (3 Scorpions, attached from 1st Army Tank Brigade)
- 2nd Regiment Botha (attached from 1st South African Brigade, 8 2-pdr anti-tank guns)
- one battery, 1st Anti-tank Regiment, Royal South African Artillery (16 6-pdr AT guns)
- one troop, 1st Light Anti-Aircraft Regiment, Royal South African Artillery (4 Bofors 40mm guns)

Division Troops
- Two squadrons, 3rd South African Armored Car Regiment (24 armored cars)
- President Steyn Machine Gun Regiment (48 Vickers .303 Medium Machine Guns)
- one company, Die Middelandse Machine Gun Regiment (12 Vickers .303 MMGs)
- Division Artillery
  - 1st Field Regiment, Royal South African Artillery (24 25-pdr gun-howitzers, 3 batteries of 8 guns)
  - 4th Field Regiment, Royal South African Artillery (24 25-pdr gun-howitzers, 3 batteries of 8 guns)
  - 7th Field Regiment, Royal South African Artillery (24 25-pdr gun-howitzers, 3 batteries of 8 guns)
  - three troops, 5th Regiment, Royal Horse Artillery (attached from 1st Armored Division, 12 25-pdr gun-howitzers, 4 guns per troop)
  - 1st Anti-Tank Regiment, Royal South African Artillery (-) (one battery detached to Division Reserve Group (16 6-pdr AT guns), 32 6-pdr, 16 2-pdr, 3 18-pdr, 6 50mm (German PAK 38))
  - 1st Light Anti-Aircraft Regiment, Royal South African Artillery (-) (one troop detached to Division Reserve Group (4 Bofors 40mm AA guns), 44 Bofors 40mm guns, 2 batteries of 16 guns & one of 12 guns)
- Division Engineers (with a troop of 3 Scorpions attached)
  - 1st South African Engineer Field Company
    - headquarters (authorized 2/45)
    - three sections (each authorized 1/64)
  - 2nd South African Engineer Field Company
    - headquarters (authorized 2/45)
    - three sections (each authorized 1/64)
  - 3rd South African Engineer Field Company
    - headquarters (authorized 2/45)
    - three sections (each authorized 1/64)
  - 5th South African Engineer Field Company
    - headquarters (authorized 2/45)
    - three sections (each authorized 1/64)
  - 19th South African Engineer Field Park Company (authorized 3/153)
    - headquarters
    - workshop section
    - bridging section
    - field stores section
    - a light aid detachment of Electrical and Mechanical Engineers was generally attached (authorized 1/12)
  - 11th South African Engineer Field Company (attached from XXX Corps)
  - 13th S A Engineer Field Company (with mine roller equipped "pilot" trucks, attached from XXX Corps)
  - 22nd South African Engineer Field Park Company (attached from XXX Corps)
- 1st South African Division Signals
- 12th South African Field Ambulance
- 15th South African Field Ambulance
- 18th South African Field Ambulance

4th Indian Infantry Division (Mountain Capable): commanded by Major General Sir Francis I. S. Tuker (CRE Lieutenant-Colonel J. H. Blundell, approximately 16,000 men assigned (not including attachments and detachments), on average, each infantry battalion had 31 Universal Carriers and 57 other vehicles, authorized 17,300 men, 72 artillery pieces, 136 antitank guns, 444 AT rifles, 48 light anti-aircraft guns, 6 armored cars, 256 universal carriers, 56 medium mortars, 162 light mortars, 48 machine guns, 1,999 trucks, 159 prime movers, 1,064 motorcycles, 197 trailers, 268 miscellaneous vehicles).

5th Indian Infantry Brigade, commanded by Brigadier D. Russell (Corps reserve)
- 1st/4th Battalion, Essex Regiment (8 2-pdr anti-tank guns)
- 4th/6th Battalion, Rajput Rifles Regiment (8 2-pdr anti-tank guns)
- 3rd/10th Battalion, Baluchi Regiment (8 2-pdr anti-tank guns)

7th Indian Infantry Brigade
- 1st Battalion, Royal Sussex Regiment (8 2-pdr anti-tank guns)
- 1st/16th Battalion, Punjab Regiment (8 2-pdr anti-tank guns)
- 1st Battalion, 2nd Gurkha Rifle Regiment (8 2-pdr anti-tank guns)

161st Indian Infantry Brigade
- 1st Battalion, Argylle and Sutherland Highlanders Regiment (8 2-pdr anti-tank guns)
- 1st/1st Battalion, Punjab Regiment (8 2-pdr anti-tank guns)
- 4th/7th Battalion, Rajput Regiment (8 2-pdr anti-tank guns)

Division Troops
- 6th Battalion (Machine Gun), Rajput Rifles Regiment (48 Vickers .303 Medium Machine Guns)

Division Artillery
- 1st Field Regiment, Royal Artillery (16 25-pdr gun-how., in 2 batteries of 8 guns)
- 11th Field Regiment, Royal Artillery (16 25-pdr gun-how., in 2 batteries of 8 guns)
- 32nd Field Regiment, Royal Artillery (16 25-pdr gun-how., in 2 batteries of 8 guns)
- 149th Anti-Tank Regiment (54 6-pdr and 10 2-pdr anti-tank guns, 4 batteries of 16 guns)
- 57th Light Anti-Aircraft Regiment (48 Bofors 40mm guns, 3 batteries of 16 guns)

Division Engineers
- 2nd Field Company Indian Sappers and Miners
  - headquarters (authorized 2/45)
  - three sections (each authorized 1/64)
- 4th Field Company Indian Sappers and Miners
  - headquarters (authorized 2/45)
  - three sections (each authorized 1/64)
- 12th Field Company Indian Sappers and Miners
  - headquarters (authorized 2/45)
  - three sections (each authorized 1/64)
- 11th Field Park Company Indian Sappers and Miners, authorized 3/153)
  - headquarters
  - workshop section
  - bridging section
  - field stores section
  - a light aid detachment of Electrical and Mechanical Engineers was generally attached (authorized 1/12)

- 4th Indian Division Signals
- 17th Indian Field Ambulance
- 26th Indian Field Ambulance
- 75th Light Indian Field Ambulance

Formations Under 8th Army Command (6 tanks total with headquarters)

8th Armoured Division, commanded by Major General C. H. Gairdner (CRE Lieutenant-Colonel C. E. A. Browning, under command of 8th Army, Only the headquarters and a few attachments under the control of the division headquarters)
- Hammerforce (detached to 1st Armoured Division)
- 24th Armoured Brigade (detached to 10th Armoured Division)
- 145th Field Park Squadron Royal Engineers (in X Corps reserve)
- HQs, 1st Battalion, The Newfoundland Regiment (Machine Gun) and Y Company (reforming)
- 6th Field Squadron Royal Engineers (detached to 10th Armoured Division)
- 9th Field Squadron Royal Engineers (detached to 1st Armoured Division)
- 143rd Field Park Squadron Royal Engineers
- 8th Armoured Division Signals

1st Army Tank Brigade (Scorpion troops detached to X, XIII, and XXX corps, this brigade may also have been equipped Canal Defense Light (CDL) tanks at this point)
- 6th Battalion, Royal Tank Regiment (2(4?) troops of 3 officers, 25 enlisted men and 3 Scorpions each) (uncertain)
- 42nd Battalion, Royal Tank Regiment (2(4?) troops of 3 officers, 25 enlisted men and 3 Scorpions each, also equipped with Matildas equipped with "Canal Defense Lights," not used, in training)
- 44th Battalion, Royal Tank Regiment (2(4?) troops of 3 officers, 25 enlisted men and 3 Scorpions each, also equipped with Matildas equipped with "Canal Defense Lights," not used, in training)

21st Indian Infantry Brigade (reforming, used for headquarters protection, camouflage and guard duty)
- 1st/6th Battalion, Rajput Rifles Regiment
- 3rd/7th Battalion, Rajput Regiment
- 2nd Battalion, 8th Gurkha Rifles Regiment (less one Company)
- 9th Indian Field Company Indian Engineers
- 29th Indian Field Ambulance

1st Armoured Brigade (holding unit)
- 4th Hussars Regiment (details, reforming)
- 8th Hussars Regiment (details, reforming)
- 2nd Royal Gloustershire Hussars Regiment (in quarantine)

12th Anti-Aircraft Brigade (for 8th Army area protection)
- 14th Light Anti-Aircraft Regiment, Royal Artillery (48 Bofors 40mm guns, 3 batteries of 16 guns)
- 16th Light Anti-Aircraft Regiment, Royal Artillery (48 Bofors 40mm guns, 3 batteries of 16 guns)
- 27th Light Anti-Aircraft Regiment, Royal Artillery (32 Bofors 40mm guns, 2 batteries of 16 guns)
- 88th Heavy Anti-Aircraft Regiment, Royal Artillery (16 3.7" Anti-Aircraft guns, 2 batteries of 8 guns (where is the 3rd battery?))
- 94th Heavy Anti-Aircraft Regiment, Royal Artillery (16 3.7" Anti-Aircraft guns, 2 batteries of 8 guns (where is the 3rd battery?))
- two troops, 27th Searchlight Regiment, Royal Artillery (5 searchlights (used to "bounce" light off clouds to illuminate the enemy)

2nd Anti-Aircraft Brigade (for headquarters and railway protection)
- 2nd Light Anti-Aircraft Regiment, Royal Artillery (48 Bofors 40mm guns, 3 batteries of 16 guns)
- 199th & 261st Batteries, 69th Heavy Anti-Aircraft Regiment, Royal Artillery (16 3.7" Anti-Aircraft guns, 8 guns per battery)

Army Troops
- B Squadron, 6th Royal Tank Regiment (from? 8th Army HQs protection with 6 Matilda (?) tanks)
- one troop, 6th South African Armoured Car Regiment (from? 8th Army HQs protection with 6 armd cars)
- Tank Delivery Regiment
- one squadron from the Special Air Service Regiment (raiding forces)

Chief of Royal Engineers (Brigadier Kisch)
- DCE Roads, Colonel Shannon
- 14 DCE, Colonel C. Topham
- 3 CRE, Lieutenant-Colonel H. C. West
- 62 CRE, Lieutenant-Colonel B. M. Archibald
- 72 CRE, Lieutenant-Colonel N. A. Armitage
- 82 CRE (Airfields), Lieutenant-Colonel M. R. M. Cubitt
- 295th Army Field Company Royal Engineers (detached to 23rd Armored Brigade Group)
- 566th Army Troops Company Royal Engineers
- 588th Army Troops Company Royal Engineers
- 25th Road Construction Company, South African Engineer Corps
- 27th Road Construction Company, South African Engineer Corps
- 31st Road Construction Company, South African Engineer Corps
- 4th Mobile Landing Ground Construction Party
- 5th Mobile Landing Ground Construction Party
- 21st New Zealand Mechanical Equipment Operating Company, Royal New Zealand Engineers

22nd South African Workshop and Park Company, South African Engineer Corps
36th South African Water Supply Company, South African Engineer Corps
1st Camouflage Company Royal Engineers
85th Camouflage Company, South African Engineer Corps
95th South African Bomb Disposal Company, South African Engineer Corps
twenty-five pioneer and labor companies plus twenty-four more in General Headquarters reserve
5th Boring Section
detachment, 114th Mechanical Equipment Workshop and Park Company
Director of Survey, Colonel V. E. H. Sanceau
517th Field Survey Company
13th Field Survey Depot
46th Survey Company, South African Engineer Corps
Lines-of-Communications, transportation and headquarters units, "It is regretted that it is not possible to include a list of (these) which contributed so materially to the success of the Eighth Army."[2]

3rd Libyan Arab Forces (guard duties)
8th Army Signals
4th Light Field Ambulance (Royal Army Medical Corps)
200th Field Ambulance (Royal Army Medical Corps)
six tank transporter companies
fifty-three general transport company equivalents

[2] History of the Royal Engineers, by Derek Boyd, Leo Cooper Ltd, London, 1975, page 395.

Desert Air Force (note: the exact nature of the Desert Air Force's relationship with 8th Army is unclear. 104 squadrons were available in the Middle East (including these incomplete squadrons: RAF 64, Fleet Air Arm 7, South African Air Force 16, Royal Australian Air Force 6, Royal Canadian Air Force 2, Rhodesian 1, US Army Air Force 13, Greek 2), with a reported total of 1600 aircraft (about 600 fighters, 400 fighter-bombers, 600 medium bombers, and 63 heavy bombers), plus 500 in reserve, note: these numbers are inconsistent)[3]

Air Headquarters Western Desert (based in Cairo)

Tactical Air Command (based at Wadi el Natrun)

Fighters (twenty-five fighter squadrons)

- No. 211 Group ('Force A', with 299 fighters and fighter-bombers, based at Bir Hooker)
  - No. 233 Wing (3 squadrons of P-40 Kittyhawks and one of P-40 Tomahawks)
  - No. 239 R.A.F. Wing (based at El Kubri)
    - No. 3 Squadron, Royal Australian Air Force (Kittyhawks, based at El Kubri)
    - 66th Fighter Squadron, U.S. Army Air Force (P-40f)
    - No. 112 Squadron (Kittyhawks, based at El Kubri)
    - No. 450 Squadron, Royal Australian Air Force (Kittyhawks, based at El Kubri)
  - No. 244 R.A.F. Fighter Wing (based at Mariut)
    - No. 80 Squadron (Hurricanes, based at Cairo)
    - No. 92 Squadron (Spitfires, based at Mariut)
    - No. 238 Squadron (Hurricanes, based at Mariut)
    - No. 274 Squadron (Hurricanes, based at LG. 154)
    - No. 341 Squadron (Hurricanes, based at Mariut)
  - US 57th Fighter Group (2 squadrons of P-40 Kittyhawks, see U.S. Army Middle East Air Force below)
  - No. 6 Squadron (Hurricane IID tankbusters)
  - No. 7 South African Air Force Squadron (Hurricane IID tankbusters)

- No. 212 Group ('Force B', with 128 fighters (including 75 flown by US pilots))
  - No. 7 (South African Air Force) Wing (four squadrons of Hurricanes)
  - No. 243 R.A.F. Fighter Wing (based at Bir Hooker)
    - No. 1 Squadron South African Air Force (P-40 Kittyhawks, based at Mariut)
    - No. 33 Squadron (Hurricanes, based at LG. 154)
    - No. 73 Squadron (Spitfires, based at LG. 89)
    - No. 118 Squadron (based at El Mirbat)
    - No. 145 Squadron (Spitfires, based at LG. 154)
    - No. 213 Squadron (Hurricanes, based at LG. 154)
    - No. 601 Squadron (Spitfires, based at El Mirbat)

- No. 211 R.A.F. Wing (based at LG. 97)
  - No. 260 Squadron South African Air Force (Kittyhawks, based at El Kubri)

- No. 240 R.A.F. Wing (based at Imayd)
  - No. 5 Squadron (P-40 Tomahawks and Kittyhawks, based at LG. 97)
  - No. 94 Squadron (P-40 Tomahawks and Kittyhawks, based at LG. 97)

Day Bombers

- No. 3 South African Air Force Bomber Wing (based at Benha)
  - No. 12 Squadron (Bostons, based at Abu Qir)
  - No. 14 Squadron (Baltimores, based at Imayid)
  - No. 21 Squadron (Baltimores, based at Imayid)
  - No. 24 Squadron (Bostons, based at LG. 99)
  - No. 55 Squadron (Baltimores and Blenheims, based at Tell el Kebir)
  - No. 60 Squadron (Maryland, Based at Wadi Natrun)
  - No. 233 Squadron (Baltimores, based at LG. 98)

- No. 3 South African Air Force Fighter-Bomber Wing (based at Benha)
  - No. 2 Squadron (P-40 Kittyhawks, based at LG. 85)
  - No. 4 squadrons (P-40 Kittyhawks, based at LG. 85)

- No. 232 Wing (2 day-bomber squadrons, equipped with Baltimores)

- No. 247 Bomber Wing (based at Giananclis)
  - No. 15 South African Air Force Squadron (Blenheims, based at Burg el Arab)
  - No. 38 Squadron (Wellingtons, based at Giananclis)

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[3] *La Regia Aeronautica, 1939-1943, Volume Terzo, 1942, L'Anno Della Speranza*, by Nino Arena, Stato Maggiore Aeronautica, Ufficio Storico, Rome, 1984, pages 233-234. The Mediterranean and Middle East, Volume IV, The Destruction of the Axis Forces in Africa, by I.S.O. Playfair et.al., Her Majesty's Stationery Office, London, 1966, pages 3, 11, 13.

No. 47 Squadron (Beauforts and Albacores, based at Amrya)
No. 459 Squadron (Hudsons and Blenheims, based at Gianaclis)
No. 22 Squadron (Beauforts, based at Gianaclis)
No. 39 Squadron (Beauforts, based at Mariut)
No. 221Squadron (Wellingtons, based at Gianaclis)
2057th GR Flight (Beaufighter, based at Gianaclis)
Ind. Flight (Wellington/Fairchild, at Gianaclis)

Reconnaissance

No. 285 Wing (3 reconnaissance squadrons and 2 flights)
two tactical reconnaissance (Hurricane) squadrons
one strategic reconnaissance (Baltimore) flight
one survey reconnaissance (Baltimore) squadron
one photographic reconnaissance (Spitfire) flight

U.S. Army Middle East Air Force commanded by Major General Lewis H. Brereton, re-designated 9th US Air Force in November 1942. Equipped with Forty B-24s, six B-17s, thirty-five B-25s, and forty-nine P-40s, another thirty-five, a sampling of all types, were not operational at this time (October 1942).[4]

9th Bomber Command (Brigadier General Patrick W. Timberlake, with 51 heavy bombers became operational on 12 OCT 42)
98th Heavy Bomber Group (B-24 "Liberators," based at Ramat David)
345th Heavy Bomber Group (B-24 "Liberators," based at LG. 224)
376th Bomber Group (absorbed the B-24Ds of Colonel Halverson's Project No. 63 in October, based at Lydda)
9th Squadron, 7th Bombardment Group (only 7 B-17s on hand on 28 June 1942, may have been absorbed into another unit)

12th Medium Bombardment Group (equipped with B-25 Mitchell medium bombers, based at Deversoir)
81st Bomber Squadron (B-25 "Mitchells," based at LG. 99/244)
82nd Bomber Squadron (B-25 "Mitchells," based at LG. 99/244)
83rd Bomber Squadron (B-25 "Mitchells," based at LG. 99/244)
84th Bomber Squadron (B-25 "Mitchells," based at LG. 99/244)

57th Fighter Group (in support of No. 211 Fighter Group, based at Idku)
64th Fighter Squadron (equipped with P-40f "Warhawks," based at Nicosia)
65th Fighter Squadron (equipped with P-40f "Warhawks," based at Idku)

78th Fighter Group (equipped with P-40f "Warhawks," based at Tanta)

Available 'to reinforce'

No. 201 Royal Navy Air Wing (two pathfinder squadrons of Albacores, based at Dikheila)
No. 755 Squadron (Albacores and Swordfish, based at Dikheila)
No. 805 Squadron (Hurricanes, based at Dikheila)
No. 815 Squadron (Swordfish, based at Port Said)
No. 821 Squadron (Albacores, based at Dikheila)
No. 826 Squadron (Albacores and Swordfish, based at Dikheila)

No. 205 Bomber Group (Wellington medium night bombers, based at Abu Smeir)
No. 231 Bomber Wing (based at Abu Smeir)
No. 37 Squadron (Wellingtons, based at Abu Smeir)
No. 70 Squadron (Wellingtons, based at Abu Smeir)
No. 236 Bomber Wing (based at Kabrit)
No. 104 Squadron (Wellingtons, based at Kabrit)
No. 108 Squadron (Wellingtons, based at Kabrit)
No. 148 Squadron (Wellingtons, based at Kabrit)
No. 238 Bomber Wing (based at Shallufa)
No. 40 Squadron (Wellingtons, based at Shallufa)
No. 109 Squadron (Wellingtons, based at Shallufa)

No. 140 Army Cooperation Wing (based at Imayd)
No. 40 Squadron (Kittyhawks, based at Burg el Arab)
No. 208 Squadron (Hurricanes, based at Bir Hooker)
No. 1437 Flight SR (Baltimores and Marylands, based at Tanta)

No. 201 Naval Cooperation Group (based at Alexandria)

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[4] Outraged Skies, by Edward Jablonski, contained in Airwar, Doubleday & Company, Garden City, New York, 1971, pages 7 to 11. Edward Jablonski states that the Western Desert Air Force had 1200 aircraft in Egypt and Palestine (predominantly fighters) and of these, more than 800 were ready to fly in October. See also Log of the Liberators, An Illustrated History of the B-24, by Steve Birdsall, Doubleday & Company, Garden City, New York, 1973, pages 5 to 9.

No. 29 Fighter Squadron (Fulmars, based at Alexandria)
No. 775 FAA Squadron (Sea Gladiators, based at Alexandria)
No. 38 Bomber Squadron (Hudsons, based at Alexandria)

No. 216 Group (four squadrons with various types of transport aircraft)

In Palestine

No. 235 Bomber Wing (based at Akka)
No. 203 GR Squadron (Beauforts, based at El Kantara)
No. 13 Squadron (Blenheims, Hudsons, Marylands, based at Gaza)
No. 230 RC Squadron (Sunderlands and Catalinas, Abu Qir)
No. 700 GR (Albacore, based at Beirut)
No. 29 Squadron (Marylands, based at Idku)
No. 252 Squadron (Beaufighters, based at Idku)
No. 272 Squadron (Beaufighters, based at Idku)

No. 235 Fighter Wing (based at Akka)
No. 335 Squadron (Hurricanes, based at Dikheila)
French Alsace Squadron (Hurricanes, based at El Firdan)
Yugoslav Squadron (Hurricanes, based at Idku)

No. 242 Bomber Wing (based at Fayd)
No. 162 Squadron (Wellingtons, based at Fayd)
No. 187 Squadron (Wellingtons, based at Fayd)

No. 245 Bomber Wing (based at Aqir)
No. 227 Squadron (B-24 Liberators, based at Aqir)
No. 9725 Squadron (B-24 Liberators, based at Aqir)

No. 249 Bomber Wing (based at Ismailia)
No. 10 Squadron (Halifaxes, based at Ismailia)
No. 76 Squadron (Halifaxes, based at Ismailia)

Air Headquarters Egypt

No.1 French Lorraine Squadron (Blenheims, based at Rayak)
No. 451 F. Squadron (Hurricanes, based at Rayak)
No. 1413 F. Squadron (Gladiators, based at Ramle)
No. 1438 F. Squadron (Gladiators, based at Haifa)

Other squadrons, including some equipped with long-range fighters, were available to give direct support to the army. Axis air reconnaissance before the battle showed the following: 1) Area around Alexandria: 705 aircrafts of which 481 were fighters, 215 medium bombers, and 9 four-engine bombers. 2) Around Cairo-290 aircraft of which 179 fighters, 101 medium bombers, and 10 four-engine bombers. And 3) Around Suez-590 aircraft of which 186 were fighters, 400 medium bombers, and 4 four-engine bombers.

APPENDIX K
CHRONOLOGY OF EVENTS,
6th NEW ZEALAND BRIGADE ZONE
21 OCTOBER TO 1000 HOURS 24 OCTOBER 1942

DATE	TIME	EVENT
21 October	Late Afternoon	2 NZ DIV moves to Assembly Area
22 October		Gen. Montgomery's pre-battle message is read to the troops
	Night	8 NZ Fd Coy clears two 40yd lanes on Bottle Track
23 October	1700	10 AD closes on Assembly Area on Qattara Track
	2000	Tanks from 8 & 24 Armd Bde form up
	2100	NZ IN BNs form up on the LD (Line of Departure)
	2130	24 BN crosses LD, moves to 1st barrage lift
	2140	8th Army begins counter-battery fire -Sappers turn-on markers on routes through 8th Army minefields
	2200	Artillery begins timed concentrations
	2223	Barrage begins to move forward with 24 BN right behind it. They soon encounter 7 Co, 382nd Grenadier Regt.
	2230	C & D Coy, 28 BN begin to advance
	2245	26 BN leaves Assembly Area
	2250	25 BN leaves Assembly Area
	2300	NZ 8 Fd Coy and 3 Fd Sqdn advances
	2320	3 Fd Sqdn's pilot vehicle immobilized by a mine
	2305	Lifting barrages ceases -24 BN seizes intermediate obj. on PL Red
	2330	Route 'A' through 1st Axis minefield completed
24 October	0030	25 BN deploys on start line along PL Red
	0040	26 BN deploys on start line along PL Red
	0055	Lifting barrage begins again -No. 2 Section (8 Fd Coy) trips IED, 4 KIA, 12 WIA
	0140	15 min pause in lifting barrage while preplanned concentrations on Miteiriya Ridge are fired
	0200	B/25 BN reaches what it believes to be its obj. and begins to dig in
	0213	6 Fd (Artillery) Regt program completed
	0222	4 Fd (Artillery) Regt lifting barrage completed
	0230	All four NZ breaches completed through 1st Axis minefield
	0245	Planned time under Opn Lightfoot for 2 NZ DIV to seize objs on PL Oxalic
	~0300	HQ 26 BN reaches eastern slope of Miteiriya Ridge -9 Armd Bde at 1st Axis minefield
	0330	Rifle Coys of 26 BN complete consolidation along PL Oxalic in the sector of the II Bn, 382nd Grenadier Regt
	0400	Planned time under Opn Lightfoot for 9 Armd Bde to conduct Passage of Lines through 2 NZ DIV -Breaches of 2nd Axis minefield along Routes 'A' & 'B' begin -BG Gentry moves forward
	0430	-10 AD abandons 'Hat' Track
	0500	-Breaches on Routes 'A' & 'B' completed -Royal Warwickshire Yeo Regt begins attempt to pass tanks forward
	~0600	-Beginning of morning nautical twilight -leading sdqns, Royal Wiltshire Yeo Regt cross crest of Miteiriya Ridge in 5 NZ Bde zone
	~0620	Sunrise
	0630	3rd Hussar Regt moves in reserve
	0800	The guns and panzers of KG Sud halt Royal Wiltshire Yeo Regt
	1000	26 BN casualties reach 100

APPENDIX L
BREACHING ACCOUNTS OF OTHER UNITS, DURING THE 2nd BATTLE OF EL ALAMEIN

ANNEX 1. "Breaching Operations, XIII Corps, Operation Lightfoot," by Christian Childs.

ANNEX 2. "9th Australian Division Breaching Operations during Operation Lightfoot," extract from Tobruk and El Alamein.

ANNEX 3. "New Zealand Engineer Breaching Operations during Operation Supercharge," extract from New Zealand Engineers, Middle East.

APPENDIX L, ANNEX 1
BREACHING OPERATIONS, XIII CORPS, OPERATION LIGHTFOOT

By Christian Childs

OVERVIEW

XIII CORPS

The mission of XIII Corps, under the command of Lieutenant-General Brian G. Horrocks, was to deceive the enemy, by convincing them that the main attack would occur in the south. This would prevent the 21st Panzer and Ariete Armored divisions from reinforcing the northern defensive positions. Montgomery also ordered Horrocks to avoid any tank casualties; Montgomery wanted all tanks available for follow-on operations.[1] H-Hour was set for 2200 hours on 23 October.

From north to south the XIII Corps consisted of the 50th Division, 44th Division and 7th Armoured Division. The corps would have to breach two former British minefields from east to west, code named January and February. The minefields were about 3000 yards apart and extended to the foot of Gebel Himeimat (Map L1).[2]

The 44th would launch a supporting attack on the north flank of the 7th Armoured Division and breach one mine lane about 300 yards north of the 7th, which would clear two lanes about 100 - 200 yards apart (Sketch L1 and L2). In an independent operation, the Free French Brigade would capture Himeimat. The corps would conduct the entire operation behind an intense artillery barrage – first on positions behind January and then shifting to those behind February.[3]

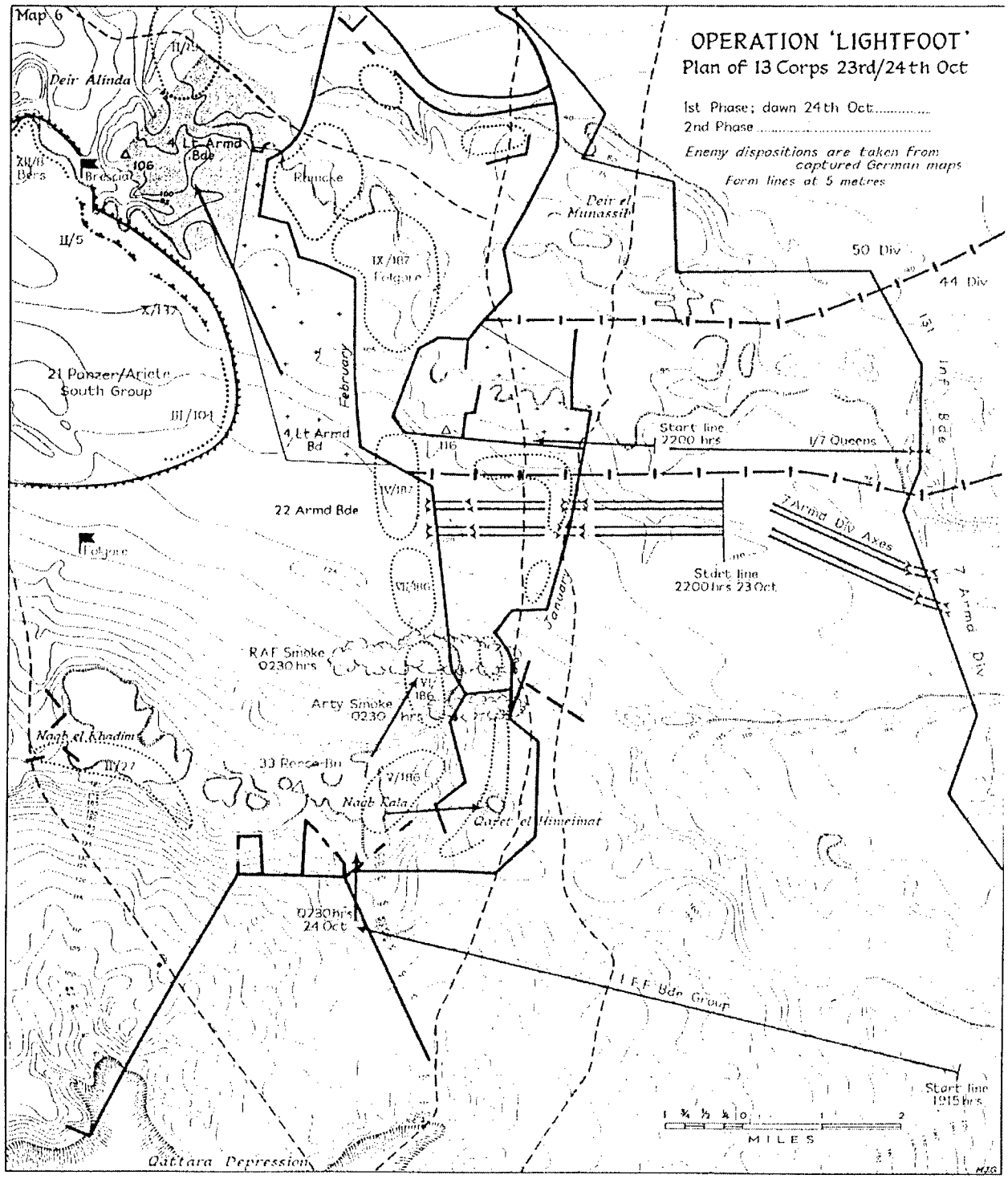
The commander of the 7th Armoured Division, General Harding, planned to breach the minefields immediately north of Himeimat, and to capture Himeimat hill and the escarpment (a steep bluff similar to a butte in the American west), to the west. The carrier-mounted 44th Divisional Reconnaissance Regiment, task organized from the 44th Division, would breach the minefields. The 44th Reconnaissance Regiment was specially organized and trained for such a mission, and they would have priority of fires from all the artillery of the 7th and 44th Divisions. The Armored Brigades would establish bridgeheads on the far side of the minefields, and the 44th Division would follow-on and take control of them.[4]

Since the panzerarmee knew that an attack was imminent; the best the Commonwealth forces could hope to do was confuse the enemy about the location of the main effort. General Montgomery implemented an intricate and comprehensive deception plan. General Horrocks describes some of the elements of this plan:

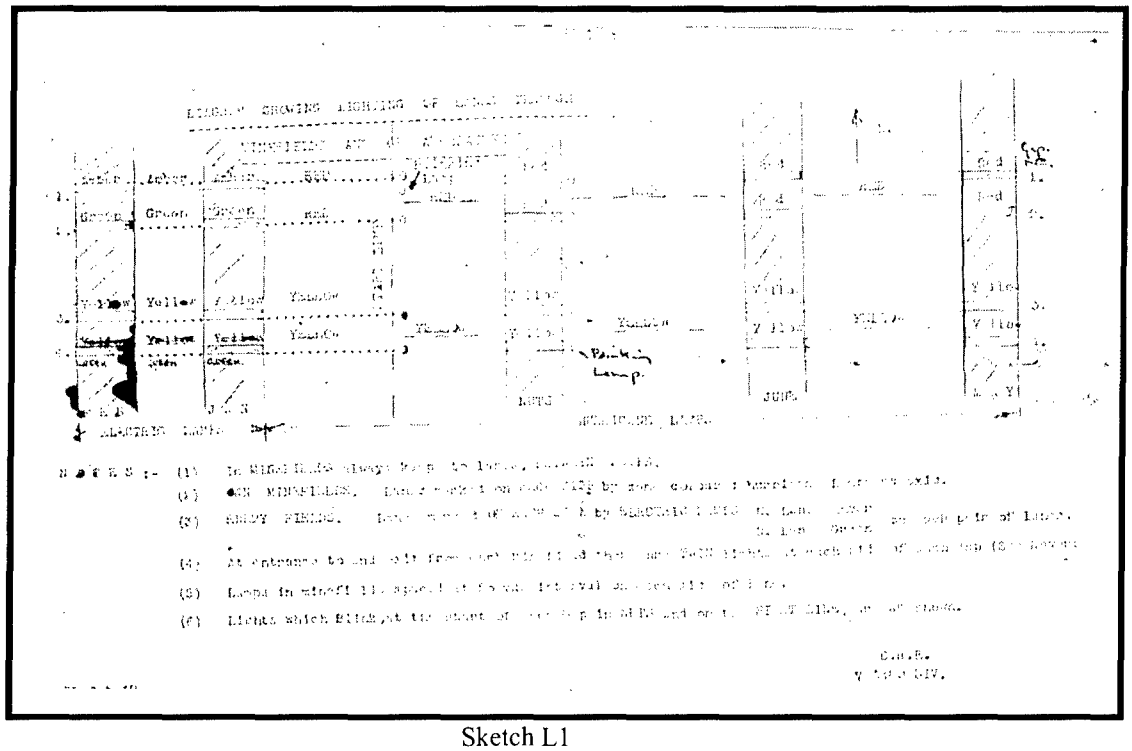
> *"Monty's very able staff, under the direction of Freddy de Guingand, worked out in detail the number and position of all vehicles and guns which would be required for the assault. These were concentrated in their proper places behind 30 Corps front very early on; but they were not the real operational vehicles. They were spares and, above all, dummies. Though the German aircraft photographed these concentrations constantly, they always remained the same, and there was no sudden increase just before the battle. As the assaulting divisions moved into position, their operational vehicles merely replaced the dummies, the change-over taking place, of course, at night.*
>
> *In my sector dummy dumps and workshops began to spring up like mushrooms, all supplied by dummy pipelines and water installations. On the night of the attack it was arranged for the wireless sets of a complete armoured division to operate so as to suggest that large armoured forces were moving forward in this sector.*[5]

Montgomery created an intelligence cell, in the southern sector, to transmit reports specifically created for German listening posts. He also had a fuel pipeline built so slowly that German intelligence was completely deceived as to when it would be completed. Montgomery's deception was successful enough to conceal the arrival

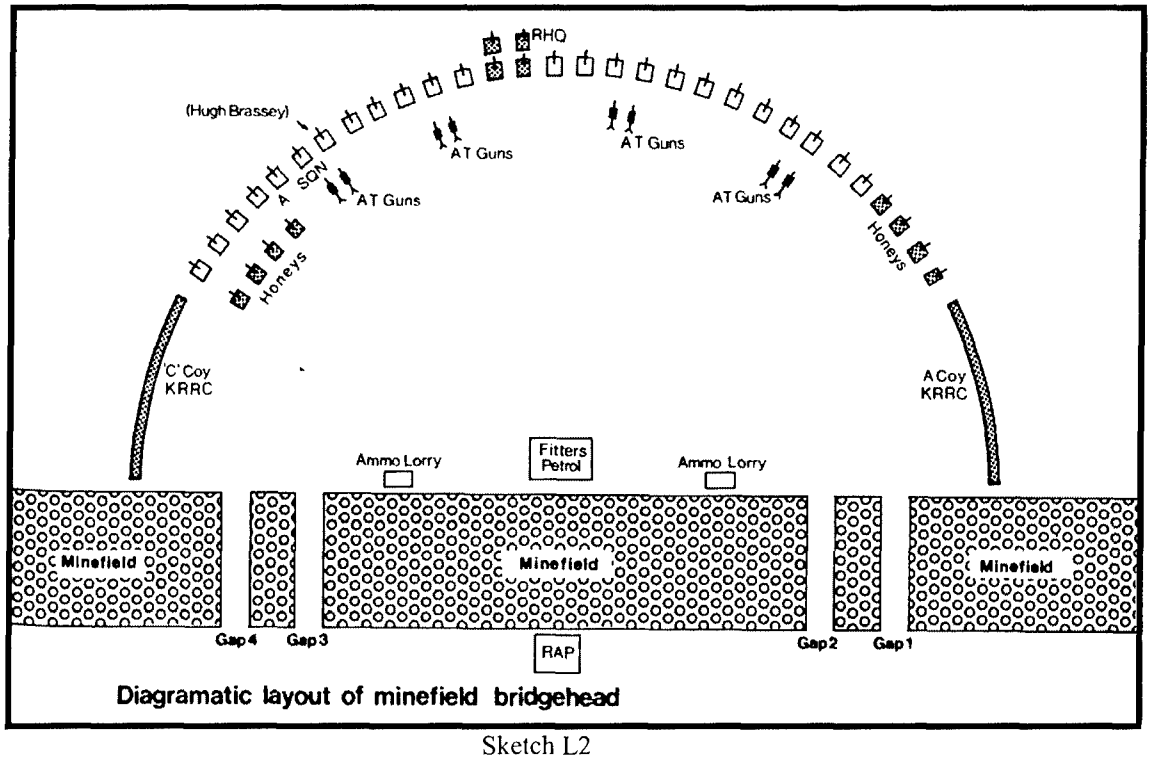
of two new divisions with two hundred and forty guns and a hundred and fifty tanks. It thoroughly confused the Germans and made them think the attack would not be ready until the end of November.[6]



MAP L1



Sketch L1



Sketch L2

PANZERARMEE AFRIKA

The Italians anticipated taking the brunt of the initial attack. The typical offensive tactics of the Eighth Army were to locate the "weak" Italians, smash through them, and envelop the German units. At El Alamein, the XIII Corps would not be bothered with trying to locate the Italian units – there were no German-manned strong points in the forward area where they planned to conduct their breaching operations.[7] In this case, the British did not underestimate their Italian opponents. The Italian 185th Folgore Division was a grounded paratroop unit that had "fought ferociously" against the 44th Division a few weeks earlier.[8] The Desert Rats of the 7th Armoured Division described the Folgore as, "northerners and of higher quality than the average." The 21st Panzer and the Ariete Armored divisions had the mission of counterattacking any breakthrough or penetration of the Italian X Corps' main defensive line.[9]

INTO THE BREACH

In October 1942 the 22nd Armoured Brigade of the 7th Armoured Division was holding the line of two minefields, known as Nuts and May. Two other minefields, January and February, had been under Axis control since August. Each of these was about 300 meters deep. January was the furthest east, about 9 kilometers to the west of the XIII Corps line of departure.[1] About 2,500 meters separated January and February in the area of the planned breaches. Both minefields extended south of Gebel Himeimat, a hill that overlooked the entire area where the battle would occur.[10]

The 7th Armoured Division Commander planned to breach January and February immediately north of Himeimat, and send the Free French Brigade to capture the hill and the escarpment west of it. The 44th Divisional Reconnaissance Regiment would breach the minefields; they were specially organized and trained for this specific task (see Table 1). The armored brigades would pass through the breached lanes and establish bridgeheads on the

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1 Colonel J. M. Lambert, the Chief of Royal Engineers (CRE) for the 44th Infantry Division, described these minefields in some detail as follows: "From Alam Nayl to Himeimat ran two former British minefields named "January" and "February." These had been laid by us as defensive minefields during the previous spring; but on the enemy's arrival at Alamein he had captured them, together with Himeimat, and used them as his protective minefields. He was well dug in behind and between them and to a small extent in front of them. Of what additions or alterations he made to them we had little information. We had replaced them, so to speak, by laying two more parallel minefields (called "Nuts" and "May") about three miles to the east.

In Operation Lightfoot, therefore, the breaching of "January" and "February" seemed likely to be the main engineer tasks. We had no up-to-date knowledge of "February." Of the nearer "January" we knew the following:

a) The front fence of the minefield was still on its original alignment as surveyed in at the time we constructed it. The further fence, where it could be seen, also appeared to be intact and unmoved.

b) No material alterations to the mines appeared to have been made, at any rate near the front fence. All mines "stolen" to date had been British Mark IVs or E.P. (Egyptian Pattern) and none had been found trapped.

c) No anti-personnel mines had been found, other than a small number of Mark II shrapnel mines originally laid by us (most of these, incidentally, had become non-operative). No "S" mines had been discovered near the front fence-which was the enemy's favorite place for putting them.

d) The enemy laid tellermines on our side of the front fence to a depth of at least 300 yards. They appeared to have been laid at random in groups of up to five. They were just buried, sometimes only half buried, in patches of soft sand and unmarked. It seemed probable that every enemy patrol going out had been given fives mines and told to leave them lying about. (During the course of the battle more than 1,000 of these scattered mines were lifted—all were tellermines. No anti-personnel mines had been laid-for obvious reasons.)

e) The enemy's foremost defended localities were immediately in rear of "January" or possibly inside it in some cases. Some small posts dug just in front of it appeared to be occupied only at night.

f) There were no substantial barbed wire or other obstacles.

When the plan for "Lightfoot" became firm, it was decided to carry out an engineer reconnaissance of the line of advance up to the "January" minefield at the place where the breach was to be made... This reconnaissance had obviously to be made on the quiet. Any reconnaissance in force, or preliminary mine-clearing operation in front of "January" at this point would have given the game away, and defeated its object by leading the enemy to alter his minefield layout at the crucial point.

At dusk, a few days before the battle, a sapper officer from 44th Division, R.E., was dropped by armored car about a mile due east of Point A. He then walked and crawled on a compass bearing due west. The going was reasonably good until about 200 yards short of the minefield where the ground became broken. He got up to the minefield but could not see beyond as it lay on a slightly hump-backed ridge. On returning to the armored car in bright moon-light he was fired on, presumably by a patrol, but got back safely. The site seemed suitable; the broken ground might necessitate some work on the approaches, but it would provide some cover where it would be needed. There was risk, which had to be taken, that the enemy had added a "vertical" or cross minefield between "January" and "February" immediately opposite [the breach]. The width of the minefield at this point as originally laid was 300 yards." From "Engineers at the Battle of Alamein – the Southern Sector," pages 20-29.

far side. The 44th Infantry Division would then take over.[11] Major R. H. W. S. Hastings describes the plan in more detail:

> *The plan, which was rehearsed three times, was for four gaps to be made in our own minefields [Nuts and May] by the Sappers twenty-four hours before the battle started. The next night the Brigade was to go through these gaps. The advance guard consisted of the 44th Divisional Reconnaissance Regiment, Battalion Headquarters [1st Battalion, The Rifle Brigade], "A" and "B" Companies of the 1st Battalion [The Rifle Brigade] and the Greys [one troop of 3 Stuarts, Royal Scots Greys] – in that order... The 44th Divisional Reconnaissance Regiment, commanded by a 60th Rifleman, Lyon Corbett-Winder, was to make four gaps in January corresponding to those in Nuts and May. As soon as these gaps were complete "A" and "B" Companies were to push through and take up flanking positions – "A" to the north and "B" to the south - facing outwards and thus forming a corridor through which the 44th Divisional Reconnaissance Regiment could pass to repeat the gapping operation on February. The Greys were to support the advance guard throughout and when the gaps were finally completed to take up positions on the other side of the last minefield, where the rest of the Brigade would join them. The 131st Infantry Brigade [44th Infantry Division] would then take over the Battalion's job between the minefields so that it could join the rest of the Armoured Brigade in their battle position to the west. The gaps around which all this activity centered were in two pairs – a pair in the north and a pair in the south, with about two thousand yards between pairs and some two hundred yards between gaps. The whole operation was to be supported by a barrage which was to creep forward two hundred yards ahead of the leading troops, a heavy barrage but not comparable to the tremendous uproar at the northern end of the line."* [12]

The 132nd Brigade, 44th Infantry Division, had the follow-up role to the 131st. They would either pass through, or, if the 131st attack went well, open the salient wider. If the attack lost momentum the 132nd would consolidate any gains.

Table L1. XIII CORPS MINEFIELD TASK FORCE

44th Reconnaissance Regiment	Attached from 44th Infantry Division, mounted in Universal Carriers
One Troop, Royal Scots Greys Regiment	3 Stuarts Tanks
4th Field Squadron Royal Engineers	Attached from division troops
Detachment from 21st Field Squadron Royal Engineers	Attached from division troops
Two troops with 6 Scorpions	
4th Field Regiment Royal Artillery	Attached from division troops, 16 25-pdr guns, 2 batteries of 8 guns
97th Field Regiment Royal Artillery	Attached from division troops, 16 25-pdr guns, 2 batteries of 8 guns

The 44th knew they were in for a tough fight with the Folgore to their front.[13] From north to south the Folgore was organized as follows: the 187th Brigade with the 2nd, 4th and 9th Parachute Infantry Battalions; Ruspoli's Group, made up of the 7th Parachute Infantry Battalion and the 8th Pioneer Battalion; and the 186th Brigade comprised of the 5th and 6th Parachute Infantry Battalions.[14]

The British began clearing lanes through their own minefields twenty-four hours before H-Hour. Units spent the rest of their time on the 23rd making final preparations, cleaning weapons and loading vehicles.[15] By 1830 hours the Army was prepared to start the attack. The Commonwealth forces moved west through their own minefields and waited for H-Hour.[16]

The operation began with a massive artillery barrage at 2140 hours. Major Hastings described the barrage as "the most impressive supporting fire that anyone had yet seen. The noise and the flashes were not to be forgotten."[17]

According to one soldier in the 2nd Battalion of the Buffs, "The barrage began. It was a shattering fantastic sound, drowning the subdued whispering of boots in the sand and the occasional clink of a rifle or bayonet as the infantry moved up. The din of over 1000 field guns firing along the front was like gigantic drumbeats merging into one great blast of noise."[18] The Axis soldiers were subjected to "an inferno of explosions, smoke and dust. All communications were disrupted."[19] The XIII Corps began to move forward toward the enemy minefields.

Countermine tactics and techniques would now help determine the outcome of the battle. The 44th Division was on the northern flank of the 7th Armoured Division. Their advance was led by sappers on foot whom would visually search for mines on a 12-foot front. They would remove the mines; the sappers' job was to find a clear route through the minefield. Behind the sappers were "Snails" – trucks fitted with diesel tanks over the rear tires. The diesel fed over the tires and onto the desert sand. The diesel left an indelible mark on the sand that could be seen by a truck driver, even at night. The trucks also proofed the safe lanes; by driving the trucks in echelon the tires covered the width of the path and hopefully detonated any mines the sappers had missed. The minefield breaching teams and the carriers of the assaulting battalion followed the Snails. Once the sappers breached January, the infantry would pass through and form a bridgehead from which they could begin to breach February or any other minefield.[20]

Two advance guards led the 7th Armoured Division toward January. These leading detachments had a pilot vehicle, Royal Engineer mine clearing party and a Scorpion. The Scorpion was a tank fitted with a flail. An auxiliary motor on the tank powered the flail, which was a rotating drum with chains attached. The spinning chains would beat the ground in front of the tank and detonate any mines in its path. The sappers drove the pilot vehicle until it struck a mine, which they assumed to be the leading edge of the minefield. They would then bring the Scorpion forward to begin the gapping drill. While the Scorpion flailed, sappers used detectors to widen and mark the cleared lane. Both advanced guards had a replacement party of sappers and Scorpion for leap-frogging, replacements or making additional lanes.[21]

The following account is from the XIII Corps Engineer Operations Report dated 26 November 1942:

> *The advanced guard for the 7th Armoured Division consisted of 44th Reconnaissance Regiment (under 22nd Armoured Brigade) who advanced in two columns, each of which included a Scorpion, and detachments of 4th Field Squadron sufficient to provide three detector parties with lifters and markers. Local escort was provided by a tank and carrier troop. The R.E. [Royal Engineer] Detachments had duplicate reserves (from 210th Field Company), and there were three spare Scorpions. The first encounter of mines was by a vehicle striking one. The Scorpions started thrashing, the detector parties sweeping on their right rear, to produce a gap 12 yards wide. It was subsequently evident that the first mine was one of a very scattered mine marsh, and clearing went on for about 900 yards before the main belt (300 yards wide) was met. Meanwhile the Scorpions had had many troubles, mostly from the tank engine and from hits by enemy shells. Bringing up new Scorpions caused delay. Progress was in fact so slow that the Scorpion engines did not overheat as had been feared."*[22]

Running into these scattered mines significantly delayed XIII Corps' timeline; the units would not even begin to breach February until the next night.[23] General Horrocks, XIII Corps commander, received criticism for delaying his operations. However, his mission was to support the main attack in the north and Montgomery ordered him to avoid any tank casualties.[24] Horrocks had no need to boldly push through January and February.

The 22nd Armoured Brigade lost about 250 men (killed, missing and wounded), along with 30 carriers and a few tanks. The brigade left one damaged Scorpion within reach of the enemy patrols. On the positive side, the 22nd collected 400 Italian prisoners, mostly from the 185th Folgore Parachute Division.[25]

On 7th Division's right flank 1st/7th Queens of the 44th Division and a section of the 11th Field Company advanced as flank protection. They stumbled upon the same scattered mines. The sappers spotted the mines and the Snails marked the clear path, exactly as intended. Scorpions were having similar success, as well as a psychological effect on the enemy. Prisoners said they were less frightened by the artillery than by the "strange phenomenon – a slowly advancing pillar of dust, out of which came dreadful noises of clanking, grinding, and rattling chains." The

Scorpions, which were sustaining heavy casualties, helped the 44th Division's efforts by drawing enemy fire and attention to the south.[26]

The 7th Division reached the eastern edge of January at 2300 hours. They had stumbled into the scattered minefield and were now facing tough resistance from the Folgore. Major Hastings describes the fight through January:

> *The enemy brought heavy fire from artillery, mortars and machine guns to bear on those waiting for the gapping to be completed. "A" Company suffered casualties almost at once. Already the area was as crowded as the car park at Cheltenham Races, and there was no room anywhere to maneuver. At the end of half an hour "B" Company reported that No. 3 gap was impassable because of soft sand. In another twenty minutes No. 2 was nearly through, but was directly in the line of fire of an anti-tank gun whose flashes were identified by Colonel Freddie Stephens in the moonlight about two thousand yards away. He ordered up "A" Company's machine-gun platoon, who engaged the anti-tank gun with all four Vickers guns from their vehicles. The Italian gunners stopped firing at once. "A" Company went straight through the gap at the best speed they could make. They were then ordered to turn south and clear the western ends of gaps Nos. 3 and 4. "A" Company overran two enemy machine-gun posts almost at the end of their gap. But the situation remained. Progress in the southern gaps was slow and it was not until after half past one that "B" Company appeared at the end of gap No. 4."*[27]

Axis counterattacks were highly effective. The Kiehl Combat Group of Panzerarmee Afrika, using captured Stuart Tanks, repulsed every attack. Battalions of the 104th Panzer Grenadier Regiment and artillery units of the 21st Panzer Division fought to a standstill, while the 10th Company held off a battalion-sized attack from the British 44th Division for twenty-four hours, between the mine belts. In one incredible example of devotion to duty, two German soldiers lay under the axle of a damaged anti-tank gun, allowing the gun to continue firing and destroy two tanks. The Ariete Division, Bersaglieri Battalion, and units of the Folgore Division fought "magnificently" and foiled any British breakthrough.[28]

The Commonwealth units did not reach their planned first-night objectives on the far side of February. In fact, they would get only to the far side of January. The 44th Divisional Reconnaissance Regiment and the 7th Division Sappers passed through January during the early hours of the 24th. The armored regiments passed through and established their bridgeheads just before sunrise.

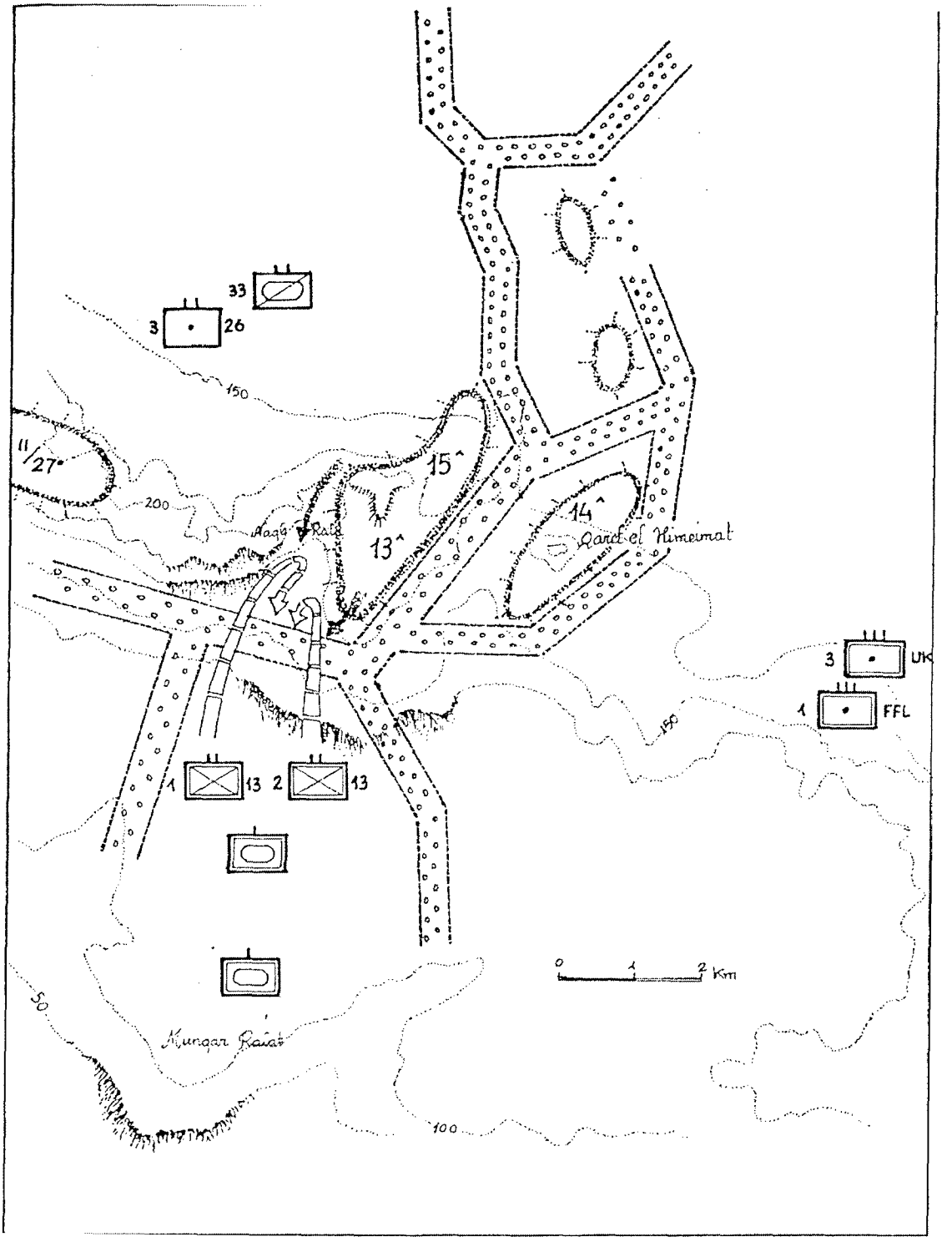
The Free French Brigade passed on a piece of good news – they had gained a foothold on Himeimat (Map L2). This hill, defended by the Italian 14th Company, 5th/186th Parachute Infantry Battalion, was vital because it offered a commanding view of the area of operations.[29] The British artillery and the RAF dropped smoke rounds north of Himeimat, between the 6th and 7th Parachute Infantry Battalions of the 186th Brigade. The smoke obscured the breaches made by the 7th Armoured Division through January and prevented the Italians on the hill from seeing the operation or calling artillery fire on the British.

The Italians in front of the 7th Armoured Division provided a stubborn fight. The companies who took the brunt of the main attack were the 6th/2nd, 24th/8th, and the 19th/7th (Map L3). Major Paolo Caccia-Dominioni da Sillavenge, commander of the Italian 31st Pioneer Battalion, relates a story about a soldier in the 7th Parachute Infantry Battalion:[2]

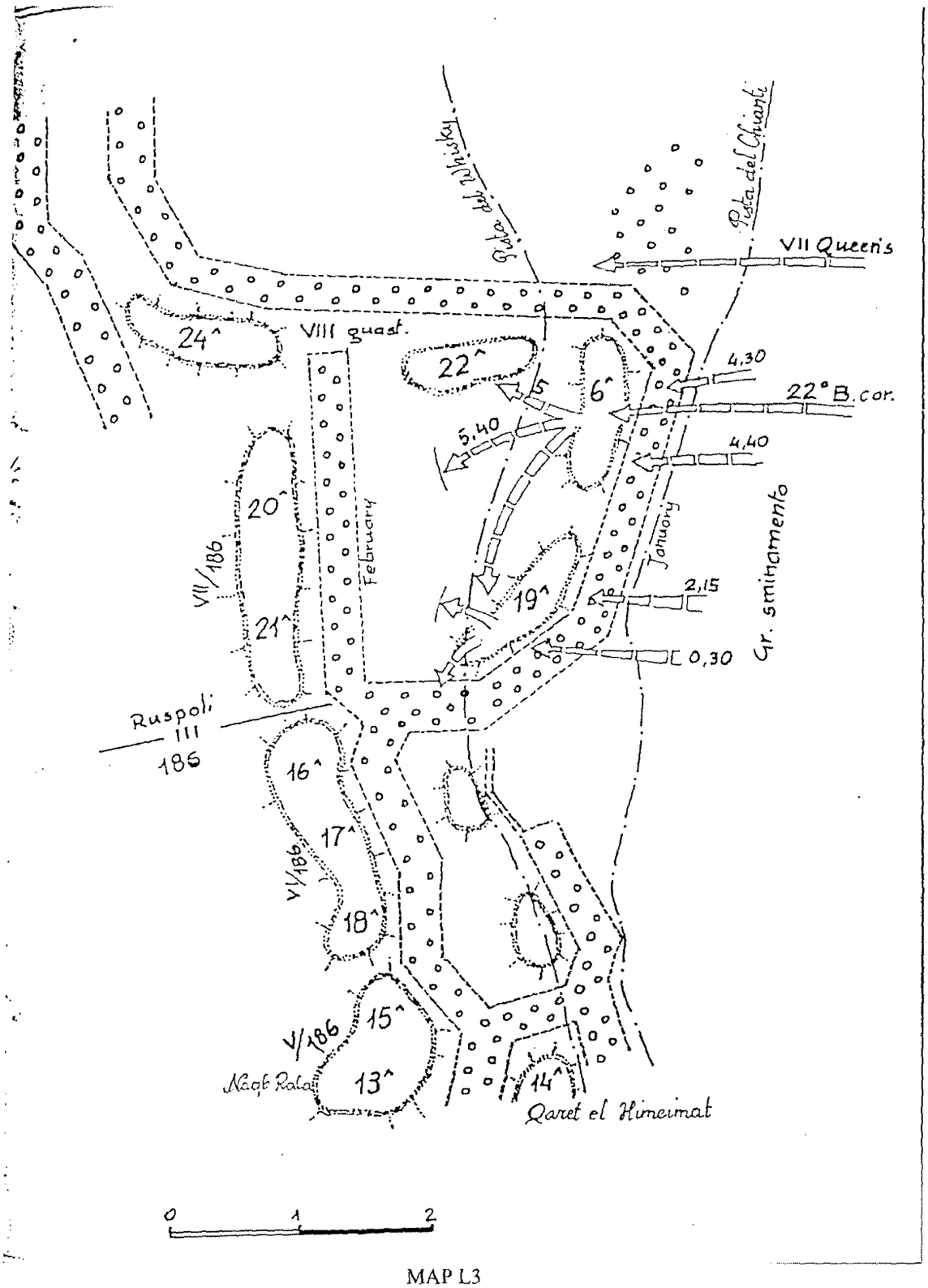
> *Another of the 7th's paratroopers, Leandro Lustrissimi, kept enemy tanks at bay with his flame-thrower for twenty-four hours. When he finally ran out of inflammable liquid, he continued to do what he could with petrol bottles, in spite of being wounded. Almost unconscious, he was taken prisoner. Then, however, he recovered somewhat and led his comrades in a furious hand-to-hand fight with their captors. They managed to free themselves and re-occupy their position. Then a group of tanks came on the scene. With his bare hands Lustrissimi dug up a mine and flung it*

[2] Caccia-Dominioni, 235. The maps in the official Italian history show the 22nd/8th rather than the 24th/8th almost directly behind January. The map shows the 24th behind February on 24 October.

beneath the leading enemy tank. He was himself killed by the explosion. He was twenty-four years old and came from Subiaco."[30]



MAP L2


Pista del Whisky
Pista del Chianti
VII Queen's
VIII guast.
24^
22^
6^
4,30
22° B. cor.
5,40
4,40
20^
VII/186
21^
February
January
19^
2,15
0,30
Gr. smilamento
Ruspoli
III
186
16^
17^
VI/186
18^
15^
V/186
13^
14^
Naqb Rala
Qaret el Himeimat
0
1
2

MAP L3

When sunrise came the soldiers of the 7th Armoured Division were digging in between January and February.[31] Attempting to breach February would be too costly during the daylight. The enemy was alerted and had a general idea where the British would make their assault. This was compounded by the unfortunate news that a German counterattack, led by the 33rd Panzer Reconnaissance Battalion, had driven the French from Himeimat. General Harding, the Division Commander, decided to resume the attack that night. Axis artillery pounded the tanks and infantrymen all day long.[32] The division had two functioning Scorpions for that night's operation.[33]

The Italians asked for a truce that evening to collect and bury their dead; the British refused. Major General G. L. Verney describes the 7th Armoured Division's experiences on the 24th and 25th:

> *The 131st (Queens) Brigade [from the 44th Division] was put under command of the Division for the night's operations and two battalions, the 1st/5th and 1st/6th Queens Royal Regiment, quickly secured a bridgehead west of the second enemy minefield, "February." Then troubles began. The infantry were pinned to the ground by the enemy's fire, and efforts to clear the lanes for the armour proved slow and costly. At last two gaps were reported clear, and the 4th CLY (Clyde and Lotharshire Yeomanry) and the 1st Royal Tanks moved forward. Both Regiments immediately began to lose tanks and in view of the instructions that General Harding had had, there was no alternative but to make no further attempts to move the armour through, so he decided to hold the ground gained with the 1st Rifle Brigade and the two Queens Battalions with an armoured regiment in support.*[34]

The 1/5th and 1/6th Queens were now dug in "precariously" on the western side of February. They suffered very heavy casualties during the attack, many of which were attributable to 'S' mines, which Axis engineers had liberally scattered throughout the minefield.[35] MG Verney continues his description of the 7th Armoured Division's actions:

> *On the morning of the 25th the Corps was ordered not to press this attack in the southern sector. In the afternoon, the 4th/8th Hussars, who were covering the right flank of the Division, were ordered to advance north-westwards in support of operations by the 50th Division on the right. Almost at once they ran into minefields covered by anti-tank guns and began to lose tanks, so this operation also had to be called off.*[36]

According to the maps from the official Italian history, the 7th/186th Parachute Infantry Battalion repelled this attack.

Vehicles and soldiers crowded the area between January and February throughout the afternoon of the 25th. They were completely exposed to the heavy and continuous artillery from the Italians.[37] The Folgore received considerable artillery support from the 1st/3rd Light Duca d'Aosta, the 3rd/1st Light Eugenio di Savoia, the 3rd and 4th of the 26th Pavia Artillery and the 1st/21st Trieste Artillery. By the end of the battle the Folgore claimed 120 damaged and destroyed British tanks and more than 600 casualties from the XIII Corps.[3] Folgore soldiers used Molotov cocktails extensively against the British armor because of the ineffectiveness of the 47/32 anti-tank gun that, in one instance, needed 20 hits to record one kill! The British were able to recover many of their tanks from the battlefield because the Italian engineer commander did not follow orders to destroy the immobilized enemy tanks.[38] As for the Folgore's casualties, their field-grade officers suffered 9 KIAs and 4 WIAs out of 18 assigned.

Over the next few days the 44th Division, reduced to the 132nd Infantry Brigade, assumed responsibility for the front. The 7th Armoured Division, including the 22nd Armoured Brigade and the 131st Queens Brigade (recently attached to the 7th Armoured Division) became supporting units in the north in preparation for Operation Supercharge. The 4th Light Armoured Brigade remained in the south, but soon rejoined the 7th Armoured Division.[39]

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[3] Caccia-Dominioni, 234-236. According to the official British history, 31 British tanks were lost. It would appear that the Italians either inflated the number or they counted the armored infantry universal carriers as "tanks."

Five days later the 44th Division finally broke through February, the scattered mines on the western side and the minefield eight miles further away.[40] George Greenfield, an officer in The Buffs (2nd Battalion, Buffs Regiment, assigned to the 132nd Infantry Brigade), gives a vivid description of the "breakthrough:"

> *There were only two narrow gaps through the minefields in front of us allotted to The Buffs, and vehicles were ordered to go through one at a time in longish intervals between, just in case the Luftwaffe managed to raise a Stuka or two for a sneak raid. So it was a long and tedious business getting the hundred or so vehicles through the minefields.*
>
> *Too long and tedious for the Free French, who were to follow us through. A squadron of them in Bren gun carriers formed up in a line abreast at about 10-yard intervals along the edge of the minefield. There was no question of bothering about gaps where the mines had been lifted. Their leader blew a blast on his whistle and the column charged into the minefield. There were thunderclaps of bangs and crashes as one Bren gun carrier after another blew up. Some went up within the first few yards; a few dodged their way ahead for 50 yards or more. But one after the other, with inevitable doom, the carriers smashed themselves to grounded hulks on the mines. It was magnificent and it was futile, a fitting epitaph to a famous victory."*[41]

SECTION ENDNOTES

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[3] "Mine and Countermine Experience, 7th Armored Division, Battle of Second Alamein", Lambert, Landmine and Countermine Warfare, North Africa 1940 – 1943, Engineer Agency for Resources Inventories, Washington, D.C., 1972, 137.
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[8] "The Fighting at Alamein", George Greenfield, 1088. (need more complete data)
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[12] Hastings, 150.
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[15] Verney, 130.
[16] Hastings, 151.
[17] Ibid.
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[19] Carrell, 285.
[20] Lambert, 138.
[21] Lambert, 137.
[22] Lambert, 138.
[23] Lambert, 138.
[24] Horrocks, 136.
[25] Alam Halfa and Alamein, Official History of New Zealand in the Second World War 1939-45, Ronald Walker, Historical Publications Branch Department of Internal Affairs, Wellington, New Zealand, 1967, 285.
[26] Lambert, 138-139.
[27] Hastings, 152.
[28] Carell, 287.
[29] Verney, 130.
[30] Caccia-Dominioni, 238-239.
[31] Verney, 131.
[32] Verney, 131-132.
[33] Lambert, 140.
[34] Verney, 132.
[35] Lambert, 140.
[36] Verney, 132.
[37] Verney, 132.
[38] Rommel's North Africa Campaign, September 1940 – November 1942, Jack Greene and Alessandro Massignani, Combined Books, Pennsylvania, 177.
[39] Verney, 133.
[40] Lambert, 141.
[41] Greenfield, 1092.

APPENDIX L, ANNEX 2
9th AUSTRALIAN DIVISION BREACHING OPERATIONS DURING OPERATION LIGHTFOOT*

When the hour for action was drawing near, a throbbing, at first half imagined, then faintly heard, stole through the night and grew into rhythmic, surging sound. The bomber aircraft that were to support the army's assault approached from the east and passed over. A few distant points of light then flickered unimpressively from the desert on the British side; they came from the muzzles of the long-range guns opening up in advance of the shock moment so that their first shells would fall in the same split second as those from the massed field artillery. In an instant, at the stroke of 9.40 p.m., flashes from hundreds of guns were seen sparkling in a long line across the desert.

For fifteen minutes the counter-battery bombardment continued unabated. Suddenly the guns were silent. There was a breathless stillness, as if their force was spent. Above the Eighth Army's hidden battle array two searchlights pointed long, still fingers into the sky. Five minutes passed. At 10 p.m. the two beams swung inward, intersected and stopped, forming a pointed arch dimly seen in the moonlit vault, like a remote symbol of crossed swords. At that instant the British guns opened a barrage of unimaginable intensity, eclipsing their first performance, and to the urgent drumming of the guns the infantrymen stepped out from their start-lines in slow, measured paces at the even rate of 75 yards per minute.

Well practiced in exercises in keeping to the exact speed required, the infantry maintained, as they advanced, a straight extended line on either side of their company guide group, which set the speed and direction. In the centre line with stakes driven in at intervals of 100 yards, on each of which was placed a rearward shining torch emitting a colored beam; various colors were used to differentiate the centre lines of different units. Later the road for following tanks and vehicles would be taken along, the centre line to the left of the stakes. The signalers meanwhile were running their lines forward well to the right of the stakes, to be clear of later vehicle movement. Not far behind the guide parties the engineers followed, ready to come right forward as soon as a minefield was struck, and instantly to commence clearing a gap. Farther back again were other groups which, as they advanced, established traffic control points which would later be in direct communication with battalion headquarters and would control the movement forward, as required, of tanks or vehicles carrying ammunition and consolidation stores. An efficient administrative machine was set in motion behind the infantrymen as they moved into the fight.

Right along the front of the XXX Corps the enemy's front-line defenses were breached and the objectives for the first phase successfully taken but it was soon found that the job of minefield clearance was much bigger than expected.

On the extreme right of the corps attack the 2/24th Battalion (Lieut-Colonel Weir) advanced with two companies--- Lieutenant McNamara's on the right and Captain Serie's on the left. One small minefield was encountered on the start line and cleared without difficulty. The enemy soon opened defensive fire with mortars and machineguns and one of the supporting 25-pounders was dropping its shells short. At 10.30 the two companies reached the minefield while the artillery concentrations were still falling just beyond and went to ground until the barrage lifted while the engineers came forward and blew gaps in the wire with bangalores.

Meanwhile the sappers were working feverishly to clear lanes through the minefields so that anti-tank guns and vehicles laden with ammunition, mines and consolidation stores could be got forward. At 11.20, after 35 minutes work under fire, two eight-yard gaps had been cleared in the first minefield but ten minutes later another field of five rows was met. Enemy artillery and mortar fire was heavy and some sappers were hit, but by 12.5 a.m. gaps had been completed. This was the main field but farther on two more fields were found and had to be gapped.

* Extracted from Tobruk and El Alamein, by Barton Maughan, Australian War Memorial, Canberra, 1966, pages 665-728.

In the first phase the 20th Brigade attacked with the 2/17th (Lieut-Colonel Simpson) on the right and the 2/15th (Lieut-Colonel Magno) on the left. Major Brien's company on the right of the 2/17th (which attacked with three companies forward) met heavy opposition and many men were hit, including Brien himself, mainly while overcoming two strong positions. One of these was knocked out and the occupants killed by a section of four men led with great dash by Corporal Harris. (Though hit in both thigh and shoulder Harris continued to lead his section until the following night when he was again wounded.) Lieutenant Hannaford took command of Brien's company and the men reached their objective on time. The centre company and the left one too reached their objectives without excessive casualties; by this time the battalion had lost 15 killed and 47 wounded and 14 others were not accounted for.

The 2/15th on the left took its intermediate and final objectives with relatively light losses but the audacious Captain Cobb, whose company was leading on the right, was among those killed. In all 5 were killed and 40 wounded.

The sappers with the 2/17th did not have undue difficulty in making gaps in the minefield but the area through which the 2/15th advanced was found to be alive with anti-personnel and anti-tank mines and it was not until 12.30 a.m. that a lane had been cleared.

The success of the XXX Corps' attack for the first phase augured well for the second, but it was soon to be found that the first line of defense which on British maps of enemy defenses had bristled with obstacles and weapons of every kind was but a comparatively lightly held outer line to cover the main line of defense sited in rear at considerably depth.

On the right flank the 2/48th Battalion (Lieut-Colonel Hammer), coming up along the 2/24th's centre line, had seen the 2/24th's success signal go up just before it reached its start-line for the second phase. At 12.38 the battalion began to advance with two companies forward - Captain Robbins' on the right, Major Edmunds' on the left--towards the enemy's second line of defense. The defenses were wired, mined and booby-trapped but these obstacles were efficiently dealt with. At first there was stiff resistance. In Robbins' company Lieutenant Lewin was hit. Sergeant Kibby took over the platoon and Robbins ordered him to attack a troublesome enemy post holding up the advance and pinning down Kibby's platoon. Kibby promptly dashed forward firing his Tommy-gun and silenced the post, killing three men and taking the surrender of 12 others. The advance was resumed.

The forward companies halted 2,500 yards from the start-line and the rear companies (Captains Bryant and Shillaker) passed through and advanced to the objective 1,400 yards farther forward. The smoke and dust raised by the bombardment had formed a dense pall and the Bofors guns, firing four rounds every five minutes along the centre line, were a great help. The success signal was sent up at 3.45 a.m. The 2/48th had advanced 3,900 yards from its own start-line and 6,900 yards from the brigade start-line. Patrols sent out to cover reorganisation met no opposition; but although Major Edmunds' company had established contact with the 2/13th Battalion on the intermediate objective the companies on the final objective could find no sign of the 2/13th on their left.

The 26th Brigade's attack on the Eighth Army's northern flank had succeeded brilliantly. Reorganisation to form a firm front to the flank was at once put in hand. The ground on which the companies dug in on the northern side was for the most part beyond the boundary of the objective prescribed in the orders. In the 2/48th Robbins' company on the right faced north, Bryant's company, which was the right corner peg of the Eighth Army's new front, faced both north and north-west and on its left Shillaker's company faced west. On Shillaker's left flank, however, the ground was still held by the enemy. Meanwhile the toiling engineers had been unrelentingly pushing their mine-free lanes forward through ground constantly harassed by fire from the enemy's un-attacked positions opposite the northern flank. As soon as the way was clear Major Tucker brought in the vehicles with consolidation stores, and the men, toughened by Hammers's hard training policy, put up a tremendous effort to get the often rehearsed job done. 'We were perfectly reorganised by dawn,' wrote hammer, in his report of the battle, & with 2,400 Hawkins laid and dug-in very solidly.' All supporting weapons were in place and all men dug-in with galvanized-iron overhead protection against airburst.

The 2/24th Battalion, which had been not quite so pressed for time, had also reorganised facing north, pushing the left-rear company (Harty's) forward and left into the gap between the 2/24th and the 2/48th and likewise pushing out the right-rear company to cover the right flank beyond which the composite force had established its strong-points in the old no-man's land to link with the coast sector defenses.

Lieut-Colonel Macarthur-Onslow's composite force was in position by 2 a.m., and digging in on a line 3,500 yards on through East and West minefield begun by the 2/3rd Pioneers on the two nights before the battle Point 24 and farther west. Six posts had been established and finished on the 23rd-24th. There was no interference by the enemy except for some artillery fire.

The 20th Brigade's task in the second phase was assigned to the 2/13th Battalion (Lieut-Colonel Turner), with the 40th Royal Tank Regiment in support. Unlike Hammer, Turner had no open flank and did not have to worry about holding a long front to the north, but his battalion had to advance to the same depth as Hammer's and on a wider front - 2,400 yards as against 800. Having regard to what was known of the enemy defenses, Turner had allotted in each phase a frontage of 900 yards to the right company and 1,500 yards to the left. The frontages were too great to be effectively covered by a straight infantry company attack, so various strong-points selected from the overprint maps were given as special tasks to platoons and fighting patrols. The attack had been rehearsed as one of cooperation between infantry and tanks, tanks being needed to help mop up so wide an area. It had been expected that the main minefield to be traversed in the first phase of the corps attack would be 250 yards deep and the plan allowed for this (and more) to have been cleared before the second-phase attack began. However, the route to the start-line of the 2/13th and 40th RTR was traversed by many secondary minefields so that mines had to be cleared for almost 1,600 yards. The lanes could not be made ready for the tanks despite Herculean efforts by Major Gehrmann's 2/13th Field Company, so the battalion attacked on time but without the tanks.

In the first 1,700 yards Captain Handley's and Captain Cribb's companies encountered as expected only small outposts, from which the occupants made off, with the exception of one strongpoint which Sergeant Carson's platoon had been detailed to attack. Carson led out his platoon on the required bearing to the post, which was overcome with grenades and the bayonet, contacted the 2/48th on his right, and then had his platoon ensconced in an adjoining position. Having heard enemy fighting on the left he set out to find his company headquarters, encountered a German post and single-handed captured nine German prisoners.

Meanwhile, from Captain Cribb's company on the left, Sergeant Easter had set out with his platoon to contact the neighboring Gordon Highlanders and take part in a joint attack with that battalion on a strong post and anti-tank gun locality on the inter-divisional boundary. Much later, Easter returned to report that he had contacted the Gordons and led his platoon with them in an attack on their next objective, which, however, did not succeed.

By 3 a.m. Captain Wilson's company and Captain Sanderson's had passed through, but still the tanks had not got forward. These companies came up against the enemy's defense line and soon met intense fire from the front and flanks and suffered heavy losses.

Wilson's company ran into crossfire from a line of German posts. Soon Wilson and the commanders of two of his platoons were wounded and their platoons pinned down. The third platoon, led by Lieutenant Pope, charged and overcame one post whereupon some of the enemy shouted in English, as a ruse, 'Hold your fire. We are coming.' The Australians ceased fire whereupon some Germans ran back and re-occupied some of the positions. Lieutenant Treweeke took command of the company and twice attacked the nearest centre of resistance, succeeding on the second attempt in overcoming it; 12 Germans were killed and 23 surrendered. Treweeke decided to wait until the tanks came tip before continuing the attack.

Sanderson's company, on the left, had also been in a fire-fight and taking casualties. Sanderson saw some Germans approaching as if they wished to surrender, ordered his men to cease fire and stood upright. He was immediately shot down. Lieutenant Norrie, though wounded, took command and ordered the men to assault but as he led them forward was also killed. Lieutenant O'Connor, also wounded, took over and after calling for volunteers led 12 men from his platoon against one of the posts. After hand-to-hand fighting the post was overcome, but not before O'Connor had been wounded again, this time mortally. Nearly all the NCOs had been

killed or wounded and the survivors, under the only remaining officer, Lieutenant Bissaker, were withdrawn to the intermediate objective where Captain Cribb later absorbed them into his company.

Meanwhile, Colonel Turner had sent Captain Cribb back to bring up the tanks. Brigadier Wrigley warned the 2/17th to have two companies ready to move forward to help the 2/13th but when it became evident that they could not reach the area before daylight, the 2/13th was ordered to dig in where it was. At dawn the forward companies which were skylined on a slight crest came under heavy fire and were forced to withdraw to dead ground a short distance back. Soon the tanks arrived in line ahead. The infantry pointed out the troublesome posts that were still un-subdued nearby and the tanks promptly destroyed them.

While the attack had been proceeding, the 24th Brigade had carried out its diversionary operations. Just before midnight a group of 50 dummies which had been earlier placed in no-man's land forward of the 2/43rd and 1,000 yards from the enemy's forward positions were raised by remote control and illuminated from time to time by sweeping searchlights to simulate men moving in to the attack, so as to invite retaliatory fire, which the enemy brought down in abundant measure.

A reinforced platoon of the 2/43rd, under Lieutenant Thomas, set out to raid enemy positions east of Kilo 110. After covering 600 yards under increasingly intense fire the patrol blew two gaps in the enemy wire, penetrated to its objective and there destroyed an anti-tank gun and inflicted about 30 casualties. After the withdrawal had been ordered, Thomas and two others were hit. Lance-Corporal Bingham (2/3rd Field Company) began to carry Thomas out. On the way, Bingham shot a German with this pistol then bailed up three others who helped him carry Thomas back. A total of five German prisoners were brought in; one Australian was killed, 8 were wounded and 7 were missing.

From Trig 33 the 2/28th sent out a raiding party 34 strong. Lieutenant Barnes' platoon with sappers and others, advancing under fire and in the light of flares, broke through several belts of the enemy's wire and reached its objective. There one forward section got into the strongly-wired enemy post and silenced a machine-gun, but the other failed to break through the wire. Barnes, who had been seriously wounded, ordered a withdrawal. Sergeant Moore took command and ably organized the rescue of the wounded and withdrawal of the survivors. The stretcher-party carrying Barnes was later hit by a mortar bomb and the stretcher was smashed, but Barnes managed to make his own way back. Moore organized a rescue party and brought in other wounded. Of the 34 men on the raid, 3 had been killed and 9 wounded. Two were missing.

The 24th Brigade's operations achieved their aim of drawing artillery fire, which came down on them for four hours. Prisoners taken later in that sector declared that they thought that they had defeated part of the main attack.

In the attack so far the 9th Division had taken 127 German prisoners, all from the *1/382nd Battalion* and 264 Italians mainly from the I and III *Battalions of the 62nd Regiment.*

Elsewhere on the XXX Corps front the assaulting infantry had had similar experiences to those of the Australians. The first objectives were taken in about two hours without great opposition but again minefields proved to be much more extensive than expected and the strongest resistance was encountered in the second line.

When the sun lit up the desert on the morning of the 24th, the enemy, if he had been able to observe the situation clearly through the battle-fog and tumult, would have seen the front of the 9th Australian and 51st Highland Divisions in the shape of a bay between two headlands. Southwards from where the 26th Brigade's positions jutted out on the extreme right flank, the front-line receded across the front of the two divisions but came out again on the New Zealand front where it remained out beyond the corps' objective--the Oxalic line--in front of the Miteiriya Ridge until the left New Zealand battalion was reached, when it again receded in front the Oxalic line on the New Zealand division's left flank and across the South African division's front to come out again to the objective on the left flank of that division and of the XXX Corps' bridgehead. All along that front the infantry were waiting to meet the expected armoured counter-attacks. The armour of the X Corps had failed to get out beyond the Oxalic line to place itself astride the enemy's supply routes in a challenging posture.

On the first night of the battle, the Eighth Army had not accomplished what its commander had ordered. Only one of the three bridgeheads for the armour had been secured and cleared of mines to the prescribed depth, and that too late. None of the three armoured divisions had pushed through to the enemy's rear. Only one had made an attempt to do so.

Montgomery's second plan was less ambitious than the discarded first plan. The change had been made, he declared, because his troops were insufficiently trained for the tasks he had set them. But the assault forces were well trained for the tasks they were given on the night of 23rd October, and fully rehearsed. No troops could have been better spirited. Montgomery had seen to that himself. What the orders prescribed and the forces faithfully and with great sacrifice strove to do was not accomplished because the tasks Montgomery had laid on the infantry divisions and minefield task forces of the armoured divisions for that night were still too great for them to undertake. That, at least, was an opinion held afterwards at XXX Corps Headquarters.

On the morning of the 24th the attention of the armoured commanders, the corps commanders and the army commander himself was attracted to the Miteiriya Ridge sector where the Oxalic Line had been reached and lanes for the passage of armour cleared. General Freyberg, forward in his tank in the early morning, was perturbed at the reluctance of the 10th Armoured Division's tanks to push forward. Unable to contact Lumsden, he sent a message to Leese, who thereupon came forward to see Freyberg. Leese and Freyberg reconnoitered the front together and then returned to Freyberg's headquarters to confer by the "blower" with Montgomery. There Lumsden soon joined them, having seen nothing that morning, it may be presumed, to diminish his dislike of issuing in line ahead through minefield lanes to attack an enemy gun-line. Freyberg, whose counsel the higher commanders probably valued more highly than anybody's, thought that the attack should be resumed that night, which may have helped the corps commanders to reach the same conclusion. Montgomery probably needed no prodding to decide that the risks could, should and would be accepted. Montgomery told Lumsden that the 10th Armoured Division was to get out into the open and manoeuvre beyond the Miteiriya Ridge.

In outline, Montgomery's orders of the continuation of the battle were, with some modifications, to carry out by the morning of the 25th such of the tasks ordained for the 24th as had not been completed. The 9th Australian and 51st Highland Divisions were to secure the rest of the Oxalic line, the armour was to debouch by night and advance to the Pierson bound. The action of the armour, however, was not to be dependent on completion of the infantry tasks - the armoured divisions were to fight their own way forward. The 1st and 10th Armoured Divisions were to advance westwards, the 9th Armoured Brigade and the New Zealand division's cavalry (armed with Honeys) southwards, all four armoured brigades to link on the Pierson bound. The thrust of the 9th Armoured Brigade was to prepare the way for later southward infantry thrusts by the New Zealand division. The 133rd Lorried Infantry Brigade from the 10th Armoured Division was to take over the part of the New Zealand front adjoining the Highland division. De Guingand later recorded that Lumsden was "obviously not very happy about the role his armour had given" and Montgomery wrote that he told Lumsden to "drive" his divisional commanders. In the XIII Corps the 44th and 7th Armoured Divisions were also to carry out their tasks uncompleted on the first day.

By daylight that morning, the 9th Division's front had erupted with fire of every kind - fire from field guns, machine-guns, mortars and snipers directed at the infantry, high velocity fire aimed at the tanks, and fire from British tanks and guns in rear engaging targets. The pandemonium was to continue - with some periods of great intensity - for several days.

Soon after sunrise the forms of enemy tanks could be seen approaching from the west. The German *15th Armoured Division* was coming in to make its first attack on the bridgehead. By 7.15 a.m. the tanks were reported about 1,000 yards west of the 2/48th's left forward company and also forward of Trig 33. The battle fire quickened. Soon the three Australian field regiments and the 7th Medium Regiment were firing pre-arranged concentrations on the areas into which the German tanks had moved and some Shermans in rear of the Highland division's front and of the left flank of the Australians' front were also engaging them. A little later lorried infantry appeared west of the 2/48th. In time, the enemy armour drew back from its first encounter with the XXX Corps artillery and the Shermans' long-range gunfire, leaving several tanks burning on the battlefield. Some Shermans were also burning.

On the northern flank the prospect at daylight had at once revealed that the tactical key to the security of the flank was Trig 29, north of Hammer's battalion. Whitehead's brigade, by comparison with other fronts, was faced by a less subdued enemy infantry, which the main artillery storm of the night assault had by-passed. Enemy artillery to the north was also active though most of its shelling was behind the forward battalions, but soon the enemy began patrolling to find the flank of the penetration.

Meanwhile, sappers were busy throughout the day widening lanes, bringing the diamond, boomerang, double bar and square tracks up to the foremost localities and clearing minefields from congested areas. In the evening hot meals were brought right up to the forward troops.

At 4 p.m. the commanding officer of the 2/13th Battalion, Colonel Turner, and the adjutant, Captain Leach, were wounded, Turner mortally; both had to be evacuated. Major Colvin was promptly brought forward to take over and, on the way, received orders from Brigadier Wrigley for the renewed attack up to the Oxalic line, which was to open at 2 a.m. next morning. The 20th Brigade was to capture the ground originally assigned to the 2/13th on the first night, but the task was now to be carried out by two battalions, the 2/16th on the right and the 2/13th on the left. The attack was to be made with full artillery support. After the Australians had secured their objective the 7/Rifle Brigade was to pass through, take Point 32 and form a bridgehead for the tanks beyond the Oxalic Line.

Colvin found the 2/13th practically without officers, and General Morshead agreed to allow all left-out-of-battle officers to be sent forward. Early that night Sergeant Easter of the 2/13th, who had a reputation for cool and reliable judgment under fire, returned from a patrol which had failed to find any sign of the 1/Gordons on the battalion's left. He expressed the opinion that there would not be much opposition to the night attack. Thereupon Colvin conferred with Colonel Simpson of the 2/17th and it was agreed to make a silent attack without artillery support. The 40th Royal Tank Regiment was to support the attack.

The 2/17th on the right advanced with two companies forward, took the objective without having to fight for it and began to dig in. The battalion's vehicles came forward but soon afterwards were shelled and bombed by aircraft. An anti-tank gun portee was set alight there as well as an ammunition vehicle in the 2/13th's area, both providing most unwelcome illumination. Some enemy posts nearby began harassing the 2/17th with machine-gun fire as reorganization proceeded. In the right company Lieutenant Wray was a steadying influence walking through it all pipe in mouth while carrying a heavy load of mixed ammunition for one of his sections which had reported that it was running short. A vehicle in charge of Sergeant Cortis of the machine-gun platoon was hit and set alight, but Cortis coolly off-limbered a gun, got it into action, engaged some of the enemy posts and silenced them. Captain McCulloch of the left forward company was killed by machine-gun fire and the company's only remaining officer wounded; Sergeant Williams took command. The men were very weary and jaded, having been without sleep for 48 hours and throughout that time frequently under intense fire.

On the left the 2/13th had encountered machine-gun fire after about 500 yards but advanced through it. The right company surprised two posts and took the occupants prisoner. By 3.15 a.m. the troops were digging in on the objective with patrols out. The enemy began to lash the forward companies with machine-gun fire from close in front, but the 40th Royal Tanks came up behind and effectively engaged the enemy nests with tracer machine-gun fire. At 4.50 a.m. contact had been made with the Gordons on the left. By 7 a.m. shallow digging had been completed and supporting arms sited.

Before dawn the air was raucous with the noise of tanks approaching from the rear but the 7/Rifle Brigade had not yet appeared when the horizon showed the first signs of approaching day.

The break-out battle was soon to reach its climax. On the Highland front the main tank force of the 1st Armoured Division (2nd Armoured Brigade) had been moving up to the Oxalic line except on the division's left where an enemy strong-point, which the division had lacked the strength to attack, still held out to the right of the gallant 7/Black Watch. It was beyond the Highlanders, however, where the southern bridgehead reached across the Miteiriya Ridge that the battle's most dramatic developments had been occurring that night. An hour and a half had been allowed to the sappers to clear lanes forward for each armoured regiment before, at 10 p.m., the guns fired the barrage behind which the three armoured brigades of the 10th Armoured division were to

debouch. The time proved all too short and the enemy, as could hardly have been otherwise, was expectant and ready for counter-strokes.

The 8th Armoured Brigade, in the centre, encountered the greatest misfortune. On one lane (Hat Track) the enemy captured the mine reconnaissance party and the exit was covered by at least one 88-mm gun. The lane was abandoned. It was then decided that two regiments, the Nottinghamshire Yeomanry and 3rd Royal Tanks, would use the Boat track but enemy aircraft reconnoitered with flares when the bombardment opened and the Notts Yeomanry were bombed with high explosive and incendiaries and shelled, so that the lane was soon illuminated by burning vehicles, in the light of which the column was harassed by enemy fire. It was decided that this lane was also unusable. The commander of the 10th Armoured Division, General Gatehouse, who was on the Boat track, had seen all this. Lumsden called for a report from Gatehouse.

Irreconcilable accounts have been given of the incidents that followed in which Montgomery, Lumsden and Gatehouse figured and the "friction of war" manifested itself and to which perhaps too much publicity has since been given. It must suffice to recount some salient facts that do not appear to have been disputed. Gatehouse feared that daylight would find his regiments exposed and vulnerable and likely to be shot to pieces by the enemy's anti-tank artillery. Lumsden, who had no authority to break off the attack, reported this to army headquarters, which was also keeping closely in touch through report centres and by analyzing what could be heard of the much-jammed radio traffic. De Guingand concluded that "a feeling in some quarters was creeping in which favoured suspending the forward move, a pulling back under cover of the (Miteiriya) ridge" and decided to take what was apparently regarded as a risk even on that battlefield. He woke the army commander and called a conference with the corps commanders for 3.30 a.m.

Three of the four armoured brigades to make the advance to the Pierson line had encountered no insuperable difficulties or problems beyond those to be expected in such a difficult operation. It is understandable, therefore, that the army commander should have decided that the operation should proceed, for he could expect at least some 400 tanks to debouch. He gave very firm instructions that they should. The original orders were partly changed, however, presumably in recognition of the fact that only one of the 8th Armoured Brigade's three lanes - the Bottle Track on which the Staffordshire Yeomanry were to debouch - was regarded as usable. One of the brigade's three regiments was to advance and link with the New Zealand division's 9th Armoured Brigade but the rest of the brigade was to remain on the Miteiriya Ridge and improve the gaps. After the conference Montgomery kept Lumsden behind and (he has since written) 'spoke very plainly to him ... Any wavering or lack of firmness now would be fatal. If he himself, or the commander 10th Armoured Division, was not 'for it', then I would appoint others who were.'

Gatehouse was no less averse than Morshead to accepting orders to commit his troops to operations which he thought unjustifiable but by comparison was less advantageously placed, not deriving his authority directly from a government. Lumsden wished Gatehouse to receive the instructions from the army commander himself. Gatehouse had gone back to his main headquarters so that he could be contacted by telephone, and there Montgomery telephoned him. Montgomery spoke 'in no uncertain voice' and nettled Gatehouse by ordering him 'to go forward at once and take charge of his battle'.

The orders were masterful. It remains to see what effect they had on the battle. At dawn on the 25th, on the left of the 9th Division's area revealed the Queen's Bays deploying among the infantry close to the end of the bridgehead; the tank commanders, dressed with great individuality for the hunt and bedecked with colorful cravats, standing up in their cockpits unperturbed by the battle-fire's cacophony and coolly surveying the terrain. There and for some considerable distance to the South the armoured brigades tanks sat about the foremost defended localities, the target of a vigorous bombardment, as if the limit of their advance had been reached. However hard and however often the "GO" button had been pressed on the army control panel, its impulses were not motivating these tanks whose commanders, though as brave as they were bizarre, evinced no intention to advance 'at all costs' to the Pierson bound. Their presence there to do battle was not very welcome to the infantry who regarded the ground of the armour's choosing as their own. Meanwhile, about 6 a.m., part of the 7/Rifle Brigade had arrived in rear of the 2/13th's forward companies where their vehicles attracted heavy fire, having insufficient space between the minefields for proper dispersal.

The enemy gunners were not too proud to shoot at sitting ducks. The carnage was terrible to watch.... It was not long before a flood of casualties swamped the 2/13th RAP, which was already working at full pressure to cope with the unit's own casualties. Captain Phil Goode and his men were equal to the occasion.

On the morning of the 25th Freyberg persuaded Leese and Montgomery to cancel the proposed southward infantry attacks of the New Zealand division. Freyberg thought that the main infantry attack had not failed by much to pierce the enemy's defence girdle and that, therefore, a further westward infantry attack on the pattern of the first should be made to extend the bridgehead. Again, the top commanders conferred at the New Zealand division's headquarters. Montgomery decided about midday to cancel the New Zealand division's "crumbling" operations because they were likely to prove very costly, and instead to start "crumbling" on the northern flank, using the 9th Australian Division. The armour was to be withdrawn except on the north of the XXX Corps front (where the 1st Armoured Division took the 24th Armoured Brigade under command), and in the far south the XIII Corps was to go over entirely to the defensive.

A counter-attack was expected on the 2/48th's front but did not develop. At dusk an enemy group was seen near the forward companies and fired on. Several Germans were killed and three captured including the acting commanders of the 125th *Regiment* and that regiment's *II Battalion.* The battalion commander had a map of the area to be attacked that night showing the enemy's minefields and the disposition of his troops. The map showed that the track leading to Trig 29 along which Hammer's carriers were to advance was free of mines; this was confirmed by Hammer's interrogation of the prisoners. Interrogation also established that the Germans had just reinforced Trig 29.

To have captured the map was rare good fortune. When it was studied at Whitehead's headquarters, it revealed that the planned axis of the 2/24th's attack ran straight along the leg of a minefield. The forming-up place and bearing of attack were therefore altered so that the sappers, instead of having to clear mines to a depth of 1,000 yards or more, would require to make only one gap 200-yards deep.

The 2/17th relieved the 2/48th at 10 p.m. on the 25th. The barrage opened at midnight and the leading companies of the 2/48th moved forward on foot; Captain Robbins' company on the right and Captain Shillaker's on the left. They pressed on through enemy defensive fire - which became particularly heavy on the right - to their intermediate objective some 200 yards short of Trig 29, and halted. Then the carriers under Captain Isaksson moving four abreast with Captain Bryant's company aboard charged through with synchronized timing onto the smoky dust-shrouded centre objective as the barrage stopped.

When the carriers reached the spur the infantry leapt out and charged, one platoon coming left and one right while one went straight on to Trig 29.

As soon as the objective had been taken Colonel Hammer contacted Major Tucker and asked him to bring forward the vehicles loaded with consolidation stores, which were being held back along the track some 500 to 600 yards to the east of the point from which the attack had started. Just at that moment a stray shell hit a mine-laden truck, which with five other trucks also loaded with mines exploded with an astounding detonation. Tucker was at first dazed, but soon got the undestroyed vehicles moving and sent Captain Potter back to "B" echelon. Potter returned with five composite reorganisation stores trucks. By first light 2000 mines had been laid. Bryant's company was facing north, Shillaker's west. Edmunds' company, on the battalion's left, facing west and northwest, had linked with the 2/17th Battalion in the 2/48th's old positions. The battalion was now firmly established, though only shallow trenches had been dug and everyone was very weary.

Meanwhile, at 12.40 a.m. the two leading companies of the 2/24th had crossed the start-line, striking northeastwards on the right of the 2/48th. It had been realized that an advance of 3,000 yards along a line of enemy posts was a difficult assignment, but the army's Intelligence service expected them to be held by Italians. On the contrary, they proved to be mainly held by Germans, and where there were Italians there were usually Germans with them.

Major Mollards's company on the right attacked along the frontal wire with one platoon in front of the wire and two on the left behind it. They fought their way forward without any serious check until less than 100 yards from the company objective when they were held up by a strong-post. This was assaulted and taken but

not before Mollard had received a disabling wound. The post was found to have a garrison of more than 40 mixed Germans and Italians and to house an 88-mm gun. Captain Mackenzie led the company forward to its objective.

The left leading company under Lieutenant Geale had to advance the prescribed distance then move left, contact the 2/48th Battalion and dig in on the northeast spur of Trig 29. This the company did but Geale was badly wounded and Lieutenant Doughan, the only surviving officer took over. Doughan was wounded later in the day and Sergeant-Major Bailey then took command. A number of posts were taken. Sergeant Berry was foremost in the affray in the attack on three of these and took two positions single-handed.

Captain Harty (on the right) and Lieutenant Greatorex followed up the centre-line, then led their companies through the forward companies towards the Fig Orchard. Each had to overcome three posts on the way. Harty's company took the Fig Orchard post, which was found to be a headquarters with offices sunk in the ground to great depth. Greatorex's company overshot the Fig Orchard and came up near the outer edge of the defences covering the heavily defended locality known as Thompson's Post. Both companies were troubled by anti-tank and mortar fire from a post 300 yards ahead. Harty and Greatorex reconnoitered to plan an assault. Greatorex was wounded (for the second time that night) and Sergeant-Major Cameron taking charge of his company got permission to withdraw it - now numbering only 14 of the 63 who started - to along-side Harty's.

The 2/24th had carried out a methodical destruction of the enemy as prescribed by the master plan, to which the number of enemy dead and prisoners bore witness, but Colonel Weir, after going forward, decided at 4 a.m. that the battalion was too depleted to hold the extended front on which his men were digging in. The forward companies were therefore withdrawn about 1000 yards where by 5 a.m. they had consolidated behind a reverse slope running northwest from Point 22 to Trig 29. On the right flank, the composite force which had been held up in its advance by fire from Thompson's Post, found itself in an exposed situation.

On that night of much action the enemy launched an attack with infantry and a few tanks against the 2/13th Battalion, following up by dark the daylight attack that had failed. Three tanks were knocked out by Hawkins mines and Treweeke's company knocked out two tracked troop carriers when they were within 60 yards. Artillery and infantry weapon fire broke up the attack. At dawn the 2/17th discerned 12 enemy tanks sitting on a ridge to the northwest, where they remained all day, harassing the Australians with guns and small-arms fire and knocking out vehicles. On the left of the divisional front the 1st Armoured Division made its morning visitation and the Australians saw 30 Sherman tanks engaging the enemy. No foolhardy attempt was made to push through the enemy gun-line and behind the coast salient.

By the evening of the 26th Montgomery had decided that the New Zealand division should be withdrawn into reserve and rested, that the 1st Armoured Division should also be drawn into reserve for refitting and relieved by the 10th and that he would rely on the 9th Division's northward attack to retain the initiative. Consequently a substantial regrouping was to be effected on the night of 27th-28th. The northward shift of the 9th Division and the withdrawal of the New Zealand division would greatly extend the front to be held by other formations. The XIII Corps was directed to make available all the infantry it could spare for operations in the north and to extend its front to include the South Africans' sector. The 4th Indian Division was to relieve the South Africans, and they in turn to relieve the New Zealanders, who would be withdrawn. The 51st Division was to relieve the 20th Australian Brigade thus enabling the 9th Division to have one brigade freed from holding duties and available to attack.

These instructions were given by Lesse to Morshead and the other divisional commanders on the night of the 26th.

The policy, laid down by Montgomery on the 26th, of continuing the attack northwards towards the sea on the 27th and succeeding days, appears to have been originally embarked on as a crumbling operation with the general object of destroying the enemy in the salient by the coast, and not with the specific intent that the armour should debouch there. At that stage a break-out point does not appear to have been indicated, nor indeed had the planning evinced any haste to get ready for a chase. No immediate intention to break out along the coast road is suggested by the written orders nor by the narrative dealing with this stage in the 9th Division's report.

With the Army Commander's brief direction to 'Attack North', consideration was given to the staging of a further attack in this area on the night 27th -28th October. On the arrival of XXX Corps Operation Instruction No. 85 of 26th October, which ordered a policy of mopping up and the completion of the capture of the final objective by all divisions on 27th October, it was decided to plan the further attack northwards on the night 28th -29th October - one night later.

In the plan submitted to the army commander by Morshead on the morning of the 26th, however, his intention had been to attack at once to seize and open up the main road from the enemy's front-line westwards for three kilometers. Perhaps it was the contemplation of this plan that implanted the idea later tentatively adopted that the armour might next debouch along the coast road. A subsidiary object of Morshead's plan was to secure the road and the area south of it for use by the division's vehicles, thus shortening its long and exposed supply and evacuation routes.

The plan was an ambitious one. The task was to be accomplished in progressive phases and required the employment of all three brigades. For the operation the 23rd Armoured Brigade less two regiments was also placed under Morshead's command, and the artillery of tile 51st, 2nd New Zealand and 10th Armoured Divisions and of three medium regiments was to be ill support. Including the division's own artillery; there would be 360 guns

Both battalions of the 20th Brigade opened their attack at 10 p.m. on 28th October. The 2/13th on the right was a depleted unit, with rifle companies averaging only 35 of all ranks, and an exhausted one, after five sleepless nights. It had attacked on two successive nights, been counter-attacked on the next two, and on the night preceding this attack had been on the move, arriving only just before dawn in an area overlooked and constantly shelled by the enemy. The troops crossed a start-line laid farther back than the plan provided but soon caught up with the barrage and had to pause until it lifted. The attack by the 2/24th on the 26th October had cleared the enemy from the ground covered in the first phase except for some isolated survivors who offered no resistance, but the enemy, apparently aiming behind the shell-burst of the British barrage, brought artillery fire down on the battalion transport and in the midst of the rear companies. The Fig Orchard, which was the first objective, was reached in 50 minutes. Captain Gillan's company dug in close behind the orchard with battalion headquarters near by. Soon Lieutenant Barrett's company and Lieutenant Vincent's passed through and continued down a track leading towards the coast. They took up position some 800 yards because the protective artillery barrage was too close. Captain Burrell's company then patrolled deeply ahead, but without making contact.

With companies barely stronger than platoons, the battalion's attack with two companies forward had inevitably been on a narrow frontage. The path taken missed enemy positions on the left flank, which now became troublesome, heavily mortaring battalion headquarters and Gillan's company. Moreover, the whole area was found to be strewn with anti-personnel mines. Casualties were mounting and it fell to Gillan's company to deal with two enemy posts which were mainly responsible. The first patrol of 10 men under Lieutenant North met with disaster when a mortar bomb landed in its midst, killing or seriously wounding all except the commander. North returned and organized a second patrol to bring his men back. Colonel Colvin had meanwhile ordered Gillan to send out another patrol with firm orders to subdue the other post. Corporal McKellar, who was given the task, moved with ten others through a minefield, attacked with grenades two machinegun crews giving covering fire to a mortar crew, and captured the guns and their crews. Next they rushed and overcame the mortar crew some 30 yards away and returned with their prisoners carrying the captured weapons. After one more post was silenced by patrol action it appeared that local opposition had at last been subdued. Meanwhile, Burrell's company had returned and dug in a short distance behind battalion headquarters.

On the left the 2/15th attacked northward from Trig 29. As the battalion was forming up it was heavily shelled and Colonel Migno and his adjutant were wounded, Magno mortally. Strange took command and led the battalion in a vigorous, well-executed attack. Advancing through machine-gun and mortar fire they encountered posts manned mainly by Italians 900 yards from the forming-up place, overcame them and secured their objectives. In the attack 89 Italians were killed and some 130 Italian and German prisoners were taken. No minefields were found and the vehicles had no difficulty in moving up. The battalion dug in. It had lost 6 killed, including Captain Jubb, a company commander, and 36 wounded; 3 men were missing. Soon after first light

two enemy tractors approached towing anti-tank guns. The guns and 22 Germans with them were promptly captured.

The fresh 2/23rd (Lieut-Colonel Evans) and the 46th Royal Tanks (Lieut-Colonel T.C.A. Clarke), who were to execute the advance to the Main road, had trained together for semi-mobile operations. To gain surprise and save time Evans planned to advance to the objective with his assault troops (one company) mounted on the tanks and two companies following on his own carriers and those of the 2/24th. By the time the 20th Brigade's attack began all were lined up ready at the forming-up place, there to await that brigade's success signal. An alerted enemy was also ready. When the barrage opened and the advance started the tanks and carriers and the men mounted on them were exposed to sharp fire. Some of the tanks, not having the assistance of moonlight as broad as that laid on for the earlier attacks, missed the marked gaps in the home minefield and were immobilized. Others, according to the diarist of the 2/23rd, moved right and left contrary to instructions to search for others gaps and "an extremely confused situation" developed, into which the enemy pumped shot and shell from weapons of every kind. In the left company, in which casualties were severe and all the officers wounded, the company sergeant-major, Warrant-Officer Joyce, rallied the survivors and led them forward without the tanks to overcome the foremost enemy positions in hand-to-hand fighting and take 40 prisoners; but elsewhere the attack did not progress.

It was decided to reset the attack and the sappers were directed to widen the gaps, but much time was lost. 'The difficulties of this period,' states the 9th Division's report, 'were added to by communications between the commanding officers of 2/23rd Battalion and 46th Royal Tanks breaking down and the headquarters of 26th Brigade and 23rd Armoured Brigade, which were situated close to each other, not being in touch.' So no doubt it appeared to the staff at divisional headquarters. Evans had lost touch because Clarke and most (if not all) of his squadron leaders had been wounded. Whitehead and Richards had gone forward together to keep closer touch.

After the gaps had been widened the advance was resumed until the tanks again reported mines. Engineer sweeping operations were undertaken but failed to discover any. It was 12.55 a.m. before the tanks moved forward again, but then they came under fire from six 50-mm anti-tank guns, whereupon they dispersed taking their infantry with them. The enemy became very active and casualties mounted fast.

The operation was developing into the type of muddle for which there were several derisive epithets in common army parlance. Colonel Evans gathered what men he could - only 60 or 70 - and organized an attack which at 3.15, after a hard fight, took the main German position with its six guns and 160 men. About that time another group of infantry and 15 tanks who were out of touch with Evans, advanced east of Evans' position towards the railway. After 800 yards they came under fire from German guns, including one 88-mm; nine tanks were knocked out and many of the infantrymen were hit. At 4 a.m., Evans reported that he was digging in about 1000 yards forward of the original FDLs because he had so few men and was not in touch with any responsible officer of the 46th RTR. The 2/23rd had suffered very severe losses in the attack, having lost 29 killed, 172 wounded and 6 missing. The casualties included 2 majors, 4 captains, and 10 lieutenants.

Meanwhile, Brigadier Whitehead had made a new plan: to attack with the 2/24th and 2/48th Battalions from the area firmly held by the 2/15th. General Morshead made the 40th RTR available to him, but the 23rd Armoured Brigade could not at such short notice give a definite time for the 40th's arrival at the forming-up place and it became apparent that the fresh battalions would probably have insufficient time to reorganize on their objectives before daylight. Morshead, therefore, postponed the attack and ordered Whitehead to ensure that the 2/23rd was securely established and made contact with the 2/13th on its right and 2/15th on its left: the 2/24th and 2/48th were to return to their lying-up areas. The few tanks of the 46th RTR still in running order - only eight - were withdrawn.

Dawn on the 29th found the 2/13th Battalion in an isolated, rather precarious position, with open left flank and a gap of 400 yards (protected, however, by an enemy-laid minefield) between the two left companies; opposite the gap were known enemy fortified posts, which might be still occupied. Behind the battalion there was an open flank for almost 1,000 yards.

From 7 a.m. onward heavy and accurate artillery fire fell on the battalion headquarters. Three shells penetrated the dug-outs; the third wounded and incapacitated Colonel Colvin, killed the adjutant, Lieutenant Pinkney, and wounded the anti-tank officer, Lieutenant Gould. Captain Jones, the command post officer, notified the catastrophe to Windeyer's headquarters and the two forward companies through his radio links. The intelligence officer (Lieutenant Maughan) who was the only officer left on the headquarters, asked brigade headquarters to find Major Daintree, the second-in-command, and in the meantime Captain Gillan had come across from his company to take charge. Major Daintree could not be found. Later it was ascertained that he had been wounded while reorganizing the transport and evacuated. Thereupon Windeyer asked Morshead to make available Captain Kelly, a former adjutant of the unit, who was then serving on divisional headquarters. Morshead agreed and promoted Kelly to the rank of major. Kelly arrived in the afternoon and took command. Finding that the four rifle companies had between them only about 100 men, he reinforced them with men from "B" Echelon and the Headquarters Company. Gillan later wrote: 'To the dazed and battered troops, it was like a shot in the arm to see Major Joe back in the fold.'

It was against the 2/15th and the 2/17th, however, that the enemy's main efforts were directed on the 29th. Fourteen tanks stood hull-down near Trig 29 all day and the whole area came under tempestuous fire. After dawn it became evident that the enemy had only a confused idea of the Australian position; several enemy vehicles drove into the Australian lines and were destroyed or captured. Later in the morning enemy infantry and tanks formed up and two counter-attacks in which both tanks and infantry were employed were directed at Trig 1 29 - one in the morning, and another in the early afternoon. The afternoon attack, which was made with greater determination, was sustained for three-quarters of an hour. Both were repelled, but on the second occasion not before six of the Australian anti-tank guns had been knocked out. At 5 p.m. the 2/15th and 2/17th sustained a still more determined attack launched at the junction of the two battalions; it was pressed until darkness fell. In coping with these attacks Colonel Simpson and his supporting artillery were greatly assisted by reports from Captain Dinning, who had moved across from his company headquarters to an exposed observation post on Trig 29 to watch the enemy's moves. It could be seen that dreadful casualties had been inflicted on the attackers. As the light faded the enemy could be observed digging in at distances varying from a quarter of a mile to a mile from the Australian front. Shortly after midnight one Italian officer drove up with a truckload of Italian wounded to the 2/27th Battalion's RAP; which was then crowded with wounded from the 2/15th.

Several more attacks were to be made before the enemy gave up the attempt to dislodge the 2/15th and 2/17th Battalions. The Australians' training in quick and thorough consolidation together with effective artillery protection had provided the answer to the German practice of counter-attacking quickly rather than deliberately. The enemy, unless able to counter-attack within two hours or so of the capture of a position, had little hope of breaking the front of these battalions, depleted though they were, except by a deliberate set-piece operation.

At 1.10 a.m. on the 29th the 20th Brigade assumed responsibility for the whole northern sector and the 2/23rd Battalion was placed under Brigadier Windeyer's command. After learning of plans for a renewed attack by the 26th Brigade on the 30th -31st, Windeyer ordered the 2/23rd to advance its positions 1,000 yards on the night of the 29th so as to link the northeast part of the 2/15th with the 2/13th. This was done without incident.

The break-out operation was to be a decisive attack, called SUPER-CHARGE and the plan written that day, provided that it should be delivered on the night of 31st October-1st November.

It was essential to maintain relentless pressure on the enemy until the break-out operation took place and it fell to the lot of the 9th Division to do so by renewing its northward attacks.

The 2/32nd Battalion (Lieut-Colonel Balfe) assembled for its attack on the night of the 30th, for which the accompanying barrage was to begin at 10 p.m. Before it started two officers of the battalion had been wounded by a sniper while reconnoitering - Major Joshua (who nevertheless carried on) and Captain Jacoby, wounded mortally. The two leading companies, commanded by Captains Huitfeldt and Eacott, set off ten minutes after the barrage began. Encountering no strong opposition, they soon caught up with it [the barrage]. The railway line - the intermediate objective - was reached in good time; 175 prisoners, nearly all German from the 1/361st *Battalion,* had been taken. After a pause on the railway line to re-form the advance continued against heavier opposition, and casualties mounted. After the forward troops had crossed the railway Colonel Balfe and

his wireless operator were on the railway line when six Germans moved forward, evidently to surrender. One drew a pistol and shot Balfe in the arm. Balfe emptied his revolver into the Germans and made off.

When the final objectives had been reached, two companies remained in reverse slope positions covering the road while two moved left and occupied an area south of the railway facing west. The engineers were clearing mine-free tracks leading forward and had begun breaking down the 12-foot railway embankments to enable vehicles to cross. But the truck bringing their explosives and equipment had not arrived and they were reduced to doing the job with shovels and using Hawkins mines for explosive charges. Within the area captured by the 2/32nd Battalion was a blockhouse which had been used by the enemy as a main casualty station. Three German medical officers and their orderlies remained on duty. Field Marshal Rommel had always enjoined a scrupulous adherence to the rules of war. True to these traditions and those of their service, the German doctors and orderlies toiled that night and in the following days to minister without discrimination to the wounded of both sides as they were brought in. There they were soon joined by the 2/32nd's medical officer, Captain Campbell, and his men and by Captain Grice and his section of the 2/11th Field Ambulance.

The 2/48th Battalion under Lieut-Colonel Hammer, the 2/24th under Lieut-Colonel Weir and the 2/3rd Pioneer Battalion under Lieut-Colonel Gallasch set off in turn from the Trig 29 area, at 10.30, 10.40 and 11.00 p.m. respectively, in the wake of the 2/32nd Battalion, and each had some action on the way. Two platoons from separate companies of the 2/3rd Pioneers assaulting, separately, and saved just in time from mistaking each other for the enemy by the inimitable profanity of their language, attacked one troublesome post to the left of the track leading to the 2/32nd and overcame it in close hand-to-hand fighting, taking more than 50 prisoners.

The battalions dug in near the 2/32nd while waiting to go forward, the area being harassed by fire. A platoon of the pioneers went over to help the engineers with their task of gapping the railway embankment. The enemy had begun closing in from the west and was soon raking the gap with fire. A platoon of the pioneers and a company of the 2/32nd independently attacked the positions mainly responsible with eventual success and again some misunderstandings were sorted out by descriptive language.

Casualties were coming fast. Balfe was hit a second time and carried out and Major Joshua took command of the 2/32nd. A German 88-mm gun shot up many carriers and vehicles attempting to bring ammunition and stores forward and many did not get through, including those of one company of the 2/32nd. About 3.45 a.m., after three hours work by 50 men, the crossing over the railway was complete and the "A" Echelon vehicles of the 2/32nd companies north of the railway crossed over; but the enemy was now pressing along the railway from the west and bringing heavy fire to bear on the gap. The 2/32nd had taken up will henceforth be called the Saucer because that is what it was to look like when dawn revealed their situation to the men of the 2/32nd and that is what they, and others who later went there, called it. In the next two days the Saucer was to become the focal point in the struggle between the two armies.

The 2/24th and 2/48th, numbering scarcely 450 men between them, had meanwhile set off on their desperate eastward advance of 2,250 yards, marching to the sound of the guns - not to the distant sound of the enemy's, but in the face of the close, harsh bombardment of their own - and were strewing the desert way of a long fight with fallen wounded and dead, yet sustaining still their task with a greatness transcending its purpose. The start-lines had been laid north from the railway to Barrel Hill, but not before the 2/48th had fought for the ground by clearing a neighboring post. The barrage opened at 1 a.m.

Major Edmunds' company on the right and Captain Bryant's on the left led the advance. As they reached the road they ran into deathly fire, but with numbers dwindling pressed on and with hard hand-to-hand fighting for almost two hours forced their way through the enemy positions to the intermediate objectives. In the right company casualties came fast; Lieutenant Caple was killed assaulting a post, another platoon commander, Lieutenant Butler, was badly wounded and evacuated. Sergeant Ranford having taken command of his platoon led assaults on two posts, overcoming both, and on the second occasion damaging beyond repair two machine-guns and an 88-mm gun. Ranford, badly wounded, continued to lead his platoon, then only seven strong, until hit again.

The reserve companies also had to fight their way forward to the intermediate objective, having to deal with un-subdued enemy posts on the edge of the depleted forward companies' path. Passing through they took

the full force of the enemy's mortar and machine-gun fire. Captain Shillaker leading the right company was soon badly wounded and Lieutenant Hamilton was killed. Sergeant Derrick led the company forward but it was forced to ground near the objective. Captain Robbins' company on the left swung out to avoid a minefield and continued the advance, but the rest of the battalion lost touch with them.

After Caple had been killed and Butler wounded, Edmunds ordered Lieutenant Allen to deal with mortar and machine-gun posts that had brought his advance to a stand-still and as Allen led a successful bayonet charge against them in the face of whipping fire, Edmunds resumed the advance with only six men. Allen's platoon took 15 prisoners but suffered severely; it was reduced to three men (including him). On Allen's right Edmunds led his six men in an assault on another post but was badly wounded by machine-gun fire as they moved in. Allen, who was also wounded, was the only officer remaining to command the company's survivors, then numbering only five.

Battalion headquarters, coming up between Shillaker's and Robbins' companies, also passed through the original two forward companies and continued up the centre but soon found themselves well ahead of the forward companies and began taking casualties from enemy fire from positions near the final objective. The Regimental Sergeant Major, Warrant-Officer Legg, led an assault by five men on a post but four were lost.

Meanwhile, Captain Bryant, the only senior company commander apart from Robbins (who was still out of touch), brought up what was left of the two companies that had taken the first objective and took charge, amalgamating his with Shillaker's company (now commanded by Derrick who, though he had been hit, was still carrying on) to form a composite company of 45 men, and then, accompanied on the right by Lieutenant Allen commanding the few survivors of what was Edmunds' company, resumed the advance, organized a charge with grenades and bayonet, and overcame the post that had held up Derrick's men.

Hammer had heard no word from Robbins, whose company had pressed on close to the objective, because Robbins had been killed and all his platoon commanders and his headquarters men had been either killed or wounded. The company had been caught in open ground as it approached the end of its advance and 16 men were killed assaulting the objective. When Robbins had been killed and the officers commanding the other two platoons severely wounded, Sergeant Kibby took command and organized an attack on the objective with the survivors, perhaps a dozen men, in two converging groups. The attackers were forced to ground within 20 yards of it. Kibby jumped up and charged, hurling grenades which silenced the post, but not before he had been caught by the enemy's fire, which cut off the life of a soldier whose gallantry in this and earlier actions at El Alamein could not have been surpassed. So was the left objective assaulted on the ground that Major Mollard's company of the 2/24th, attacking from the other side, had briefly captured some months before.

Colonel Hammer called a conference of all who were now acting as commanders of what remained of his battalion and ordered that the men were to dig in and hold the ground they had attained. The battalion, now reduced to 41 men, had no communications, all signal sets having been shot up and lines mutilated. He decided that he would make contact with the 2/24th Battalion to see whether it would be feasible to hold the ground where he was, north of the road, while the 2/24th held ground south of the road. Handing over command to his adjutant, Captain Reid, who had been thrice wounded, Hammer set off alone armed only with a pistol, to find the 2/24th. Later he returned, having been shot through the face, but with two prisoners. He had found the headquarters of the 2/24th, but Weir was not there. He then ordered a withdrawal to the blockhouse, saying that he believed the 2/24th would also be withdrawing.

Colonel Weir's patrol to Thompson's Post had penetrated the outer wire without incident but was fired on soon afterwards a short range. One man killed; another was wounded as the patrol quickly withdrew. Private O'Brien, a stretcher bearer, turned back, however, and brought the wounded man out. The fire showed Thompson's Post to be very much occupied.

When Weir returned to his battalion's firm base, he was given an oral message to the effect that, because Hammer's battalion was so depleted, Hammer proposed to withdraw; so Weir decided to do likewise. Hammer, on the other hand, had decided to withdraw only because after making contact with the 2/24th while Weir was absent leading his patrol to Thompson's Post he had gathered that Weir had decided to withdraw. Still it was all for the best, and both battalions came back just before dawn to the Saucer. On the way, however, the

2/24th passed through a minefield of aerial bombs, two of which detonated. There were 28 casualties; Lieutenant Kearney and 11 others were killed and Colonel Weir so badly wounded that Captain Harty (who was a temporary captain on only three months' standing) had to take command. The devoted O'Brien moved fearlessly among the wounded, dressing all 16. Later two of the battalion's carriers came up and brought out these and other wounded just before first light.

Harty led back the 54 survivors of the 2/24th to the 2/32nd Battalion's base where they took up a position on the left of the 2/32nd Battalion. Weir was taken to the casualty station at the blockhouse and Major Gebhardt took command after first light. Of the 206 men (including only five officers) with which the 2/24th had entered the attack, 42 had been killed and 116 wounded (though some of these were still carrying on); two men were missing. The battalion had taken 48 German and 14 Italian prisoners and a formidable array of weapons: one 88-mm gun, two 50-mm guns, two 20-mm guns, 12 Spandaus, one medium mortar, one light mortar, and seven howitzers.

Hammer had also withdrawn his few - his very few - to the base at the Saucer, where they dug in just to the east of the 2/32nd Battalion. The 2/48th Battalion had taken some 200 German prisoners. It had lost 47 killed, 148 wounded and 4 were missing. Among the 18 officers who took part in the attack only four now remained alive and unwounded. On 23rd October this battalion had 30 officers and 656 other ranks; of which 21 officers and half the men had since been killed or wounded.

The prisoners taken by the division in the operation totaled 544 of which 421 (including 7 officers) were German and 123 (including 5 officers) were Italian.

In the early hours of the 31st an important reinforcement reached the small Australian force of three depleted battalions astride the main road - one which was soon to play an important and possibly decisive role in a battle which was of some importance to the Eighth Army's prospects of a successful break-out. The 289th Battery R.A., a battery of Rhodesian anti-tank gunners manning 6-pounders who had earlier been sent up from the XIII Corps to help with operations in the north and were now attached to the 2/3rd Anti-Tank Regiment, had been allotted to the 2/32nd Battalion's support. In the dark their commander sited three troops (one being still in reserve) to cover, on the right, the approaches to the crossing from north and west - this troop's guns being on either side of the crossing - and on the left, to prevent close envelopment of the 2/32nd battalion's left flank and rear by tanks moving round the front of the battalion's protective minefield and through the gap between the 2/32nd and 2/15th battalions. Here were two troops, one close to the railway and one farther out, in the gap.

Also in the Saucer the next morning were three troops of Major Copeland's 9th Battery of the 2/3rd Anti-Tank Regiment - Lieutenant Kessell's in support of the 2/32nd Battalion on its northern flank, "B" Troop and "C" Troop (in support of the 2/24th and 2/48th Battalions) being south of the railway.

A situation map showing the 9th Division's dispositions at dawn on the 31st, if one could then have been correctly drawn from the scanty information available, would have presented a vastly (and gravely) different picture from that expected to be seen on completion of the operation. The coast road was not opened nor were the well-developed defenses north and south of it cleared. It is strange that it could have been expected that they would be. The overprint map and all other information had given clear warning that the defenses about the road were formidable. There are some indications that a belief had been nurtured that the enemy was thinning out and might by then have been demoralized; but if there was some evidence to that effect there was more plain evidence to the contrary.

Dawn revealed that an enemy locality had been penetrated and there were many isolated pockets which were quickly mopped up. The 2/32nd Battalion took some 200 prisoners. Major Rosevear's company of the Pioneers, which found itself in the midst of an enemy position, took 47.

The two isolated companies of the 2/32nd Pioneer Battalion received the enemy's first attention. Captain Stevens' company, holding no ground of vantage, and under observation from the enemy on the sand-dunes, was in the worst position. Stevens sent a patrol of 17 under Lieutenant Dunn to some dunes out in front to enfilade the enemy from the flank. Some of the men were cut down by fire. Lieutenant Dunn extricated the patrol but not before all the NCOs had been killed or wounded, and more casualties were suffered as they

came out. Dunn was badly hit and Captain Owens went out and carried him back. Only four of the 17 returned unwounded. Stevens' company was pinned down, any move attracting fire, until about 10.30 a.m. when the fire ceased and a German officer approached under a white flag and advised surrender, as the alternative to annihilation. He was told, 'If you want us, come and get us', some other remarks not in the best taste were also addressed to the envoy. After he had withdrawn the Germans completed the company's encirclement and continued to lacerate it with fire throughout the morning.

Greater efforts were being made by the enemy to force the issue against the men in the Saucer to the south of Stevens' and Owens' companies, but the Australians had meanwhile received an important reinforcement. In the early hours of the morning the 40th RTR (Lieut-Colonel J.L.T. Finigan) less one squadron had been slowly moving northward, as sappers cleared a path for them, behind the enemy's original front-wire, by the track past the fig orchard which ran north to the railway along the western edge of Thompson's post. About dawn, and not without mishaps, Finigan brought his squadron past Thompson's Post and up to the 2/48th Battalion, by which time he had received orders that be was to support that battalion. There is some evidence that the purport of Finigan's assignment was that Hammer and he should organize an attack on Thompson's Post. Be that as it may, Finigan carried out to the letter his orders to support Hammer's battalion and his tanks stayed beside the 2/48th through the day, two troops - no more had space for manoeuvre between the minefields - going into hull-down positions north of the railway.

The first German counter-attack was made about 11.30 a.m. Fifteen German Mark III and Mark IV tanks advanced north of the road and swung in between the road and railway near the Barrel track while infantry advanced on their right flank. The Rhodesians' guns and the Valentines engaged them. The German tanks probably expected a "walk-over" and panic but met strong fire and steady defence and soon withdrew. The infantry attack was smashed by artillery and other fire.

The main attack on the Saucer was made in the early afternoon, again coming in from the northern side of the ridge. While the 6-pounders engaged the German tanks to the north, Valentine tanks south of the railway came forward to meet them. Two of the Rhodesian 6-pounders were put out of action but other Rhodesian guns knocked out four German tanks. The German tanks fought their way forward, knocking out many Valentines, and overran Captain Eacott's company of the 2/32nd Battalion, grinding in the infantry positions and taking prisoner most of the company's survivors. During the action the enemy attempted to bring forward an 88-mm gun but it was knocked out (but more British than German) and a Valentine and a German Mark III were in flames. In this action, an anti-tank gun of the 2/3rd Regiment wounded Gunner Schwebel whom was the least disabled, though severely injured in his arms and legs. Schwebel managed to get the other two wounded men across to the blockhouse. Typifying the spirit of defense, he returned to the gun and had it ready to fire before the next attack. It was then hit again, whereupon Schwebel seized a Bren gun and fought with the infantry.

It was decided to bring in the reserve squadron of the 40th RTR. The squadron arrived at Windeyer's headquarters. Captain Williams then guided the tanks forward under fire, at first in a jeep and later on foot, to the 2/15th Battalion, whence most went on. Soon afterwards, however, the Valentines were withdrawn from the Saucer. No other comment need be made on the performance of the commanders and crews of the Valentine tanks in the fighting on 31st October than that of the historian of the 2/48th Battalion, which had earned the right to judge how others fought: 'The courage of these men,' he wrote, 'made their action one of the most magnificent of the war.'

About 4 p.m. the German tanks attacked again from the north but eight were stopped by gunfire and as the clay ended they withdrew. They had, however, achieved part of their objective by pushing the British off the road; for in a lull in the fighting towards 5 p.m. Rosevear's company, isolated by the earlier break-through behind them, was withdrawn. That left the international blockhouse with its tireless workers, in effect, in a no-man's land. From it the enemy had permitted casualties to be evacuated throughout the day. When darkness fell the Pioneers reorganised and dug in close to the railway embankment on its south side. In the attacks on the Saucer that day, the Germans had repeatedly brought up infantry with their tanks, but on each occasion the concentrated gunfire of the defence had dispersed the infantry.

It was not until late afternoon that it was known at Morshead's headquarters just how weak the depleted battalions at the Saucer had become. It then became obvious that their strength was insufficient to

maintain the defense of the place against a violently reacting enemy, but to have given up the ground seized would have accorded neither with the army commander's plan nor with Morshead's character. The relief of the 26th Brigade by the 24th as previously contemplated would have involved, if all had gone according to plan, merely a change-over between battalions which would then have been alongside each other; a relief at the Saucer, the most hotly contested ground on the whole front, where an attack might well occur, while units were changing over, was another matter. But Morshead at once decided that it must take place. The orders were issued about 7.30 p.m. The relief, effected at night with transport using circuitous routes, was completed by 3.30 a.m., which reflected some credit on the division's standard of staff work and training. The exhausted enemy did not attack while it was proceeding.

Brigadier Godfrey took over command of units in the Saucer from Brigadier Whitehead. The 2/28th Battalion - which Lieut-Colonel Loughrey had had rebuilt after the Ruin Ridge disaster and molded in so short a time into a first-rate combatant unit - relieved the 2/24th Battalion; the 2/43rd Battalion (Lieut-Colonel Wain) relieved the 2/48th. The 2/32nd (Now back in its own brigade) and the 2/3rd Pioneers were not relieved. Brigadier Godfrey established his command post in the Saucer.

The changes in dispositions that had been made in the Saucer under pressure of attack during the afternoon had not been known when the relief orders were issued, so that the fresh battalions arriving there by night found their instructions inapplicable and the situation confused. Colonel Loughrey acted with great vigour in consulting other commanders and having his companies quickly disposed, by his own siting, in tenable positions interlocking with the other units' defenses. The improvised dispositions adopted in the dark in a precarious situation on un-reconnoitered ground were - in the words of a unit historian - 'the ultimate in unorthodoxy', but were to be proved the next day and found not greatly wanting by the ultimate test of severest attack. The defended locality's front-line (facing west) comprised one company of the 2/43rd astride the main road, then on its left two companies of the 2/28th between road and railway then on the left of the railway the depleted 2/32nd Battalion, holding a flank out towards the 2/15th defenses; the other three companies of the 2/43rd were in depth behind the two forward companies of the 2/28th, and the other two companies of the 2/28th were in depth behind the 2/32nd Battalion. Farther still to the left was the 2/3rd Pioneer Battalion. The 2/43rd faced east and north (with its northern flank platoon on Barrel Hill), the 2/28th and 2/32nd northwest and west and south-west. Thus it was astride the road itself that the defense had least depth. The men dug themselves in as best they could but the ground was in many places unyielding nor had they any head cover.

The anti-tank defense was improved by disposing a troop of the 12th Battery's guns with the 2/15th to cover the gap between that unit and the 2/32nd. (It was further strengthened the next day when the reserve troop of the Rhodesian Battery was driven in helter-skelter and established south of the railway as an attack was imminent.) A minefield had been laid on the north-west side and the front was enfiladed from the 2/15th positions by machine-guns also brought forward during the night.

The survivors of the 2/42nd and 2/48th, who bad suffered more casualties during the day, were taken back to the original front-line on the coast sector (the defenses opposite to which were still occupied by the enemy) to sleep the night and muster next morning at their saddest roll-calls ever.

Dawn on Sunday 1st November in the Saucer revealed to the incomers numerous enemies all around them, at distances only 800 to 1,000 yards away. The Germans were doubtless no less surprised than the Australians at what daylight revealed.

The enemy promptly opened fire with small arms, mortars, 88-mm guns firing airburst shells, and a variety of field guns. Most of the fire came from the west and north-west but some from the north-east and south-east. An artillery duel soon developed in which, of course, the Germans fared worst, not only because they had fewer guns but because those they had were alarmingly short of ammunition. However, it was the enemy's turn next, it seemed, when at 8.40 a.m. German dive bombers, escorted by 15 fighters, were seen making for the Australian position; but they were intercepted by British and American fighters and jettisoned their bombs on their own troops. Seven were shot down. The enemy's infantry were seen assembling about 10 a.m. and at the same time it was reported that the British Intelligence service had intercepted a message for Field Marshal Rommel ordering the 21st *Armoured* and *90th Light Divisions* to attack the Barrel Hill salient along the axis of the road and railway. Their terms of the message indicated that Rommel thought only one

strong-point remained, which would not withstand a resolute attack. Morshead drove down to the tempestuous Saucer and conferred there with Brigadier Godfrey.

Later in the morning more troops were seen moving south-east from Sidi Rahman. Against this dangerous British outpost presumed to be so weakly held, the Germans at midday opened an attack which they were to sustain and press without much avail throughout that long day and into the night with a succession of determined and most desperate attempts to fulfill their commander's injunction to destroy it. The brunt of the attacks came in between the road and railway on the 2/43rd and 2/28th Battalions, but the 2/32nd were also in the fire fight and, good neighbors as they were, judged it better to give than to receive. Their mortars were busy throughout the afternoon and very effective.

The first attack, made in the late forenoon by about a battalion and a half of infantry in conjunction with numerous tanks, was supported by sustained artillery, mortar and machine-gun fire. At least eight 88-mm guns were firing air-burst over the Australians. Both then and throughout the day the number of tanks employed could seldom be estimated because of the dust and smoke. As the assault was coming in, the enemy was attacked by a "football team" of bombers answering a call from the division. At 12.45, six tanks were closing in on the 2/43rd from the north-west. By 1.25 one platoon of the north-east company had been thrust off Barrel Hill but the position was regained by prompt counterattack. Anti-tank fire had knocked out three German tanks and one 88-mm gun north of the 2/43rd.

In front of the 2/28th tanks advanced close to the forward companies, went into hull-down positions and fired mainly on the anti-tank guns. All four guns of Lieutenant Kessell's troop of the 2/3rd Anti-Tank Regiment were knocked out. Soon twelve 6-pounders and two 2-pounders had been put out of action. The forward troops, who in the opinion of the battalion's diarist, were 'not impressed by the close proximity of the tanks' met the challenge with sustained, accurate fire from all weapons. Casualties mounted but about 2.30 p.m. the German tanks apparently realized that their infantry could not get through and backed out. The Germans had singled out the Rhodesians for special attention. Eight of their anti-tank guns were put out of action. In a lull Major Copeland sent Lieutenant Wallder's troop across the railway to replace them and Wallder managed to get his guns into action under the enemy's observation and fire.

At 3.25 p.m. the enemy resumed the tank and infantry attack against the 2/43rd and 2/28th. This assault came in from the northern side and was pressed home against the north-west company of the 2/43rd commanded by Captain Hare, overrunning a platoon on Barrel Hill, which was captured. Hare was killed. Sergeant Joy, whose platoon had been partly overrun, reorganised his men and regained all the lost positions but one and eventually the enemy withdrew. On the 2/28th's front the attack had fallen mainly on Captain Taylor's company and Captain Newbery's, both of whom proved inspiring leaders. The 2/28th had no artillery Forward Observation Officer nor line communication to the rear and, therefore, the artillery fire could not be directed to best effect. Some ground was given up but the attack was withstood and the forward companies held on.

Some of the German tanks pushed on past the Australian position down the road to the east towards Thompson's Post. Later - about 3.50 p.m. - 27 tanks were observed north of Thompson's Post. At the same time enemy infantry began forming up astride the road and railway about a mile or so to the west of the Australian positions, but were effectively shelled. The enemy next began probing, apparently seeking weak spots, after which an advance against the 2/28th was made by infantry riding on tanks and with several self propelled guns coming forward to support, but the German infantry were quickly persuaded by accurate Australian fire to go to ground. Two self-propelled guns were soon knocked out.

By 5 p.m. the enemy appeared to have accepted failure of that attack but half an hour later tanks and infantry formed up to assault from the east while from the other side about 100 infantry advanced with determination between the road and railway. These were halted by steady fire and the attack from the east did not develop.

At dusk, adopting the traditional German tactic of advancing out of the setting sun, tanks and infantry half concealed by dust and smoke attacked from the west while a simultaneous thrust was made from the north-east, covering fire was given from the ground seized on Barrel Hill. The force attacking from the north-east comprised at least three tanks and 15 lorry-loads of infantry. Again the attacks failed to penetrate the defensive fire.

The German onslaught continued after dark. An assault supported by an artillery bombardment was made at 8.30 p.m. and withstood, but the fire fight continued. Colonel Evans, appointed to take over the command of the brigade, arrived at 9.30 p.m. Soon afterwards all lines of communications to the Saucer and throughout most of the division was cut by British tanks moving forward through the divisional area. Still the fire continued to rage in the Saucer. Before it died down at 2.30 a.m. the next morning an intense British gun barrage had opened up farther south. Operation SUPERCHARGE had begun.

The 20th Brigade was harassed by shelling throughout the 1st. When the German attack opened at midday, the 2/15th now commanded by Major Grace was heavily shelled and the other battalions were also under intermittent fire. In the 2/17th an outstanding company commander, Captain McMaster, was mortally wounded.

On the afternoon of 1st November, Colonel Macarthur-Onslow of the composite force had been warned to send machine-guns, anti-tank guns and two platoons of Pioneers to strengthen the right flank of the 2/43rd between the railway and the main road. The thin-skinned vehicles could not get through in daylight. When Captain Williams (2/2nd Machine Gun Battalion) reached the 2/43rd, Colonel Wain told him that as a result of the counter-attacks his battalion and the 2/28th were in so confined an area that it was not advisable to bring so large a force forward; instead the detachment was sited in support between both battalions. It reached its position at 3.30 a.m. on the 2nd.

During the rest of the night of the 1st -2nd the battalions of the 24th Brigade were reorganised so as to give each battalion more room and to bring a reserve battalion back into a position in depth. The 2/43rd was now north of the railway with the composite force detachment to the east, the 2/32nd south of the railway with-the 2/28th to the east. The 2/3rd Pioneers were on the left of the 2/32nd and linked with the 2/15th.

Throughout that fiery first day of November the infantry had received formidable support from the Desert Air Force, though targets were hard to find because of the dispersal of the enemy's vehicles.

Stark evidence of the severity of the fighting was found the next day when a patrol of the 2/32nd Battalion counted 200 enemy dead in front of that battalion's positions. The salt marsh beyond Barrel Hill was so closely pock-marked with shell holes that it would have been difficult to find a square yard that had not been cratered.

In the fighting in that area from 30th October to 2nd November, the four battalions of the 24th Brigade had 487 casualties, most of which were received before Operation SUPERCHARGE began. The 2/43rd had 43 killed (and 7 missing), the 2/32nd 21, the 2/28th 13 (and 10 missing), the 2/3rd Pioneers 14 (and 46 missing).

Thus, the 9th Division had carried out its "crumbling" mandate to attack northwards and to draw into the northern sector and upon itself as much of the enemy's fighting strength as possible while the Eighth Army was making its preparations for SUPERCHARGE. That was the division's contribution to the final break-out.

APPENDIX L, ANNEX 3
NEW ZEALAND ENGINEER BREACHING OPERATIONS DURING OPERATION SUPERCHARGE*

151 BRIGADE, NIGHT OF 1-2 NOVEMBER

NORTH LANE, 151 BRIGADE, NIGHT OF 1-2 NOVEMBER

Lieutenant Standish, responsible for the northernmost lane, found employment 600 yards from the start line and No. 3 Section went into action:

We cleared a lane - not many mines - the distance required, with tanks following immediately behind us. When I thought we were through all the mines and gone the distance ordered, I told the leading tanks, and all the tanks, about 30 of them, carried on past us to support the infantry who were having a pretty rough time .... I was getting hectic messages back from the infantry to hurry the tanks up as much as possible. This was altogether a pretty sticky show and we had some casualties, I forget how many.... Visibility was so bad in this show I remember, due to smoke and dust etc., that we left continuous white tape along the ground behind us as we went forward so that the tanks could see to follow us. There was supposed to be tracer to steer us, but we could never see it and had to go by compass.'

SOUTH LANE, 151 BRIGADE, NIGHT OF 1-2 NOVEMBER

No. 2 Section (Lieutenant Page) was in trouble right from the start; they were under fire before they reached the start line and their trucks were soon burning. Page writes:

Things got a bit disorganised for a time and meanwhile the support vehicles started to bank up behind us. Eventually on foot and with what blokes and gear we could muster we set forth with the pack hard on our heels. Fortunately we did not, initially, encounter any mines but were in trouble almost immediately with pockets of (enemy) machine gunners in burnt out vehicles and gun pits. These fellows had been left behind by the advancing infantry. When a hold up of this nature occurred the support vehicles would come to a halt a few yards behind us. The drill was then evolved to bring one forward to shoot out the obstruction, move on to the next and repeat the process. The prisoners that accrued in the meantime we faced in the general direction of our lines and sent on their way.

We were making fairly heavy weather of it in this fashion when we discovered, I don't remember how, that John Standish was ahead according to plan, his line of advance was taped, and there didn't appear to be anybody using it at this state of the proceedings. The obvious thing to do seemed to change direction right with our column and lead them on the taped line. This was done but not if I remember rightly, without argument about lines of approach, etc. From this point on things went reasonably well. To my mind this was John Standish's night, he did a great job.

Lieutenant Page was awarded an MC for his inspiring leadership and initiative during the battle. Casualties for the night were two killed, thirteen wounded, three missing. Major Skinner's car went up on a mine but he escaped with bruises and scratches.

CENTRAL LANE, INTER-BRIGADE BOUNDARY, NIGHT OF 1-2 NOVEMBER

Major Anderson detailed No. 3 Section to do the gapping for 6 Field Company. Lieutenant St. George had not been replaced and Sergeant Brown still commanded, but in view of the importance of the assignment the company second-in-command (Captain Goodsir) took over the conduct of the operation.

* Extracted from New Zealand Engineers, Middle East, by Joseph F. Cody, Official History of New Zealand in the Second World War 1939-45, War History Branch, Department of Internal Affairs, Wellington, New Zealand, 1961, pages 363-369.

The section took its place behind the advancing infantry, who were soon lost in the dust and smoke of the barrage. There was no delay at first minefield, which after a quick examination appeared to be a dummy; how the second field was discovered is explained by Captain Goodsir:

Some hundreds of yards further on we ran into mortar fire and then heavy anti-tank and machine gun fire at very close range without having visually detected any suggestion of a minefield. While we were pinned down Sergeant Brown came up from the rear and reported that the two right hand trucks had gone up on mines.

Brown was told to return to the trucks and look out for the section, which would be sent back in small parties to avoid further casualties beyond the several already Sustained. Captain Goodsir saw the last sapper moving back and made another quick search for his reconnaissance party before he followed them. Instead of a gapping team organized and working he found Major Anderson and a few sappers clearing the lane by themselves. The explanation was that Sergeant Brown had been wounded and evacuated, while the men, with nobody to command them, had dispersed and taken what shelter they could find. It was fortunate that Major Anderson and Lieutenant Hermans had arrived in the former's jeep. Hermans was sent forward to try to find Captain Goodsir, who at that moment was himself looking for his 'recce' party before returning. Major Anderson found that:

Things were not so good. Sergeant Alan Freeborn (our Orderly Room Clerk) was with me and we had to take over the platoon. We taped the line, made a hasty recce for mines lifted about a dozen and it was then that we used the Scorpion it blew only one mine in passing the gap.' As a matter of fact it also nearly 'blew' Captain Goodsir, who had been missed by Lieutenant Hermans and was returning after his fruitless search.

The leading tanks, waiting impatiently for a cleared lane, were asked to subdue the enemy fire while the reserve section was brought up and the scattered No. 3 Section collected again. The sight of Sergeant Lawrence calmly getting his gapping team working so restored the confidence of the rather shaken men that they joined in the visual search for mines. Captain Goodsir took command of the augmented reserve section while Lieutenant Morgan stood by with the transport and spare men. In the morning they found that they were sharing the same piece of desert with about a hundred Italians who had decided early in the night that silence was golden.

By this time the gap had been proved, the enemy fire silenced, Lieutenant Hermans had returned from his quest for Captain Goodsir, and the advance resumed. Time was running short but the ground appeared more open and the sappers cracked on the pace. Smoldering hessian camouflage and two upturned anti-tank guns explained the lack of opposition after the pandemonium of a short time earlier. Major Anderson and Lieutenant Hermans went on ahead in the scout car to get the lie of the land. Lieutenant Hermans wrote:

We pressed on with our scout car in the lead and "Andy" getting a bit concerned because we were a bit behind schedule and time was running out. I was scanning ahead with my binoculars and remarked to Andy that there seemed to be some peculiar troop movement ahead with people moving out of our way and going out to our flanks. I couldn't make out what the "Infantry" were doing .... we came upon a derelict vehicle a hundred yards or so to our left and there seemed to be somebody taking cover behind it. We paused to take stock of the position and lo and behold! a platoon of infantry came up from our rear, deployed, and advanced on the derelict... the picture was beginning to unfold. Instead of being ahead of us the infantry was behind and the troop movement I had observed was the enemy forward troops getting out of the way when they saw or heard the column of tanks rumbling along behind us. We were just a bit lucky the tanks had caught up with us when they did or things would have been very sticky.

Regarding the tanks, Major Anderson says:

We were in contact with the tanks all the way. In fact they were treading on our heels and the Brigadier used to give me hell whenever there was a brief hold up. We marked the route with green lamps every tenth of a mile - by speedo - and the first tank to pass always knocked the lamp over. I had several "Where the b ----- h ----- are your lamps" from the Brig.'

With the armour out in the open and the sky starting to lighten, the section returned to the trucks and began to dig in. Something white attracted attention and Lieutenant Hermans went to investigate. He returned with three very nice Biretta (sic) pistols and four very shaken Italians from a dug-in tank that was flying a white flag.

The reason for the extraordinarily heavy fire the company had encountered was made clear at daylight. They had missed a 50-feet wide gap through the enemy minefield by yards and the gap had been covered by the tank, several anti-tank guns and supporting machine guns, all of which our tanks had put out of action. The minefield was put down with our own Hawkins mines hastily but effectively concealed beneath clumps of desert scrub.[1] When the scattered No. 1 Section had been collected in the daylight it contained the lost 'recce' party. They had not seen the mines but had run into one of the anti-tank guns, which they captured and held the crew prisoner. They were then captured themselves by other Italians until the fire of our tanks presented the opportunity of parting from their captors. The cost to 6 Field Company of the night's operation was five wounded and one died of wounds, all from No. 3 Section.

152 BRIGADE, NIGHT OF 1-2 NOVEMBER

On the left of the attack 8 Field Company had a complicated route to follow before it could form up behind 152 Brigade and in front of the tanks, anti-tank guns, carriers and assorted vehicles that carry the supporting arms of an assaulting force.

Lieutenant Pickmere (3 Section), right, and Lieutenant Hanger (1 Section), left, advanced with their sappers in two lines fifty yards apart and with their sandbagged trucks following in line abreast. There was no information as to where mines might be found and the idea was that if the sappers prodding in front with their fixed bayonets missed the mines the trucks would connect and, by the resulting explosion, disclose the field. The keenest eyes could see no signs of disturbed sand, but the ground was hard and stony and the half-moon obscured by cloud made the going slow.

NORTH LANE, 152 BRIGADE, NIGHT OF 1-2 NOVEMBER

The terrific din of the barrage drowned the noise of incoming missiles and five men went down - two killed - when something exploded between the two lines. The Sappers carried on until it seemed that they would be up with the forward infantry of transport following so nothing had been missed. At last there was a Dingo car that had obviously hit a mine, and when Pickmere went to investigate he saw half-buried some lengths of what appeared to be steel rail. On closer inspection it turned out to be a new type of mine - an Italian V3 anti-personnel as well as anti-tank mine, and the first encountered.

While the sappers were getting ready to give the new nuisances the primer cord treatment because nobody knew anything of their mechanism or characteristics, Lieutenant Pickmere explored the belt and found that it was only about one hundred yards wide and that beyond it the track-marks of German tanks were clearly visible. Major Reid came up at this time and the two walked perhaps a quarter of a mile farther west until they were quite convinced that it was now clear country.

When we came back the lane clearing was going well and it was not long before the sappers had the 8 or 9 mines and suspicious objects which had been located in the first 8 yd strip all set to blow up-a charge of gelignite on each and the whole connected with primer cord. We made the mistake of placing our small blistering charges of gelly on the centre of these long mines instead of over one end where the mechanism was; with the result that 2 or 3 did not go off when we detonated the line and we had to have several attempts at them. All this was wasting valuable time while the tanks were impatiently waiting to get through. Major Reid finally came up, lifted the remaining ones holus bolus and threw them clear of the lane.

SOUTH LANE, 152 BRIGADE, NIGHT OF 1-2 NOVEMBER

Lieutenant Hanger had some unexpected assistance on this occasion:

Had more luck this time as we caught the Hun laying the minefield and I was able to make them pick up a few and we were able to clear our gap pretty smartly... My main trouble was a dug in tank firing 88 AP straight up our lane. A little disconcerting to have a white hot AP shell whizzing past your nose periodically through the night. One of my other troubles was a Tommy Colonel, who wanted to halt his tanks in the gap while he talked to his Brig. on the blower. However, after using a bit of good Kiwi language not usually used on a senior officer we got him moving.

Ninth Armoured Brigade, which 6 Field Company had seen safely through the minefield and which was to use the infantry objective as its start line and then, with the aid of a barrage, advance a further mile before first light and smother the enemy gun line, did not fully succeed in its mission. It did not reach its final objective although it knocked out at least seven 88-millimetre and thirty other guns, plus a dozen tanks, after an all-day fight. The brigade commander had been ordered to accept if necessary 100 per cent casualties to make good his objective, and that is very nearly what happened. The brigade left the assembly area with 133 tanks, many of which were patched up battle casualties with strange crews; some dropped out during the 25-mile approach march and it was not known exactly how many went into battle that morning, but when they were reorganised into one regiment only 35, which included some that had got up during the morning, could be mustered.

The brigade report on operations has a good word for the New Zealand sappers in spite of the trouble with the lamps:

In the centre R Wilts had been seriously held up by a field of Hawkins mines irregularly laid by our own troops, in the clearing of which 6 NZ FD COMPANY NZE, whose work throughout this operation had been of superlative quality, lost many casualties in personnel and vehicles.... The work of the sappers in lifting minefields in the dark and under enemy fire was beyond all praise, and without them the armour would never have been able to advance.

The battle went on all day and after dark (2-3 November) No. 2 Section, 8 Field Company (Lieutenant Wildey), and No. 1 Section, 7 Field Company (Lieutenant Foster), laid a protective minefield in front of the Maoris. There was no enemy interference for the reason, unknown at the time, that Rommel was too busy packing up and organising a fighting withdrawal. His first step was to put a holding force on the Fuka escarpment. The Desert Air Force was not making his problem any easier and armoured-car elements were beginning to worry at his communications. If a breakthrough occurred on a large scale the Italian division, having no transport, would have to be left as souvenirs of the battle. The large-scale breakthrough did occur and the Italians were left to contemplate an eventual safe return to sunny Italy.

The sappers passed the third day of the month widening lanes and destroying derelict tanks and captured guns. A gap had been forced through the enemy defences at last and General Freyberg was told to get his division concentrated as soon as possible after first light (4 November) and block the retreat through the Fuka position. For this assignment he was given 4 Light Armoured Brigade in addition to 9 Armoured Brigade, reduced now to a composite regiment.

The Field Companies reverted to the command of the brigades: 7 Field Company to 5 Brigade, 8 Field Company to 6 Brigade, 6 Field Company to 9 Armoured Brigade; 5 Field Park Company was divided into a water and demolitions party (Corporal Purvis) attached to Engineer Headquarters, a battle group to move with Divisional Supply Column and a rear party with Divisional Reserve Group.

Fourth Light Armoured Brigade, whose mission was to cover the Division during the advance, passed through the narrow gap soon after daybreak; 9 Armoured Brigade had collected its components under nearly impossible conditions. They were spread all over the battlefield, where columns were crossing each other's lines of advance in the darkness and each moving object created its own smoke screen of dust. Sixth Field Company eventually found its place and the column began to move south-west in a wide sweep south to avoid the battle 1 Armoured Division was still waging to the north.

Main Divisional Headquarters, which included Divisional Engineer Headquarters and part of 5 Field Park Company, went next, followed by 5 Brigade with 7 Field Company during the afternoon, and finally about dusk 6 Brigade (with 8 Field Company) got clear of the forward defended localities."

It was 1.50 a.m. on the morning of 2 November when every gun on the Corps' front opened up a terrific barrage. One hundred and fifty thousand rounds were fired on a 4000-yard front during the next four and a half hours. Under this umbrella the assault brigades advanced. New Zealand sappers worked with the British infantry, lifting mines and marking lanes through which tanks and guns could advance in close support. Shortly after 4 a.m. word came through that the first objectives had been taken, and two hours later both brigades were on their final objectives and consolidating. Meanwhile, 28 (Maori) Battalion had cleared out the enemy pocket on the right flank and linked up with the Australians. At a quarter past six 9 Armoured Brigade passed through to carry on the attack. In a fierce and most gallant battle against a powerful anti-tank screen, the three armoured regiments fought their way forward. Their casualties in tanks were extremely heavy but the result of their attack was decisive. Enemy ranks counter-attacked our salient in the afternoon, but 1 and 10 British Armoured Divisions were deployed forward in time. All but one of our armoured divisions were engaged and the entire enemy's.

Throughout the night of 2-3 November and the next morning the battle continued along the whole front. On the New Zealand sector the infantry came forward during the night, taking over from the assault brigades, and held the salient securely on 3 November while our armour widened the gap. It was clear that the enemy's resistance had been broken, and on 3 November our tactical reconnaissance aircraft observed lines of enemy transport moving west, against which the bomber force flung its full strength. On the night of 3-4 November 9 Australian Division advanced its line north towards the coast, the Highlanders advanced across the Rahman track, and early the next morning 10 Corps, including 2 NZ Division, began the chase. At the same time 13 Corps in the south advanced. What was left of the Afrika Korps, with some remnants of the Italian *Mobile* Corps, was in full retreat, leaving five Italian infantry divisions to their fate.

APPENDIX M
OPEN QUESTIONS

Question 1: Which division is the XXX Corps main effort during Operation Lightfoot? It appears to be the 2nd New Zealand Division. From section 5.1

Question 2: Is there a photo available of Abraham S. J. du Toit, South African Army? From section 5.4

Question 3: Is there a photo (or drawing) available of the 8th Army's Pram Mine Detector? From section 5.4 Yes, see The Sappers' War, with ninth Australian Division Engineers, 1939-1945, by Ken Ward-Harvery, published by Sakoga Pty Ltd in conjunction with 9th Division RAE Association NSW, 1992, page 73, "Diagrams... redrawn by the Author [Ken-Harvey] from 'Report on Lightfoot Operations' in War Diary AWM [Australian War Memorial] ref 5/5/13 Nov 1942".

Question 4: Is there a photo available of the 'Snail' mine marking system? From section 5.4

Question 5: Who (the 8th Army or Middle East Forces) controlled the 24 labor and pioneer companies in 'General Headquarters Reserve'? From section 5.4

Question 6: What does D.D.M.E. stand for? From section 5.4 Deputy Director Mechanical Engineering

Question 7: How did General Montgomery intend to keep the Axis infantry from withdrawing, and thus preventing his 'crumbling' operation? From section 6.1.1.

Question 8: Are copies of the Operations Orders issued for the Second Battle of El Alamein by XXX Corps, X Corps, 2nd New Zealand Division, and 10th Armoured Division (or their subordinate maneuver and engineer elements) available? From section 6.1.1.

Question 9: Are copies of the Operations Orders issued for the Second Battle of El Alamein by the 164th Leicht Afrika Division, 15th Panzer Division, the Afrika Korps, 102nd Trento Division, and the 133rd Littorio Division (or their subordinate maneuver and engineer elements) available from section 6.1.5.

Question 10: Was the Allies impression that they had achieved tactical surprise based on the Axis reaction or from intercepted and decoded Enigma transmissions? From section 6.2.6.

Question 11: What was the relationship between the 26th Infantry Battalion's "Special Group" and No. 3 Section, 8th Field Company? From section 6.4.2.3.

Question 12: Why not use the 133rd Lorried Infantry Brigade, already assigned to the 10th Armoured Division, as part of the division's attack to Phase Line Pierson on the night of 24/25 October? From section 6.6.3.

Question 13: Are copies of the Axis maps captured by Captain Rutherford on 25 October 1942 available? From section 6.9.1.1.

Question 14: Are copies of the 8th Army after action report, "Lessons from Operations October and November 1942," available? From section 7.5.

Question 15: What was the actual quantity and distribution of universal carriers with the 8th Army? From Appendix I

APPENDIX N
AUTHOR'S BIOGRAPHICAL SKETCH

William C. Schneck is a senior project engineer for the Countermine Systems Division, Night Vision and Electronic Sensors Directorate, Fort Belvoir Virginia. During Operation Restore Hope, he deployed to Mogadishu, Somalia as a subject matter expert in mine warfare. During the Gulf War, he was deployed to Southwest Asia as a Subject Matter Expert in countermine warfare with the 20th Engineer Brigade (Airborne). During Desert Shield, he trained 19 US engineer battalions in Iraqi mines and mine warfare techniques. He is currently serving as the commander of the 276th Combat Engineer Battalion. Previous military assignments include Assistant Division Engineer, 29th Infantry Division (Light), S-3, 1/170th Infantry, Battle Captain, 29th Infantry Division (Light) tactical command post; Sapper Company Commander, B/229th Engineer Battalion (Light) (Combat); and combat engineer platoon leader, 27th Engineer Battalion (Airborne) (Combat). He is a graduate of CGSC, CAS3, the Infantry Officer Advanced Course; Engineer, Armor and Infantry Officer Basic Courses, and the Sapper Leader Course. He is a Professional Engineer and holds a master's degree in mechanical engineering from Catholic University as well as a bachelor's degree in mechanical engineering from the Georgia Institute of Technology.

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GLOSSARY

A. A. – (German abbreviation for Aufklaerungeabteilung) Reconnaissance battalion
A-Tag – German equivalent to D-Day (not the invasion of Normandy, but a secret or as yet undetermined day for the beginning of an attack).
Abteilung – German term used for a detachment or some battalion sized units or staff sections
A.K. – (German abbreviation for Armeekorps) (Army) corps
A.O.K. – (German abbreviation for Armeeoberkommando) A field army headquarters
ARKO – (German abbreviation for Artilleriekommandeur) Artillery Commander
Art. – (German abbreviation for artillery)
A.R. – (German abbreviation for artillery regiment)
a.D. – (German abbreviation for ausser Dienst) Retired

Btl, Bn – (German abbreviation for Bataillon) Battalion
Befehlspanzer – German term for command tank
Brueko – (German abbreviation for Brueckenkolonne) Bridging column

Chef d. Gen. St. – (German abbreviation for Chef des Generalstabes) Chief of the general staff

Ers. – (German abbreviation for ersatz) Replacement

(f), (fr) – (German abbreviation for franzoesisch) French, generally used to designate captured French equipment in German use
Faehnrich – German term for cadet or officer candidate
Feldwebel – German term for sergeant major
Fest. – (German abbreviation for Festung) Fortress
FH - (German abbreviation for Feldhaubitze) Field howitzer
FK - (German abbreviation for Feldkanone) Field gun
FLAK – (German abbreviation for Flugabwehrkanone) Antiaircraft gun
Flammenwerfer – German term for flame thrower
Flivo – (German abbreviation for Fliegerverbindungsoffizier) Air liaison officer
Fkl – (German abbreviation for Funklenk) Radio-controlled
Fs – (German abbreviation for Fallschirmjaeger) Airborne or parachute unit

G, Gesch – (German abbreviation for Geschuetz) Gun
Geb – (German abbreviation for Gebirg) Mountain unit
Gefreiter – German term for corporal
Gef. St. – (German abbreviation for Gefechstand) Command post
Generalmajor – German rank equivalent to a US brigadier general
Generalleutnant – German rank equivalent to a US major general
General der Artillerie – German rank equivalent to a US lieutenant general
General der Kavallrie – German rank equivalent to a US lieutenant general
General der Infantry – German rank equivalent to a US lieutenant general
General der Panzertruppe – German rank equivalent to a US lieutenant general
General der Pioniere und Festungen – German rank equivalent to a US lieutenant general
General Oberst – German rank equivalent to a US (full) general
Generalfeldmarschall – German rank equivalent to a US general of the armies
Gp, gep – (German abbreviation for gepanzert) Armored
Gren – (German abbreviation for Grenadier) Infantry
Gr. – (German abbreviation for Gruppe) Squad or section sized unit
Gr. Wf. – (German abbreviation for Granate Werfer) Infantry mortar

Hauptmann – German term for the army rank of captain
Heere – German term for the army
HKL – (German abbreviation for Hauptkampflinie) Main line of resistance

Ia – German designation for 1st General Staff Officer (leadership) roughly equivalent to a US G-3/S-3 (operations officer)
Ib – German designation for 2nd General Staff Officer (supply) roughly equivalent to a US G-4/S-4 (logistics officer)
Ic – German designation for 3rd General Staff Officer (intelligence) roughly equivalent to a US G-2/S-2 (intelligence officer)
IIa – German designation for the staff adjutant
IIb – German designation for the personnel section
IVa – German designation for administration
IVb – German designation for the medical staff officer
ID – (German abbreviation for Infanteriedivision) Infantry division
Inf. – (German abbreviation for Infanterie) Infantry
IG – (German abbreviation for Infanterie-Geschuetz) Infantry gun
i. G. – (German abbreviation for im Generalstab) The additional designation given to a member of the General Staff Corps
Ing. – (German abbreviation for Ingenieur) Engineer (civilian title with nominal military rank) generally involved in logistic engineering functions, not a combat engineer
IR – (German abbreviation for Infanterieregiment) Infantry regiment

Jg, Jaeg. – (German abbreviation for Jaeger) Light infantry or a fighter aircraft

K, Kan – (German abbreviation for Kanone) Cannon
Kdo – (German abbreviation for Kommando) Command
Kfz. – (German abbreviation for Kraftfahrzeug) Motor vehicle
KG – (German abbreviation for Kampfgruppe or Kampfgeschwader) Battle group or aircraft bomber wing
kl. – (German abbreviation for klein) Small, light
Kol – (German abbreviation for Kolonne) Column
Kompaniechef – German term for company commander
Kp – (German abbreviation for Kompanie) Company
KStN – (German abbreviation for Kriegstaerkenachweisung) Table of organization
KTB – (German abbreviation for Kriegstagebuch) War diary
kz - (German abbreviation for kurz) Short

l, le, lei – (German abbreviations for leicht) light
Ladungswerfer – German term for a spigot mortar, usually used by pioneer units
Landser – German term for an infantryman or common soldier
LG – (German abbreviation for Leichgeschuetz) Recoilless gun
lg – (German abbreviation for lang) Long
LKW – (German abbreviation for Lastkraftwagen) Cargo truck
Lw – (German abbreviation for Luftwaffe) German Air Force

M, Moers – (German abbreviation for Moerser) Heavy mortar or howitzer
m – (German abbreviation for mittlere) Medium
MG – (German abbreviation for Machinengewehr) Machine gun
mot – (German abbreviation for motorisiert) Motorized

Nachrichtenabteilung – German term for signals battalion

Ob – (German abbreviation for Oberbefehlshaber) Commander-in-Chief
Oberleutnant – German term for first lieutenant
Oberschuetze – German term for the rank of private first class
Oberst – German term for colonel
Oberstleutnant – German term for lieutenant colonel
OKH – (German abbreviation for Oberkommando des Heere) Army High Command
OKL – (German abbreviation for Oberkommando des Luftwaffe) Air Force High Command
OKW – (German abbreviation for Oberkommando des Wehrmacht) Armed Forces High Command

PAK – (German abbreviation for Panzerabwehrkanone) Anti-tank gun
PD – (German abbreviation for Panzerdivision) Armored division
Pi – (German abbreviation for Pionier) Pioneer, combat engineer
PKW – (German abbreviation for Personenkraftwagen) Passenger vehicle
Pz – (German abbreviation for Panzer) Tank
Pz Bue – (German abbreviation for Panzerbuechse) Anti-tank rifle
Pz Kpfw. – (German abbreviation for Panzerkampwagen) Armored fighting vehicle, usually a tank
PzGr, PzGren – (German abbreviation for Panzergrenadier) Motorized or mechanized infantry
Pz. Jg. – (German abbreviation for Panzerjaeger) Antitank unit
PzPiBn – (German abbreviation for Panzer Pionier Bataillon) Armored pioneer (combat engineer) battalion
Pz. Sp. W. – (German abbreviation for Panzerspaehwagen) Armored (reconnaissance) car

Rgt – (German abbreviation for Regiment) Regiment
Ritterkreuz – German term for the Knight's Cross award
Rollbahn – German term for route of march or main supply route

s – (German abbreviation for schwer) Heavy
Sanitaets – German term for medical units
Schuetze – German term for the rank of private
Sd Kfz – (German abbreviation for Sonder Kraftfahrzeug) Special motor vehicle
sfl – (German abbreviation for selbstfahrlafette) Self-propelled carriage
SPW – (German abbreviation Schuetzenpanzerwagen) Armored personnel carrier
St Pi – (German abbreviation for Sturmpionier) Assault pioneers (combat engineers)
Stab – German term for staff
Storch – A light German aircraft used for liaison, similar to the US Piper Cub
Stosstrupp – German term for assault troops
Stug. – (German abbreviation for Sturmgeschuetz) Assault gun-
Sturmtrupp – German term for assault troops

Unteroffizier – German term for non-commissioned officer

Wehrmacht – German term for armed forces

z.b.V. – (German abbreviation zur besonder Verwendung) "For Special Use"
Zug – German term for platoon

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3	Commander, 2nd New Zealand Engineer Regiment
2	Australian Liaison Officer, US Army Engineer School
1	Italian Army Staff College