THE MEDICAL ADMINISTRATIVE ASPECT

OF

THE LIBYAN - TUNISIAN CAMPAIGN

(1st August 1942 - 14th May 1943)

BY


(Two Volumes)

VOLUME I
## INTRODUCTION

1. SCOPE. ........................................... 1
2. FACTORS FOR SUCCESS. ................. 2
   (a) SEA POWER. .......................... 2
   (b) AIR POWER. ......................... 2
   (c) ROAD TRANSPORT. ............... 2
   (d) EFFICIENCY AND READINESS OF THE MIDDLE EAST BASE. 3
   (e) A CAMPAIGN ON TWOFRONTS. .... 3
3. TIME AND DISTANCE. ................. 4
4. THE G.H.Q. MEDICAL ORGANISATION. 4
5. OPERATIONAL AND MEDICAL BACKGROUND. 6
6. FALL OF TOBRUK. ................. 6
7. WITHDRAWAL TO EL ALAMEIN. .......... 7
8. THE EL ALAMEIN LINE. ............. 7
9. READJUSTMENT OF THE MAIN BASE. ... 8
10. STABILISATION ON THE EL ALAMEIN LINE. 8
11. GHARBANYAT MEDICAL AREA. .... 9

### PART I. PREPARATION FOR THE ADVANCE FROM EL ALAMEIN

(1st August - 23rd October 1942)

A. GENERAL.

1. THE GENERAL SITUATION - AUGUST 1942. 10
2. G.H.Q. TASKS. .......... 11
3. PROVISION OF REINFORCEMENTS. .... 12
4. PROVISION OF VEHICLES. .... 12
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. FOOD SUPPLIES.</td>
<td>13</td>
</tr>
<tr>
<td>6. PETROL, OIL AND LUBRICANTS.</td>
<td>14</td>
</tr>
<tr>
<td>7. MOVEMENTS AND TRANSPORTATION.</td>
<td>14</td>
</tr>
<tr>
<td>8. ADVANCE PLANNING.</td>
<td>14</td>
</tr>
<tr>
<td>9. WATER SUPPLY.</td>
<td>16</td>
</tr>
<tr>
<td>10. OPENING AND OPERATION OF HARBOURS AND PORTS</td>
<td>17</td>
</tr>
<tr>
<td>11. ADVANCED BASES.</td>
<td>18</td>
</tr>
<tr>
<td>12. CO-ORDINATION BY G.H.Q. ADMINISTRATIVE STAFF, SERVICES AND R.A.F. ADMINISTRATIVE STAFF.</td>
<td>21</td>
</tr>
<tr>
<td>13. ADMINISTRATIVE LiaISON WITH EIGHTH ARMY.</td>
<td>21</td>
</tr>
<tr>
<td>14. SALVAGE OF CAPTURED EQUIPMENT.</td>
<td>21</td>
</tr>
<tr>
<td>15. EIGHTH ARMY MEDICAL ARRANGEMENTS - AUGUST 1942.</td>
<td>23</td>
</tr>
<tr>
<td>16. CASUALTIES AND SICK.</td>
<td>25</td>
</tr>
<tr>
<td>17. THE HYGIENE PROBLEM.</td>
<td>26</td>
</tr>
<tr>
<td>18. FIELD HYGIENE SECTIONS.</td>
<td>27</td>
</tr>
<tr>
<td>19. HYGIENE ORGANISATION IN CAPTURED AREAS.</td>
<td>28</td>
</tr>
<tr>
<td>20. FLY CONTROL UNIT.</td>
<td>29</td>
</tr>
<tr>
<td>21. RATIONS AND FEEDING PROBLEMS.</td>
<td>30</td>
</tr>
<tr>
<td>22. HYGIENE PROBLEMS OF ARMoured UNITS.</td>
<td>32</td>
</tr>
<tr>
<td>23. DISEASES - INCIDENCE AND PREVENTION.</td>
<td>33</td>
</tr>
<tr>
<td>24. NYD (NEUROSIS) AND PHYSICAL EXHAUSTION.</td>
<td>39</td>
</tr>
<tr>
<td>25. THE REORGANISATION AND INCREASED MOBILITY OF FIELD MEDICAL UNITS.</td>
<td>41</td>
</tr>
<tr>
<td>26. THE ARMoured UNITS.</td>
<td>42</td>
</tr>
<tr>
<td>27. (a) THE FIELD AMBULANCE.</td>
<td>43</td>
</tr>
<tr>
<td>(b) THE LIGHT FIELD AMBULANCE.</td>
<td>44</td>
</tr>
</tbody>
</table>
PART III  EL AGHEILA TO THE EASTERN FRONTIER OF TUNISIA.

(13th December 1942 - 13th February 1943)

1. GENERAL.
SECTION I

EL AGHEILA TO BUEMAT.

(13th December 1942 to 14th January 1943)

2. THE ADVANCE TO BUEMAT. 102
3. MAINTENANCE. 103
4. ROAD TRANSPORT. 104
5. AIRFIELD CONSTRUCTION. 104
6. AIR FREIGHT. 105
7. CHRISTMAS 1942. 105
8. MEDICAL ARRANGEMENTS.
   (a) BENGASI. 106
   (b) BARCE. 106
   (c) TOBRUK. 107
   (d) EVACUATION (i) ROAD.
       (ii) SEA. 107
       (iii) AIR. 108
   (e) CASUALTIES EVACUATED. 108
   (f) BLOOD AND MEDICAL STORES. 109
9. PLANNING FOR TRIPOLI. 109
10. MAINTENANCE ARRANGEMENTS FOR THE ARMY
    WEST OF TRIPOLI. 113
11. FORMATION OF TRIPOLI ADVANCED BASE
    ADMINISTRATIVE HEADQUARTERS. 114
12. MEDICAL PLANS FOR TRIPOLI. 115
13. MEDICAL PLAN FOR THE ADVANCE ON TRIPOLI. 117
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>The Advance to the Tunisian Frontier</td>
<td>119</td>
</tr>
<tr>
<td>15</td>
<td>Evacuation of Casualties.</td>
<td>120</td>
</tr>
<tr>
<td>16</td>
<td>Air Evacuation from Forward Airfields.</td>
<td>121</td>
</tr>
<tr>
<td>17</td>
<td>Tripoli Harbour.</td>
<td>121</td>
</tr>
<tr>
<td>18</td>
<td>G.H.Q. Reconnaissance of Tripoli.</td>
<td>122</td>
</tr>
<tr>
<td>19</td>
<td>The Arrival of Convoys.</td>
<td>123</td>
</tr>
<tr>
<td>20</td>
<td>Pioneers and Labour.</td>
<td>124</td>
</tr>
<tr>
<td>21</td>
<td>Road Transport.</td>
<td>124</td>
</tr>
<tr>
<td>22</td>
<td>Reinforcements.</td>
<td>125</td>
</tr>
<tr>
<td>23</td>
<td>Telephonic and Telegraphic Communication.</td>
<td>125</td>
</tr>
<tr>
<td>24</td>
<td>Supplies.</td>
<td>125</td>
</tr>
<tr>
<td>25</td>
<td>Petrol.</td>
<td>126</td>
</tr>
<tr>
<td>26</td>
<td>Works Services.</td>
<td>127</td>
</tr>
<tr>
<td>27</td>
<td>Arrangements for the Civil Population.</td>
<td>127</td>
</tr>
<tr>
<td>28</td>
<td>Lines of Communication Organisation.</td>
<td>128</td>
</tr>
<tr>
<td>29</td>
<td>Situation on 13th February 1943.</td>
<td>128</td>
</tr>
</tbody>
</table>

**PART IV**

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>General.</td>
<td>130</td>
</tr>
<tr>
<td>2</td>
<td>The Advance to Enfidaville.</td>
<td>131</td>
</tr>
<tr>
<td>3</td>
<td>Operation of Ports West of Tripoli.</td>
<td>132</td>
</tr>
<tr>
<td>4</td>
<td>Tripoli Advanced Base.</td>
<td>133</td>
</tr>
<tr>
<td>5</td>
<td>Road Transport.</td>
<td>133</td>
</tr>
<tr>
<td>6</td>
<td>Air Transport.</td>
<td>134</td>
</tr>
<tr>
<td>7</td>
<td>Personnel Reinforcements.</td>
<td>135</td>
</tr>
</tbody>
</table>
8. REPLACEMENT OF VEHICLES.  
9. SIGNALS COMMUNICATIONS.  
10. MEDICAL ARRANGEMENTS IN TRIPOLITANIA.  
11. MEDICAL ARRANGEMENTS FOR THE TUNISIAN BATTLES.  
12. EVACUATION OF CASUALTIES.  
13. PSYCHIATRIC AND NEUROPATHIC CASES.  
14. BATTLE CASUALTIES.  
15. APPOINTMENT OF CONSULTANT SURGEON, EIGHTH ARMY.  
16. FIELD SURGICAL UNITS.  
17. BLOOD TRANSFUSION.  
18. HYGIENE (a) GEOGRAPHICAL AND SEASONAL FEATURES.  
   (b) ANTI-MALARIAL MEASURES.  
   (c) SANITATION OF OCCUPIED AREAS.  
   (d) CLOTHING.  
   (e) INCIDENCE OF DISEASE.  
   (f) CIVIL POPULATION.  
   (g) HYGIENE ORGANISATION.  
   (h) GENERAL.  
19. PIONEERS AND LABOUR.  
20. MEDICAL ARRANGEMENTS FOR PIONEER AND LABOUR COMPANIES.  
21. PRISONERS OF WAR.  
22. ADMINISTRATIVE CO-OPERATION BETWEEN EIGHTH AND FIRST ARMIES.  
23. END OF THE CAMPAIGN.
PART V

LESSONS AND OTHER FEATURES OF THE CAMPAIGN.

1. FOOD SUPPLIES. 157
2. OPENING AND OPERATION OF PORTS. 160
3. THE DENTAL SERVICE. 161
4. BRITISH RED CROSS WAR ORGANISATION. 164
5. MOTOR AMBULANCE CONVOYS AND AMBULANCE
   CAR COMPANIES, R.A.S.C. 165
6. MEDICAL AND DENTAL LESSONS OF THE CAMPAIGN. 166
7. HYGIENE. 170
8. ADMINISTRATIVE LIAISON AND CO-ORDINATION. 171

SUMMARY 173

ACKNOWLEDGEMENTS 174

VOLUME II

ABBREVIATIONS USED.

BIBLIOGRAPHY.

TABLES I - X.

APPENDICES A - K.

INTRODUCTION

1. SCOPE

This survey is designed to show, from the G.H.Q. administrative aspect, the work of the medical services of the Middle East Force, in the successful LIBYAN-TUNISIAN campaign of 1942 - 43. To give a comprehensive picture, a description is given of some of the problems faced and solved in maintaining the personnel, equipment and stores required by a modern army in the field. On this background is a record of the methods adopted by the medical staff to preserve health in the EIGHTH ARMY and to treat and evacuate sick and wounded.

The survey does not go into operational details except in so far as they must inevitably be mentioned. As far as security permits statistics, diagrams and maps are given to substantiate facts.

The survey is divided into five parts, the first four of which are based on arbitrary periods of the campaign.

Part I Preparations for the EIGHTH ARMY offensive
(1st August 1942 – 23rd October 1942)

Part II EL ALAMEIN to EL AGHEILA
(24th October 1942 – 12th December 1942)
Part III  EL AGHEILA to the TUNISIAN FRONTIER
(12th December 1942 - 13th February 1943)

Part IV  The TUNISIAN FRONTIER to the end of the Campaign.
(14th February 1943 - 14th May 1943)

Part V  Lessons and other features of the campaign.

Some of the problems faced were peculiar to certain phases of the campaign. These are dealt with in that part of the survey to which they are related. Other problems were peculiar to the campaign as a whole.

2. FACTORS FOR SUCCESS

From the administrative aspect the success of the campaign was fundamentally due to the following factors: -

(a) SEA POWER

The Royal Navy, the Merchant Navy, and the Royal Air Force, convoyed our shipping across the oceans of the world and along the coast of North Africa permitting the building-up of the Middle East Base and the maintenance of our desert forces in their westward advance.

(b) AIR POWER

The Royal Air Force, assisted later by the Ninth United States Air Force, secured and maintained throughout the campaign complete domination of the air.

(c) ROAD TRANSPORT

For the first time in the WESTERN DESERT Campaign
there was sufficient road transport to give a wide
radius for maintenance on land.

(d) EFFICIENCY AND READINESS OF THE MIDDLE EAST BASE
The Middle East Base in EGYPT and PALESTINE had been
developed gradually throughout the three lean
years that had preceded the opening of our final
offensive.
The development of ports, railways, inland water
transport; the construction of the many big
hospital sites, workshops, depots and personnel
camps; the staffing, stocking, and equipping of
these installations; the development of airfields
and maintenance units; the arrangements for a huge
supply of petrol for the Army and the Air Force
and many other works, all far advanced by October
1942, enabled the Main Base to accept the heavy
demands made upon it by the forces in the field.

(e) A CAMPAIGN ON TWO FRONTS
In previous campaigns the enemy had been able to
concentrate his undivided attention against the
force operating from EGYPT. Hardly had the
EL ALAMEIN offensive begun in October 1942 before
a combined British and United States Force landed
on the coast of MOROCCO and ALGIERS and this
event ensured that from then onwards the Axis
Forces would be compelled to fight this NORTH
AFRICAN campaign on two fronts, on the sea, on the
land and in the air.
3. **TIME AND DISTANCE**

In order to appreciate the significance of the effort put into this campaign, it is essential to consider the time and space factors involved. Firstly there was the task of bringing to the Middle East the vast numbers of personnel and increased tonnages of materials drawn from all parts of the world, secondly there was the movement out of the Main Base and up to the forces in the field of great quantities of supplies essential to maintain the momentum of our offensive. This is shown diagramatically in Appendices 'A' and 'B'.

4. **THE G.H.Q. MEDICAL ORGANISATION.**

The functions of an Army Medical organisation in a campaign are (1) to maintain good health and prevent disease in the force, (2) to collect, evacuate and distribute the sick and wounded from the forward area and (3) to ensure that sick and wounded are given efficient treatment. (Field Service Regulations, 1930, Vol. I (Chap. XII, Sec. 68), Nichols (1940) (Chap. II)).

It is not intended here to explain at length the basic details of an Army Medical Organisation; these are adequately described in Field Service Regulations, 1930, Vol. I (Chaps. XV and XVI), R.A.M.C. Training (1935), Regulations for the Medical Services of the Army (1938) and by Nichols (1940).

The head of the medical organisation in the Middle East Force and adviser to the Commander-in-Chief was the Director of Medical Services (D.M.S.)
At the Medical Directorate, G.H.Q., M.E.F., the D.M.S. had an administrative and consultant staff.

The administrative staff, controlled by a Deputy Director of Medical Services (Brigadier), had a nucleus of three main sections headed by Assistant Directors (one Colonel and two Lieut-Colonels) each assisted by a Deputy Assistant Director (Major). Section I dealt with planning, organisation, policy, formation and moves of units, training and evacuation arrangements. Section II dealt with personnel, war establishments, medical boards, claims and hospital charges. Section III dealt with all questions relating to medical and ordnance equipment of medical units. Other sections of the administrative staff dealt with (a) hygiene, preventive medicine, and vital statistics (b) pathology (c) dental services and (d) nursing services.

The Director of Medical Services, Major-General Sir Percy S. TOMLINSON, K.B.E., C.B., D.S.O., F.R.C.P., K.H.P. and his administrative and consultant medical staff formed a highly capable team, whose experience, ability and cooperation enabled the Medical Services in the Middle East to function efficiently and smoothly. Under Major-General Sir Percy TOMLINSON's inspiring leadership, a very harmonious relationship existed between the Medical and other branches of G.H.Q. from whom the greatest cooperation in matters affecting the medical services was always obtained.

The representative of the D.M.S. in the field
was the D.D.M.S. EIGHTH ARMY who was also Adviser to the G.C.C. EIGHTH ARMY and commanded EIGHTH ARMY medical units.

5. OPERATIONAL AND MEDICAL BACKGROUND
(See Map - Appendix 'C')

The Axis offensive was launched on 28th May 1942 against our positions at GAZALA and BIR HACHEIM. BIR HACHEIM was evacuated on 11th June and our forces were withdrawn from GAZALA positions on 15th June. At this time TOBRUK was the forward hospital base where a General Hospital (1000 beds) had, with an Advanced Depot of Medical Stores, been located since the siege in summer 1941.

For some time before the Axis offensive was launched in May 1942 we had been preparing for an offensive. Towards this end the Western Desert Railway was being extended towards BELHAMED and the movement of war materials was in hand by road from CAPUZZO. Construction of the railway was continued after the Axis offensive began, and the railhead at BELHAMED was opened on 12th June, just before our withdrawal from the GAZALA positions began. Ambulance Trains however, never went farther west than CAPUZZO.

6. FALL OF TOBRUK

TOBRUK fell on 19th June as we were withdrawing towards the EGYPTIAN frontier and the TOBRUK hospital and the Advanced Depot of Medical Stores were captured complete. Fortunately all but a few
patients had been evacuated by hospital ship and by
road to the base, (by Motor Ambulance Convoy and Ambulance
Car Company by road to CAPUZZO and MATRUH and from both
by Ambulance Train to the NILE DELTA).

7. WITHDRAWAL TO EL ALAMEIN

Our withdrawal continued across the Egyptian
Frontier into EGYPT and the Axis follow up was rapid.
We lost SIDI BARRANI, MATRUH, then DABA and on 30th June
the enemy, still pressing forward, made contact with our
EL ALAMEIN defences, some 60 miles west of ALEXANDRIA.

During the withdrawal an ARMY MEDICAL
CONCENTRATION AREA was selected twenty-five miles
behind the EL ALAMEIN line at GARBANTYAT (see Appendix
'D') lying between the desert road and railway, having
a small railway station which served as an ambulance
train siding. A Casualty Clearing Station, a Mobile
Military Hospital, a South African and an Indian C.C.S.
were located here together with two Field Ambulances
and an Advanced Depot of Medical Stores. These units
were gradually thinned out and sent to base to rest
and re-equip. Evacuation from the Medical Area at
GARBANTYAT was by Ambulance Train to SUEZ CANAL Area
Hospitals.

8. THE EL ALAMEIN LINE

At EL ALAMEIN the EIGHTH ARMY, now under the
personal command of General Sir Claude AUCHINLECK,
G.C.I.E.,C.B.,C.S.I.,D.S.O.,O.B.E.,A.D.C., dug in and
continued to develop the system of defences which,
stretching from the sea to the QATTARA Depression, were eventually to prove too strong for the Axis.

9. **READJUSTMENT OF THE MAIN BASE**

The withdrawal of the EIGHTH ARMY to positions on the EL ALAMEIN defence system, and the possibility that at the beginning of July 1942 the Axis might not be finally halted at EL ALAMEIN, (indeed it was appreciated that with the NILE DELTA almost in sight, Marshal ROMMEL, as soon as his forces were rested and reorganised, would launch further attacks), led to consideration and implementation of measures which were to be taken to readjust the Main Base. Certain base installations in the AMIRIYA Area (20 miles west of ALEXANDRIA) were evacuated elsewhere to safe areas, and the hospitals in ALEXANDRIA assumed the role of C.C.Ss. by clearance of patients and reduction of their staff and equipment. The hospitals at AMIRIYA and at BUSELLI (20 miles east of ALEXANDRIA) were cleared and moved to SYRIA and the SUDAN. Medical units and medical stores in the CAIRO and SUEZ Canal Area were thinned out and dispersed to safe areas throughout the Middle East. In the SUDAN, a reserve hospital area was established in the event of the NILE valley being used for the evacuation of casualties.

10. **STABILISATION ON THE EL ALAMEIN LINE**

During the latter part of July two attempts were made by the EIGHTH ARMY to dislodge the enemy.
Both failed chiefly through lack of men and weapons, but by early August the EL ALAMEIN battle front was finally stabilised in an approximate north and south line from TEL EL EISA to HIMEIMAT, about 40 miles from AMIRIYA.

11. GHARBANTYAT MEDICAL AREA

The MEDICAL AREA at GHARBANTYAT then became, and was developed as, the focal point of EIGHTEEN ARMY medical services and ambulance train railhead up till, during, and for a short period after the battle of EL ALAMEIN.
PART I

PREPARATIONS FOR THE ADVANCE FROM EL ALAMEIN

(1st August - 23rd October 1942)

1. THE GENERAL SITUATION - AUGUST 1942

On 3rd August, the Rt. Hon. WINSTON CHURCHILL, Prime Minister of GREAT BRITAIN, visited the Middle East.

On 13th August, the command of the EIGHTH ARMY was taken over by Lt-General B.L. MONTGOMERY C.B., D.S.O.


It was decided at this juncture not to attempt further attacks on the Axis at EL ALAMEIN until a strong force, particularly in armour, had been built up. Before this could take place, however, it was appreciated that the enemy would attack. This the enemy did at the end of August by breaking through the minefields North of HAMIMAT and moving North-East up to ALAM HALFA positions (see Appendix 'D'). 13 Corps was given the task of stopping the attack without itself incurring heavy casualties. This was effected successfully with the help of the R.A.F., who concentrated on the destruction of the enemy's supply echelons.

When the enemy withdrew after some ten days fighting he retained possession of the minefields
north of HMEINAT and the MUNASSIB locality. But it was appreciated that with the casualties he incurred the enemy would be most unlikely to attack again for some considerable time, and preparations for our attack began at once and consisted in the field of:

(a) the formation of 10 Corps as a powerful armoured striking force.

(b) intensive training in breaking through enemy minefields at night.

2. G.H.Q. TASKS

From the G.H.Q. aspect, the period 1st August to 23rd October 1942 was devoted by all branches to three main tasks:

(a) Reorganising the EIGHTH ARMY and providing it with personnel, vehicles and equipment to replace losses and wastage and so bring it, as far as possible, up to full scale efficiency.

(b) Establishing within easy reach of EIGHTH ARMY at places selected by their Administrative Staff the large quantities of war material required to enable the Army to assume a full scale offensive.

(c) Planning ahead in conjunction with the R.N. and R.A.F. to ensure that, if and when the offensive was successful, the administrative machine would be geared to sustain the momentum of the offensive regardless of where the pursuit of the enemy might lead the EIGHTH ARMY.
3. **PROVISION OF REINFORCEMENTS**

During this period new formations and reinforcements arrived from U.K. and at the opening of the offensive on 23rd October, EIGHTH ARMY constituted a powerful striking force consisting of U.K., Australian, New Zealand, South African, Indian, Free French and Greek Troops.

R.A.M.C. reinforcements on arrival were sent to the R.A.M.C. Base Depot whence they were sent forward to D.D.M.S. EIGHTH ARMY on demand.

4. **PROVISION OF VEHICLES**

At the beginning of August, all the EIGHTH ARMY Units were deficient in transport. To aggravate this deficiency a considerable percentage of vehicles was in a bad condition after long use in the desert.

The task of making good this total deficiency and of weeding out the worst of the existing vehicles was complicated by three factors:

(i) The new formations arriving from U.K. were without their full scale of transport, which in any case was lower than the scale found by experience to be essential for desert warfare.

(ii) Unbalanced intake of vehicles. During the greater part of this period no 15-cwt trucks arrived in Middle East. As a result units and formations were equipped instead with
bantams and three-ton lorries, this improvisation being possible owing to a good intake of bantams at the time. Later, when the inflow of bantams slackened, 15-cwt trucks were again coming forward satisfactorily. To some extent, therefore, one type of vehicle offset the other.

(iii) A great proportion of the vehicle intake at this time consisted of non-desertworthy 30-cwt vehicles. This was counteracted by giving priority to the repair and overhaul of desertworthy (aptly nicknamed "desertweary") vehicles in workshops.

Note: "Desertworthy" means a vehicle fitted with large tyres and of sufficient horsepower to enable it to traverse all types of terrain - hard road and soft sand - found in the Western Desert.

5. FOOD SUPPLIES

The supply of normal rations was adequately maintained and at the same time large reserves were made available at the Advanced Base ready for the advance.

In addition to normal rations, the Eighth Army, because of its proximity to the Delta, was kept supplied with fresh fruit and vegetables on a greater scale than ever before. This was done in spite of the fact that at
that time of the year both quantity and quality of fresh vegetables were at their worst, and that the hot weather caused deterioration of these supplies during transportation.

6. PETROL, OIL AND LUBRICANTS

Petrol, oil and lubricants were in ample supply, the only difficulty being the provision of sufficient containers owing to the requirements of EIGHTH ARMY reserve dump programmes, and the building up of reserves at AMIRIYA and ALEXANDRIA.

7. MOVEMENTS AND TRANSPORTATION

The enormous Middle East programme of movement by road, rail, sea and air of troops and stores during this period entailed a great strain on the executive and planning staffs of the G.H.Q. Mov. and Tr. branch and on their resources.

8. ADVANCE PLANNING

While the work of re-equipment of the Army with personnel, vehicles and equipment, and providing the reserves required for the offensive, was in progress, plans were made to ensure that, once the advance began, the L of C could be developed at the speed necessary to ensure the momentum of the Army.

From the medical aspect this meant careful preparation for the hygiene control of new areas, the smooth evacuation of patients and the adequate provision of medical supplies.
If forced to withdraw, the enemy, given time, would carry out demolitions so as to delay our advance as much as possible. In the Western Desert it was difficult to impose delay on mobile fighting troops except by the occupation of defensive positions which must be broken or turned. On the other hand, the momentum of an advance could be slowed down if the vital administrative arteries were seriously damaged and took long to repair. It was necessary, therefore, so to plan that demolitions on the administrative arteries could be rapidly overcome. Action was concentrated on measures to ensure,

(a) rapid repair of the Western Desert Railway which, until the port of TOBRUK was captured and opened, would be the main line of supply.

(b) the rapid repair of the Western Desert water pipeline, without which the Western Desert railway could not function at maximum efficiency, nor could the total water requirements of the Army be met.

(c) the rapid repair of the Western Desert Road west of such railheads as were open.

(d) The rapid opening and operation of harbours west of EL ALAMEIN to give additional, though limited, supply by sea until TOBRUK Port itself could be opened and operated.

(e) the quick delivery of urgent fighting and other (including medical) stores from base to forward troops.

(f) the rapid evacuation of casualties and sick.
9. WATER SUPPLY

The following preparations were made for the rapid provision of water in view of it being a most vital commodity:

(a) **The Western Desert Pipeline**: A considerable mileage of pipeline was moved to EL ALAMEIN and a specially equipped R.E. party was held ready to operate along the old pipeline to repair demolitions and test such pipe as was considered undamaged. Arrangements were made to lay a duplicate pipeline from EL ALAMEIN to DABA, and the EL ALAMEIN pumphouse was connected to keep both pipelines filled.

(b) **Aqueducts**: R.E. parties were organised for the purpose of repairing the aqueducts at BAGUSH, MATRUPH and elsewhere.

(c) **Wells**: R.E. well boring sections were provided for drilling at FUKA and other points where it was known water could be obtained.

(d) **Pumps**: A large number of pumps were issued to EIGHTH ARMY to be earmarked for specific purposes e.g. pipeline and deep wells.

(e) **Supply by Sea**: To ensure against any breakdown of the above arrangements, preparations were also made to supply water by sea at short notice for personnel. This was done as follows:

(i) holding at ALEXANDRIA a large reserve of condemned 44-gallon drums lined with hard bitumen for rapid filling and loading in
ships as required.

(ii) storing water in 4-gallon tins, and 2-gallon welded containers (TUCANS), for despatch by rail, road and sea.

(iii) holding in readiness three water barges (approx. total capacity 87,000 gallons) for receiving water from water-ships and for pumping it ashore.

10. OPENING AND OPERATION OF HARBOURS AND PORTS

(a) Outline Plan

The early capture and operation of a harbour or port was important. The enemy, if at all practicable, would do all he could to block harbour or port entrances and to demolish such port facilities as existed at the time of his occupation.

The G.H.Q. outline plan was to operate first MERSA MATRUH followed by BARDIA and/or SOLLUM, TOBRUK and BENGASI. As the advance progressed the rearward harbours and ports were to be closed, or the capacity reduced so that the port operation personnel and craft could be moved forward. TOBRUK would be the first port capable of being made to handle considerable tonnage and to take hospital ships.

(b) Opening and Operation of Harbours and Ports

Preparations were made by the Army and Navy to ensure the immediate clearance of obstructions in captured harbours and ports, and also for the provision of personnel and harbour-craft to operate these ports with the minimum delay.
11. ADVANCED BASES

(a) The forward areas of the EIGHTH ARMY in the EL ALAMEIN line were only 40 miles from ATIRIYA which, with depots and hospitals in ALEXANDRIA area, now constituted the first Advanced Base for the EIGHTH ARMY. From this Advanced Base communication with the Main Base (i.e., EGYPT, east of the DAMIETTA branch of the NILE) was by rail and road.

(b) It was foreseen that the maintenance of EIGHTH ARMY, when it reached EL AGHEITA and was preparing to enter TRIPOLITANIA, would become extremely difficult without the establishment of new Advanced Bases.

TOBRUK was selected as the second advanced base as it had a good harbour and could be served by sea and road until the railway was reopened. This was to become the advanced base for the next stage of the advance: the capture of BENGASI and exploitation to the Eastern TRIPOLITANIAN frontier.

(c) BENGASI would then become the next and true Advanced Base for subsequent operations and could be served by sea and road through TOBRUK, which being the terminus of the Western Desert Railway, would play its part as an Auxiliary Advanced Base for some time.
(d) The policy for the formation, development and control of such Advanced Bases as were to be established as the advance progressed was discussed with the EIGHTH ARMY and the following, in general terms, was the agreed division of responsibility: -

(i) Responsibility for the formation of an Advanced Base, the nature of base units (e.g. hospitals and depots) and reserves to be held would be decided by G.H.Q. in consultation with H.Q. EIGHTH ARMY.

(ii) Responsibility for the initial working of any captured port would rest with EIGHTH ARMY.

(iii) Three stages in development were accepted.

Stage I. Initial layout to ensure that the immediate requirements of EIGHTH ARMY were met without delay; responsibility for this rested with EIGHTH ARMY.

Stage II. Establishment of advanced depots and hospitals in accordance with G.H.Q. policy was to be determined at the same time. G.H.Q. had to ensure by close cooperation
with EIGHTH ARMY that developments necessary to establish the Advanced Base did not interfere with EIGHTH ARMY's initial maintenance requirements. The planning for this stage had to be undertaken as early as possible and was effected as follows:—

(i) The first key plan and maintenance project was to be prepared by G.H.Q. and discussed with EIGHTH ARMY.

(ii) D.Q.M.G.; G.H.Q. with a small G.H.Q. reconnaissance party was to proceed to the new advanced base area as soon as EIGHTH ARMY indicated that the reconnaissance could be carried out.

(iii) D.Q.M.G.; G.H.Q.; in consultation with D.A.& Q.M.G. EIGHTH ARMY was to decide second key plan and revised maintenance project. This procedure was followed throughout the campaign and worked satisfactorily.

Stage III. There was to be full development of the Advanced Base in accordance with G.H.Q. policy; the responsibility for this
12. **COORDINATION BY G.H.Q. ADMINISTRATIVE STAFF, SERVICES AND R.A.F. ADMINISTRATIVE STAFF.**

The D.O.H.C., G.H.Q., M.E.F., coordinated the work of the branches of G.H.Q. in support of EIGHTH ARMY by holding regular meetings with Directors and/or their Deputies. These meetings continued throughout the period of the campaign and proved invaluable. At each meeting the latest operational situation was explained and administrative matters with reference to EIGHTH ARMY discussed.

13. **ADMINISTRATIVE LIASION WITH EIGHTH ARMY**

Sound liaison existed between the staffs of G.H.Q., M.E.F., and H.Q., EIGHTH ARMY. It was the basis of excellent coordination of planning and maintenance, and of quick and effective action, being founded on early and accurate administrative information from EIGHTH ARMY.

14. **SALVAGE OF CAPTURED EQUIPMENT**

(a) Much had been learnt from previous campaigns in the desert and arrangements were made to profit as far as possible from past experience. In a successful advance large quantities of enemy equipment are captured including much valuable medical equipment. In war everything must contribute towards lightening the burden on production and supply of equipment. In medical equipment there has been a greatly
diminished and even cessation of production of certain items owing to worldwide shortage of raw materials, for example, quinine. Further, it was vital to cut down as much as possible the demands on the Merchant Navy and the Royal Navy, (to avoid bringing items thousands of miles by sea) by taking full advantage of every item falling into our hands. This implied strict injunctions to all ranks to guard, and avoid the pilfering of, any captured medical stores until they could be collected, sorted out and distributed according to needs. The items which were most sought after were:

(i) Quinine products
(ii) X-ray tubes and apparatus
(iii) Surgical instruments
(iv) Laboratory equipment and microscopes
(v) Rubber articles.

Salvage of all items of any equipment, both of our own and captured, results in their being used in one form or another. Here are examples of the medical use to which certain general items from salvage can be put:

(i) mosquito netting for use as tulle gras
(ii) muslin map-backing for plaster of Paris bandages
(iii) unserviceable parachute silk for occupational therapy
(iv) tin for making containers to hold
presterilized dressings.

(b) There were few salvage units at the beginning of the offensive and consequently they could provide only the foundations for salvage operations, their main functions being:

(i) to establish and operate dumps on the supply route and at Railhead.

(ii) to sort material at dumps for use forward, or for evacuation as required by services.

(iii) to carry out collection of special items.

(iv) to safeguard captured dumps as far as possible until the services were able to take over.

The Army issued comprehensive instructions as to the furnishing of information regarding captured enemy material, the protection of valuable salvage until taken over, and the method of evacuating salvage etc., G.H.Q. issued an order of priority for recovery and evacuation of equipment in which quinine drugs, X-ray apparatus, and surgical and laboratory equipment took a high place.

15. **EIGHTH ARMY MEDICAL ARRANGEMENTS - AUGUST 1942**

(a) On the EL ALAMEIN front 13 Corps had an Advanced Surgical Centre at ALAM EL HALFA. This Centre comprised the light section of a Mobile C.C.S., the
surgical team of a New Zealand Field Ambulance and a Field Transfusion Unit. Ten beds were available for grave post-operative cases - particularly abdominal and thoracic - to permit of retention and nursing prior to air evacuation to base.

(b) A Mobile C.C.S. was established at the Army Medical Area GHARABANTIYAT with adequate surgical and specialist assistance.

(c) Evacuation from the Advanced Surgical Centre to GHARABANTIYAT was by ambulance car. (The desert tracks from ALAM-EL HALFA to GHARABANTIYAT were rough, but ambulance cars did the journey slowly and carefully.)

(d) On several occasions, by arrangement, ambulance aircraft alighted on the ALAM EL HALFA medical area and were loaded with cases for evacuation with the minimum of delay.

(e) From GHARABANTIYAT evacuation of sick and wounded was by road, rail and air to base.

(i) the majority by daily Ambulance Train to ALEXANDRIA and to SUEZ CANAL area hospitals

(ii) some by road to ALEXANDRIA

(iii) ambulance aircraft were used for evacuation of serious, and special cases (e.g. cranial (including ophthalmic) thoracic and maxillo-facial) to CAIRO hospitals and special centres.

GHARABANTIYAT was within the zone of fighter landing grounds and as transport planes did not fly in this area they were not available for evacuation. It
was planned, however, that as soon as air supremacy was established (and it was increasing daily) fighter escorts would enable transport planes to go further forward and allow them to evacuate casualties on their return flights.

The R.A.F. would not consider the establishment of "RED CROSS" landing grounds in this area in view of the fact that any one of them might be required for urgent air operational purposes.

16. CASUALTIES AND SICK

During the period under review (1st August - 22nd October 1942) the 23,465 cases were evacuated from EIGHTH ARMY. They consisted of 1,417 battle casualties and 22,048 sick.

The greater number of wounds caused by fragments of high-explosive shell, mine, grenade or bomb, and of these the majority were minor flesh wounds.

A number of factors contributed to successful results in the treatment of wounds: (1) warm dry weather in a desert, (2) only the minimum of light summer clothing was worn, (3) the front was static, ample surgical facilities were at hand and base hospitals were relatively near, (4) the use of sulphenilamide which proved a most important asset to surgery.
The withdrawal to EL ALAMEIN and the subsequent concentration of forces on a narrow front was a matter of great concern to those responsible for the hygiene and preservation of the health of the troops. The factors causing anxiety can be summarised as follows (Gear 1944):

(i) It was summer, the season of flies and their associated diseases.
(ii) The exhausted condition of the troops.
(iii) The slackening of unit and individual hygiene discipline during the withdrawal - partly owing to our troops being very tired.
(iv) The mass of hygienically uncontrollable natives who had been swept back by the battle to the rear of EL ALAMEIN.
(v) The further fouling of the area by our own troops.
(vi) The fly-plague breeding on the insanitary battlefield.

Bearing in mind the difficulties of place and time, the lack of trained personnel and apparatus, and an army, a good proportion of which was still raw to the conditions in sub-tropical regions, and, therefore, still lacking to some extent in hygiene consciousness, the measures adopted to prevent diseases and to enhance the fitness and vigour of the troops were highly satisfactory.

The various measures taken to deal with the
hygiene problem are discussed below. These entailed essentially a quick revision of the field hygiene organisation. As a result the situation was vastly improved and our force was not incapacitated. Not so with the enemy, with whom, it was later ascertained excremental diseases had played havoc resulting in the weakening of his fighting strength and of his energy, will, and ability to resist our powerful autumn offensive.

Steps were also taken in the prevention of Typhus Fever, Desert Sores, Vitamin Deficiency Diseases, Burns in Armoured Fighting Vehicles, etc., during the battle and the advance.

Ration scales and methods of feeding and cooking in the field also received particular consideration. The increased mobility and wide dispersal of the modern fighting force had created a host of new hygiene problems of which the method of supply, composition and cooking of food were the most important.

18. FIELD HYGIENE SECTIONS

The standard organisation of Field Hygiene Sections and of unit water duty and sanitary personnel, was found to be too rigid, especially to meet the mobility and kaleidoscopic conditions of desert warfare.

To overcome these defects and to prepare for the advance of EIGHTH ARMY, a certain improvised reorganisation was required. The principle governing
this reorganisation was that Field Hygiene Sections
would not rigidly adhere to their divisions, but be
held as Corps and Army pools, for employment according
to the needs of the situation.

Its application to the EIGHTH ARMY for the
battle period was made on the plan that 13 Corps would
not follow up in the event of a successful attack but
that 10 Corps would press forward after the enemy. Corps
groups, each of three Field Hygiene Sections, were
formed. In the case of 10 Corps, Commanding Officers
and detachments of the sections were with brigades
while a Corps unit under 7 Light Field Hygiene Section,
with all disinfectors and workshops, was located with
13 Corps.

19. **HYGIENE ORGANISATION IN CAPTURED AREAS**

Arrangements were made for the proper hygiene
supervision of :-

(a) our own troops ensuring their cleanliness by
provision of bath units and disinfectors;
(b) the clearance of the battlefield once the battle
was over;
(c) all new areas which were to serve as Lines of
Communication;
(d) the cleaning up of fouled areas;
(e) the purification of water supplies;
(f) the delousing and accommodation of prisoners of war.

Field Hygiene Sections were detailed in advance
for these duties and adequate hygiene stores were made
available. Hygiene officers were included in the staffs
of each of the new area administrative headquarters, and each given a Field Hygiene Section to supervise sanitary and hygiene restoration.

20. **FLY CONTROL UNIT**

The area occupied by our forward troops at EL ALAMEIN was cursed with a plague of flies owing to this area having been the concentration area to which all Western Desert Bedouin tribes had withdrawn early in the Desert campaign. Their primitive habits had resulted in a gross and widespread fouling of the ground which, resulting in fly breeding, was largely responsible for the high incidence of diarrhoea and dysentery among our troops. To this was added the fly breeding in corpses especially in "no-mans land". To combat this fly breeding special measures were quickly undertaken, the most important of which was the organisation of a **FLY CONTROL UNIT** to supplement the Army Hygiene organisation. This unit, consisting of 5 officers and approximately 300 men, was given a quick course of fly control and sent up to EIGHTH ARMY early in August. There it operated in association with a Field Hygiene Section moving from area to area right up to and including "no-mans land". It assisted units in clearing the debris, refuse, and dead bodies.

As a measure to meet an unusual emergency, the creation of the Fly Control Unit was more than justified as was seen by (a) the reduction in the fly plague and (b) the marked fall in the incidence of diarrhoea and dysentery.
(a) **Battle Rations**

Previous desert operations had caused anxiety from a medical point of view owing to the retention of troops for long periods on a battle ration designed for a week. First thoughts on the remedy were the proposal of a ration scale capable of sustaining men for periods of several weeks, and yet neither too bulky nor too difficult for use in the absence of water and cooking facilities. However, this was unacceptable owing to its weight and the variety of items. Eventually a new battle ration of approximately 3,100 calories per man per day was evolved, for use for an absolute maximum period of ten days. It was a great advance on the old battle ration in providing variety, including such items as sausages, cheese, jam, onions, and tinned fish. Medical concern that the period of ten days should not be exceeded was fully appreciated by the "Q" authorities. In spite of severe limits to source and supply, especially of imported tinned food and of fresh food suitable for long transportation, the aim was that the EIGHTH ARMY should go into battle with well-balanced rations, designed to keep it going, to keep it vigorous, and to ward off food deficiency diseases.
(b) **Distribution and Cooking of Food**

However satisfactorily a well-balanced, adequate ration emerges from Supply Stores (D.I.Ds.) much can happen to destroy its value before consumption by the troops. This aspect of feeding the troops has been as difficult as any, as dispersal of troops resulted in the disappearance of organised company cooking in the field. In its place each small group, usually each vehicle crew, had to fend for itself. Vehicle or sectional cooking was very unsatisfactory. Well cooked meals at regular intervals were replaced by casual feeding "out of a tin". There was waste of rations, and debris from cooking and feeding was scattered carelessly over camping areas. A corollary to this problem arose in the case of A.F.V's. Fighting all day, leaguered in blackout conditions at night when too tired to look after themselves, the crews of tanks and armoured cars had too frequently been unable to get more than a bite of a biscuit now and then.

To counter this unsatisfactory state of affairs, it was arranged that company cooking should be reintroduced and, except in actual highly mobile phases, most units during the operations were using it. A mobile cookhouse was designed to carry hot meals forward to the fighting A.F.V. crews. The mobile cookhouse consisted of a 3-ton
lorry with detachable cooking equipment which could be changed from one lorry to another in case of need. Three such lorries provided full cooking facilities for an Armoured Regiment.

(c) Pack Rations for Armoured Fighting Vehicles (A.F.Vs)

A further special ration problem which received some attention prior to operations was the provision of a pack ration for A.F.Vs. Tanks and armoured cars had to face long periods of isolation or great stress, had to be self-contained to meet such emergencies, and the provision of food, including liquids, led to the trial of packs (produced in the United Kingdom) of two-men and three-men one-day rations and on a smaller scale of an American pack ration. In addition, most A.F.Vs. were supplied with special half-gallon thermos containers for hot drinks. The problem was still under consideration and no final decision was made prior to the operation as to the form and content of packs as a sufficient variety could not be produced to suit all tastes and certain items e.g. margarine, tended to deteriorate in keeping. Eventually a small but highly stimulating ration was evolved consisting of \( \frac{1}{160} \)th gallon of rum, 2-ozs of boiled sweets and 2-ozs of chocolate.

22. HYGIENE PROBLEMS OF ARMoured UNITS

There were many hygiene problems associated with armoured formations, such as feeding and
clothing the crews, visual devices, cooling of tanks etc.

The problems of feeding Armoured Fighting Vehicle crews, and of supplying pack rations, have been briefly discussed above.

The experience of tank battles in June and July 1942 had shown that in the Middle East no special cooling arrangements were required as heat exhaustion and heatstroke did not appear.

Burns were a serious problem. Investigation into their incidence and distribution showed how important in prevention ordinary clothing was. An order was consequently issued that tank crews should go into battle wearing slacks and long sleeved shirts, to reduce exposed areas of skin to the minimum.

23. DISEASES - INCIDENCE AND PREVENTION

(a) Climatic conditions, per se (in spite of heat, humidity and sandstorms) did not create any health problems during the months of preparation for the offensive.

(b) General Health

A uniform method of rendering sick attendances at Medical Inspection Rooms and admissions to Field Medical Units in Divisions and Independent Brigades was initiated. The proforma used was a monthly return indicating (a) disease (b) number of first attendances (c) number admitted to medical units. This return was submitted to the A.D.M.S. of Division or S.M.O. of Independent Brigade who consolidated
the returns and forwarded them to D.M.E., C.H.Q., M.E.F. The return did not include men attending for routine inspections, reporting discharge from hospital or for post-hospital treatment.

Table I shows the daily admission rate of sick in EIGHTH ARMY during August (2.42 per 1,000 strength) and September 1942 (1.96 per 1,000 strength). It is a striking index of the excellent health of the Army and especially of the improvement which was maintained up till and throughout the offensive.

Table II indicates the principle diseases causing admission to medical units in EIGHTH ARMY, selected from records. This table, read in conjunction with Table I, demonstrates that much PREVENTABLE sickness occurred e.g. dysentery and diarrhoea, inflammation of areolar tissue and accidental injuries. The sharp rise (0.24 to 2.53 per 1,000 strength) in infective hepatitis in September indicates the beginning of the infective hepatitis "season". It is worthy to note that out of 449 cases in September, 336 occurred in the New Zealand and Australian divisions.

Accidental injuries and burns were an important cause of wastage.

N.Y.D. Pyrexia was high during August (6.72 per 1,000 strength) and September (6.05 per 1,000 strength) and was considered to be largely due to malaria. At the end of August a Mobile Bacteriological
Laboratory was sent to the EIGHTH ARMY C.C.S. Area at GHBARNYAT and was instrumental in diagnosing the malaria cases before evacuation, thereby reducing the incidence of "NYD Pyrexia". Malaria occurred mainly in 9th Australian Division which had arrived from SYRIA.

(c) Dysentery and Diarrhoea.

During the early preparatory stage, and right up to the commencement of the battle, the high incidence of these diseases caused much anxiety. It was a combination of seasonal change, strict control, and disciplinary measures which reduced the fly population and the incidence of this group of diseases. Apart from the pre-existing fouling of the battle area of EL ALAMEIN, and carelessness due to the retreat, the main insanitary feature in the Army was the bad disposal of waste especially from scattered cooking points. Burial of refuse was shown to be largely useless mainly on account of carelessness, and incineration consequently came to be accepted as the only safe method of preventing fly breeding. Disposal of nightsoil was successfully accomplished under desert conditions by the use of the incinerator-petrol-tin latrine (see Appendix 'E').

A high incidence of dysentery was prevalent throughout the Middle East as well as in EIGHTH ARMY. During August, 3,807 cases were admitted to Middle East hospitals mainly from "unsalted" troops arriving
during the height of the dysentery season. The type of dysentery was on the whole mild, and of non-
epidemic variety. At this time saline treatment of
bacillary dysentery was going out of fashion in
favour of sulphaguanadine though limited supplies of
the latter restricted its use to the more severe
cases.

Following the investigation in 1941 by Fairley
and Boyd further reports on the treatment of
bacillary dysentery in Middle East hospitals were
made by Paulley (1942), Wilson (1942), Bulmer (1943),
Bulmer and Priest (1943) and Hendry (1943). These
officers reported the superiority of the sulphanamides
over saline treatment with special reference to
their specificity, to the resultant quick recovery
and diminished convalescence, and to the absence of
complications. Sulphaguanadine was generally
preferred on account of its slow absorption and
rarity of unpleasant side-effects. Trials were
carried out with succinyl sulphathiazole and the
results compared favourably with those of
sulphaguanadine, absorption being minimal and toxic
symptoms being absent (Cons.Trop.Medicine M.E.F.
(1943)).

Sigmoidoscopy was being more generally carried
out in base hospitals as a valuable diagnostic and
prognostic measure in the 

later stages, and in cases
which did not clear up as quickly as they should.
A valuable memorandum on sigmoidoscopy was issued
in Middle East at this time for the guidance of medical officers. The authorised scale of one sigmoidoscope for a large general hospital was inadequate and was remedied by the establishment of a central pool of sigmoidoscopes from which hospitals requiring extra instruments could draw.

(d) Inflammation of the Areal Tissue - THE DESERT SORE

This condition was troublesome, having its highest incidence in the desert in autumn and because of its indolent nature was the cause of the loss of many man-hours of full duty. An unfortunately common fallacy; even among medical officers, was the opinion that its causative factor was an unbalanced diet. This was disproved by Army investigators and recorded by Richards (1943). Different troops on the same rations showed difference incidence. Some with less satisfactory rations than others got no desert sores, while even troops on full fresh scales showed a high incidence. Rapport (1942), Henderson (1943) and others in army reports revealed that the "desert sore" affected mainly light-skinned peoples from temperate climates, living under desert conditions, i.e. excessive sunlight, fly irritation, lack of opportunities for washing (Richards (1943)) and sand or dust irritation. Africans and Indians although affected were much less liable to desert sores than white men. Bettley (1943) considered that the desert sore was
closely associated with impetigo contagiosa and that it was probably a form of bullous impetigo analogous to pemphigus contagiosus.

A final factor was the almost invariable occurrence of desert sores on those exposed parts that were especially liable to light injuries, such as the elbows, forearms, hands and knees. Usually there was such a history of minor injury, e.g. small cuts and scratches.

In the treatment of desert sores the most successful methods used were (a) occlusion with elastoplast (b) ausol dressings (c) 3% sulphonilamide in vaseline. Unit medical officers were advised to admit to C.C.S. or hospital any cases which did not respond to treatment within two weeks.

Preventative measures which were being introduced at the onset of the battle were recommendations to replace shorts with slacks, the insistence of immediate first-aid for all injuries, however trivial, and also the trial of a preventative cream applied to the exposed skin surfaces. This cream consisted of,

<table>
<thead>
<tr>
<th>Sodium Stearate</th>
<th>3 parts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glycerine</td>
<td>1 part</td>
</tr>
<tr>
<td>French Chalk</td>
<td>5 parts</td>
</tr>
<tr>
<td>Distilled Water</td>
<td>10 parts</td>
</tr>
</tbody>
</table>

and was an odourless, light greyish, non-greasy cream which disappeared when rubbed into the skin.
After using this cream a minimum of soap and water took off all grease, oil and dirt on the hands and wrists. It had been devised to protect drivers, artisans and artificers etc., whose hands were continually in contact with paraffin, diesel oil or similar products likely to cause dermatitis. On the grounds that desert sores were to a large extent found in personnel working with transport companies and in workshops, priority of issue was made to these. The results were generally good but more extensive trials are necessary to confirm its benefit in desert sores.

24. M.Y.D. (NEUROSIS) AND PHYSICAL EXHAUSTION

(a) In July 1942 the Consultant Psychiatrist M.E.F. visited EIGHTH ARMY at EL ALAMEIN and reported that "everywhere morale was high, but that the effects of fatigue and severe physical strain were also evident".

During his tour he stayed at Field Ambulance Main Dressing Stations (M.D.Ss) and was able to see M.Y.D. (Neurosis) cases at an early stage. It was obvious that in the stress and hurry of battle a number of casualties who should not have left the battle area were being evacuated as "Bomb-shock", with "Blast", "Battle Stress" and/or similar diagnoses. Many of them were dehydrated, mildly confused with a slow reaction time, and would fall asleep on sitting or lying down. Investigation proved that TRUE M.Y.D.(N)
casualties were less than 2% of total sick and wounded, whereas with the usual diagnoses they were 7 - 10% of the total. The explanation was twofold, firstly, men were being unnecessarily evacuated to base with labels like those already quoted, and secondly, large numbers of purely exhausted men were being labelled as "Neurosis". It was accordingly recommended by the Consultant Psychiatrist that (a) the diagnosis of PHYSICAL EXHAUSTION should be permitted and used by R.M.O's in suitable cases and (b) that rest stations run by Field Ambulances be established somewhere along the coast to stop the tired soldier from being evacuated too far and thereby occupying hospital beds, to say nothing of depleting unit strengths.

The diagnosis PHYSICAL EXHAUSTION was adopted forthwith in the Middle East and was later (in October) approved by War Office. It proved most useful as the first nervous symptoms were in fact the result of extreme fatigue. The diagnosis was also preferred by medical officers and patients to the label N.Y.D.(N) which carried an undeserved stigma. The outlook in treatment improved as the medical officer was more willing to look after the case. It was thought that the term PHYSICAL EXHAUSTION might be dangerous in disguising the true neurotic cases but this was overcome by insisting that, if the symptoms under rest and observation persisted more than seven days, the
diagnosis was discarded and the diagnosis N.Y.D.(N) or (P) adopted.

An EIGHTH ARMY Field Ambulance was set aside for the care of Physical Exhaustion cases. It was located at IKINGI MARYUT. On admission these cases were allowed a good long sleep as they were tired out, often too tired to eat, and then given good meals and more rest. The collection and care of these cases at this Field Ambulance resulted in the return of the majority to their units after a brief period of rest and convalescence without hospitalisation, reducing materially the sick wastage and earning the great appreciation of unit commanders and men alike.

25. THE REORGANISATION AND INCREASED MOBILITY OF THE FIELD MEDICAL UNITS

The period of preparation for the great EL ALAMEIN offensive was remarkable in that although having withdrawn in face of a fast moving, well equipped and determined enemy, we were able so thoroughly and efficiently to improve our Field Medical Service that the standard of treatment a casualty received in the field was the highest ever attained. By dint of pooling experience of two and half years of desert warfare the medical units assumed many and new successful features. Increased mobility was the keynote of the metamorphosis.

We were building up a fighting force that was to be ready to surge forward as soon as the enemy broke
and it was essential to success that the Army kept in contact with the fast retreating enemy. This meant that medical units must ever be 'on the spot', following up, collecting wounded, giving surgical treatment at the earliest opportunity, and evacuating as quickly as possible.

The various new features are discussed under the following headings:–

1. The Armoured Units.
2. The Field Ambulance and Light Field Ambulance.
3. The Mobile Casualty Clearing Station.
4. The Field Surgical Unit.
5. Presterilized Dressings.

26. THE ARMoured UNITS

(a) The Casualty Collecting Vehicle.

In battle the collection of wounded from damaged armoured cars and tanks had always been a problem for the medical officer. For this purpose, he had no vehicle on the Regimental War Establishment but was usually allotted one or two ambulance cars from his brigade Light Field Ambulance. It was, however, hazardous and unsatisfactory for these vulnerable vehicles to approach a damaged tank in the heat of battle because the tank was usually still a target; only the wounded could be removed leaving the uninjured crew marooned and likely also to become casualties. Arrangements were therefore made to provide the regiment with a 15-cwt armoured car adapted to carry two stretchers and to act
as a casualty collecting vehicle. This vehicle was intended to carry a driver and a medical orderly and to be despatched to disabled tanks or armoured cars to collect casualties and marooned crews. For this reason it was inadvisable under the terms of the Geneva Convention to mark this vehicle with a red cross. The regimental medical officer was discouraged from travelling in the vehicle as it was considered he should be near the Regimental HQ where he would easily be found and casualties brought to him.

(b) Accessibility of Tank First Aid Outfits

Though not directly concerned with the medical officer it is pertinent to mention here that steps were taken to place a first-aid box in an easily accessible place outside and at the rear of tanks. This was done because it was found that when a tank was knocked out the crew had to jump out immediately regardless of their wounds as the tank became a target. In the haste of doing this they omitted to take with them the first-aid outfit, which was inside the tank and retrieving it was too dangerous an undertaking.

27. (a) THE FIELD AMBULANCE.

The War Establishment scale of eight ambulance cars was found to be insufficient for the Field Ambulance's commitments especially as it was often called upon to detach ambulance cars for duty with Armoured Regiments, motor battalions, patrols and columns. The scale was therefore increased to twelve.
(b) **THE LIGHT FIELD AMBULANCE**

The home War Establishment of Light Field Ambulances was not suited to desert needs and the summer of 1942 was occupied in adapting, in the light of experience gained, the home establishment to desert requirements by the provision of two extra 3-ton lorries for carriage of reserve petrol, water and rations, and the substitution for motor-cycles, which were of little use in the desert, of a proportion of bantams. Ambulance cars were increased from 16 to 20 for the same reason as with Field Ambulances.

28. **THE MOBILE CASUALTY CLEARING STATION**

The necessity of early and adequate surgical treatment for casualties especially the major wounds of head, chest and abdomen, was a lesson learnt in the last war. The chances of recovery of these types of casualties were in direct ratio to the length of time elapsing between receipt of the injury and surgical intervention.

In the Western Desert this treatment, to be adequate, necessitated the retention and nursing of cases after operation for forty-eight to ninety-six hours before they were fit to withstand evacuation over rough tracks to the nearest railhead. This treatment could not be carried out in Field Ambulances which had at all times to be mobile and able to change position at very short notice to conform with the movement of their respective Brigades. As "the C.C.S. is the first
place from the line in which full surgical treatment and some hospital accommodation is provided" (Nichols 1940, p.145), it was therefore necessary for the C.C.S. to be mobile or partially mobile to provide surgical teams and nursing facilities as soon as they were required.

In the advance in 1940 into Libya all three C.C.Ss. of our force were marooned in the rear for want of transport and therefore were unable to help their respective divisions which were 400 miles away.

Up to the 1941 Libyan offensive the C.C.S. was a relatively static unit. It had the minimum of transport for domestic needs in a static role. Although divisible into a light section and heavy section it was too cumbersome and, while 'moveable', was dependent on transport being supplied by 'Q' and, owing to other commitments, this rarely appeared.

In October 1941 three C.C.Ss. were hurriedly made mobile for the autumn offensive. The results were most gratifying for the C.C.Ss. kept in touch with and accompanied the advancing troops throughout the operations.

The term "Mobile C.C.S." was thus introduced but the mobility referred only to the light section which had been given the following transport to make it self-contained:

- 1 Motor-cycle
- 1 four-seater car
- 10 three-ton lorries
- 1 Water tank lorry
2 technical vehicles (Operating Theatre lorry) (Sterilisation lorry)

This enabled the light section to be sent forward and to open as a surgical centre at short notice. The heavy section was adapted for transportation by 30 three-ton lorries of a platoon of a General Transport Company R.A.S.C. Two of the original mobile operating theatres were gifts from the United States of America.

Following the success of the three Mobile C.C.Ss. in the winter and spring 1941-42 Desert Campaign it was decided in July 1942 to make all C.C.Ss. in the Middle East mobile, and priority was given to those serving with EIGHTH ARMY. A new War Establishment which included the above-mentioned vehicles had been produced. Also included were more nursing orderlies as well as other personnel to allow of sub-division of the unit into efficient light and heavy sections. The increase in personnel also provided for the constantly recurring labour required in the movement of the units and its dispersal at short notice. The equipment was similarly revised to exclude all cumbersome and unnecessary items and to incorporate all the latest improvements.

The reorganisation of the C.C.Ss. in EIGHTH ARMY was completed in September and thus assured the fighting troops of sound medical support.

Nursing sisters, whose presence in the desert had hitherto not been encouraged, were sent up to join their C.C.Ss. in September and brought about an even higher standard of comfort and nursing care in the field.
29. **THE FIELD SURGICAL UNIT**

The aim of the Army Medical Services in active warfare is to make skilled surgery available to casualties as early as possible. This is essential in abdominal wounds and has been stressed by the War Office (1943), Ogilvie (1941 and 1942), Acuitin (1940), Smith (1942), Shroeder (1942). It was achieved by "bringing the surgeon to the patient" in units such as the Mobile C.C.S. and the Field Surgical Unit, the latter unit having been developed in the summer of 1942 during the preparations for the EL ALAMEIN offensive.

The maximum operating capacity of a surgeon is about twenty cases in twenty-four hours only a quarter being major procedures (D.M.S., M.E.F., Memorandum on Surgery 1942). With this in view the pre-war establishment of a 1200-bed General Hospital included in its staff a "moveable" (but not "mobile" in the sense of possessing transport) surgical team which could be sent forward to reinforce surgical centres in the field during periods of great activity. The surgical team consisted of a surgeon, anaesthetist, a theatre nurse and an operating-room assistant, with a set of general surgical instruments.

Army surgical equipment is based on an allowance of one set of general instruments to every surgeon on the establishment of a unit and one set of special-instruments (head, chest, intestinal etc) to every hospital and C.C.S. A surgical team detached from its hospital and sent forward to work took its personnel and general instruments, but relied on the host unit.
for operating accommodation, sterilizing facilities, replenishment of stores, special surgical and anaesthetist apparatus, and the sorting and care of its patients. It also relied on being moved with the host unit and this arrangement proved inadequate in the earlier Libyan Campaign because the C.C.S.s. themselves were static. This was partly remedied when the C.C.S.s. were made 'mobile'. But, the situation was still unsatisfactory because the transport of the mobile C.C.S. was only sufficient for its own needs and was inadequate for an additional surgical team.

Till this time also, personnel, suitable equipment and transport had not been sufficient to meet EIGHTH ARMY's request for an increase in teams and for teams to be independent units.

In June 1942, however, it was decided that the system of effectively reinforcing a C.C.S. or M.D.S. with a surgical team could be remedied only by making the latter mobile and to reorganise the team into a "Field Surgical Unit (Middle East Type)" which would form the basis of forward surgery and a fluid surgical reserve at the disposal of D.D.M.S. Army. This unit was to be self-contained as regards equipment and transport and to rely on the host unit only for rations, accommodation, sterilization facilities and care of patients. It was also decided that Field Surgical Units should be allotted to Army on the scale of two per division.

The reorganisation was carried out in September and eight units were sent to EIGHTH Army.
This marked one of the notable stages in the preparation for the October offensive when the results of early surgery in the field were an ample reward to those who conceived the idea of a Field Surgical Unit.

The personnel of a Field Surgical Unit consisted of a surgeon, an anaesthetist, a clerk, an operating room assistant, two nursing orderlies and a batman. The transport was a four-seater car and a three-ton lorry. The theatre was an I.P.P. (Indian Pattern Private) tent with canvas floor; the sterilizing annexe was a 180-lb tent, and bivouac shelters were supplied for personnel. A portable operating table and a battery lighting set were provided. As an autoclave was beyond the capacity of this small and highly mobile unit sterile dressings and theatre linen were carried for 100 casualties placing reliance for resterilization on the host unit during lulls.

A set of simple surgical instruments was provided and proved sufficient to trim a skull wound, reset a rib, open a spine or repair an intra-abdominal injury.

30. PRESTERILIZED DRESSINGS

When busily engaged for any length of time a Surgical Team was not long in exhausting its supply of sterilized dressings and theatre linen and if the C.C.S. or Field Ambulance was also busy there was difficulty in getting these articles resterilized. To meet this an improvised presterilization service was instituted in CAIRO in August 1942. The following six standard types
of packets were prepared and sterilized in sealed tins made from salvage: -

- Tin A - small swabs
- Tin B - large swabs
- Tin C - small set of linen, gowns, caps and dressings for an abdominal operation
- Tin D - small set of linen, gowns, caps, masks and dressings for a general operation.
- Tin E - vaseline gauze
- Tin F - vaseline sulphanilamide gauze.

These tins were sent up to EIGHTH ARMY on a shuttle service by road, rail or air for distribution, and a reserve was built up at the Advanced Depot of Medical Stores for times when the ordinary supply ran out or was not available. So highly appreciated was this service and so great the demands that the preparation and presterilization centre was later put on a permanent footing and designated a SURGICAL DRESSING STERILIZATION UNIT with a staff of one Nursing Sister (in charge) and fifteen A.T.S. Other Ranks.

31. MEDICAL UNITS GIVEN TO EIGHTH ARMY

The following NON-DIVISIONAL units were placed at the disposal and under command of the Deputy Director of Medical Services (D.D.M.S.) EIGHTH ARMY: -

- C.C.Ss.

One Non-mobile C.C.S. (already open at GHRABANYAT)
Six Mobile C.C.Ss.
In reserve: Two Mobile C.C.Ss.
One Non-Mobile C.C.S.

<table>
<thead>
<tr>
<th>Ambulance Cars</th>
<th>Ambulances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three Motor Ambulance Convoys</td>
<td>(M.A.Cs.)</td>
</tr>
<tr>
<td>Two Sections of M.A.Cs.</td>
<td></td>
</tr>
<tr>
<td>Three Indian Motor Ambulance</td>
<td></td>
</tr>
<tr>
<td>Sections</td>
<td></td>
</tr>
<tr>
<td>Two American Field Service</td>
<td></td>
</tr>
<tr>
<td>Ambulance Car Companies (each</td>
<td></td>
</tr>
<tr>
<td>of two platoons)</td>
<td></td>
</tr>
<tr>
<td><strong>Total Ambulances:</strong></td>
<td></td>
</tr>
</tbody>
</table>

- Field Surgical Units - Eight
- Field Transfusion Units - Four
- Field Ambulances
  - Three Corps Field Ambulances
  - One Army Field Ambulance
- Field Hygiene Sections
  - One Army Field Hygiene Section in addition to all Divisional Field Hygiene Sections (under Corps control).

Miscellaneous Units
- One Advanced Depot of Medical Stores
- One Mobile Ophthalmic Unit
- One Mobile Bacteriological Laboratory
- One Mobile Hygiene Laboratory
- Two Mobile Dental Units
While all arrangements were being made for a large scale offensive the actual date and time of the attack was, for security reasons, not divulged to G.H.Q. Directorates. Only a selected few high-ranking officers were in possession of this information and to the rest of G.H.Q. Staff the commencement of the offensive was known as 'D' day.

In order that the enemy should have no inkling that 'D' was approaching, medical units were forbidden to erect as much as a single additional tent. This was a serious handicap to C.C.Ss. These units were placed on the sites they were to occupy with their tentage laid out on the ground. Luckily one C.C.S. had been working in the Army Medical Area CHARKANYAT since the withdrawal to the EL ALAMEIN line, and this was the only C.C.S. in a position to function when the operations began at 22.00 hours on October 23rd. That night three other C.C.Ss. in the Army Medical Area erected their canvas, and 48 hours later these four units and a Field Ambulance had dealt with 4,800 casualties. This must be regarded as an outstanding performance.

In the Base Area no inkling that increased casualties might be expected could be given. The Medical Directorate was forbidden to issue any orders regarding the clearance of hospitals and no additional Ambulance Trains were allowed to be run. As the distance from the forward lines to the nearest General Hospital
was barely 65 miles it looked as if the Base units might be caught short with an early rush of patients. The available empty beds in EGYPT on the day the battle began were 12,117. 'G' Branch estimation of casualties was 10,000.

33. EVACUATION ARRANGEMENTS

The table of evacuation arrangements in accordance with 'G' estimate of casualties is given in Table III.

Road

As it was particularly desirable to avoid having ambulance cars passing through the streets of ALEXANDRIA to the three General Hospitals in that area it was decided to establish a rear centre for walking and sitting cases at ABD EL QADR. Accordingly a Light Field Ambulance was established there in the former hospital buildings, and accommodation and feeding arrangements for 750 patients were provided. Evacuation from its centre to the base areas (CANAL and CAIRO) was to be carried out by two special temporary trains composed of ordinary second-class passenger coaches reinforced with one independent ward coach. These trains were each able to carry 600 walking and sitting patients. The only cases carried by Ambulance Car to ALEXANDRIA were Australians, Fighting French, Greeks (as their hospitals were in that area), and cases too ill to stand a long train journey to the CANAL Area.
Rail

Lying cases were to be evacuated by Ambulance Train to the DELTA. Sitting cases were only to be evacuated by this means if there were insufficient lying cases to fill the Ambulance Train.

Three Ambulance Trains were held in readiness: one at AMIRIYA, one at ALEXANDRIA and one at CAIRO. As the AMIRIYA train moved up to GHARBIYYAT the other two moved forward to AMIRIYA and ALEXANDRIA respectively. It was thus possible to ensure at least two trains to GHARBIYYAT daily. Each Ambulance Train had accommodation for 300 lying cases.

Air

Only two Ambulance Aircraft proper were available, (one U.D.F. and one Australian). Arrangements were made with R.A.F., H.Q., that all planes carrying stores forward would carry patients back. The landing ground some three miles from GHARBIYYAT was used for this purpose. Australian cases were to be flown to the Australian Hospital at BUSEILLI, head and chest cases to HELIOPOLIS for special centres in CAIRO.

Sea

Arrangements were made for a Hospital Ship to stand by to clear cases from the ALEXANDRIA group of Hospitals to the Hospitals in SYRIA and PALESTINE.

34. HOSPITAL BED ACCOMMODATION

Hospitals: ALEXANDRIA Hospitals which, since the withdrawal had acted as C.C.S.s., were unobtrusively
reinstated to their proper function and an Australian General Hospital was moved from SYRIA and established at BUSELLI (east of ALEXANDRIA).

D.Ds.M.C., EGYPT, PALESTINE and SYRIA were told to arrange with Cs.C. Hospitals that on receipt of information from the Medical Directorate at G.H.Q., as to 'D' day, as many convalescent and semi-convalescent patients as possible should be sent to Convalescent Depots.

Plans for “crisis” expansions were prepared not only in Hospitals but also in Convalescent Depots, ready to put into operation when the order was given.

Cases were moved by ship (see table VIII) and train from the hospitals in EGYPT and SYRIA thus giving the maximum number of empty beds in the CAIRO and CANAL Areas. All this had to be done very quietly, and increased clearance of cases by trains was carried out by adding ward coaches to the normal trains, not by running additional Ambulance Trains.

Camps for Light Cases: Plans were prepared to erect a Camp in the CANAL Area for the reception of light cases which did not require a hospital bed. This camp was to hold 750 - 1,000 cases.

The Hadfield Spears Fighting French Hospital Unit opened 200 beds at TOLUMBAT (east of ALEXANDRIA) and a Mobile Military Hospital ran a similar number of beds in the same area. The latter unit was used in this manner whilst still in reserve for EIGHTH ARMY.
The preparatory phase for the EL ALAMEIN Battle involved a tremendous strain on Medical Supplies. This was due to:

(i) All field medical units having to be re-eqipped after the withdrawal.

(ii) New units from U.K. having to be equipped to make good losses at sea and also to make them up to Middle East Scales.

(iii) Equipping reorganised and newly formed units e.g. Light Field Ambulances, Field Surgical Units and Mobile C.C.Ss.

(iv) Adequate reserves of medical stores requiring to be placed at strategic places for the advance.

All items of field medical equipment were in short supply and in Section 14 under 'Salvage' reference has already been made to shortage of some important medical supplies e.g. surgical instruments, Laboratory and X-ray apparatus; to this list can be added bismuth salts, Sodium Pentothal, Sulphathiazole, and Sulphaguanidine. The world shortage of bismuth salts necessitated the strictest control of their use. The use of Bismuth Carbonate was restricted to General Hospitals and only on the authority of the C.C. Medical Division. At this period only there was a great shortage in the Command of Sodium Pentothal, and its use was restricted to forward medical units. A small amount
only was made available for cases requiring a long series of operations e.g. plastic and orthopaedic cases for whom Pentothal was an excellent drug for induction of anaesthesia. Anaesthetists were urged in such cases to use if possible the weaker drug Sodium Cyclonal.

Sulphaguanadine was also limited and its use was restricted to:

(i) Severe Acute Bacillary Dysentery of any type
(ii) Shiga Dysentery of moderate or severe type
(iii) Sub-acute and chronic dysentery in whom sigmoidoscopic examination revealed the presence of colonic ulceration which failed to heal.

(b) Medical supplies reached EIGHTH ARMY through an Advanced Depot of Medical Stores (located at GHARBAMITYAT Medical Area) from a Base Depot of Medical Stores at ALEXANDRIA.

36. THE BLOOD TRANSFUSION SERVICE

This was the first occasion on which Blood Transfusion was used on a very large scale, and the description of the preparations made necessarily overlaps into the battle phase.

(a) Blood

The provision of 'stored' blood was complicated by the fact that there were few British troops in the CAIRO Area, and the majority of these had already been used as blood donors. It was therefore
decided to take blood from troops in the GENEIFA Area (on the west bank of the Great Bitter Lake between ISMAILIA and SUEZ).

On 12th October a detachment of the Base Transfusion Unit in CAIRO (augmented by two Field Transfusion Units which were in reserve), consisting of one Officer, ten R.A.M.C. Other Ranks and three R.A.S.C. Drivers, were despatched to a General Hospital in the GENEIFA Area.

Three days were devoted to organising the Bleeding Centre, blood grouping, and testing group 'A/2' and 'B/3' men to select suitable donors for bulk supplies of high titre grouping serum. Officers Commanding Units were interviewed, propaganda posters distributed, and a Blood Transfusion film shown at various local cinemas to encourage volunteer donors.

All apparatus for taking blood was provided, sterilised and made ready for use, by the parent unit in CAIRO, so that the Detachment was concerned only in grouping, bleeding, capping, labelling and packing. The blood was sent in refrigerator trucks and ice-boxes to CAIRO where it was packed for despatch by air. Two refrigerator trucks were employed in transporting the blood between GENEIFA and CAIRO (approximately 30 miles).

Bleeding was carried out at first in two I.P.P. (Indian Pattern Private) tents, using eight stretchers for donors. Later, another I.P.P. tent
was added, and up to twelve stretchers used at one time. Suction was successfully provided by a foot pump with reversed valve fitted to a mercury manometer with pressure tubing round the tents and a lead to each stretcher. The transfusion department of the General Hospital was taken over for the capping, labelling and packing of the blood. In that department a sterile room was prepared for this purpose, and tests showed that the standard of sterility achieved was satisfactory.

Grouping was carried out daily at various units by a grouping team.

Bleeding commenced on 16th October, and Table IV shows the number of bottles of blood, and of certain other products for intravenous administration which were despatched to units between 16th October and 6th November, after which date demands were negligible. The actual number of donors bled was in excess of the bottles of blood sent forward as imperfectly filled bottles were used for other purposes, and a certain number of bottles were used locally.

The number of bottles of blood plasma and sterile solutions sent to EIGHTH ARMY from 16th October to 6th November 1942 is given in Table IV.

It was found that the Detachment at its original strength was unable to produce more than a steady 150 to 200 bottles of C/4 blood daily. On 20th October, another Field Transfusion Unit
was attached, on 25th October eight more Other Ranks and on 27th October four more Other Ranks, from the Base Transfusion Unit. This eased the situation but even so bleeding had to go on continuously from 0745 hours to 2330 hours or midnight, with short intervals for meals, to produce the requisite number of bottles.

To obtain 400 group O/4 donors it was found necessary to group approximately 1,000 volunteers. Careful organisation was required to ensure a constant stream of donors.

About 26th October, it became obvious that if demands continued at the high figure which had then been reached, the supply of donors would be exhausted in a relatively short time. To ease the situation the Deputy Director of Pathology visited the forward area and discussed the supply difficulties with those concerned, with a view to restricting transfusion to cases showing definite indications for such treatment. Co-operation was readily enlisted; but, as it happened, the danger point had already been passed. Casualties from this time onwards rapidly decreased, and there was no difficulty in providing ample quantities of blood for all purposes.

The parent unit in CAIRO was severely strained in producing the required apparatus daily, in addition to preparing intravenous fluids, organising despatch, etc., etc. The available
personnel on 16th October, including the detachment and augmented by two reserve Field Transfusion Units and certain loaned personnel, was three officers and forty other ranks (R.A.M.C. and Friends Ambulance Unit), seven R.A.S.C. drivers and one R.E. sergeant. In addition seventeen natives (including two carpenters and two plumbers) were employed for cleaning apparatus, box making etc.

These numbers proved quite inadequate to cope with the volume of work during the peak period, and on 26th October eighteen R.A.M.C. other ranks, and on 28th October a further seven R.A.M.C. other ranks, were temporarily posted from the Base Depot. These men had no previous training in blood transfusion, but nevertheless filled the gap, and enabled the work to be kept up to date. From 16th October to 5th November, 10,679 bottles or ampoules containing sterile solutions for intravenous use were sent forward.

(b) Plasma

At the beginning of the battle, all C.C.Ss. and Field Ambulances were stocked with plasma up to, and in many cases beyond, the authorised scale.

(c) Glucose Saline

As in the case of plasma, units were fully stocked at the beginning of the battle. Demands were unexpectedly high owing to the large number of abdominal cases.

The maximum output of distilled water from the
two Manne sty stills and the other small stills available at the Base Transfusion Unit was 450 litres a day. This quantity was completely used up in coping with the various demands but a sufficient reserve to tide over the peak period was in stock, and no shortage occurred, though at one time the situation was a little disquieting.

(d) Distribution of Blood and other Transfusion Stores

The problem presented in this battle was a new one. Lines of communication were relatively short, but large numbers of casualties were anticipated, numerous surgical teams were forward, and, because of the relatively static type of warfare expected in the early stages, most Field Ambulances as well as C.C.S.s. were in a position to carry out transfusion.

For these reasons it was decided that certain Field Transfusion Units must devote themselves largely to distribution.

The chain of supply arranged was as follows:

(i) From GENETPA to CAIRO Base Transfusion Unit by refrigerator truck.

(ii) From Base Transfusion Unit to CAIRO Air Transport Centre by truck.

(iii) From CAIRO Air Transport Centre to Advanced Air Transport Centre (A.A.T.C.) by transport plane.

A Field Transfusion Unit was attached to the A.A.T.C. for the purpose of receiving, if necessary storing, and forwarding on the blood. During
the EL ALAMEIN battle this unit was located at Kilo 148, CAIRO - ALEXANDRIA Road.

At first the blood was sent in insulated boxes. The standard box was tin-lined (for insulation) and held 10 bottles of blood with 5 giving sets or 6 bottles of distilled water; 6 of dried plasma and 3 giving sets. The R.A.F. asked that the weight should be reduced as much as possible. This was successfully achieved by packing the already cool blood in bottles, interspersed with small bottles of ice, in plain, non-insulated boxes. On arrival at A.A.T.C., much of the ice was still unmelted and the blood perfectly cool.

(iv) From A.A.T.C. by ambulance or refrigerator truck to the Medical Concentration Area at CHABANIYAT where an augmented Field Transfusion Unit (the Blood Supply Unit) was in charge of distribution.

Blood was normally sent by air. The timing of blood distribution was therefore as follows. Blood taken in GEMEIFA reached CAIRO up to midnight. It was prepared for despatch and sent to CAIRO A.T.C. early next morning, reached the A.A.T.C. Field Transfusion Unit about 0915 hours, and Blood Supply Unit about 1200 hours.

Plasma, glucose saline, and other stores went by truck (or ambulance train if possible).

(v) The Field Transfusion Unit acting as Blood Supply Unit issued blood and all other transfusion
stores : -
(a) To Medical Units in the Medical Concentration Area and to Field Transfusion Units.
(b) To the "Advanced Blood Bank".

It is estimated that about two-thirds of the very large volume of work done by this unit was concerned with distribution and only one-third in actual transfusion.

(vi) The "Advanced Blood Bank" consisted of a refrigerator truck from the Base Transfusion Unit, with orderly and driver, and was stationed at the junction of the main desert road, and first at one and then at another of the transverse roads supplying the southern sector of the line. It met the demands of M.D.Ss. and Light Sections of C.C.Ss.

(vii) Three Field Transfusion Units located in the Corps areas issued blood and other transfusion stores as required to medical units in their proximity.

The distributing units were given the almost equally important duty of collecting used sets and "empties". Experience quickly showed that there was but one satisfactory way of doing this, namely, by issuing fresh material only in exchange for used. Exceptions had to be made to this rule from time to time, but on the whole it worked well and resulted in satisfactory returns. It also avoided any possibility of 'hoarding' by over-anxious units.
37. THE OPERATIONAL PLAN FOR THE EL ALAMEIN BATTLE

The grouping of the EIGHTH ARMY for the battle on 24th October 1942, and the enemy grouping are shown in Appendix 'F'.

The EIGHTH ARMY was composed of the 10, 13 and 30 Corps. The northern portion of the line was held by 30 Corps which included the 9th Australian, 1st South African, 4th Indian and 51st Highland Divisions and the 23rd Armoured Brigade. 13 Corps was south of 30 Corps holding the line to the QATTARA DEPRESSION with the 50th Northumbrian Division, the Fighting French Brigade, the 1st Greek Brigade and the 7th Armoured Division while the 44th Division was the tactical reserve.

In the rear of 13 and 30 Corps was the powerful and highly mobile 10 Corps comprising the 1st and 10th Armoured Divisions and veteran 2nd New Zealand Infantry Division.

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

The Army Commander's plan was to make his major attack in the NORTH, with 30 Corps, with a subsidiary attack in the SOUTH, with 13 Corps.

Two gaps were to be made in the minefields in the NORTH through which 10 Corps was to pass, the attack was then to swing SOUTH with the armour protecting the WESTERN flank.
In the SOUTH one gap was to be made through which 7th Armoured Division was to pass, the attack was then to swing NORTH with the armour protecting the WESTERN Flank and attacking as opportunity offered. But the attack in the SOUTH was not to be pressed if heavy casualties were to result as it was likely that some of 13 Corps' infantry and armour would be required at a later stage to assist in the break-through in the NORTH.

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

EL ALAMEIN to EL AGHEILA

(24th October 1942 – 12th December 1942)

1. THE BATTLE OF EL ALAMEIN

(See also map at Appendix 'F')

Although outside the scope of this administrative survey, a brief description of this historic battle is given, and for this reference has been made to Middle East Training Manual No. 7 1942 (October and November) on "Lessons Learnt from Operations".

At 2200 hours on 23rd October EIGHTH ARMY attacked. The attack was planned with the meticulous thoroughness typical of General MONTGOMERY and much of it had been rehearsed.

The operation was divisible into two phases, the first of which consisted of an initial full scale infantry "break in" attack with limited army tank support, against prepared enemy defences heavily mined, but not strongly wired, with the object of opening up a gap for the move forward of armoured formations, and at the same time creating for them the opportunity for decisive action in the open country beyond.

This initial attack was followed by a period of twelve days "dog fight", comprising a series of highly co-ordinated infantry attacks, on narrow fronts, occasionally with army tank support, widening and extending the initial gap, until such time as the enemy
minefield area had been secured and was opened for the break-through battle by armoured and mobile formations. The second phase of the battle was the break-through of our armour on 3rd November south of the railway between the 15th and 21st German Panzer Divisions, and from 4th November the battle became one of rapid movement in pursuit of the enemy.

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

The battle was fought in a desert terrain which was featureless and entirely lacking in cover and landmarks. There was a mass of known and unknown minefields and all vehicle movement was initially restricted to narrow track gaps through these minefields and presented many difficult traffic problems.

Later, however, the movement of wheeled and tracked vehicles was unrestricted when clear of the minefields.

The success of the operation was due to intensive training, co-operation and initiative.

All formations including medical units had been put through a period of intense training during which the Commander had intimated his intention, the aim of the training and the standard to be achieved.

Co-operation between the three Services, and within the EIGHTH ARMY itself, was of the highest
standard and was the result of intimate planning, close liaison between the respective Service staffs and intensive training.

By gaining and keeping the initiative the enemy was kept guessing.

The enemy was deceived as to the actual time and place of the attack. This initial successful break-in was followed by a number of powerful highly co-ordinated attacks on varying axes, but all inter-related, aimed at clearing the minefield zone, crippling the enemy and preparing the way for the final blow. The enemy was never allowed to recover from the initial setback of the break-in and for this reason his stage management of the battle was at fault throughout. His troops fought stubbornly but he was forced continuously to parry blows, seldom to initiate them. It would seem that he maintained, and fought in, mixed battle groups long after their usefulness had ended. His counter-attacks were piecemeal and bore no resemblance to his massed effort of the past, and he was in fact forced to repeat many of our faults of certain earlier operations.

2. THE ADVANCE

On 4th November EIGHTH ARMY advanced with 10 Corps leading the pursuit followed by 30 Corps, while 13 Corps remained behind to help in the huge task of clearing the battlefield.

The advance was rapid and Table V illustrates
the distance covered and the dates on which localities were occupied, together with the dates on which railheads and ports were opened and water supplies made available. MATRUK was reached on 8th November and, after delay due to weather, our forces occupied SOLLUM and CAPUZZO on 12th November, followed by TOBRUK on 13th. BENGAzi was captured on 20th November and the Axis AGHETIA defences were reached on 23rd November. Owing to the speed of our pursuit the enemy had been unable to carry out any serious demolitions.

In the EL AGHETIA area the enemy was back on prepared defensive positions and a halt was called to enable the operational and administrative staffs to prepare for the next phase. This involved reconnaissance, regrouping of tank and air forces and the rapid development of the advanced bases at TOBRUK and BENGAzi.

3. **DEVELOPMENT OF WATER SUPPLY**

The provision of an adequate water supply by the desert pipeline was important in determining the speed at which the railway could be brought into operation and also to allow the rail and road routes to be used for petrol, ammunition, food supplies and evacuation of casualties.

The pipeline was severely damaged and 400 breaks had to be repaired; paradoxically enough the breaks had been caused mainly during our May - June 1942 withdrawal and later by our own shelling and bombing.

The main difficulties encountered in repair work were the replacement of 5 miles of pipe (removed
by the enemy) west of CHARING CROSS (12 km south west of MATRUH), the repair of damaged reservoirs, and of extensive flooding by rain of certain areas through which the pipeline ran.

Good progress in the repair work was made, for by 11th November water was being delivered at DABA, on 25th November at SEMILIA (east of MATRUH), and on 7th December NILE water was available at the pipehead at MISHEIFA, 265 miles from ALEXANDRIA.

Wells were drilled and aqueducts put back into commission at DABA, FUKA, MATRUH and SIDI BARRANI by 19th November. The wells at FUKA and MATRUH were of low salinity and, blended with NILE water, their output was used for railway locomotives.

At BARDIA water had initially to be landed in drums by sea as our demolitions during the 1942 withdrawal had been thorough, but the aqueducts were recommissioned by 16th November.

At TOBRUK there was to begin with a considerable water shortage, and water had to be delivered by sea. A reduced output from the aqueducts was, however, available by 20th November.

4. WESTERN DESERT RAILWAY

The opening of the railway progressed rapidly. The speed was determined by (a) the rate of repair of the permanent way (b) the provision of adequate water for locomotives and (c) the opening of signal communications.
(a) Repair Work

East of DABA the destruction was great; west of DABA, and as far as TOBRUK, the damage was of a minor nature except for the presence of mines. By 25th November the line was repaired as far as TOBRUK.

(b) The Railway Water Supply

Initially water was delivered by rail tank car until the pipeline was able to deliver water as indicated already. By 7th December steam locomotives operated to CAPUZZO and Diesel locomotives to TOBRUK.

(c) Railway Signal Communications

Repair of railway signal communications was very difficult and as they often broke down, resulted in delay of rail traffic. In a short time, however, these too were operating satisfactorily.

(d) Railheads

The dates of opening of railheads are shown in Table V.

During his occupation of TOBRUK, the enemy had extended the line of our former railhead at BELHAMED as far as TOBRUK.

By 1st December, twenty-eight days after the pursuit began, the railhead at TOBRUK was opened and 335 miles of railway cleared of mines and repaired. Then, in spite of shortage of railway operating personnel, line washouts, violent sandstorms, etc., an average of six trains per day
with a peak of eight was being operated.

5. ROADS

As the desert could be used in dry weather road demolitions were no great hindrance. After the roads through the EL ALAMEIN battlefield area had been repaired the first delay was caused at SOLLUM where, however, demolitions were quickly repaired. Many major road repairs had to be carried out between TOBRUK and AGEDABIA. As all these commitments were so great a strain on our resources of plant, labour and material, that all road repair and maintenance had to be confined on the forward roads.

6. OPENING AND OPERATING OF HARBOURS AND PORTS

(a) MERSA MATRUH was occupied on 8th November. There were no demolitions but owing to mines the harbour did not operate till 11th November, meanwhile small craft discharged at SMUGGLERS COVE, east of MATRUH. Hospital Ships were not used at this port.

(b) BARDIA was captured on 12th November. Discharge began on 16th November.

(c) TOBRUK, entered on 13th November, had been further damaged by our bombing and enemy demolitions. Little difficulty, however, was experienced in opening the port and the first discharge took place on 16th November.

(d) DERNA was too small a harbour to be of any great value except for local maintenance.
(c) BENGASI was occupied on 20th November and had been more thoroughly damaged than TOBRUK. It was, however, able to operate six days after occupation. Twenty-five usable lighters left behind by the enemy were much appreciated.

In stormy weather this harbour was not safe for large ships, and hospital ships had occasionally to delay loading and remain outside the harbour till the weather calmed.

7. MAINTENANCE POLICY

To carry our forces on from west of TOBRUK to the eastern frontier of TRIPOLITANIA, maintenance of EIGHTH ARMY had to be based first on TOBRUK and later on BENGASI.

This was effected by delivery of stores mainly by rail at each railhead as it opened up to TOBRUK, by road from successive railheads and by maximum discharge at harbours till TOBRUK port was fully in operation.

After the capture of BENGASI, maintenance was mainly by sea to that port using also to capacity the railway to TOBRUK and road transport westwards.

EIGHTH ARMY demands were planned about two weeks ahead of the delivery period and had to be closely related to the capacity of maintenance by rail and sea.
8. AIR TRANSPORT

(a) Air Freight

The demands for air freight increased enormously as the L of C lengthened westwards. When our forces were at AGEDABIA air transport was operated to forward landing grounds from CAIRO. Only stores for which there was an immediate demand owing to an acute shortage were sent by this means. All demands for air freight were co-ordinated by 'Q' Staff/Army and passed to G.H.Q., giving a priority. The average lift was 3,000 lbs per day.

(b) Personnel

There was an increased demand for movement of personnel by air as our forces advanced. Liaison Officers, Heads of the Administrative Staff and Services, specialists and reinforcements all had to be moved in the shortest possible time.

9. RECOVERY OF EQUIPMENT AND VEHICLES

As the Army moved westwards vast quantities of equipment of all types was left in battle areas of EL ALAMEIN and up to TOBRUK.

The recovery and overhaul of this valuable equipment and of the vehicles dispersed over a large area was a huge problem, and, while some were evacuated by rail, those dispersed in areas remote from the railway could only be inadequately evacuated owing to the magnitude of the task and the lack of available personnel and transport.
10. **SIGNALS COMMUNICATIONS**

Owing to the long distances covered in a short time, the amount of line repair work which had to be undertaken, and to several setbacks owing to storms, communications with Rear H.Q., EIGHTH ARMY became uncertain and unreliable, but soon a satisfactory system was set up using wireless.

In addition, an air letter service was operated between BENGASI and CAIRO via TOBRUK and MATRUH and this proved the most satisfactory method of clearing the heavy volume of traffic.

11. **FOOD SUPPLIES**

Every effort was made from the start of the offensive to restrict the consumption of the battle ration to short periods under seven days and to keep rations up to the full Middle East Field Service Scale supplemented by fresh rations whenever possible. Frozen meat was sent up to TOBRUK in insulated wagons and provided occasional fresh issues to troops in that area. Field Bakeries were established at MATRUH and TOBRUK before the end of November.

12. **REINFORCEMENTS**

Reinforcements to EIGHTH ARMY were sent up initially by rail, when the railway was put back into commission, and from TOBRUK onwards by road. At this stage it was too risky at sea to send personnel ships to TOBRUK and BENGASI.
G.H.Q. were kept informed of EIGHTH ARMY'S requirements by a daily statement and medical reinforcements were demanded on a weekly basis by D.D.M.S., ARMY.

Transit Camps moved forward close behind EIGHTH ARMY and were established successively at AMIRIYA, MATRUH, TOBRUK and BENGASI.

13. PRISONERS OF WAR

A 10,000 Prisoner of War Camp was attached to EIGHTH ARMY and moved forward in its rear collecting and arranging for the disposal of all Prisoners of War. Cages were constructed at BURG EL ARAB, MATRUH and BARDIA but closed when a cage was constructed at TOBRUK and a large camp at BENGASI.

All prisoners of war were sent back to the Main Reception Camp in the DELTA by road and rail and later by sea from BENGASI. Seriously wounded and sick prisoners of war were evacuated through normal medical channels.

The number of prisoners received at the Main DELTA Reception Camp and hospitals between 24th October and 13th November was 8,572 Germans and 23,566 Italians.

14. MEDICAL ARRANGEMENTS - PHASE I

The first phase of the EL ALAMEIN battle was from the start of the attack on the night of 23rd October till 3rd November when there was heavy fighting against strongly fortified positions. Infantry and
artillery were chiefly involved and casualties were heavy.

The Field Ambulances and Casualty Clearing Stations, with the attached Field Surgical Units, were all in prepared positions and were able to cope with wounded to their maximum capacity. But they arrived in batches so large as to put a great strain on the sorting and operating mechanism of these units.

As will be seen from the evacuation table (Table VI) casualties were very high in the first few days of the battle but corresponded favourably with the estimate which had previously been made (Table III).

Many patients who would, under conditions of lesser stress, have been operated upon, were necessarily evacuated with their first field dressings and emergency splinting in place. Careful selection was undertaken, however, and as a result of this and care in evacuating transport and the regular use of sulphonamides, few suffered from the added delay. Nothing but praise was given by the Base Hospitals who received the cases in excellent condition.

As soon as the battle started the C.C.S.s. at CHARBANIXAT which had hitherto not been allowed to put up their tents now opened with the utmost speed and were able to cope with the huge number of casualties. At the same time the clearance of ALEXANDRIA Hospitals was immediately effected.

Rail evacuation on the first day of the battle was seriously hindered owing to a petrol train having
been hit and set on fire between IKINGI-MARYUT and GARRANIZAT. D.D.M.S., EIGHTH ARMY overcame this difficulty, however, by calling up every available ambulance car from ALEXANDRIA to bridge the gap. Within 24 hours the rail was quickly cleared and evacuation continued according to plan.

After the first gains in the Northern sector, a ward coach was run forward to EMAYID Station to remove a number of abdominal cases which had been operated on and held in M.D.Ss. and Light Sections of C.C.Ss.

A diagram of the system of evacuation is given at Appendix 'G'.

Apart from the railway mishap mentioned above evacuation by road, rail, air and sea went according to plan and reflected great credit on all concerned who worked unstintingly and wholeheartedly assuring the sick and wounded of rapid transit to the quiet and comfort of base hospitals.

The part played by the Light Field Ambulance at ABD EL QADR was outstanding; by accepting all the lightly wounded and sick it assured priority of evacuation to the many more serious cases and also enabled the lighter cases quickly to rejoin their units after a good rest.

15. MEDICAL ARRANGEMENTS - PHASE II

with the break-through of our armour on 3rd November the battle became one of rapid movement.
The mobile medical units constantly changed their position in support of the advancing troops.

The number of casualties sustained by our troops in this phase was small and the work of the surgeons was limited to the care of the more seriously wounded enemy.

From EL ALAMEIN onwards sick and wounded were quickly treated and evacuated through Field Ambulances and Mobile C.C.Ss. with Field Surgical Units and Field Transfusion Units all of which kept pace with the quickly advancing troops by a series of leapfrog movements.

C.C.Ss. were established successively at DABA, GERAWLA (10 miles east of MATRUH), SIDI BARRANI, SOLLUM, CAPUZZO, TOBRUK, DERNA, BARCE and BENGASI.

As far as TOBRUK evacuation had been by road, rail and by air for serious cases. From TOBRUK hospital ships took over the main evacuation. When BENGASI was reached and subsequently EL ACHELLA the line of evacuation was as follows :-

Road - From Field Ambulances to a Medical Area, seven miles south of BENGASI, thence by stages to C.C.Ss. at TOBRUK Railhead. This was system until hospital ships plied to BENGASI.

Rail - From TOBRUK every third day by ambulance train to the DELTA.

Sea - From BENGASI by Hospital Ship to ALEXANDRIA.

Air - Serious cases from MSUS and BENNA and later EL HASEBIAT (near AGEDABIA) to HELIQOLIS via EL ADEM.
The numbers of casualties and sick admitted to Field Medical Units and those evacuated during the months October to December are shown in Tables I, II and Table X, respectively.

16. AIR EVACUATION

From 23rd October until 13th December, some 2,000 Army and R.A.F. casualties had been evacuated from the Western Desert to Base Hospitals.

Prior to the battle of EL ALAMEIN, when air superiority was assured, three de Havilland Ambulance aircraft, each capable of taking six stretcher and two sitting cases, had operated from the Advanced Air Transport Centre at BURG EL ARAB. The planes belonged to an Australian Air Ambulance Unit and only carried very serious cases to CAIRO and Australian cases to the Australian Hospital at BUSEILLI.

Casualties were also evacuated by empty returning transport aircraft from the Advanced Air Transport Centre.

As the EIGHTH ARMY moved forward the Air Transport Centre and Air Ambulances were again linked. As the distances became greater there was an increased demand for stores to be sent by air transport and the number of planes was increased which made more available for the evacuation of casualties.

It was found necessary to establish at the Advanced Air Transport Centre a Medical holding unit; a company of a Field Ambulance was provided for this.
This was named the Casualty Air Evacuation Centre. It was an accepted principle that aircraft could not wait for patients and that these must wait for the aircraft. The Advanced Air Transport Centre was placed as near as possible to the road on the main ARMY line of communication and near a C.C.S., or R.A.F. Medical Receiving Station. Air ambulance planes still continued to evacuate from forward areas as far as was permitted by the operational fighter group concerned.

By this means as many as 200 patients were evacuated in a single day by returning transport aircraft alone, over the distance of 700 miles to base hospitals.

In addition to the Air Ambulance Unit, a Blood Transfusion Unit (the Blood Supply Unit) was attached to, and moved with, the Advanced Air Transport Centre. The function of the unit was to receive and store blood and plasma, etc., brought by the air transport planes from base, and to distribute them to forward units.

During the advance the Advanced Air Transport Centre with its attached Air Ambulance Unit, Casualty Air Evacuation Centre and Blood Supply Unit were located in turn at BURG EL ARAB, DABA, MATRUH, GAMBAT, TUMI, MARTUSA, BENINA and AGEDABIA.

17. TYPES OF CASES EVACUATED BY AIR

The only class of case which travelled badly by air was the penetrating wound of the abdomen.
Generally speaking, all others that had had resuscitation and surgical treatment travelled well and these included head injuries, chests, burns, multiple injuries.

For head cases the surgical policy was that cases capable of withstanding the journey by air to the Neurosurgical Centre in CAIRO should be evacuated within 72 hours (Ascroft 1943) with the minimum of surgical interference in the field and in many cases with only one of more intravenous doses of sulphadiazine. When the ARMY had gone beyond BENGASI the duration of the journey increased and it became necessary to send forward a Mobile Neurosurgical Unit to do the minimum primary surgery of head cases.

Chest cases travelled comfortably owing to the fortunate circumstances that transport aircraft were obliged, for operational reasons, to fly at about 100 feet.

The development and success of air evacuation, in particular by transport plane, was due to enthusiasm and co-operation of the S.M.C., Western Desert Air Force, the D.D.M.S.; EIGHTH ARMY, the Advanced Air Transport Centre, British Overseas Airways Corporation, the Australian Air Ambulance Unit and the personnel of the Field Ambulance who formed the Casualty Air Evacuation Centre.

18. FIELD SURGICAL UNITS AND MOBILE C.C.Ss.

This phase of operations proved conclusively that had Mobile C.C.Ss. and Field Surgical Units not
been available the early treatment of casualties would have broken down.

It was found that the forward surgeons could do their best work only if their location was accessible and at the converging point of well-known tracks. The collection of casualties had often to wait till the heat of the battle was over or till night had fallen. Their evacuation was in ambulance cars, at seldom more that 10 miles an hour, over rough tracks where travel ceased at dusk. Thus it was rare for wounded to reach the surgeon within the six-hour period which is the theoretical ideal of war surgery.

Major-General C.G.I.V.T., late Consultant Surgeon M.E.F., in an unpublished paper "War Surgery in two Commands" (1943) stated the experience of a forward surgeon as to the average time between wound and operation during the EL ALAMEIN battle; it was:

- November 1st to 6th - 13.2 hours
- 7th to 12th - 44.0 hours
- 13th to 24th - 11.7 hours

19. THE TRANSFUSION SERVICE

The principal points which emerged from supplying blood for the EL ALAMEIN battle were:

(i) The system of distribution worked smoothly and adequate supplies were available wherever required. The value of adequate distribution arrangements was demonstrated. For this purpose Field Transfusion Units were used. This should, however, have been part of the
duties of the Base Transfusion Unit, which should be provided with the necessary, transport and personnel.

(ii) Offsetting the time lag and the severity of wounds which occurred was the transfusion service whose excellent resuscitation work revived many a casualty whose chances of survival or fitness for operative interference were nil. Blood and serum transfusion was widely used, one out of every three casualties was considered in need of, and benefited from, transfusion. Blood was superior to plasma in cases of severe haemorrhage while plasma was preferred to blood for burns.

(iii) The staff of the Base Transfusion Unit was wholly inadequate to cater for such a rush period as was experienced.

(iv) In the staff of a Base Transfusion Unit, one additional private (laboratory assistant) was allowed for every additional 750 bottles of glucose saline prepared weekly. Calculating from the output and establishment of the Base Transfusion Unit, this was a considerable under-estimate. In the terms of 'man days', and taking into consideration all the steps involved, one man could produce 3.5 bottles of blood and 10 bottles of other fluids for intravenous use per day.

20. SURGICAL POLICY

The guiding principle in wound surgery was the saving of life rather than the prevention of infection; foreign bodies and dead tissues in wounds were removed,
the wound was trimmed, sulphanilamide powder dusted in, and strips of vaseline gauze loosely laid in the deepest part. Skin edges were left alone and not sutured. The results were good, the patients travelled well and their wounds arrived in good condition at the base.

The application of sulphadiazine to head injuries made it possible for them to be evacuated by air and to arrive in good condition for primary surgery at the neurosurgical unit in Cairo. ASCHERT (1943) records 100 head cases who travelled well by air to base.

Padded plasters, plaster slabs with or without Thomas Splints or Cramer's Wire were commonly used with good results for immobilisation during evacuation.

For the lower limbs the "Tobruk Plaster" was popular (a Thomas Splint applied with the knee slightly flexed, wool-rolls between the knees and side bars, a plaster slab behind and encircling turns of plaster round splint and limb).

For the upper limb a large U-shaped slab was applied under the elbow coming well into the neck and over this encircling turns of plaster binding the arm to the chest.

These devices were intended to give comfort to the patient during the evacuation and required to be changed on arrival at the base hospital.

Abdominal wounds travelled badly and had to be operated on very early, hence the value of a Field Surgical Unit placed well forward. These cases had to be kept for at least four days before they could stand
a journey and it was usual to have a few beds available at each surgical centre for them. Time was not wasted at resuscitation and operation was usually undertaken with a drip running. The other principles of treatment were: suprapubic incision and swabbing of the pelvis without waiting for the rigors of peritonitis, a straight abdominal incision, exteriorisation or drainage of the large intestine and the insertion of a drainage tube through the incision. 10 c.c.s. of sulphadiazine in 50 c.c.s. of saline were injected through this tube, and more later if necessary, the tube being finally pulled out. All intestinal injuries were nursed in the Fowler position with continuous gastric suction and continuous intravenous fluids.

The sulphonamide series of drugs were extensively used, viz., sulphanilamide (M & B 125), sulphapyridine (M & B 693), sulphathiazole (M & B 760) and sulphadiazine.

21. REPORTS OF SURGEONS AT BASE HOSPITALS

Surgeons at Base Hospitals reported that the forward surgery was of a high order and noted particularly that primary suture of wounds had been avoided. There was also much less plugging of wounds with vaseline gauze than previously. The successful results were attributed to early treatment, good resuscitation (adequately rendered), proper cleansing of wounds, general use of sulphanilamide, adequate drainage, and
satisfactory immobilisation of orthopaedic cases ensuring comfortable evacuation. Much credit went to the efficient arrangements for provision of refreshments during the evacuation journey and to the improved transport facilities. Effective rating of casualties and correct labelling for special centres as well as excellent field medical notes were also much appreciated.

It was noted that clothing was rarely embedded in the wounds.

22. MOBILE SECTION OF ADVANCED DEPOT OF MEDICAL STORES

Maintenance of forward medical units with medical supplies was greatly improved by the addition of a mobile section to the Advanced Depot of Medical Stores. The suggestion had come from EIGHTH ARMY in September. This section, consisting of three lorries 3-ton (each containing a selection of medical supplies), three drivers and three R.A.M.C. corporals was sent forward to the divisional areas, thus saving Field Ambulances a long journey back to the Depot for replenishments. This mobile section often worked as far as 200 - 400 miles in advance of the Depot and carried with it a representative selection of the most frequently used medical stores. It made tours of divisional medical units on a pre-arranged timetable being attached to each Field Ambulance in turn, and without it another medical store depot would have been necessary.

This Mobile Section is now included by War
Office in the War Establishment of an Advanced Depot of Medical Stores.

23. HYGIENE - GENERAL

Once active operations commenced there was little of hygiene interest until the enemy broke early in November. Then the anticipated hygiene problems arose in captured territory - cleaning up of fouled areas, purifying water supplies, delousing prisoners of war, and pushing forward apparatus to ensure the cleanliness of our troops. This latter was necessary as typhus fever had to be borne in mind as a hazard if our own troops became lousy.

The removal of human remains in all stages of decomposition from armoured fighting vehicles on the EL ALAMEIN battlefield was one of the unpleasant duties in which hygiene personnel had to assist.

The scheme of pooling formation Field Hygiene Sections before the battle had excellent results. Sanitary assistants were where they were required and the Hygiene Section workshops produced a steady flow of apparatus to supply troops moving forward into new areas. It was possible to send forward hygiene teams with stores and apparatus to captured areas like MERSA MATRUH and CAPUZZO long before any permanent unit was available.

One difficulty that arose was that the rapid changes in the composition of formations resulted in sanitary assistants becoming completely divorced from their parent units.
24. **HYGIENE - ORGANISATION IN CAPTURED AREAS**

With the advance it was necessary to make arrangements for all new areas which were to serve as Lines of Communication and Advanced Bases. Our Field Hygiene Sections carried out excellent work in depositing hygiene stores in such areas. With the establishment of Sub-Areas three Field Hygiene Sections were detailed to supervise their hygiene and sanitary restoration, two being allotted to the area including DERNA and TOBRUK, and one for MATRUH area.

25. **COOKING**

The mobile cooker introduced for armoured units proved its worth, for such units, even in the worst battle conditions, were able to get hot meals right forward for their tank crews.

The reintroduction of company cooking was also appreciated but much training and propaganda was still necessary to improve the standard of cooks and cookhouse hygiene to make company cooking a success.

26. **WATER SUPPLIES**

In the initial stages of the operation the water supply was almost entirely from points on pipelines originating in ALEXANDRIA. All water was chlorinated before issue. On the average the daily issue was one to one and a half gallons per head.

With the move forward many new and doubtful sources from birs (water holes) and wells were brought
into use. Hygiene personnel assisted in the inspection and clearance of polluted wells, and supervised the chlorination of new supplies. Diesel oil, bone oil, dead bodies were the commonest agents contaminating water supplies but rarely held up our organisation for long. As water had to be transported over long distances the daily allowance per man dropped for short periods to a half gallon of water.

27. WEATHER.

During October and November the weather became cooler and in November Khaki serge battle-dress replaced the summer drill. Days were sunny, and day temperatures were moderately high in October with nights cooling off rapidly while in November the nights became colder and heavy rain occasionally caused discomfort to the troops in the field. During this month the mean daily maximum and minimum temperatures at EIGHTH ARMY H.Q. were 72.5°F and 54.25°F respectively.

28. HEALTH AND DISEASE

From Table I it will be seen that health of EIGHTH ARMY during October, November and December 1942, was well maintained considering that there was such an increase in the battle casualties between 4th October and 15th November. It is, however, noticeable that the battle casualties still remained well below the number of sick. The average daily sick admission rate to field medical units decreased from 1.67 in October to 1.59 per 1,000 strength in November.
In Table II the notable feature is the displacement, during these months, of diarrhoea and dysentery by infective hepatitis as the disease reached epidemic proportions and caused so much loss of manpower owing to its prolonged course.

Inflammation of the areolar tissue which could be associated with accidental injuries, and burns still remained very high and caused a lot of manpower wastage.

29. INFECTIVE HEPATITIS

Infective Hepatitis appeared most prominently at first in the New Zealand and Australian Divisions. Unfortunately, lack of knowledge of its cause and mode of spread prevented any special prophylactic measures being instituted.

The Consultant in Tropical Medicine (1943) reported that the high incidence of this disease was not confined to EIGHTH ARMY but was prevalent elsewhere in Middle East where the incidence was from 0.33 per 1,000 in June to 9.03 per 1,000 in December 1942. The incidence of cases in the Middle East as a whole, however, provided an excellent opportunity for investigation and this was carried out and recorded by several medical officers (VAN ROOYEN & GORDON (1942), GORDON (1943) and CAMERON (1943)). The Army Medical Bulletin (September 1943) on "Infective Hepatitis and Allied Forms of Jaundice" summarised all known information and stressed that "in the absence of a satisfactory laboratory test, control of epidemic spread must rest in a greater
awareness of the prodromal symptoms and isolation of suspects before jaundice appears.

It was noted that the incidence was greatest among officers and that it often affected several members of the same mess. This has suggested the theory that these persons share eating utensils which may be responsible for spreading the infecting agent as a result of improper washing. These findings and the excellent review in the British Medical Journal (1943, Nov. 27, p. 680) support the theory of an excremental spread.

It was a general observation that cases of Infective Hepatitis, if discharged too soon, tended to relapse or in any event arrived at Convalescent Depots before being fit to derive benefit from rehabilitation. To avoid this and to obtain some uniformity in treatment of cases medical units were given the following instructions:

(i) All cases of infective hepatitis were to be kept in bed till the urine was free from bile, or appetite had fully returned.

(ii) All cases were to be kept in hospital until the disappearance of jaundice.

(iii) Thereafter the patients were to have at least two weeks convalescence.

(iv) "Relapse cases indicating extensive liver damage were to be evacuated to South Africa when fit to travel."
30. **ENEMY HYGIENE**

In spite of the highly efficient axis military organisation it was painfully evident throughout the campaign that the standard of hygiene was deplorably low. From what one could observe personally and with confirmation from official reports one could go as far as to say that while the Germans had a weak hygiene organisation the Italians had none.

The enemy lines and camps at EL ALAMEIN, their bases at MATRUH, TOBERUK, DERNA and BENGASI were revolting in the masses of human faeces and refuse left everywhere.

It is natural therefore that the disease incidence, especially diarrhoea and dysentery, was very high and contributed in no small measure to his defeat. Many German and Italian prisoners were admitted to our hospitals suffering from a combination of chronic dysentery, starvation and gross nutritional disorder. Inability to evacuate these cases to the rear coupled with a certain callousness on the part of the Axis appear to have been the chief factors in the retention in the line of these men who would have had little fighting value.

Louse infestation was present in almost 100% in Italian prisoners of war and to a slightly lesser degree in Germans. A comprehensive reception area had to be organised for the disinfection of these prisoners of war before they were evacuated to camps in base areas.
The disgraceful conditions under which our own troops, mainly Africans and Indians, who had been axis prisoners from July to November, were kept, are a severe indictment both of his hygiene and sanitary standards and of his humanitarian principles. Their camps were overcrowded and filthy, latrines were holes in the ground and grossly inadequate, and cooking arrangements hardly existed. The grossly deficient diet issued resulted in avitaminoses especially 'B' and 'C' and was the cause of a tragically high dysentery rate among our men.

31. ADVANCED BASE PLANNING

As soon as the advance started, planning was taking place for the long-term policy of development of advanced bases in CYRENAICA and TRIPOLITANIA. It was decided that TOBRUK, BENGASI and TRIPOLI would in turn be advanced bases for EIGHTH ARMY. In the case of TOBRUK and BENGASI previous knowledge of these areas proved of value in drafting the first key plans and maintenance projects.

As EIGHTH ARMY captured TOBRUK and BENGASI its Administrative Staff made the necessary immediate short-term plans but this was usually based on the first key plan which was in their hands as a guide just before the ports were captured.

As the speed of advance from TOBRUK to BENGASI was so rapid a first key plan was not available to EIGHTH ARMY before the capture of the latter port.
However, a G.H.Q. reconnaissance party with representatives of EIGHTH ARMY immediately visited the port and prepared the first key plan "on the spot" by 29th November.

The second key plan and maintenance project were then made for TOBRUK on 4th December and for BENGASI on 9th December. The projects allowed for 30 days supply of stores for Army and R.A.F. and for a two to three weeks reserve when G.H.Q. took over the areas.

Maintenance was to be effected (a) by sea from the DELTA to TOBRUK and later to BENGASI, (b) by rail to TOBRUK and (c) by road forward of TOBRUK the latter ceasing when BENGASI was fully developed.

32. MEDICAL PLANNING

The provisional plan for the CYRENAICA base allowed for the provision of 1200 hospital beds and two depots of medical stores, distributed as follows:

TOBRUK: One General Hospital (600 beds)
One African Section (100 beds)
One Advanced Depot of Medical Stores
Evacuation: By sea - Hospital ship
By rail - Ambulance Train
By air from EL ADEN airfield

BENGASI: One General Hospital (200 beds)
One African Section (100 beds)
One Advanced Depot of Medical Stores
One Venereal Disease Treatment Centre (200 beds)
Evacuation: By Hospital Ship
By Air from BENINA
In another suitable site a Convalescent Depot (1000 men) had been brought up from the SUDAN and was standing by in the NILE DELTA Area at notice to move to CYRENAICA.

A Hospital Ship was standing by in ALEXANDRIA to sail to TOBRUK as soon as it could be accepted.

When TOBRUK was captured, the D.D.M.S. EIGHTH ARMY reported that owing to damage to the former British hospital buildings there was now no suitable hospital site for a 600 bed Hospital, nor was there an adequate water supply. Accordingly it was decided to locate two C.C.Ss. (one British and one Indian) at TOBRUK and to establish the 600 bed hospital at BENGASI or BARCE.

C.C.Ss. were immediately established at TOBRUK by EIGHTH ARMY.

On 24th November the first Hospital Ship entered TOBRUK and evacuated 450 patients. Meanwhile serious cases were being evacuated by air from EL ADEM landing ground (20 miles south of TOBRUK).

A medical representative was included in the G.H.Q. reconnaissance party which carried out a reconnaissance on 3rd December of TOBRUK, Derna, Barce and Bengasi. In the Key Plan resulting from this the following medical layout was finally decided.
TORRUK - Two C.C.S.s.
One African Section of a General Hospital
One Advanced Depot of Medical Stores

DERNA - not of great importance and could be
staffed as for a reception station.

BARCE (70 miles from BENGASI)
- One General Hospital (600 beds) and
One African Section (100 beds).
There were good buildings here able to
accommodate the beds with ease.

BENGASI - One General Hospital (200 beds) to be
located together with an R.A.F. Medical
Receiving Station in the Italian “Colonial
Hospital” buildings.
One Advanced Depot of Medical Stores to
be allocated a portion of a big barracks
in the south of the town.

TECNIS - An ideal site for a Convalescent Depot
(1000 men) situated 15 miles east of
BARCE in the GEDEL AKDAR Hills - it
had a good water supply and the site
had already been occupied by a small
Italian convalescent hospital.

An Army Medical Area had been established
7 miles south of BENGASI but it was planned that if
the attack on AGHEILLA defences succeeded the Army
Medical Area would move forward and patients would be
evacuated to the 200 - 300 bed "holding" hospital at
BENGASI. Serious cases would be flown to EL ADEM
(for TOBRUK and the Ambulance Train to DELTA) or
direct to CAIRO. Other cases would be passed on to
the 600 bed General Hospital at BARCE. The BARCE
hospital would send its convalescents to TECNIS
and evacuate long term cases to base by Hospital Ship
from BENGASI using the BENGASI Hospital to hold such
cases over-night.

The hospital buildings in BARCE were in a
filthy condition and the water pump and electric plant
had been put out of action by the enemy. It was a
good while before it was in a fit condition to
accommodate the hospital.

Owing to the limited capacity of convoys from
the DELTA, the hospitals mentioned above were not
established until January 1943, and until then
EIGHTH ARMY field medical units maintained the
L. of C. evacuating by sea, air and Ambulance Train
to base.
VOLUME I
PART III

EL AGHEILA TO THE EASTERN FRONTIER OF TUNISIA.

(13th December 1942 - 13th February 1943)
PART III

EL AGHEILA to the EASTERN Frontier of TUNISIA

(13th December 1942 - 13th February 1943)

1. GENERAL

On 12th December, EIGHTH ARMY was ready to resume the advance on EL AGHEILA.

10 Corps had now been relieved by 30 Corps in the line while the former rested and refitted in the TOBRUK - TMUNI Area. 30 Corps consisted of one armoured division, one armoured brigade and two infantry divisions. Its task was to attack the EL AGHEILA defences and to be prepared to follow up the success. It was anticipated that if the attack was successful the enemy would withdraw to BUERAT and the WADI ZEM ZEM, 260 miles further west.

It was foreseen that the maintenance of 30 Corps and the evacuation of its casualties was going to be a severe strain on road transport for along the GULF OF SIRTE there were no big harbours for shipping. BENGAZI would be the advanced base and RAS EL ALI, SULTAN or SIRTE might be used as supply points using small coaster craft from BENGAZI but this would be difficult to operate in stormy weather known to occur in the GULF in winter.

It was essential now that TRIPOLI, with its big port be captured as soon as possible since transport was inadequate for maintenance of other than a small
force over the long distance between BENGASI and TRIPOLI and our aim was to maintain our advance with a powerful force west of TRIPOLI. With TRIPOLI in our hands, maintenance would be carried out by sea from the DELTA and TOBRUK, by-passing BENGASI, and eliminating the long road haul from that port. Maintenance from TRIPOLI westwards would be effected by road. From the medical aspect the foregoing remarks apply equally to evacuation of sick: until we reached and passed TRIPOLI port, and apart from air, the only means of evacuating patients would have to be by the long tedious road journey to BENGASI.

This part of the survey therefore deals with (a) an advance of 640 miles by EIGHTH ARMY across TRIPOLITANIA involving preparations for two major actions at EL AGHEILIA and BUERAT. (b) the capture and initial development of the important port of TRIPOLI. (c) a time factor of 63 days.

This is dealt with in two sections:-

Section I - EL AGHEILIA to BUERAT (13th December to 14th January)

Section II - BUERAT to the EASTERN Frontier of TUNISIA (15th January to 13th February)
SECTION I
EL AGHEILA to BUERAT
(13th December to 14th January)

2. THE ADVANCE TO BUERAT

On 13th December, after a reconnaissance in force the previous day, it became clear that the enemy was withdrawing westwards from the AGHEILA defences and our troops resumed their advance keeping in contact with the enemy. By the 29th December, after pushing forward at an average speed of 12 miles a day, our leading elements reached BUERAT. Below is a record of the progress made:

<table>
<thead>
<tr>
<th>Location</th>
<th>Date</th>
<th>Days</th>
<th>Miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>MERSA BREGA</td>
<td>13th December</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EL AGHEILA</td>
<td>15th December</td>
<td>3</td>
<td>32</td>
</tr>
<tr>
<td>MARBLE ARCH</td>
<td>16th December</td>
<td>4</td>
<td>73</td>
</tr>
<tr>
<td>NOFILIA</td>
<td>18th December</td>
<td>6</td>
<td>134</td>
</tr>
<tr>
<td>SULTAN</td>
<td>19th December</td>
<td>7</td>
<td>187</td>
</tr>
<tr>
<td>SIRTE</td>
<td>25th December</td>
<td>13</td>
<td>223</td>
</tr>
<tr>
<td>WADI TAMET</td>
<td>26th December</td>
<td>14</td>
<td>254</td>
</tr>
</tbody>
</table>

At BUERAT the enemy was occupying defences astride the main coast road and the high ground to the south. These had to be reconnoitred, a tactical plan prepared and administrative preparations completed to enable 30 Corps to be maintained at TRIPOLI and in order to avoid giving the enemy time to complete his demolition programme at TRIPOLI: speed, in fact, was essential.

The advance from BUERAT was resumed on 15th January.
3. MAINTENANCE

The discharge of stores, equipment and ammunition at TOBRUK reached a peak (26,000 tons) during the week ending 15th December. From this time on, deliveries to TOBRUK decreased as they increased at BENGASI and by the end of December maintenance of EIGHTH ARMY through TOBRUK ceased.

BENGASI port was very vulnerable to strong weather owing to its outer mole having been damaged by bombing. On 3rd January a severe storm arose and blew for two days. It increased the breach already existing in the outer mole causing the loss of a ship outside the harbour, the total loss of two ships within the harbour, and damage to several others and to newly constructed lighter berths.

The effect of this severe storm was serious:
(a) discharge at the port was seriously reduced at the critical time when the Army was advancing rapidly to BUERAT and (b) the damage done now rendered the port susceptible to lesser storms and would require ships to put to sea before these storms broke (this happened on 10th and 14th January) and led to a very heavy fall in tonnage to be discharged.

Well before the attack on the EL AGHELIA defences and until BENGASI was fully developed the deliveries by sea to that port were augmented by road from TOBRUK. This was a distance of 300 miles and the road lift amounted to an average of 800 - 900 tons per day.

This route was also used to compensate for
the storm damage at BENGASI, and to increase the lift
10 Corps was "grounded" while its transport was used as
Transport Columns.

4. ROAD TRANSPORT

The demand for General Transport Companies
R.A.S.C. was out of all proportion to the supply.
Transport, apart from that required for normal
operational movement, was required for:

(a) work at the Advanced Bases at TOBRUK and BENGASI.
(b) the long road supply route from TOBRUK through
    BENGASI to SIRTE — some 674 miles.
(c) the heavy programme of road and aerodrome
    construction.

To meet this the hard pressed DELTA and
PALESTINE base was further denuded of transport
bringing to a standstill many important base works
thereby causing much inconvenience.

5. AIRFIELD CONSTRUCTION

As the advance progressed and enemy airfields
were captured, and occupied, the demand for the repair,
and for the "all weather" construction, of these
airfields increased so as to permit of increasing the
range of our tactical and strategical bombers to cover
Western TRIPOLITANIA, TUNISIA, SICILY and ITALY. This
construction and the establishment of the new bomber
bases was a heavy commitment for maintenance in addition
to the already severely strained programme for EIGHTH
ARMY. The problem was answered by concentrating on the Army needs and making special arrangements for strategic air requirements which could not be met from EIGHTH ARMY resources.

6. AIR FREIGHT

On 23rd December the air transport service was extended to MARBLE ARCH and 10th January to TAMET. From 1st January air transport was operated in two distinct services - the first was from CAIRO direct to MARBLE ARCH or to some other selected forward airfield and was used exclusively for urgent demands, the second service from EL ADEM airfield to forward landing grounds. The capacity of the second service was double the first.

In both cases serious casualties were evacuated on the return journeys to the DELTA and EL ADEM respectively.

7. CHRISTMAS 1942

Every effort was made to enable EIGHTH ARMY troops to have an enjoyable and traditional Christmas fare. Arrangements for this had been made early and were of three kinds:

(a) R.A.S.C. Xmas fare i.e. Pork and Rum
(b) E.F.I. supply i.e. Turkey, Xmas Pudding and Cake, Beer.
(c) Postal i.e. Xmas Mail.

It reflected great credit on those concerned that the arrangements made were successfully fulfilled
in spite of the many difficulties and the long distances involved. From the morale point of view this achievement was a great stimulus to the EIGHTH ARMY.

8. MEDICAL ARRANGEMENTS

So far the general situation at this period has been unfolded and it will be seen that the medical aspect falls "into the slots" made.

The medical organisation developed during this period on the following lines:

(a) BENGASI

About seven miles south of BENGASI off the main road was the Army Medical Area. It comprised a Mobile Military Hospital, a Field Ambulance, a Field Surgical Unit and a Field Transfusion Unit.

In BENGASI itself, the Italian Colonial Hospital was occupied by a company of a Field Ambulance and an R.A.F. Medical Unit. Arrangements were already in hand for a 200-bed General Hospital to be sent up from the DELTA but owing to an already heavily committed shipping programme it was not expected till late in January.

(b) BARCE

The main hospital for the advanced base, a 500-bed unit, was established at BARCE on 10th January, having relieved the C.C.S. which had previously been established there. This marked a big step forward in the medical arrangements and the presence of this hospital henceforth reduced to a certain extent
manpower wastage resulting from the evacuation of minor casualties to the DELTA.

(c) TOBRUK

At the beginning of this period there were three C.C.Ss. at TOBRUK. On 2nd January one C.C.S. was sent forward to assist in the long lines of communication beyond BENGAHI.

An East African Section (100 beds) was also sent to TOBRUK from the DELTA to deal with the sick of the many East African Pioneer and Labour troops in that area.

(d) EVACUATION

(i) Road

From Forward M.D.Ss. and C.C.Ss. to the ARMY MEDICAL AREA at BENGAHI. From here cases were sorted out and evacuated (if serious) by air from BENINA airfield, or by road to the holding hospital at BENGAHI if a hospital ship was immediately available, otherwise by road to HARCE hospital.

(ii) Sea

As has already been described, storms severely hampered shipping at BENGAHI at this time and this equally affected hospital ship evacuation. Nevertheless, some 1,400 cases were evacuated by hospital ship during this period.
(iii) Air

From 15th December a regular ambulance train service of three trains per week was run to TOBRUK-railhead. This enabled full advantage to be taken of the main air transport service which was operating more and more from EL ADEM forward. Certain casualties e.g. head, chest, maxillo-facial, and other severe cases were flown direct from forward airfields at AGEDABIA and EL HASELAT to the DELTA hospitals. As the advance progressed westwards, the Advanced Air Transport Centre was moved forward, and when the leading elements of the Army were before EUBRAT the route of air evacuation was from TAMET to MARBLE ARCH and BACTINA and thence to TOBRUK Ambulance Railhead or direct to the DELTA according to the nature of the casualty.

(e) CASUALTIES EVACUATED

The number of casualties evacuated during the period 16th December to 14th January was as follows:

<table>
<thead>
<tr>
<th></th>
<th>Battle Casualties</th>
<th>Sick</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital Ship</td>
<td>136</td>
<td>1209</td>
<td>1345</td>
</tr>
<tr>
<td>Ambulance Train</td>
<td>296</td>
<td>3897</td>
<td>4193</td>
</tr>
<tr>
<td>Air</td>
<td>82</td>
<td>374</td>
<td>456</td>
</tr>
<tr>
<td>M.A.C.</td>
<td>18</td>
<td>141</td>
<td>159</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>532</strong></td>
<td><strong>5621</strong></td>
<td><strong>6153</strong></td>
</tr>
</tbody>
</table>
(f) **BLOOD AND MEDICAL STORES**

Supplies of blood, plasma, saline etc., were sent regularly by air from the CAIRO Base Transfusion Unit to the Advanced Air Transport Centre (to which was attached a Blood Transfusion Unit) at BENINA and to its subsequent locations, and thence distributed to forward Blood Transfusion Units.

Urgent medical stores were also flown to BENINA for consignment to medical units.

In order to keep up the supply of stretchers and blankets 200 stretchers and 500 blankets were despatched by each hospital ship from ALEXANDRIA to BENGASI.

9. **PLANNING FOR TRIPOLI**

For some time thought had been directed to plans for the use of TRIPOLI after capture, and during December 1942, every possible item of information concerning TRIPOLI was collected and collated together with air reconnaissance photographs. These were used in preparing the first key plan and maintenance project to be given to EIGHTH ARMY as a basis for their first reconnaissance after the capture of TRIPOLI.

Information concerning the country west of TRIPOLI was collated at the same time, emphasis being laid on the availability and "usability" of ports, harbours and anchorages including those of ZUARA, GABES and SFAX.

The following factors were considered in drafting the plan:
(a) the advance westwards from TRIPOLI of our forces would depend on the rate of development of TRIPOLI as a port and advanced supply and hospital base.

(b) Maintenance planning basis.

Although the future operational commitment was unknown, planning was based on the maintenance of the whole of EIGHTH ARMY and the Desert Air Force in TUNISIA.

(c) Maintenance and Evacuation Route

With TRIPOLI 1,000 miles from the nearest Railhead at TOBRUK, and 1,300 miles from the DELTA, maintenance with supplies and evacuation of casualties would be by sea only, with a possible sea shuttle service from TOBRUK with the elimination of the TRIPOLI - BENGASI - TOBRUK road method of maintenance and evacuation.

(d) Port Development Policy

From the medical aspect it is important to know this as it explains how the development of a medical base was not rapid as it had to fit in with the heavy general development programme.

Naturally the maximum development of the port in the shortest possible time was the aim but this would depend on port repairs, on the availability of suitable shipping, quay space and harbour craft. The target was 3,000-ton daily discharge of stores and ammunition.

In addition to reserves required for 10 Corps, Army Troops and R.A.F., reserves would also have
to be built up as quickly for the projected move forward from CYRENAICA of 10 Corps and for subsequent EIGHTH ARMY operations. All this had to be done in the shortest possible time in order not to hamper the ARMY in its pursuit of the enemy.

(e) Railway Development

This was of no medical importance. The narrow gauge railway serving TRIPOLI port and extending 70 miles westward to ZUARA would be used to the fullest extent especially between the port and the advance base depots.

(f) Sick Wastage

Except for a limited number which might be evacuated by air, casualties would be evacuated by sea. A hospital ship service would be established direct between ALEXANDRIA and TRIPOLI, allowing for a TRIPOLI - BENGASI shuttle service in an emergency.

In order to avoid unnecessary sick wastage and overloading of the hospital ship service, or the continuance of road evacuation (which it was planned to eliminate), it was essential to establish a hospital base at TRIPOLI with sufficient hospitals and a convalescent depot.

(g) Personal reinforcements

Accommodation for augmented transit camp facilities would be required for personnel reinforcements owing to the distance from base
of this port, and the probable irregularity of personnel carrying ships.

(h) Civil Population

The estimated civil population of TRIPOLITANIA was 774,000, of which 103,000 (including 35,000 Italians) were in TRIPOLI. This was to be an extra heavy supply commitment and would take priority after that for our forces.

It was important that a civil administration be established to organise among other things a civil health, hygiene and hospital service.

(i) Workshops

Owing to the distance from the DELTA, TRIPOLI workshops would have to be self contained.

(j) Siting of Depots, Installations and Hospitals.

The main principles governing the siting of installations would be:

(i) Avoidance of the densely populated parts of TRIPOLI town area.
(ii) Proximity to the existing road system.
(iii) Maximum use of existing rail facilities and buildings.
(iv) Dispersion.

(k) Buildings.

With the huge supply programme in view very little constructional material could be shipped, and the maximum use of suitable buildings was to be made. Unfortunately the condition of TRIPOLI buildings, however attractive in plan, was little
known. Nevertheless only repair, and no new
construction, was to be undertaken. Where
accommodation was not available, stores would
have to be stacked in the open under tarpaulins.
The first key plan and maintenance project
were completed and sent to Rear H.Q., EIGHTH ARMY
on 21st January.

10. MAINTENANCE ARRANGEMENTS FOR THE ARMY WEST OF TRIPOLI

On 31st December while EIGHTH ARMY was at BUERAT
the first meeting to discuss the maintenance of EIGHTH
ARMY by sea through TRIPOLI was held. Arrangements were
discussed for the opening of the port, the provision
of shipping and the future maintenance of the Army west
of TRIPOLI. It was estimated that the date of capture
would be 21st January. (It was actually captured on
23rd January). The Royal Navy estimated that owing to
heavy demolitions expected it would be some 7 - 10 days
more before the harbour entrance would be cleared to
accept shipping. In case, however, events might move
quicker than expected it was agreed to plan that the
first stores convoy be ready to enter TRIPOLI on 21st
January. The voyage ALEXANDRIA - TRIPOLI takes five
days.

The Royal Navy, and G.H.Q. Movements and
Transportation Branch had already completed their
arrangements for the opening and operating of the port
including the provision of personnel, harbour craft,
and locomotives for the narrow-gauge railway system
which ran West of TRIPOLI to ZUARA.
A shipping schedule was arranged and included the loading of four ships of capacity between 5,000 and 7,000 tons to be ready to sail on or after 16th January from ALEXANDRIA for TRIPOLI as well as those earmarked for BENGASI.

11. FORMATION OF TRIPOLI ADVANCED BASE ADMINISTRATIVE HEADQUARTERS.

The distance covered by EIGHTH ARMY in its advance to TRIPOLI, some 1,400 miles, was a great achievement even with modern mechanical aids considering the type of country covered, but from the administrative aspect it was an exacting matter and it was therefore appreciated that the time was at hand to arrange an intermediate administrative body between EIGHTH ARMY and G.H.Q., M.E.F. to relieve the former of the many and increasing administrative responsibilities accruing from its advance and to allow it to concentrate on fighting. These responsibilities can be summarised as follows :-

(a) Increased responsibility in maintenance and hospitalisation policy.

(b) Control of the large civilian population of TRIPOLITANIA.

Having reached TRIPOLI and having continued their advance westward EIGHTH ARMY and the R.A.F. would bear the same relation to G.H.Q. Middle East as an overseas expeditionary force would to the War Office.
Accordingly it was decided to establish at TRIPOLI, soon after its capture, a complete Base and Lines of Communications Headquarters under control of G.O.C. EIGHTH ARMY. It would take control of TRIPOLI port, advanced base, and of TRIPOLITANIA Area. It would also deal direct with G.H.Q., M.E.F. on behalf of EIGHTH ARMY.

12. MEDICAL PLANS FOR TRIPOLI

The medical plan for TRIPOLI was based on all operational and administrative information available. The EIGHTH ARMY and Western Desert Air Force amounted to a strength of 240,000. Hospital beds required in TRIPOLI were estimated on a basis of 8% casualties and sick in two-thirds (the fighting component) of the force and 4% casualties and sick in the remaining third which was considered as the base component. Some 16,000 beds were therefore required but it was decided to place initially only 25% of these beds in TRIPOLI and CYRENAICA, the remainder being available in the base hospitals in EGYPT and PALESTINE.

About 2,700 beds were to be located in TRIPOLI and 1,400 in CYRENAICA.

TRIPOLI
One General Hospital (600 beds and expansion) 800 beds
One General Hospital (600 beds and expansion) 800 beds
One Combined (British & Indian) General Hospital 400 beds
Two C.C.Ss. - 400 beds
One V.D. Treatment Centre - 200 beds
One African Section - 100 beds

Total - 2,700 beds

Other medical units required:
One Convalescent Depot (less one division (1000 beds)) for CYRENAICA
One Base Transfusion Unit
One Dental Laboratory
One Orthopaedic Centre
One Maxillo-Facial Unit

The above units were to be provided by G.H.Q. M.E.F. from the Base, while the following units were to be provided by EIGHTH ARMY:
One Field Hygiene Section
Field Surgical Units
Mobile Hygiene Laboratory
Mobile Bacteriological Laboratory
Mobile Dental Units
Mobile Ophthalmic Unit
Mobile Neuro-Surgical Unit
One M.A.C. Section (25 cars) for TRIPOLI.

Buildings were to be selected and areas earmarked for these medical units making a generous allowance for civilian needs by appropriating only one civilian hospital for military purposes.

A reserve hospital area was to be selected
some distance from TRIPOLI for use in cases of
damage by bombing to any of the town hospitals and also
for further hospitals if such became necessary.

Evacuation was to be on previous lines; serious
cases to be flown to TOBRUK (for ambulance train evacuation
to the DELTA) or direct to the DELTA, while other cases
would be evacuated by hospital ship. In the event
of many sick and casualties occurring a frequent
hospital ship service would be required, and a shuttle
service TRIPOLI - BENGASI or TRIPOLI - TOBRUK might
be necessary if beds were short to quicken the turn-
round of hospital ships.

13. MEDICAL PLAN FOR THE ADVANCE ON TRIPOLI

(See Appendix 1)

30 Corps were to attack the BUERAT - WADI ZEM
ZEM defences and advance on TRIPOLI in two columns,
one taking the coastal route and the other the inland
route while an Independent Brigade would operate in
the area between them. The coastal column consisting
of one division was to operate along the road BUERAT -
MISURATA - TRIPOLI. The inland column consisting of
one armoured and one infantry division was to advance
rapidly over desert tracks from South of BUERAT
through SEDADA, BENT ULID, TARIUMA and on to TRIPOLI.

Owing to the distances involved two separate
evacuation lines and C.C.Ss. were used while the centre
column evacuated cases to the most accessible M.D.Ss.
of the inland and coastal columns.
A Field Ambulance (less one company) was used to coordinate the evacuation and to form staging posts on the long coastal route releasing M.D.S.s. in turn for more forward work and finally opening an M.D.S. near MISURATA. A New Zealand C.C.S. was established at TAMET for the coastal column and evacuated its cases by air from the neighbouring Landing Ground. A South African C.C.S., which was closed at SIRTE, was to move up to PILASTRUINA and await orders to take over from the M.D.S. at SEDADA. This C.C.S. was to receive cases from the inland column and evacuate by air through SEDADA landing ground as soon as a service could be started.

Meanwhile a Mobile Military Hospital moved from SIRTE to TAMET to await orders to move to TRIPOLI.

The Divisions in the Coastal Columns were allotted an Ambulance Car Convoy to meet the increased demand for Ambulance Cars when the evacuation line became extended.

A carefully thought out programme was made for the entry into TRIPOLI. Arrangements were made for a medical and hygiene staff to be among the earliest to enter the town with a Field Hygiene Section and a Field Ambulance. The latter would take over hospitals and medical stores. The former would make a quick hygiene reconnaissance of the town.
14. THE ADVANCE TO THE TUNISIAN FRONTIER

(See Appendix 'K')

On 16th January the EIGHTH ARMY attacked the enemy in the WADI ZEM ZEM defences. All preparations and dispositions had been completed in the usual thorough manner. The defences were overcome and the enemy withdrew along the coast road fighting a series of delaying actions and carrying out many demolitions.

Our coastal column occupied MISURATA on 18th January and as it maintained its pressure along the coast, the inland column was swinging south-west into the hilly country and without meeting great resistance captured TRIPOLI on 23rd January.

The goal had been reached! The dream of desert campaigners had materialised. There remained, however, the enemy who was withdrawing westwards, and EIGHTH ARMY did not halt but kept up the pursuit west of TRIPOLI.

Resistance was small but the TUNISIAN frontier was not reached until 18th February owing to extensive mining on the road to ZUARA and bad weather. In addition the ARMY was diverting its attention to TRIPOLI, realising that further success westwards depended on the rapid clearing up and development of that town.
15. EVACUATION OF CASUALTIES

Casualties of the coastal column were evacuated without hitch to the C.C.S. at TAMET in spite of the difficult going owing to destruction of the tarmac road.

On 13th January the South African Mobile C.C.S. from PILASTRINA moved to, and opened at, SEDADA and successfully evacuated patients by returning empty supply planes to TAMET and MARBLE ARCH.

The line HOMS - TARRUNA - GARIAN was reached on 19th January and casualties from this line were evacuated by ambulance car to an M.D.S. at DARRAH which was in the vicinity of an airfield from which empty supply planes evacuated cases. Later this duty was taken over by the Field Ambulance which usually acted as the Air Casualty Evacuation Centre.

On the 21st January the South African C.C.S. at SEDADA was moved to a location 10 miles south of TARRUNA where an emergency landing ground was arranged. It was relieved by the Mobile Military Hospital which, until it moved to TRIPOLI on 24th, was able to deal with cases received from MISURATA.

Rearward road evacuation was avoided by the establishment of the TARRUNA C.C.S. which held cases until TRIPOLI was captured when cases other than those which had been evacuated by air were sent to the TRIPOLI Colonial Hospital which had been taken over by a Light Field Ambulance. On the 24th January the Colonial Hospital was taken over by the South African C.C.S. from TARRUNA.
16. AIR EVACUATION FROM FORWARD AIRFIELDS

Air evacuation from forward airfields was most valuable and saved many patients the distress of a rough road journey. On the other hand it was not quite satisfactory as ambulance planes could not always be obtained immediately at the place they were wanted. The system was improved however, when the R.A.F. Landing Ground reconnaissance officer began informing the D.D.M.S., ARMY, of suitable airfields for evacuation so that medical units could be sited conveniently near. It was stressed at this stage that ambulance planes when required were needed urgently and must be held ready at rearward landing grounds to be sent forward on request by D.D.M.S. Corps or A.D.M.S. Division.

During the period 15th to 23rd January 30 Corps sustained 507 battle casualties and 159 were sick. Of this total of 666, 320 patients were evacuated by air to rearward landing grounds and to the New Zealand C.C.S. at TAMET.

17. TRIPOLI HARBOUR

From constant air reconnaissance and photography we were aware of the general enemy plans for the demolition of TRIPOLI harbour. By 21st January he had completely blocked the harbour by sinking four vessels, and had blown extensive breaches into the SPANISH MOLE. These demolitions were confirmed from the ground immediately after the capture of the port. Bulk petrol berths and the port petrol pipeline had been destroyed
but the railway was little damaged. Clearance of the harbour entrance and harbour repair work was considered feasible and work began immediately.

Seven days after the capture a gap was made in the harbour entrance sufficiently wide and deep to admit tugs and lighters. By 10th February the gap had been made 125 feet wide and 26 feet deep, permitting the entrance of ocean-going ships.

The enemy had left intact a number of tugs, lighters, a crane, two locomotives and many railway wagons all of which were invaluable.

The port area was immediately cleared and repairs effected to allow of the landing of stores and their removal by road transport. Steps were also taken to repair the petrol pipeline and bulk tanker berths.

18. G.H.Q. RECONNAISSANCE OF TRIPOLI

On 26th January, three days after the capture of the port, a G.H.Q. reconnaissance party was flown to TRIPOLI to check and supplement the first key plan, which had been prepared at G.H.Q. After this reconnaissance, which was carried out with representatives of EIGHTH ARMY staff, the second key plan and final layout of the base were completed.

Excellent buildings were found for three General Hospitals and a Depot of Medical Stores. Areas east of the town were selected and reserved for a convalescent depot and additional hospital sites.

2,700 beds were to have been located in TRIPOLI
and 1,400 in CYRENAICA. As a result of the
reconnaissance and in view of the fact that the whole
force would be based on TRIPOLI it was decided to
increase the quota in TRIPOLI to 4,500 beds, this to
consist of:

- One General Hospital - 1200 beds
- One General Hospital - 600 beds
- One Combined (British & Indian)
  General Hospital - 400 beds
- One V.D. Expansion - 200 beds
- One African Section - 100 beds
- One Convalescent Depot - 2000 beds

Total 4500 beds

In addition a 600 bed and a 1200 bed General
Hospital, two Indian Hospital Sections (200 beds) and
two African Hospital Sections were earmarked as a
reserve to send to TRIPOLI at short notice if more
beds were required.

The decision to provide a 2000 bed Convalescent
Depot for TRIPOLI involved the cancellation of 1000
convalescent beds originally allotted to CYRENAICA.

19. THE ARRIVAL OF CONVOYS

EIGHTH ARMY had arranged for six large landing
craft to be loaded at BENGASI and sent to TRIPOLI to
assist in unloading the first stores convoy from the
DELTÁ. The landing craft arrived on 26th January and
were unloaded outside the KARABANLI MOLE.

G.H.Q. Middle East had arranged for the first
stores convoy from ALEXANDRIA to be off TRIPOLI on
21st January. Weather conditions were bad and it was
27th January when the convoy arrived. They began
discharging outside the harbour. On 15th February,
the twenty-sixth day after capture, a total of 3,500
tons was discharged. From now on imports to
BENGASI decreased as the capacity of TRIPOLI increased.

20. PIONEERS AND LABOUR

Pioneers and Labour, an essential part of the
Army maintenance organisation, had increased from twenty-
five to thirty-six uniformed companies. It was only
after our advance into TRIPOLITANIA that assistance
was obtained from civilian unskilled labour in
CYRENEICA, skilled labourers having been evacuated by
the enemy.

In TRIPOLI, to begin with, men from Infantry
were used for unloading but as the supply position eased
and the necessity for labour increased these were
replaced by uniformed Pioneer and Labour Companies.
Ultimately ten companies were fully occupied in TRIPOLI
assisted by civilian unskilled labour which came
forward slowly and only when our occupation of
TRIPOLITANIA appeared to be fully established.

21. ROAD TRANSPORT

Until 13th-14th February supplies continued
to be brought along the 1,000 miles of road from
TOBRUK. This was in two stages; firstly by transport
including that of 10 Corps along the 300 miles from
TURMIK Railhead to BENGASI at the rate of 800 tons per
day. After 14th February when TRIPOLI was well
established the road supply route was abolished.

22. REINFORCEMENTS

Although some urgent reinforcements were sent
forward by air the main means of transport was now by
sea in personnel ships. 3,800 reinforcements were sent
to EIGHTH ARMY in December and 9,470 in January.

23. TELEPHONIC AND TELEGRAPHIC COMMUNICATION

Extensive line reconstruction was affected by
the Royal Corps of Signals from EL ALAMEIN to TRIPOLI
as the enemy in his withdrawal had systematically
destroyed the permanent line in many parts. This meant
the examination, repairing, rewiring, testing and
maintenance of some 1,400 miles of wire. It was an
achievement of the highest order to have established
communication between CAIRO and TRIPOLI within six days
of its capture. The heavy volume of administrative
traffic was largely borne, however, by high speed
wireless and highly efficient air letter service.

24. SUPPLIES

Middle East had a heavy commitment in regard
to supplies at this time; they included provision for
(a) EIGHTH ARMY and for the building up of the reserves
at TRIPOLI advanced base (b) MALTA whose stocks had been
deprecated during the siege and which now had to be built
up (c) BENGASI area (d) TOBRUK area. To meet this it was found necessary to transfer to EGYPT reserve stocks from SYRIA and the SUDAN.

Items in short supply such as tins of meat and vegetable stew, a popular issue, were made good by increased issues of preserved meat and tinned vegetables while surplus stocks in Detail Issue Depots in EGYPT and PALESTINE were recalled. This sufficed to meet the demands.

25. PETROL

The problem of petrol supply resembled that of ordinary supplies. Shipments to MALTA, BENGASI and TOBRUK continued but the TRIPOLI task was twofold, (a) the daily ARMY requirements and (b) the rapid establishment of large petrol reserves for future operations in TUBISIA. Demands consequently reached their peak and at one stage reached 4,000 tons per day. Up to 23rd January the ARMY received its petrol in returnable and non-returnable tins which kept base tin-filling factories working at high pressure. The situation eased somewhat, after 23th January, when one of the huge BENGASI storage tanks was repaired and filled. By 13th February, also, bulk petrol was being stored in TOBRUK from railway cistern wagons.

At TRIPOLI bulk petrol storage tanks were not badly damaged and were soon repaired. The first discharge of bulk petrol took place by 23rd February. Arrangements were also made to send a tin-filling plant to TRIPOLI.
26. WORKS SERVICES

The field of engineer services in modern warfare is immense including repair, construction and re-construction of ports, roads, aerodromes, buildings and base installations, water supplies, electric power plants etc. etc. Not only were these tasks undertaken efficiently by our engineers but what was of paramount importance was that engineers were always where required and completed the tasks confronting them in time for the works to give their maximum operational results.

These works involved the despatch of huge tonnages of engineer stores of which cement and bitumen, heavy plant and machinery comprised a large part.

27. ARRANGEMENTS FOR THE CIVIL POPULATION

The population of CYRENAICA was about 20,000. That of TRIPOLITANIA was about 774,000 of which 70,000 were Arabs, 45,000 Italian and 30,000 Jews.

It had been foreseen that stocks of foodstuffs would be very small indeed in the occupied countries and plans for the supply of food for civilian population had been prepared well in advance.

The British Military Administration (B.M.A.) was responsible for the provision and distribution of foodstuffs and other essential supplies to the civil population.

The B.M.A. was also responsible for civilian medical arrangements. A British Senior Medical Officer was appointed and was given a staff of army medical
officers... A public health service was quickly restored and hospitals, dispensaries, and maternity and child welfare clinics opened. The strictest medical supervision was kept on all public utility services etc. Medical supplies and ambulance cars were also made available.

28. LINES OF COMMUNICATION ORGANISATION

Further small administrative headquarters were set up in areas and sub-areas of the L. of C. behind EIGHTH ARMY as it advanced. This relieved the ARMY of responsibility for detailed administration of captured areas and greatly assisted it in the development of rail heads ports and advanced bases.

Such H.Qs. were established successively at EL ALAMEIN, MATRUK, CAPEZZO, TOBRUK, BENGASI, NOFILIA, MISURATA and TRIPOLI.

29. SITUATION ON 13TH FEBRUARY, 1943

TRIPOLI port and advanced base were being rapidly developed. This enabled EIGHTH ARMY to move west into TUNISIA. The advance towards the MARETH LINE, the next AXIS defence line, was delayed by bad weather and the necessity to construct a causeway across the marshes some three miles east of the TUNISIAN frontier.

So far there were only small medical units in TRIPOLI viz: a South African C.C.S., a Field Ambulance (less one company), two Field Transfusion Units, an Advanced Depot of Medical Stores, a Mobile Bacteriological Laboratory, a Mobile Hygiene Laboratory, and a Motor
Ambulance Convoy.

The medical road evacuation link between TRIPOLI and BENGASI was broken by the move of the New Zealand C.C.S. at TAMET to west of TRIPOLI. There were no hospital ship evacuations from TRIPOLI during this period ending 13th February.

At this stage 10 Corps was still in CYRENAICA based in BENGASI and the R.A.F. Strategic Bombing Force was being built up in CYRENAICA.
VOLUME I

PART IV

TUNISIAN FRONTIER TO THE END OF THE CAMPAIGN.

(14th February to 14th May, 1943)
PART IV

TUNISIAN FRONTIER TO THE END OF THE CAMPAIGN
(14th February to 14th May, 1943)

1. GENERAL

On 20th February FIRST and EIGHTH ARMIES came under the co-ordinated operational command of 18th ARMY GROUP. G.H.Q., M.E.F., continued to be responsible for the administration and maintenance of EIGHTH ARMY and the Western Desert Air Force.

By 21st February the advanced elements of EIGHTH ARMY were in contact with the enemy south of the MARETH defences and immediately concentrated west of TRIPOLI with a view to attacking these defences.

Maintenance of this force and evacuation of its casualties was by road from TRIPOLI. Air evacuation was also used. The road distance was about 175 miles of which the last 50 miles were in a very bad condition and just east of the TUNISIAN frontier the road crossed a narrow causeway across the marshes.

On 3rd March, H.Q., TRIPOLITANIA BASE AND L OF C. took over control of TRIPOLI advanced base enabling the ARMY staff to concentrate on operational maintenance for the next advance.

On 6th March, our positions at MARETH were attacked in strength by the enemy but they were repulsed suffering heavy losses.

During the first half of March, 10 Corps was moved forward from BENGASI area and was concentrated
west of TRIPOLI by the beginning of the MARETH battle.

2. **THE ADVANCE TO ENFIDAVILLE** (See Appendix 'J')

On the night of 20th-21st March EIGHTH ARMY attacked the MARETH defences. Fierce fighting ensued and continued until 28th March when the enemy withdrew northwards to defensive positions in the line of the WADI AKARIT, north of GABES, which was occupied after slight opposition.

The WADI AKARIT was strongly held and was attacked on 6th April. After bitter fighting the enemy again withdrew. By 10th April SFAX was occupied.

10 Corps now took up the pursuit and two days later occupied SOUSSE and the enemy withdrew to ENFIDAVILLE, 13 miles further north. On 13th April the enemy defences south of ENFIDAVILLE were contacted and on the night of 19th-20th April a further attack was launched which resulted in its capture.

The rate of advance is shown below:

<table>
<thead>
<tr>
<th>Location</th>
<th>Date</th>
<th>Days</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>MARETH</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GABES</td>
<td>29th March</td>
<td>2</td>
<td>23 miles</td>
</tr>
<tr>
<td>WADI AKARIT</td>
<td>31st March</td>
<td>4</td>
<td>40 miles</td>
</tr>
<tr>
<td>SFAX</td>
<td>10th April</td>
<td>14</td>
<td>108 miles</td>
</tr>
<tr>
<td>SOUSSE</td>
<td>12th April</td>
<td>16</td>
<td>190 miles</td>
</tr>
<tr>
<td>ENFIDAVILLE</td>
<td>20th April</td>
<td>24</td>
<td>218 miles</td>
</tr>
</tbody>
</table>

The average distance covered daily was 9 miles including heavy fighting at WADI AKARIT.

The EIGHTH ARMY line remained on the ENFIDAVILLE front till the end of the campaign for the enemy held strong defensive positions in the mountains north of
ENFIDAVILLE and some EIGHTH ARMY formations were removed to assist FIRST ARMY in the final drive on TUNIS.

On the 1st May 7th Armoured Division, 4th Indian Division and the 201 Guards Brigade moved west and north-west to join FIRST ARMY. As 1st Armoured Division had already been transferred the strength of EIGHTH ARMY on the ENFIDAVILLE front was reduced to four Infantry Divisions and two Armoured Brigades.

3. **OPERATION OF PORTS WEST OF TRIPOLI.**

Ports west of TRIPOLI were small but all were used for maintenance purposes for varying periods.

The possibility of using ZARZIS had been doubted but it was opened on 10th March and, functioning for a week only, reduced the load on road transport from TRIPOLI.

GABES harbour was known to be of little value because of sand shoals and was used for three days only from 3rd to 5th April.

It was planned that SOUSSE and SFAK were to be developed to the maximum for the maintenance of EIGHTH ARMY. This was to be done by shipping direct from the DELTA and by small coasters from TRIPOLI.

With this in view ocean going ships were loaded in the DELTA prior to the attack on the MARETH line. They were then sailed to TRIPOLI where they were lightened to meet the draft restrictions of SFAK and held ready to be called forward.

SFAK Harbour was partially blocked when occupied.
on 10th April and could only admit landing craft, but in 4 days time it was accepting 'Z' craft and small coasters. The port was increasingly used until the end of the campaign.

4. **TRIPOLI ADVANCED BASE.**

By the beginning of this period the capacity of TRIPOLI port had been sufficiently developed to permit the handling of the tonnages required by our forces.

More harbour craft had been made available and the bulk petrol installations were repaired to accept the necessary quantities of petrol.

The 95 cm. railway running from TRIPOLI to ZUARA was used only for clearance of stores from TRIPOLI port to depot areas that the rail served.

The first Hospital Ship arrived at TRIPOLI on 20th February and disembarked the personnel of a 600 bed General Hospital. The Hospital's equipment arrived about the same time by store ship. On the 21st February the first hospital ship evacuation of 350 patients was effected from TRIPOLI.

5. **ROAD TRANSPORT.**

By 13th February, with maintenance through TRIPOLI assured, the road haul from BENGASI to TRIPOLI had been reduced to a small daily average of about 150 tons, this being used in the nature of "balancing tonnage".

The immediate problem was the maintenance of the forces West of a roadhead at BEN GARDANE, 120 miles west of TRIPOLI. The distance was no problem, the difficulty
being the bad road and the interference with the operational traffic (required to concentrate Army and Air Forces) by the heavy two-way maintenance traffic.

The strictest road control was instituted. For maintenance convoys, fixed block timings were allotted for each day, and traffic priorities were laid down. Marshalling areas and control points were established at which traffic could be staged or taken off the road where this was necessary to permit the passage of more urgent traffic. Slow traffic usually moved by night and staged by day. Headlights were permitted as far west as BEN GARDANE.

As far as possible traffic by day operated at 15 m.p.h. and 20 v.t.m. (vehicles to the mile), and by night at 8 m.p.h., and 40 v.t.m. In practice it was found best to operate traffic in blocks of 500 to 600 vehicles with about half an hour time gap between blocks.

On one day, 5,500 vehicles passed the control post at BEN GARDANE, 4,300 moving west and 1,200 returning eastwards to TRIPOLI.

Generally speaking, motor ambulances were arranged to run in convoys without hindrance.

6. AIR TRANSPORT.

On 26th January, the air transport service was extended from the TAMET airfield to CASTEL BENITO, the service beginning to operate at this airfield three days after its capture. On 6th April the service was extended
to GARES and on 18th April to SFAX.

As many returning transport planes as possible were used to evacuate patients from the forward area to CASTEL BENITO.

7. PERSONNEL REINFORCEMENTS.

After February 1942, the movement of reinforcement personnel from the DELTA to EIGHTH ARMY became a difficult matter. During this month 30 Corps was being concentrated west of TRIPOLI in readiness for the battle of the MARETH LINE, and towards the end of the month and, during the first half of March, 10 Corps was moved westwards from the area of BENGASI and AGEDABIA.

Every means of road transport was employed in carrying forward over the 1,600 miles from the DELTA the large numbers of personnel required by the ARMY and DESERT AIR FORCES.

As many as possible were sent direct by sea. Others were flown direct from the DELTA or alternatively from EL ADEM, the airfield near TOBRUK railhead.

To handle this personnel the transit camp at TRIPOLI was used as an advance personnel and reinforcement depot.

The casualties sustained in the battles of MARETH and the WADI AKARIT and the normal wastage which had to be compensated for in readiness for future operations created a demand greater than the available supply at the time of reinforcement personnel, but this was met by the end of March.
The provision of adequate personnel reinforcements, and their movement over the long distances involved, were successfully completed and by the end of the campaign practically all units in EIGHTH ARMY were well up to strength.

8. REPLACEMENT OF VEHICLES.

At this stage of the campaign, vehicle replacement presented a big problem. Replacements could not be sent forward by sea as all available space required for the movement of stores.

Vehicles sent by road had to cover 1,600 miles before reaching the Army and many required considerable overhaul in the advanced base at TRIPOLI because of the wear and tear to which they were subjected en route to the Army, especially where the replacement was a reconditioned and not a new vehicle. The time lag between despatch and delivery to unit under these conditions averaged about one month.

9. SIGNALS COMMUNICATIONS.

As the enemy withdrew he continued his systematic destruction of all permanent line routes and their repair continued to be a major problem, but was to some degree eased by capture of permanent line stores in TRIPOLI area.

10. MEDICAL ARRANGEMENTS IN TRIPOLITANIA.

The medical plan for TRIPOLITANIA has already been outlined and, with the capture of TRIPOLI and the
subsequent advance, was put into effect.

Owing to various shipping difficulties delay occurred in fully implementing the plan proposed for the establishment of hospitals, but by the end of March the situation had improved considerably and is discussed below in paragraph 11.

Under the D.D.M.S. EIGHTH ARMY the duties and responsibilities of the D.D.M.S. of TRIPOLITANIA BASE AND L. OF C. were:

(a) control of military hospitals and convalescent depots;
(b) maintenance of a pool of medical reinforcements for EIGHTH ARMY;
(c) medical supervision of the lines of communication, east and west of TRIPOLI;
(d) supervision of medical aspect of occupied enemy territory administration;
(e) maintenance of EIGHTH ARMY and TRIPOLI medical units with medical supplies;
(f) reception and evacuation of sick and wounded from EIGHTH ARMY and TRIPOLITANIA;
(g) medical supervision of TRIPOLI town and port.

11. MEDICAL ARRANGEMENTS FOR THE TUNISIAN BATTLES.

For the expected enemy attack on our positions at MEDENINE the "G" estimate of our wounded was 3,000. The attack which took place on 6th March was, however, repelled, some 300 casualties only being incurred by our troops. For the MARETH battle "G" had estimated that we would sustain 5,000 wounded in the break-through and
in the capture of GABES, and 2,000 in the subsequent advance and capture of SFAX. Fortunately, our wounded in the MARETH battle between 21st and 23rd March amounted only to 363 while at the WADI AKARIT battle on 6th to 9th April some 2,000 were wounded. Nichols (1940) (Chap.VII p.46) states, "One is supposed to obtain one's figures from "G", but it is not advisable to reply upon these figures too implicitly even if they can be obtained", because the estimates were usually conservative as "G" was always optimistic of his attack. Generally speaking our experience with EIGHTH ARMY "G" Staff was not the same; their estimates, as shown above, generally erred on the liberal side.

In preparing for the MARETH battle D.D.M.S. EIGHTH ARMY expected 1,200 wounded daily in the first few days and established at MEDENINE a medical area with three C.C.Ss. whose capacity would be some 700 beds (see Appendix 'J'). At BEN GARDAN he placed another C.C.S. and a Mobile Military Hospital with a combined capacity of 700 beds, while alongside there was an Army Field Ambulance M.D.S. to take sitting and walking journey patients. Owing to the tedious five-hour road from BEN GARDAN to TRIPOLI a South African C.C.S. was stationed at ZUARA for the staging, inspection, treatment and refreshment of casualties in transit to TRIPOLI. Evacuation along this road was to be effected by 100 ambulances which could evacuate 600 cases in 24 hours, and returning empty lorries which would evacuate 300 sitting patients in 24 hours. Serious cases were to be evacuated by air
from SENEM (near MEDENINE) and BEN GARDAN landing grounds. These arrangements worked successfully.

Some anxiety was experienced before the MARETH battle because of the unsatisfactory hospital bed situation in TRIPOLI. On 13th March only two hospitals and two African Sections were open with 1,600 beds available between them (and these were full), and two Field Ambulances were functioning as a hospital with 200 stretchers. However, by hospital ships clearing to BENGASIS and ALEXANDRIA, by air evacuation, and by a magnificent effort on the part of medical staffs the hospital capacity of TRIPOLI was raised by 21st March to 4,400 by improvisation (with stretchers forming "crisis" expansions) in the following manner:--

<table>
<thead>
<tr>
<th></th>
<th>Beds</th>
<th>Stretchers</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two British General Hospitals</td>
<td>2,100</td>
<td>500</td>
<td>2,600</td>
</tr>
<tr>
<td>One Combined &quot; &quot;</td>
<td>600</td>
<td></td>
<td>600</td>
</tr>
<tr>
<td>African and S.D.F. Hospital Sections</td>
<td>400</td>
<td></td>
<td>400</td>
</tr>
<tr>
<td>Two Field Ambulances</td>
<td>400</td>
<td>400</td>
<td>800</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3,500</strong></td>
<td><strong>900</strong></td>
<td><strong>4,400</strong></td>
</tr>
</tbody>
</table>

On April 5th, the eve of the battle of WADI AKARIT, the situation was more satisfactory, more equipment having been received and many stretchers having been replaced by beds so that 4,620 beds and stretchers were available. On that date there were 2,337 beds vacant. In addition a Convalescent Depot had opened accommodation for 1,000 men.
Evacuation arrangements for the 2,000 wounded of the WADI AKARIT battle worked excellently, a group of two C.C.Ss. and a Mobile Military Hospital having been established at GABES. Air evacuation was carried out on a large scale on this occasion.

For the attack on the ENFIDAVILLE line on 19th April "G"'s estimate was 2,500 wounded and some 1,300 were actually incurred. Three C.C.Ss. were established at Sfax whence evacuation was effected by road to GABES; by air to CASTEL BENITO (TRIPOLI) and by hospital ship to TRIPOLI. There were now four hospitals in TRIPOLI, with a total capacity of 5,100 beds, and their staffs were supplemented by that of another hospital which was waiting the arrival of its equipment. The Convalescent Depot had also increased its capacity to 2,000 men.

During the final operations in the ENFIDAVILLE- TAKROUNA Area some 500 casualties resulted.

By 13th May there were five hospitals and a South African Field Ambulance open in TRIPOLI with a total capacity of 5,837 beds of which 2,325 beds were vacant.

12. EVACUATION OF CASUALTIES (Appendix 'J')

Evacuation from TUNISIA was by road, rail, sea and air:
(a) **By Road** From forward areas to TRIPOLI.
(b) **By Rail** From TOBRUK by Ambulance Train to the DELTA.
(c) By Sea

From TRIPOLI either direct to ALEXANDRIA or, if necessary, to BENGASI. Towards the end of the campaign casualties were evacuated by sea from Sfax and SOUSSE to TRIPOLI, for accommodation in hospitals in the TRIPOLI area and for onward transit to the DELTA. Owing to the need to clear beds in TRIPOLI hospitals before and during the battle of MARETH, hospital ships had to be operated on the quickest possible turn-round. To this end they were sent to BENGASI, so that the maximum use could be made of the hospital facilities there. Between 19th March and 14th May thirteen hospital ship loads of patients (5,858) were evacuated from TRIPOLI and two (848) from Sfax (on 24th April and 11th May).

(d) By Air

The system of evacuation of casualties by air during the fighting in TUNISIA is illustrated diagrammatically at Appendix 'J'. Casualties were evacuated by the ambulance aircraft of No.1 Australian Air Ambulance Unit, consisting of three DH 86 ambulance planes, No.1 South African Air Ambulance Unit consisting of one Lodestar ambulance plane, and transport aircraft of the Air Transport Wing R.A.F., returning from the forward areas. Towards the end of the campaign three Bombay aircraft which had been converted to ambulance planes were attached to the air ambulance units.
On the forward journeys these ambulance aircraft carried up supplies of blood and medical stores. The air ambulance units operated from the most forward landing grounds to those near the Corps and Army Medical areas which represented the terminus of the forward run of ordinary transport aircraft.

During the attack on the MARETH LINE air evacuation was carried out as follows:

(i) **By Ambulance plane.**

From forward landing grounds direct to CASTEL BENITO where rear Air Casualty Evacuation Unit (A.C.E.U.) consisting of three sections, was situated, or to SENEM Landing Ground where two sections of the A.C.E.U., were situated, and from SENEM Landing Ground or BEN GARDAN Landing Ground where one A.C.E.U., section was located, to CASTEL BENITO.

(ii) **By transport plane.**

From SENEM or BEN GARDAN Landing Grounds to CASTEL BENITO.

A new and most successful development was the evacuation of casualties from 6 N.Z. Field Ambulance main dressing station.

This was situated at BIR ZOUMIT on the axis of the flank attack on EL HAMMA. This M.D.S. and the landing strip were, in fact, behind the positions occupied by the enemy at MATMATA.

During the period 16th to 30th March 175
casualties were evacuated to CASTEL BENITO, 194 to SENEM Landing Ground, and from SENEM Landing Ground to CASTEL BENITO 244 cases.

During the battle of WADI AKARIT the GABES Landing Ground was used by transport planes with the result that evacuation by road to TRIPOLI was negligible.

The successful evacuation of casualties by air was due to excellent co-operation between the Medical Services of the Army and the R.A.F., and to the pilots of the four, and later nine, ambulance aircraft who flew their craft in all weathers and to and from the most forward landing grounds which were usually nothing more than landing strips.

Much more could have been accomplished by this method had further ambulance aircraft been available, and many serious casualties would have been saved the distress of a long road evacuation, the effect of which was to reduce the chances of early recovery.

13. PSYCHIATRIC AND NEUROPATHIC CASES.

In order to reduce the number of Psychiatric and Neuropathic (P & N) cases which would otherwise have had to be evacuated to the DELTA hospitals, 50 beds were allotted in hospitals at TRIPOLI for P & N cases, and a rehabilitation centre of some 200 beds was opened at No.7 Convalescent Depot TRIPOLI, the whole being under the supervision of a psychiatrist specially appointed.

The resultant reduction in the number of P & N cases which had to be evacuated to hospitals in the base
was a great saving of man-power in the forward areas.

14. **BATTLE CASUALTIES.**

Table I shows the number of battle casualties which occurred in our troops in February and March. The high incidence in March corresponds with the heavy battles of MARETH and WADI AKARIT. It will be noted, however, that the number is less than that of either October and November 1942 during which the battle of EL ALAMEIN was fought.

Of the 4,537 battle casualties, 2,345 were wounds of the extremities, wounds of the lower extremity being in the majority. Multiple wounds accounted for 667 and there were 593 wounds of the head and neck. As might be expected, wounds of the head, neck and upper extremity were more frequent in armoured units, while infantry units suffered mainly wounds of the lower extremity from mines.

Mine casualties figured very high in the list of wounds owing to the widespread and indiscriminate mining of areas, tranks and roads carried out by the enemy.

15. **APPOINTMENT OF CONSULTANT SURGEON, EIGHTH ARMY.**

It had been observed during this and previous desert campaigns that the final results of surgery in the field depended very much on early treatment, and while the results obtained in recent operations were the best yet achieved they varied with individual surgeons, some having more experience of war surgery in the desert than others. Consequently it was felt that an experienced Consultant Surgeon was necessary with the Army. He would
constantly be available during busy periods to supply experience, encouragement and assistance where necessary. The Consultant Surgeon, G.H.Q., M.E.F., could not always be forward. For these reasons, in March 1943, Lieut-Colonel C. DONALD, R.A.M.C., who, since the EL ALAMEIN battle, had been acting in an advisory capacity with EIGHTH ARMY, was officially appointed Consultant Surgeon to EIGHTH ARMY.

16. FIELD SURGICAL UNITS.

The use of Field Surgical Units throughout the campaign, especially in the later stages, brought out these lessons:

(a) That Field Surgical Units should not be located forward of the Light Section of a Casualty Clearing Station except to be attached to an M.D.S., which was likely to remain static for some time under Corps control. Only under exceptional circumstances should a Field Surgical Unit be placed under Divisional control.

(b) Field Surgical Units should not be moved frequently; a case was reported where a Field Surgical Unit was moved four times in 48 hours, opening and closing each time - no effective use could have been made of that unit. A Field Surgical Unit, when moved to a new location, should spend at least four days there.

(c) Many cases operated on in a Field Surgical Unit, e.g. abdominal wounds, must be retained up to a minimum of four days before evacuation and should a Field Surgical Unit have to move before these cases have recovered sufficiently, arrangements must be made for a detachment
of the Field Ambulance or Casualty Clearing Station to care for them.

17. **BLOOD TRANSFUSION.**

Owing to the long distance of TRIPOLI from CAIRO it was found necessary to establish a Base Transfusion Unit at TRIPOLI. This unit obtained fresh blood from troops in the TRIPOLI area, thus ensuring a steady supply for the EIGHTH ARMY medical units and greatly reduced demands on the base transfusion unit in CAIRO.

From this unit at TRIPOLI, blood, plasma and associated supplies were flown forward to the EIGHTH ARMY blood supply unit. This was one of two portions of a Field Transfusion Unit which was always located on a forward landing ground in close association with the Advanced Air Transport Centre. Supplies of blood, plasma etc., were then distributed by road to the advanced blood bank (the forward portion of the same field transfusion unit). As the advanced blood bank was sometimes 150 miles forward of the blood supply unit, supplies were flown by the empty ambulance planes going forward. From the advanced blood bank distribution to Field Ambulances, Field Surgical Units and Casualty Clearing Stations was effected by lorry.

During the two months of March and April over 2,830 bottles of blood and 2,490 bottles of plasma were issued to the Blood Supply Unit, and over the period October 1942 to the end of April 1943 the average monthly issue was over 1,055 bottles of blood and 1,050 bottles of plasma.
The layout of the blood transfusion service for the battle of MARETH is given at Appendix 'K'.

18. HYGIENE.

(a) Geographical and Seasonal Features.

From the point of view of hygiene the main feature was the change from the desert conditions of EGYPT, CYRENAICA and TRIPOLITANIA to the scrub covered hills and marshes of TUNISIA, which is notoriously malarious.

The fly plague, which made existence in the desert so uncomfortable and led to a high incidence of fly-borne diseases diminished, but the mosquito took its place. Fortunately, however, the campaign ended before the true malarial season began.

(b) Anti-Malarial Measures.

Little information was available regarding the incidence of malaria amongst the civil population in TRIPOLITANIA and SOUTH TUNISIA, though broadly speaking there was little danger of malaria until the Army reached the area north of MEDENIN in SOUTHERN TUNISIA. The country here was well watered and cultivated, and MARETH, GABES and SFAX were considered as being malarious if not highly so.

With the fall of TRIPOLI and the rapid advance into what was reputed to be malarious country the problem of educating officers and men in anti-malarial measures became acute. A Malaria Field Laboratory was sent to EIGHTH ARMY and arrived in TUNISIA in early February.
In no time malaria surveys and anti-malarial training were under way. Special malaria officers were selected and trained, and one anti-malaria control unit mobilised in each division. Mobile detachments consisting of a Malarialogist, a laboratory assistant and equipment were sent from the Malaria Field Laboratory to Corps in the forward areas to teach and supervise training. In addition, propaganda was instituted and pamphlets were circulated in an effort to make the force "malaria-conscious".

Following favourable reports on the use of suppressive mepracrine treatment by FIRST ARMY and the American 18th Corps preparations were made and a similar procedure adopted in EIGHTH ARMY, by the end of March.

(c) **Sanitation of Occupied Areas.**

The hygiene organisation had as its most troublesome work the clearance of occupied areas, especially the towns. Field Hygiene Sections and the hygiene staff of sub-areas had to organise considerable refuse clearing schemes, the repair of sewage plant, the restoration of water supplies and the general sanitary clearance of all captured areas. The work was particularly arduous in the towns of TOBRUK, DERNA, BENGASI and TRIPOLI.

The problem was made more difficult by the fact that hygiene units had to take part in the advance under the limits imposed by mobile warfare, which meant that sanitary equipment and materials were available only in very small quantities and much improvisation was necessary with whatever local materials could be obtained.
A greater measure of destruction of water and sewerage services was expected than was actually found in the towns of TRIPOLITANIA and Southern TUNISIA. The water and sanitary systems were relatively soon restored in TRIPOLI and the town put into a fit sanitary condition for use as an advanced base.

Generally, the findings reported in the first stages of the advance from EL ALAMEIN were confirmed in the case of TRIPOLITANIA and TUNISIA, namely, that the state of enemy camps and lines and the condition of his troops indicated a distinctly lower standard of hygiene and sanitary organisation than our own.

(d) Clothing.

Throughout this period the troops remained in battledress. The lack of washing and laundry facilities in the earlier stages resulted in the occasional occurrence of lousiness in some units. The awareness of the troops to the danger of typhus however prevented lousiness ever becoming serious, and with the assistance of the field hygiene sections large scale disinfection was undertaken when required.

(e) Incidence of Disease.

Owing to the transfer of formations to FIRST ARMY, suitable records are available up to March only. The incidence of disease in this period is given in Tables I and II.

The daily sick admission rate (2.42 diminishing to 0.99 per 1,000 strength) is again a striking index of the high degree of physical
efficiency and vigour maintained by the army during the advance. The commoner diseases were infective hepatitis, dysentery and diarrhoea, and tonsillitis. In the occupied towns, especially TRIPOLI, there was a marked danger of venereal disease showing an increase, but vigorous action was taken to ensure that full preventive measures were adopted by the troops and no serious prevalence occurred.

A noticeable feature was the increased incidence of digestive complaints during slack periods. Desert sores and septic skin conditions also tended to decrease as the army advanced westwards. The incidence of infectious disease was negligible, and in spite of a relatively high percentage of louse infestation in some units, only two unconfirmed cases of typhus occurred among British troops.

(f) Civil Population

The most serious health hazard to be feared from the civil population was typhus fever, a condition which is endemic in these communities. Though some sporadic cases occurred, it was fortunate that no major epidemic resulted.

The early arrival of the civil affairs medical organisation enabled the Army to transfer its responsibilities for prevention of disease in the civilian population. The population, however, did not present any formidable health problems during the period of the advance.
(g) **Hygiene Organisation**

No major changes were made in the hygiene organisation. Field Hygiene Sections on the whole accompanied their divisions, and non-divisional Field Hygiene Sections were used specially in such base areas as TRIPOLI to maintain adequate sanitary supervision of the advance bases and lines of communication.

(h) **General.**

That the operations culminating in the capture of TUNIS were without any very distinct hygiene features is itself a striking confirmation of how successful were the measures for the prevention of disease and the maintenance of health in EIGHTH ARMY.

As in the EL ALAMEIN battle, so in this period, the Army was kept healthy and vigorous by the fact that its food, its clothing, its water supplies, its camping areas and the means of cleansing personnel were kept under constant hygiene supervision. The prevention of disease, too, kept the army at full fighting efficiency. All these factors combined to indicate that again the hygiene organisation and the hygiene standard of the Army were of a high order and an important factor in the final victory.

19. **PIONEERS AND LABOUR.**

By the end of the campaign there were over 60 Pioneer Companies employed with EIGHTH ARMY, or along the L. of C. as far east as the EGYPTIAN frontier.

These pioneer companies were employed mainly for labour in the ports and harbours, in depots,
and on airfields and road construction.

The pioneer companies were mainly African (from High Commission Territories, i.e., Basutos, Bechuanas and Swazis) and East Africa, and Indian, with a few Mauritian and Seychellois companies.

This excellent military labour was supplemented as far as possible by such civil labour as could be obtained.

The heavy work undertaken by the men of the Pioneer Companies was often of an exceedingly monotonous nature and perforce had to be carried on for very long stretches at a time. Though not spectacular, the work done was essential and often under the most difficult and exacting conditions. The men of these companies gave of their best and much is owed to them by the fighting soldiers.

20. MEDICAL ARRANGEMENTS FOR PIONEER AND LABOUR COMPANIES.

African Pioneer Companies are organised into Groups administered by a Group Headquarters. On the Group H.Q. there were two Medical Officers who, in addition to their medical duties, usually had a sick bay of some 20 to 40 beds in which to detain and treat cases of minor illness.

In September 1942 plans were made to organise African Sections of General Hospitals. Each section was to have 100 beds, with a British medical officer in charge and was to be self-contained as regards staff and equipment, thus enabling it to be
attached to the General Hospital or Casualty Clearing Station in the area in which African troops were located. These sections were to share the specialist facilities of the General Hospital or Casualty Clearing Station.

The sections were to be designated East African, Basuto, Swazi or Bechuana according to the particular nationality of the African staff and were intended to deal primarily with Africans of that nationality.

A few African sections were formed but it was not possible to form sufficient of these sections owing to the shortage of trained African medical orderlies. Further, it was found uneconomical to locate more than one of these sections in an area as the numbers of the different types of Africans did not warrant it. So the African section, whatever the nationality of its staff, had to deal with the sick and wounded of East Africans, Basutos, Bechuanas and Swazis. It was arranged that as far as possible the type of section should correspond with the type of the majority of Africans in the area.

By May 1943 ten of these sections had been formed and were doing excellent work. In EIGHTH ARMY area African sections were located in TOBRUK, BARCE and TRIPOLI, and were able to admit and treat all Africans in those-areas, thus relieving the pressure on British beds in the hospitals.

21. PRISONERS OF WAR.

A large Prisoner of War reception camp
(with camp hospital) was established at TRIPOLI and similar ones were started at GABES and SFAX.

Between 14th February and 30th April some 2,500 German and 2,000 Italian prisoners were evacuated to camps and hospitals in the DELTA by sea. At the beginning of May evacuation to the DELTA ceased owing to shipping being required for other purposes, and the prisoners were retained in TRIPOLI, apart from occasional evacuation as the opportunity occurred. By the end of May there were approximately 600 German and 9,700 Italian prisoners in the reception camps and about 1,000 in hospital in TRIPOLI.

Although large numbers of prisoners were captured in the final stages of the campaign they were mainly evacuated westwards under arrangements made by the Allied North African Forces.

Sick and wounded prisoners were treated in camp hospitals as far as possible by their own medical personnel under the supervision of British medical officers. Serious cases were admitted to one of the TRIPOLI hospitals where 100 beds were set aside.

22. ADMINISTRATIVE CO-OPERATION BETWEEN EIGHTH AND FIRST ARMIES.

As EIGHTH ARMY advanced further north into TUNISIA it came in closer contact with FIRST ARMY and the degree of co-ordination effected by 18 ARMY GROUP increased steadily both as regards operations and administration. G.H.Q., M.E.F., however, continued to maintain EIGHTH ARMY through the advanced base at TRIPOLI,
and to some extent by direct shipments to Sfax. Evacuation of casualties and sick from Eighth Army was also carried out under the arrangements of G.H.Q., M.E.F.

In May the 7th Armoured and 4th Indian Divisions and 201 Guards Brigade left Eighth Army to join First Army to participate in the final break-through to Tunis and were maintained through Sfax.

23. **End of the Campaign.**

In the last stage of the campaign Eighth Army held the enemy on the Enfidaville front while the First Army reinforced by 1st and 7th Armoured Division, 4th Indian Division and 201 Guards Brigade made the final break-through on Tunis.

On 12th May, Marshal Messe, Commanding the Axis Forces on the southerly portion of their front, surrendered unconditionally to the Eighth Army and although fighting in the Cape Bon peninsula did not cease altogether until 14th May, this was the end of the campaign for the Eighth Army.

The advance of Eighth Army along the coast had covered 1,800 miles in just over 200 days.

By now plans were well advanced for the assault on Sicily, and Eighth Army administrative staff were released to complete the planning for the new operation.

Eighth Army formations were moved gradually back into Tripolitania and some returned
by road to the DELTA. In this way the formations were positioned for training and re-equipping in readiness for the next offensive which was scheduled to begin eight weeks after the end of the TUNISIAN campaign.
VOLUME I

PART V

LESSONS AND OTHER FEATURES OF THE CAMPAIGN.
PART V

LESSONS AND OTHER FEATURES OF THE
CAMPAIGN

1. FOOD SUPPLIES.

(a) Ration Scales.

From the point of view of morale and the general health of the forces in the field it is most important to make the maximum possible issue of fresh supplies, the need for this being greater in hot climates.

Experience during the campaign showed that active operations need not necessarily curtail the quantity or variety of rations and that troops benefited by the issue of the Middle East Field Scale (M.E.F.S.) of rations in operational conditions. The availability of well-balanced rations throughout the advance was largely responsible for the vigour of the troops and for the absence of food deficiency diseases.

The new Battle Ration was found very satisfactory but every effort was made to issue fresh items in the M.E.F.S. ration rather than their tinned equivalents. (These efforts were largely successful). Fresh fruit and potatoes were shipped from the Base to TRIPOLI and although it was impossible to ship fresh vegetables satisfactorily, local supplies at BENGASI and TRIPOLI were utilised. The only fresh item which was not satisfactorily supplied
was frozen meat. This question is dealt with fully in a later paragraph.

The efforts to extend issues of full M.E.P.S. rations were considerably assisted by the use of mobile cookhouses. In the advance these mobile cookhouses proved of great value.

The issue of an extra small, but highly stimulating, ration to A.F.V. crews subject to long periods of great stress was also successful.

(b) Frozen Meat.

The provision of frozen meat and fresh supplies was unsatisfactory.

There were ample supplies of frozen meat in the large cold storage depots in the main base area, and no shortage of fresh supplies. Limited cold storage accommodation was made available at the ports of TOBRUK, BENGASI and TRIPOLI during the advance. The difficulty lay in the shortage of suitable refrigerator shipping.

During the early stages of the campaign it was possible to ensure a fairly regular supply to BENGASI by means of three small ships but early in January 1943 one of these was sunk off BENGASI.

Refrigerator plants designed for use in barges on the River TIGRIS and a 200-ton plant intended for use on shore were obtained for installation in selected ships, and the provision of additional and special refrigerator shipping was asked for.
In spite, however, of improvisation carried out locally the frozen meat situation continued to be unsatisfactory throughout the campaign. The only certain remedy was the provision of proper and reliable refrigerator ships, but these were in short supply.

(c) Control and Distribution of Food Reserves.

When the campaign began the forces to be maintained were within 50 miles of the main base area in the DELTA. On the 14th May 1943, when it was terminated, some formations of the original EIGHTH ARMY were over 1,800 miles away.

In October 1942, stocks in the Middle East Base were high, but by the end of February the supply situation was becoming difficult; a large proportion of the reserves which, in October, had been in the M.E. Base supply depots were spread out along the L. of C. at TOBRUK, BENGASI and TRIPOLI advanced bases, in the EIGHTH ARMY and in the staging posts established along the coast road between BENGASI and TRIPOLI.

The campaign demonstrated the necessity for having ample food reserves readily available at the main base to compensate for supplies which would become "locked up" in a long L. of C. and for the quantities which would be en route by sea and overland.
(d) Technical Difficulties of Maintaining an Advancing Force by Sea.

The essential factor in maintaining the EIGHTH ARMY by sea was the rapid initial establishment of "balanced" (i.e., a representative selection of stores in terms of average demand) holdings of all commodities at new ports and the maintenance of these "balanced" holdings once they have been established. For this purpose ships were loaded with "balanced" units of 100 tons as an insurance against delays, losses by enemy action, changes in programmes.

The "balanced" loading secured in this way was not ideal. It created great difficulty in sorting out supplies on discharge and tended to increase breakages in handling numerous different sizes, types and shapes of packages. In the latter stages cargoes were loaded with 75% bulk storage and with 25% in "balanced" units. As soon as the stock position was sufficiently secure, "balanced" units were abandoned.

2. OPENING AND OPERATION OF PORTS.

(a) The need for the closest co-operation between the services responsible for operating a captured port was most important.

(b) The limiting factor in obtaining the maximum tonnage discharge at each port captured during the campaign was the shortage of harbour craft.
experience showed that in preparing loading schedules a 10% margin had always to be made for last minute adjustments to loadings, inaccuracies in estimates of measurement tonnage, and wastage of space through broken stowage.

(d) Hospital ships and personnel ships which could not berth alongside, made a serious drain on power craft and lighters, and as far as possible special arrangements should be made to provide landing facilities in order to obviate withdrawing harbour craft required for cargo discharge.

3. THE DENTAL SERVICE.

(a) Strength

The strength of the Army Dental Corps in EIGHTH ARMY was maintained throughout the advance on the basis of one dental officer to each field medical unit in a division which was equivalent to one officer per 5,000 men. This was augmented gradually by the addition of Mobile Dental Units each having one officer and two dental mechanics. Beginning with three of these, the number was gradually increased till, in the end, ten such units were operating with, or close behind, the EIGHTH ARMY on a scale of two Mobile Dental Units per U.K. Division.

(b) Mobile Dental Units.

Mobile Dental Units proved to be the solution to the problem of provision and repair in the field of dentures and almost completely stopped the wastage
from evacuation on dental grounds that had previously been a source of anxiety. Had it been possible to provide these in 1941 as was projected, much of the evacuation could have been avoided, but the impossibility of obtaining the requisite transport precluded their formation until Autumn 1942 when six vehicles were issued. Four units were then immediately formed and allotted to EIGHTH ARMY. The advent of these Mobile Units in the field was of great assistance to dental officers at Field Ambulances who were without facilities for mechanical work and harassed with the problem of deciding when a 'denture' case was sufficiently urgent to warrant sending to the C.C.S. where it might or might not be possible to deal with it at once, more probably the latter, in which case there was a definite probability of evacuation to the Base.

The ideal location of Mobile Units is between Field Ambulance and C.C.S. preferably adjacent to or in close liaison with the former. They are 'self-contained' and independent units and need not be attached to a 'parent' medical unit.

(c) **Type of Work Carried Out.**

In general the type of work was dominated by the circumstances. As would be expected there was a higher proportion of extractions as against conservations of teeth compared with base areas. This was no reflection on the dental officers who were usually faced with the need to deal with large numbers of 'sick' as expeditiously and effectively as possible. Future benefit to the individual had often to be disregarded in favour of
present needs of the many. Scaling of teeth also bulked largely in treatment; men tended to accumulate calculus on teeth readily under desert conditions.

(d) **Dental Fitness**.

In contrast with Dominion troops, who had the benefit of a much higher allotment of dental officers, the dental condition of U.K. Troops was fair and improved as time went on. A large number of troops had arrived from home in a dentally unfit condition. Despite strenuous efforts made it had been impossible to effect a material improvement in these before they went forward owing to the totally inadequate strength of the Dental Service in Middle East. Small inspections carried out on different arms of the Service showed that only about 50% could be classed dentally fit and this on a lowered dental standard of 'fit in all probability for a minimum period of six months'. This standard improved to a marked extent in the later stages of the campaign when it was possible to employ the Dental Service in increased strength under more static conditions.

(e) **Administration**.

It was felt that the Dental Service in the field could have been used to greater effect had there been an administrative dental officer at Army H.Q. to advise the D.D.M.S. on the dental situation in the Army. This was illustrated when in the end it became possible to utilise the services of the Assistant Director of Dental Services (A.D.D.S.) TRIPOLITANIA for this purpose. This took place prior to the
Battle of MARETH, when there was an immediate marked increase in the effectiveness of the forward Dental Service, wholly due to the efforts of this officer. The necessity, however, of minimising the staff of HQ EIGHTH ARMY in order to keep it wieldy and mobile, ruled out this and other desirable appointments.

4. BRITISH RED CROSS WAR ORGANISATION.

The Middle East British Red Cross War Organisation played a valuable part throughout the Campaign. By the untiring efforts of the Commissioner, his staff and his many voluntary workers of the British Community of Egypt, the activities of the British Red Cross Organisation were wide and varied and earned the sincere appreciation of the fighting services, the patients, British prisoners of war and their relatives. The activities included the provision of comforts for patients in the field and in base hospitals, gifts of apparatus and equipment for hospitals and special centres, making up parcels and despatching them to prisoners of war in enemy hands, visits to hospitals, provision of reading material for patients, organisation of outings and entertainment for patients and convalescents, and answering enquiries from relatives concerning patients.

The Red Cross Officers’ Convalescent Homes in Egypt, Palestine and Tripoli were able to supplement the existing facilities in Army Convalescent Depots.

After the capture of BENGASI a Red Cross Stores Depot was opened at BARGE and later in TRIPOLI where a
mobile section was added to enable stores to be taken round to medical units in the field.

5. **MOTOR AMBULANCE CONVOYS AND AMBULANCE CAR COMPANIES, R.A.S.C.**

In the fast moving desert campaign the ambulance cars played a most important part, in fact, without ambulance cars the medical services would have been a failure. Much praise is due to the work of the officers and men of Motor Ambulance Convoys (M.A.Cs.) and Ambulance Car Companies (A.C.Cs.). They worked unstintingly under the most trying conditions of terrain and yet were always mindful of their responsibility - to get patients back in comfort and alive. This involved the negotiation of miles of rough, uneven, dust-laden desert track, liable to enemy attack, at a speed of 5 - 10 miles per hour with only the prospect of the tedious return journey facing them after arriving at their patients' destination.

The M.A.C. was, till early 1943, a medical unit commanded by a Major, R.A.M.C., and consisted of three sections each of 25 motor ambulances. Before the end of the campaign all M.A.Cs. were reorganised into R.A.S.C. units but operationally under medical control commanded by a Major, R.A.S.C. They retained a similar organisation as before except that the R.A.M.C. personnel formed a medical section in addition to the three ambulance car sections.

Ambulance Car Companies were R.A.S.C. units but like M.A.Cs. worked under Medical direction. Some
M.A.C.s. worked under Corps control (usually on the scale of one section per division) while others and selected Ambulance Car Platoons were under D.D.M.S. Army.

Ambulance Car Companies, consisting of four platoons each of 33 motor ambulances, could be used over a wide area. All did sterling work and it is pertinent to make mention of the American Field Service Ambulance Car Companies staffed by American volunteers who, not relishing the monotony of base work pressed for, and were often given, tasks with forward troops e.g. columns and armoured units. They were equipped with four-wheel drive Dodge ambulances of light, sturdy, manœuvreable design, each carrying four stretchers.

The standard ambulance cars were front-wheel drive Austin Type K2, heavy cars, exceptionally comfortable and roomy, and carrying four stretchers. The only criticism that could be levelled against them was that they were rather lightly sprung for heavy, bumpy, desert work.

Field Ambulances were equipped with eight Austin K2 and four Humber two-stretcher, four-wheel drive, ambulance cars, the latter being most useful for R.A.P. and A.D.S. evacuation work.

6. MEDICAL AND DENTAL LESSONS OF THE CAMPAIGN.

(a) Much suffering was avoided, and many lives saved by :-

- (i) the use of Mobile C.C.Ss. and Field Surgical Units.

(ii) the blood transfusion service.
(iii) evacuation of casualties by air.

(i) **Mobile C.C. Ss. and Field Surgical Units.**

The value of these units in ensuring the early treatment of casualties was proved conclusively under the most difficult conditions of fast moving warfare.

(ii) **The Blood Transfusion Service.**

The large supplies of plasma and saline sent to EIGHTH ARMY before and throughout the advance were amply justified being used with highly beneficial results and with very few adverse reactions. Owing to the lack of adequate staff and transport in the Base Transfusion Unit a system of supply through a selected Field Transfusion Unit (divided into blood supply unit and an advanced blood bank) was established and ensured a satisfactory blood service to forward medical units.

Considerable quantities of whole blood and plasma were required for the high proportion of mine injuries which were characteristic of the campaign.

(iii) **Evacuation of Casualties by Air.**

Generally the system of evacuation by air worked well and saved many casualties a long, arduous and possible dangerous journey by road. All types of cases travelled well except perforating abdominal wounds. Although evacuation by transport plane from rear landing grounds was satisfactory
it was found that evacuation from forward to rear
landing grounds (the most forward landing grounds
to which transport planes were allowed to fly) was
limited by the very small number of ambulance
aircraft available. This placed a serious restriction
on this section of the chain of evacuation. To get
the maximum benefit out of evacuation by air, more
ambulance planes are required for this forward link.

(b) Early establishment of hospitals at Advanced Bases.

The longer the L. of C. the greater the need
to establish early forward hospital and specialist
facilities to avoid wastage by evacuation and inadequate
treatment and rest in the long evacuation route.

The movement of hospitals cannot be lightly
undertaken, and has to be considered in relation to other
demands, and the limited shipping available. A good deal
of anxiety was experienced by not having, until the end
of the battles of MEDENINE, MARETH and WADI AKARIT,
sufficient beds to meet the 'G' estimate of casualties.

(c) Mobile Section of Advance Depot of Medical Stores.

The provision of a mobile section of an Advanced
Depot of Medical Stores and the provision of pre-sterilized
dressings and theatre linen represented a great step
forward in facilitating the work of the forward medical
units.

(d) Battle Casualties.

Table I indicates that 18,324 casualties were
incurred from August 1942 to March 1943 inclusive; the
nature of wounds and of the weapons causing them varied
greatly. Sometimes mainly shell wounds were inflicted, and at other times, especially during a rapid advance, mine wounds predominated. The multiple wounds caused by the German 'S' mine were often a problem to surgeons. Rapid movement inevitably caused delay in collection of casualties, but this was compensated somewhat by having air superiority, adequate medical supplies available, and the ability to push surgical units to the most forward limit.

In spite of almost continuous fighting the casualties were still slight compared to the last war. WILES (1944) in a valuable analysis of battle casualties admitted to M.E.F. hospitals from April 1942 to March 1943 (inclusive) estimated the number of wounds at 28,993 which was about 3% greater than the number of patients concerned owing to casualties having more than one serious wound. His comparison of the Middle East mortality rate of 2.1% with 7.4% in EGYPT and PALESTINE in the Great War is striking evidence of the success of the medical organisation in support of EIGHTH ARMY.

(e) Dental.

(i) The work of the Dental Service was most satisfactory in spite of being under-manned forward for a long time.

(ii) The Army fought most of the campaign in an only partially fit dental condition.

(iii) That three dental officers within a division which amounted to a ratio of 1 to 5,000 men could not cope with maintenance work in an Army already 50% dentally unfit. Five dental
officers was the minimum necessary.

(iv) To secure maximum efficiency of the Dental Service an Administrative Dental Officer is desirable at Army H.Q.

7. HYGIENE.

(a) Organisation

The mobility of the North African campaign emphasised the necessity of still further strengthening unit hygiene and of making yet more elastic the distribution of hygiene sections as between divisions and army.

(b) Sanitation.

Improved sanitation resulting from the high standard of hygiene in the Army paid dividends in a much reduced incidence of excremental diseases. The enemy did not have this high standard and his losses due to this group of diseases were much more serious than our own.

(c) Water Salinity.

With careful training and experience in the Desert troops could live on a very short ration of water with a salinity up to 300, but this depended largely on the time of the year (higher salinities can be drunk in the summer than in the winter), and also upon the saline content other than sodium chloride.

(d) Burns.

- This was a serious problem in A.F.Vs. Prevention was considerably assisted by covering the exposed parts (arms and knees) with long-sleeved shirts and trousers.
(e) **Disease Incidence.**

The excellent health of the Army as a whole was reflected in the daily admission state which never exceeded 2.42 per 1,000 strength. Conditions showing the highest incidence were infective hepatitis, excremental diseases and accidental injuries.

Though the disease incidence can be regarded as satisfactorily low the prevalence of preventable disease such as dysentery, diarrhoea, etc., shows that much remained to be done in prevention.

The campaign proved that if an Army is 'hygiene conscious' and observes proper food and water standards, serious outbreaks of disease could be prevented, and an important contribution made towards victory. The failure of the Germans and Italians to reach an equally high standard of hygiene resulted in reduced efficiency of their forces through disease and debility.

8. **Administrative Liaison and Co-ordination.**

The basis of efficient administration is good liaison, co-ordination and co-operation between all branches of the staff and services.

Good liaison, based on personal contacts, existed between the administrative staff and services at G.H.Q., M.E.F., and H.Q. EIGHTH ARMY.

In G.H.Q., M.E.F., the Lieut-General of Administration (L.G.A.) delegated to the Deputy Quartermaster-General (D.Q.M.G.) the responsibility for co-ordination of effort which he effected by means of regular conferences
of Directors of all branches and services concerned, by regular personal visits to EIGHTH ARMY, and by correspondence with the Deputy Adjutant and Quartermaster General (D.A.& Q.M.G.) of the ARMY.

The Directors of the Medical, Supply, Ordnance and other Services visited the ARMY from time to time as required and dealt direct with their own service problems.
SUMMARY

1. A survey has been made of the Libyan - Tunisian Campaign from the Medical Administrative aspect.

2. A description of the 'G', 'A' and 'Q' background of the campaign is given in order to show how closely the medical service must fit in with general planning of operations and maintenance in order to obtain successful results.

3. The success of the medical and hygiene organisation was illustrated in the good health of the EIGHTH ARMY and in the low mortality among casualties.

4. The medical and dental organisation has been described together with the many modifications and adaptations peculiar to the needs of the Western Desert.

5. Apart from the victorious and rapid nature of the campaign stress has been laid on the magnificent effort of the medical services in withdrawal to EL ALAMEIN and the complete reorganisation and re-equipment of medical units.

6. Another achievement was the success in medical planning, which enabled the collection, treatment and evacuation of sick and wounded, to function smoothly throughout the campaign.

7. The problems of road, rail, sea and air evacuation throughout the campaign have been described.
ACKNOWLEDGEMENTS.

My thanks are due to the D.M.S., M.E.F., and to the D.Q.M.C., M.E.F., for permission to study official reports. I am indebted to Brigadier R.F. WALKER, C.B.E., M.C., late D.D.M.S., G.H.Q., M.E.F., for his advice and criticism and to S/Sgt. L.J. GIBSON, R.A.M.C., for his invaluable assistance in typing and drawing.