PILOTS' HANDBOOK.

CAIRO–BAGHDAD AIR ROUTE.

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Third Edition, August, 1929.

PREFACE TO THIRD EDITION.

1. This book has been compiled with the object of providing pilots using the air route between Cairo and Baghdad, with a concise, and at the same time adequate compendium of instructions, orders and notes of general information which can be easily handled and referred to in the air.

2. Pilots should make every endeavour to embody in their copy of this book any subsequent amendments which may be published from time to time.

3. Officers should include in their reports, records of any errors or omissions in this publication or any changes in the track that they may notice, as well as any fresh information they may discover. Such new information can then be included in future amendments or editions.

4. In consequence of the great length of the track, the severity of climatic conditions, the lack of water, the enormous extent and uniform appearance of the desert and the uncertainty of the weather in this area, a very detailed organisation has been found necessary to ensure the safety of aircraft and pilots undertaking the desert crossing. It is only by strict adherence to set procedure that difficulties can be overcome and the security of pilots assured.

5. This book has been compiled, therefore, with the object of assisting pilots in every way, without harassing them with endless special orders. Every effort has been made to foresee the more probable misadventures which

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may arise, but it is realised that it is not possible, or even desirable, to try to provide against every possible contingency.

6. Where such contingencies are encountered, pilots may rest assured that if they act in accordance with the spirit of these instructions, and if they display initiative and resolution, their action will always be supported.

7. The success of the route rests more in the hands of pilots of aircraft operating on it than in the hands of those who are responsible for its inauguration and maintenance.

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CAIRO—BAGHDAD ROUTE.

PART I—GENERAL.

1. The opening of the desert route between Amman and Baghdad was definitely decided upon at the Middle East Conference of March, 1921, when the Secretary of State for the Colonies, the Chief of the Air Staff, and the local army and air force commanders met at Cairo for discussions prior to the inauguration of the Middle East Department of the Colonial Office.

2. The objects of this route were set out as follows :—

(i) A link in an air chain of imperial communications between Europe and India and possibly further afield.

(ii) A line of rapid reinforcement from Egypt or Palestine to Iraq both for aircraft and personnel.

(iii) A means of rapid communication for service purposes by means of regular flights.

(iv) A form of training in long-distance flying.

3. The track was constructed by survey parties sent out from Cairo on the one side and Baghdad on the other, and to render the track as conspicuous as possible, the wheel marks of heavy Crossley Desert tenders and Rolls Royce tenders were employed.

4. Auxiliary markings in the form of ploughed furrows added to the visibility of the track. By April, 1922, a series of landing grounds had also been prepared along the track at average intervals of twenty miles.

5. All these grounds were conspicuously lettered in the Cairo zone and numbered in the Baghdad zone. The grounds from Amman to El Jid were lettered eastward consecutively " C " to " R " (with the omission of " B,"

" I " and " Q ") whilst the grounds from Ramadi to El Jid were numbered " I " to " XI " in Roman numerals westwards, El Jid being No. XI. Ground number eight was, however, marked in ordinary numerals, thus " 8."

6. A new landing ground named " B " has since been prepared and marked at Kasr Kharana, and there is now a track between a point marked " arrow " about five miles east of Kharana on the car track to a point marked " 475 " south of Azrak.

7. A number of whitewashed arrows clearly visible from the air have been made on the railway track at the stations north and south of Ziza pointing in the direction of Ziza and at Ziza itself a large " Z " has been whitewashed on the railway lines.

8. Middle East Command is responsible for the track up to and including landing ground " D." Iraq Command is responsible for the track up to and including Rutbah. Between " D " and Rutbah the responsibility for salving and assisting aircraft rests with the unit to which the aircraft belongs.

9. Egyptian local time is two hours ahead of G..M.T., Iraq local time three hours. All messages are sent G.M.T., but pilots should alter their watches at Amman. This is particularly necessary when flying East, as when reaching Baghdad pilots will have one hour less daylight remaining than at Cairo.

10. Amman is the intermediate port and refuelling base. Ziza, which is situated on the Hedjaz railway twenty miles south of Amman, is now used only as an emergency landing ground with no stocks of petrol and oil.

11. Where the type of aircraft allows, a non-stop flight from Amman to Ramadi or vice-versa is desirable. When a non-stop flight is not possible, one of the desert landing grounds is chosen as a refuelling point. For this purpose, petrol dumps have been established at landing grounds " D " and " V " and at Rutbah. " Imperial Airways " fuel is also available at landing ground " B " on emergency, but the necessity for its use should seldom arise.

12. Ramadi, which is 63 miles west of Baghdad, has a good surface of gravel which renders it almost immune from becoming unfit after heavy rain. It is 160 feet above sea level, and slopes very gently down towards the northward. It is bounded on the north by rough ground, *i.e.*, graves and mounds; and on the south and south-easterly sides there are lines of trenches a short distance away. The landing ground is clearly marked all round by square slabs of whitewashed cement, which do not project sufficiently above the ground to be harmful to tail skids.

13. The valley of the Jordan and the Dead Sea is separated from the Iraq Plain by a broad elevated tract which forms the northern portion of the great tableland of Arabia. At the place where it is crossed by the Cairo–Baghdad air route, this tableland has a width from west to east of about 450 miles and an average altitude of 2,000 feet.

14. The western escarpment of the plateau rises somewhat abruptly from the valley containing the Jordan and the Dead Sea, and its apparent height is increased by the low level of the Dead Sea which is some 1,300 feet below sea level. The eastward slopes, which bound the Iraq Plain, are much more gradual, and the escarpments are comparatively insignificant.

15. The highest portion on the track is 3,350 feet above sea level; this point is situated only some eight miles east of the beginning of the ascent from the Jordan Valley.

16. For some twenty miles eastward from the western edge of the plateau the belt of country called Transjordan is deeply incised by the valleys of numerous streams draining towards the Jordan and Dead Sea.

17. Further east the plateau surface consists of rolling uplands with shallow depressions; the principal of these depressions is that of Azrak, the floor of which is about 1,600 feet above the sea.

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18. As the Iraq Plain is approached, shallow valleys draining north-eastward are passed, the principal of which is the Wadi Hauran. This wadi crosses the track at Rutbah. The eastern valleys are devoid of running water except for short periods after rain, and are much broader and less deeply eroded than those that drain into the Jordan basin.

19. Though the eastern three-fourths or more of this plateau are more commonly styled the " Syrian Desert " on maps, only a very small part of the surface has a truly desert character. It should rather be described as steppe ; for, even in the very heart of it, there are immense tracts of good grazing ground for camels and sheep, and though there are some bare stretches, especially in the volcanic area, it is seldom that a traveller finds himself at a spot where no vegetation is in view.

PART II—GENERAL CHARACTER OF THE GROUND.

21. Except where overlaid by basalt sheets, the rocks forming the plateau are almost entirely of limestone. A few beds of sandstone are associated with the limestone near the middle point of the desert route. The limestones contain an abundance of flint and chert and, where the conditions have been unfavourable for the formation of a covering of soil, the surface is strewn with flinty gravel produced by the disintegration of the rock and the superficial removal of its softer constituents.

22. Only in a few places along the route is the ground so soft as to present serious difficulties to car traffic. The soil-covered tracks are in some places cultivated, especially in the neighbourhood of Amman, where there are extensive cornfields ; in other places they support a growth of grasses and small bushes.

23. For a forced landing, flat gravel is safer than bush-covered ground and usually the darker the flints are in colour, the better is the surface ; but care should be taken in the air not to mistake dark basalt boulders for dark flint gravel.

24. Fortunately, the basalt country, indicated by special marking on the map, is confined to a well-marked region extending for about one-eighth of the whole journey from Amman to Baghdad.

25. When a pilot in the air is in doubt whether he is inside or outside the basalt belt, a point worth noting is that car-tracks usually show up much more clearly and sharply on dark gravel than on the basalt boulders.

26. It may further be remembered that it is rare that a tract of basalt boulders is free from bushes growing in the interspaces, whereas flat gravel stretches are frequently devoid of every trace of vegetation. If green-

stuff is totally absent from a dark-looking tract, it is more likely, therefore, to be good gravel than anything else.

The Basalt (Lava) Country. (Azrak to Ground " H ").

27. Basalt is first encountered on the eastward journey near Azrak about seventy miles east of the Jordan, and from there onwards it caps most of the hills which rise from the plateau for a distance eastwards of some eighty miles. The basalt is a heavy dark rock of great hardness which weathers into large boulders.

28. This basalt rock is the chief obstacle of the journey. Originally spread as a thick sheet over the limestone, it has in the course of ages been broken up in the interspaces between the hills. These spaces are covered for many miles with a rough paving of basalt boulders, often more than two feet in diameter. Some of the stretches of boulder are half covered with bushes growing between the stones, and, from the air, they have a deceptive appearance and are likely to form a trap to any pilot who may be forced to land on them.

Mud Flats.

29. A remarkable feature of the Syrian Desert, especially in the basaltic region, is the presence of extensive mud flats. They occupy very shallow depressions and are the result of evaporation of drainage water loaded with sand and fine reddish-yellow mud which has collected in the depressions after rain. They are often several miles across, with a perfectly flat surface, and when thoroughly dry they are excellent for car travelling and provide good landing grounds. They have also the great merit to pilots of being very conspicuous from the air, owing to their sharp colour contrast with the dark country surrounding them. When they are wet, as happens after rain, these mud flats are of course unsuitable as landing grounds or for cars, but they dry up very quickly after rain.

30. It is noticeable that the mud is of a decidedly darker colour when wet than when dry. This change of colour, when the mud is drying, is a valuable criterion whether a particular mud flat is safe to land on or not, when no water is visible from the air. If a mud flat on which it is desired to make a landing varies in colour, a selection of the lightest coloured place is desirable; this patch is usually to be found near the edge of the plain.

31. If there is uncertainty about their being dry, the mud flats should be avoided if possible, but in the event of a forced landing—when some risk has to be taken—it is better to chance a little doubt about dryness than to attempt a landing on the basalt boulders which generally surround the flats in the lava-belt. Outside the lava-belt there will usually be no trouble in finding safe landing grounds on gravel around the mud flats.

Water Sources.

32. Casual pools of muddy water are likely to accumulate, especially among the hills along the western portion of the desert route, during the rainy season (*i.e.*, November to March) and even occasionally during the summer, if thunderstorms occur. Several of these pools, some of them several feet deep and a hundred yards or more in length, were made use of by the ground reconnaissance convoy in June, 1921. As to the position of pools at any time, the pilot's own observations will be the best guide, as pools are always conspicuous from the air.

33. There are very few permanent water sources along the route between Amman and Ramadi. The principal are the following :—

(i) *Bir Kasr Kharana*—(35 miles east of Amman on the track). Water can, it is said, be got by digging to a depth of a foot or two in the valley floor at the foot of a white hill about two miles south-east of the castle ruin.

Azrak.—Water good and plentiful in pools.

Bir Imiri.—(About eleven miles south-east of the *Azrak* landing ground). A good landing ground on the mud flat in dry weather.

El Jid.—Indifferent water is obtained from a shallow well (distant about 600 yards from ground XI on a bearing of 278° (magnetic) ; but better water is obtainable from deep wells about two miles further north-east.

Rutbah.—(Bearing 117° (magnetic) distant six miles from ground IX). Good water is obtainable in the fort at Rutbah.

Flying Conditions and Weather Effects.

34. Varying conditions of weather have considerable effect on the appearance of the desert and known landmarks. Under normal conditions as seen from the air the desert possesses, in general, a grey appearance. The hills and rocks also appear grey, much the same as the surrounding country. The lava always retains a dark appearance.

35. The presence of thick clouds throws a dark shadow upon the desert and, additionally, hills and rocks have a much darker colour. Broken clouds throw dark shadows which often closely resemble land formations or dark pools. At times they completely obliterate some landmarks, and the entire desert assumes a different appearance. Cloud shadows are especially misleading to a pilot who is looking for bitumen pools in the vicinity of ground " I."

36. After rain or heavy dew visibility becomes very good, but where a mud flat may be sought as a landing ground or a landmark, it is not easily visible, since the moisture causes it to assume a colour closely resembling that of the surrounding country.

37. When landing over mud flats, it should be observed that, owing to the bright sunlight and the uniformity of these flats, similar landing conditions prevail to those of landing on snow, and height from the surface is deceptive. For this reason, landing should be made near the edge of the flat or at a point where definite and distinctive objects with shadows are visible. Moreover, owing to the glare thrown up from the flats, twin-engine pilots are particularly advised to wear sun-glasses when effecting a landing on them.

38. The head and neck should be adequately protected from the sun during flights over the desert ; glare glasses, which are available in squadron stores, are recommended to be worn on long desert flights.

39. The track is now very well marked from Ramadi to Rutbah owing to the continual road traffic. This portion is sufficiently clear for an experienced air route pilot to follow the track on a clear night with a full moon. Between Rutbah and Amman the track is indistinct in places and even with a full moon would be impossible to follow at night. The track is not good between Rutbah and landing ground XI ; also between " B " and Ziza or Amman. Pilots should exercise particular care on these sections of the route. On the latter section the numerous car tracks in different directions are confusing.

PART III—DESERT EQUIPMENT OF AIRCRAFT.

41. *Rations (Long Desert Flights).*

(i) *Twin-engined aircraft.*

3 ordinary flying rations for each occupant	12 lb. each.
1 emergency ration for each occupant .	3 ,, ,,
$2\frac{1}{2}$ gallons of water per occupant ..	25 ,, ,,
Minimum of 18 gallons will be carried ..	180 lb.

(ii) *General purpose aircraft.*

1 wing water tank or 5-gallon drum	56 ,,
2 Chaguls	16 ,,
2 flying rations	4·3 ,,
Sterilizing tablets	·7 ,,
1 emergency ration	10 ,,

42. *Blankets.*

Summer—2 for each occupant ($4\frac{1}{2}$ lb. each).
Winter—3 for each occupant.

43. *Medical.*

(i) *Twin-engine aircraft.*

3 first-aid aeroplane satchels	$4\frac{1}{2}$ lb.

(ii) *General purpose aircraft.*

1 first-aid satchel	$1\frac{1}{2}$,,

44. *Communication.*

1 set ground strips	3 lb.
6 message bags	$1\frac{1}{2}$,,
1 Very light pistol	$4\frac{1}{2}$,,
12 Very light cartridges	3 ,,
12 smoke candles (twin-engine)	12 ,,
3 smoke candles (general purpose)	3 ,,
Message picking-up gear (2-or 3-seater aircraft only).	4 ,,
1 mirror	3 ,,

45. *Technical equipment.*

See Appendices I and II.

PART IV—METEOROLOGICAL ORGANISATION OF THE AIR ROUTE.

47. No complete and accurate system of information as to the meteorological conditions over the Arabian Desert is yet available, but observations are now being made at Rutbah Wells. Detailed information of the probable conditions prevailing, including the condition of the track, can be obtained by telephone from Air Headquarters Meteorological Section, Baghdad, at 0600 and 1300 hours G.M.T. daily. A broad general inference is broadcast at 1500 hours G.M.T., but attention must be paid to K.R. and A.C.I., Chapter XII. This inference is based on observations made in Egypt, Palestine, Amman, Syria and Iraq, but is 10 hours old. Such a variety of weather as is experienced in Great Britain does not occur in this area, but changes are made with equal rapidity, and owing to paucity of reporting stations, care should be taken when contemplating a flight to obtain the most recent reports.

48. For the purpose of collecting useful information concerning weather conditions between Cairo and Baghdad from all stations on the route, and for the purpose of supplying both aircraft and ground stations with such information, meteorological centres are established at Cairo and Baghdad.

49. Under arrangements made at these centres, weather reports, including upper wind speeds and directions, are made available at all air route stations and are transmitted to aircraft at the pilot's request. Local meteorological reports and upper winds can also be obtained from Rutbah.

50. *Meteorological Stations.*—The following is a list of meteorological stations which are concerned with the route :—

(i) Heliopolis ..	Meteorological Headquarters, Middle East. No. 216 (B) Squadron.
(ii) Abu-Sueir ..	No. 4 Flying Training School.
(iii) Gaza ..	Imperial Airways, Ltd.
(iv) Ramleh ..	No. 14 (B) Squadron.
(v) Amman ..	Headquarters, Palestine and Transjordan.
(vi) Rutbah ..	Posts and Telegraphs.
(vii) Ramadi ..	Civil Surgeon. (Surface conditions only).
(viii) Baghdad ..	Air Headquarters, Iraq Command. (Forecasts).
(ix) Meteorological Section, Hinaidi.	For upper wind reports and fitness of aerodrome.

51. *Air Route Weather Reports.*—Weather reports to aircraft are issued in " clear " and all times quoted are G.M.T. (Greenwich mean time). These messages contain information as outlined below :—

(i) Name of station.

(ii) Time of observation.

(iii) Flying fitness (fit or unfit), affirmative or negative.

(iv) Weather (state of sky, rain, passing showers, &c.).

(v) Height of clouds (low medium or high) above station level.

(vi) Surface wind.

(vii) Visibility.

(viii) State of aerodrome. Should the surface of the aerodrome be unfit for landing, this information will be added at the end of the message thus :— " Aerodrome Negative."

(ix) The pilot balloon-ascent results, drafted according to the following specimen, indicating wind direction and velocity :—

Surface	N.W.	15.
One	N.W.	17.
Three	N.N.W.	20.
Six	W.	25.
Ten	W.	30.
Fly four.		

The words refer to the approximate height, in thousands of feet, above sea-level. The last two words of the message relate to the most advantageous height for flying.

The heights of clouds are given in terms above station level and the heights of winds in terms above mean sea level.

52. *Transmission of Weather Reports from Air Route Meteorological Stations on Cairo—Baghdad Route.*

(i) Weather and upper wind reports available for aircraft.

(*a*) *Cairo to Baghdad.*

Position of aircraft.	*Reports available.*
Heliopolis ..	Weather and upper wind reports from Aboukir, Abu-Sueir, Heliopolis, Ramleh and Amman are handed to the pilot before leaving Heliopolis aerodrome.
Between Abu-Sueir and Kantara.	Weather and upper wind report available at Abu-Sueir awaiting request from pilot.
El Arish ..	Weather and upper wind report available at Ramleh awaiting request from pilot.
Near Ramleh ..	Weather and upper wind report available at Amman awaiting request from pilot.

Position of aircraft.		*Reports available.*
Amman	..	Weather and upper wind report from Amman and Ramadi handed to pilot before leaving aerodrome.
Rutbah	..	Weather and upper wind reports can be obtained on request from Rutbah, providing 2½ hours' notice is given.
Ramadi	..	Surface conditions can be ascertained through Air Headquarters Meteorological Section, Baghdad.
Hinaidi	..	Weather and upper wind reports can be obtained on request, providing 1½ hours' notice is given.

Forecasts for route Rutbah–Baghdad can be obtained from Air Headquarters Meteorological Section, Baghdad, providing 1 hour's notice is given.

(*b*) *Baghdad to Cairo.*

Hinaidi	..	Weather and upper wind report from Hinaidi telephoned on day of departure to the squadron concerned by Meteorological Station, Hinaidi.
		Weather conditions over Egypt and Palestine sent to aircraft either at Hinaidi, in the air, or at Ramadi.

Route forecast Baghdad–Rutbah can be obtained from Air Headquarters, Meteorological Section, Baghdad, providing 1 hour's notice is given.

Rutbah	..	Upper wind reports available on request provided 2½ hours' notice is given. Any special information received by Air Headquarters, Baghdad, is transmitted to all aircraft in the air as long as W/T communication can be effected.
0515 G.M.T.	..	Weather and upper wind report from Amman sent direct to aircraft on the route.

Position of aircraft.	*Report available.*
Near landing ground " L."	Weather and upper wind report available at Amman awaiting request from pilot.
Amman ..	Weather and upper wind report from Amman and latest reports from other meteorological stations handed to pilot before leaving Amman aerodrome.
After passing Ramleh	Weather and upper wind report available at Ramleh awaiting request from pilot.
Near Romani ..	Weather and upper wind report available at Abu-Sueir awaiting request from pilot.

(ii) Observations made for aircraft in the air will be addressed " No. of Aircraft " to await request from " Air." Weather warnings, " Unfit " reports and reports that indicate important changes in the weather will be sent direct to aircraft with the least possible delay.

(iii) Should aircraft land intermediately, the nearest meteorological station in the direction in which the aircraft are proceeding will continue to supply them with observations including upper wind results, every three hours, unless they report that they are unable to proceed.

53. *Weather reports from aircraft.*—In order to assist the meteorological stations of both Middle East and Iraq Commands, and also aircraft that may be following, any unusual weather conditions experienced over the desert route between Amman and Ramadi should be reported by wireless without delay to either " Meteor, Heliopolis " or " Aviation, Baghdad." For further details *see* meteorological Standing Orders for Middle East.

PART V—W/T ORGANISATION.

Regulations for Normal Flying Formations and Number of Aircraft crossing the Desert.

57. Any aircraft performing the crossing alone will carry W/T equipment.

58. As many aircraft as possible of a formation will carry ground and air W/T apparatus. Any formation of two, three or four aircraft will include one W/T aircraft, and where five or more aircraft proceed on the route, at least two will carry full W/T equipment.

59. Where four or more aircraft cross together, and there is more than one W/T aircraft in the formation, they are to be paired or grouped with the object of reporting progress, their needs and forced landings.

60. All aircraft, in a formation of not more than three, equipped with W/T should listen in but only one operate except in emergency. No change over should be made from one aircraft to another during the stages of the flight owing to the difficulties it causes to reception stations.

61. Every formation crossing the route is to contain either a pilot or observer who has previously performed the journey.

62. Pilots are not to follow blindly the formation leader, but are to watch the track closely all the way, and, if the formation leader shows signs of losing the track they are to lead him on to it by pre-arranged signals.

63. Aircraft will fly in formation. The observer of the leading aircraft is responsible for informing his pilot of the descent or falling back of rear aircraft.

64. Where practicable, the officer commanding the formation should instruct the pilot of the W/T working aircraft, to fly at the rear of the formation, as the formation can then be kept in view.

65. All pilots are to carry a copy of this handbook.

Wireless Procedure to be followed (Ground and Air).

66. Pilots should ensure that their W/T operators are fully acquainted with the following orders for W/T procedure, and also with the method of erection and manipulation of a ground W/T station with the apparatus at their disposal. By closely obeying these instructions, officers in charge of aircraft will not only ensure their own safety and comfort with a minimum of delay, but will save trouble and anxiety on the part of units concerned.

67. Operators are to be acquainted with the call signs for all W/T stations on the air route and the collective call sign for " all stations."

68. The W/T aircraft accompanying the formation will invariably carry out W/T air tests on the day previous to the flight, when the aircraft are air-tested. When the aircraft is tested and found satisfactory, a signal to this effect will be made to the appropriate headquarters. The unit at which the test is carried out will signal the aircraft numbers and call signs to all W/T stations on the air route.

69. Aircraft are to carry small writing books in which operators are to keep a careful log of all messages transmitted and received. A copy of Air Publication 982 (" Aircraft W/T Operating Signals ") must always be carried also.

70. Wavemeters will always be carried. Aircraft will use the 333 (900 m.) frequency.

71. A serial number must be transmitted with each message. These serial numbers are to run consecutively, from the beginning to the end of the journey, irrespective of the fact that the journey occupies more than one day.

72. A time of origin in G.M.T., must conclude each message. Times in the text of a message will always be quoted in G.M.T., and followed by the letters " G.M.T." For these purposes watches should be synchronised with those of the ground station, before leaving.

73. The pilot is responsible for giving the operator the necessary information, but an operator is of little assistance on the Cairo–Baghdad route unless he takes an intelligent interest in it and so gives his pilot as much help as possible in every way.

74. The pilot must always include a reference to the other aircraft in company in all his messages, and immediately signal should they part company.

75. *In the Air.*—(i) If more than one W/T aircraft is in the formation, it must be clearly decided before leaving the ground which is the "stand-by" aircraft, and which aircraft is to "tune in" first. Both aircraft will "tune in" before any message of any kind is exchanged.

(ii) No aircraft will leave an aerodrome that possesses a ground W/T station without "tuning in" satisfactorily and obtaining an answer from the ground station. The W/T aircraft should leave the vicinity of the ground first. This also applies to stops at intermediate refuelling stations.

(iii) The "stand-by" W/T aircraft will "listen out" throughout the flight, but will not use its W/T unless the other aircraft forced-lands or its W/T fails, when the "stand-by" aircraft will take over entirely, and inform all air route stations to that effect. Should the W/T aircraft fail to make a signal for forty-five minutes, the "stand-by" aircraft will call him up and, failing reply, will assume W/T duties. The "stand-by" W/T aircraft, when parting company or taking over from the W/T aircraft, is to commence a new sequence of serial numbers for messages.

(iv) Aircraft will work with the nearest W/T station, but all messages are to be addressed to all air route W/T stations (collective call sign). East of ground "R," aircraft will work with Baghdad, and west, with Amman. Aircraft should endeavour to open up communication with the next station ahead before losing touch with the station behind.

(v) Aircraft will transmit between Baghdad and Amman over all landing grounds and not at stated times. Between Amman and Cairo aircraft will transmit at every half-hour.

(vi) It should be remembered that location reports are the most important of all messages.

76. *Forced Landings.*—General instructions on forced landing are outlined in paras. 80 to 82, but the following W/T instructions will also be adhered to when aircraft are forced to land :—

(i) Should an aircraft of a formation encounter engine or flying trouble, it will fire a red Very light signal before going down to land.

(ii) The W/T aircraft will then call all air route stations followed by its own call sign, and, without waiting for an answer, will proceed with the call sign of the aircraft in trouble, followed by the operating signal for " Forced landing at .....," the name and number of the nearest landing ground or location point and the time of origin. The whole message is to be made twice through.

(iii) When a W/T aircraft is unaccompanied and is about to make a forced landing, the W/T operator should endeavour, if possible, to signal to all air route W/T stations the operating signal " Forced landing at..... .....," followed by the name or number of the nearest landing ground or location point and the time of origin.

(iv) Where the aircraft that has made a forced landing displays ground strips giving information which the pilot of the W/T aircraft considers of value to receiving stations, such as cause of trouble, he will transmit such information before landing. If he does not land, he will report by W/T the position and requirements and proceed.

(v) " Forced-landed " aircraft carrying a W/T set will get into touch as soon as possible with the nearest W/T station and confirm the location and needs of the aircraft. To economise accumulator consumption, the operator will state that he will " listen out " or report every

two hours from zero to ten minutes after the hour, or for whatever period the ground station requires him.

(vi) The line of the aerial should, if ground permits, be erected with the free end pointing away from, and in line with the receiving station. The aerial should be suspended as high as possible.

(vii) A pilot, immediately he lands at a service station, will confirm in writing any W/T signals transmitted in the air by his aircraft regarding "forced-landing" aircraft. Unless a definite answer has been received, such signals should also be repeated from the air when nearing a receiving station, or from the ground, if an emergency ground set is subsequently erected en route.

(viii) Pilots should bear in mind that they should render every facility to the operator to get into touch with the nearest air route W/T station as quickly as possible after having made a forced landing. This will save much anxiety and inconvenience to all stations concerned with the movements of aircraft.

(ix) If no acknowledgment has been received for a forced-landing signal, the pilot should ensure that a land-line signal is sent if land-line telegraphy is available.

PART VI—PROCEDURE FOR A FORCED LANDING.

80. *General, and applicable to all formations.*—(i) Any aircraft landing, either voluntarily or involuntarily, on an emergency or other ground between Cairo and Baghdad will fire a red very light to indicate the intention of landing.

(ii) A smoke candle will always be dropped by an aircraft " forced-landing," so as to obtain surface wind direction. These candles should be examined as to serviceability before they are placed in the aircraft.

(iii) If the pilot of the " forced-landed " aircraft judges that the ground is fit for aircraft to land on, he must put the " T " accurately into the wind at a point where he wishes the wheels of any landing aircraft to touch. He must realise the responsibility he is taking in putting out a " T," both for landing and taking off. He must not be biassed by a desire for companionship of another pilot, but must judge strictly on the merits or demerits of the area he has examined.

(iv) If the ground is unfit to land on, he will make the suitable Ground Strip Code signal to his accompanying aircraft immediately he has made up his mind what he wishes him to do. (*See* Part IX).

(v) Whenever possible, one accompanying aircraft will go down to ascertain full particulars and requirements of " forced-landed " aircraft.

(vi) Where a stay of a night or longer is probable, or when there are signs of rough weather, the aircraft must be picketed down into the wind as soon as possible.

(vii) Airscrew covers will invariably be used when aircraft stand in the desert by day.

(viii) Water and food will be economically rationed.

(ix) If a pilot lands between Rutbah and Baghdad there is a frequent service of cars on the road and assistance may be obtained.

81. *Where the formation consists of two aircraft.*—(i) When a "forced-landed" aircraft puts out signals that the ground is unfit to land on, the pilot of the accompanying aircraft will wait fifteen minutes for further information from ground signals and then, if he himself does not carry W/T and on examination discovers no possible landing ground in the vicinity, will proceed to Amman, Rutbah or Baghdad, whichever is the nearest. The ground aircraft will then report his proceeding forward or his return to his station of departure.

(ii) If the aircraft still in the air carries W/T, is proceeding eastward and has reached ground "N," the pilot will carry out the normal W/T procedure and, if he is unable to land in the vicinity, he will proceed to Baghdad. If he is flying westward and has reached ground "8," he will similarly proceed to Amman alone.

(iii) If the W/T aircraft can land in the vicinity of the unserviceable one, he will immediately report the position to Cairo or Baghdad, and await instructions.

82. *Where the formation consists of three or more aircraft.*—(i) When three aircraft are proceeding and one goes down, the two serviceable ones (provided that one of them is fitted with W/T) will proceed, after fulfilling the normal W/T procedure and ascertaining full requirements of the unserviceable aircraft, by landing alongside, if possible, or by receiving ground signals.

(ii) If the two serviceable aircraft are not fitted with W/T and cannot land alongside or in the vicinity of the unserviceable aircraft, they will proceed to their destination, the unserviceable aircraft reporting their action accordingly, if the condition of its W/T allows.

(iii) Where there are four or more aircraft paired or grouped with W/T, the serviceable aircraft will, if one aircraft makes a forced landing, proceed ahead after carrying out normal "forced-landing" and W/T procedure, and thereafter the provisions of para. 81 will apply.

h

PART VII—AIR PILOTAGE.

Procedure on encountering Bad Weather.

85. When a pilot leading a formation on the route encounters bad weather of a type that is likely to result in his losing sight of the track, he will exercise discretion whether he :—

(i) lands or waits on the nearest available landing ground, at the same time broadcasting his movements by W/T, and carrying out the general "forced-landing" procedure of the route, afterwards awaiting improvement of the weather and proceeding when possible, or

(ii) returns to Ziza or Ramadi.

Procedure when the Track has been lost.

86. Wind speed and direction must be checked as frequently as practicable, so that in the event of the track being lost, the course to steer in order to cut it will be known. A record of the course and distance made good must always be kept in the log, in order that, in the event of a forced landing when the track has been lost, an approximately accurate D.R. position can be signalled by W/T to searching aircraft. This position should be given in the form of cross bearings if the forced landing takes place away from any point which is marked on the map.

87. If the leader of the formation loses sight of the track, he should at once attempt to find some landmark, and should then keep this always in view while endeavouring to regain sight of the track. Whilst circling round in view of the landmark, he will fire one green light to indicate to accompanying aircraft that he has lost sight of the track. If the pilot of any other aircraft of the formation finds the track, he will fire two green very lights, and assume leadership until the track has been definitely located.

88. In the case of aircraft being definitely lost, having failed to locate the track, a forced landing must be made by the leader of the formation on suitable ground, before his petrol runs out and preferably with at least half an hour's petrol in hand in order that :—

(i) A good landing ground can be selected.

(ii) The forced landing can be near an Arab camp.

The remaining aircraft in the formation will wait for the leader to put out a " T " before landing.

89. Before landing, the aircraft fitted with W/T, while still in the air, will broadcast his approximate position, quoting the last landing ground seen, his approximate distance from it, and the course he was actually steering.

90. *Procedure after Forced Landing.*—A pilot will endeavour to fit up a ground W/T station, if the apparatus is carried, and get into touch with the nearest air route station. If the landing has been made near an Arab camp, the inhabitants can usually give fairly accurate bearings of places selected, and in this way the approximate position can be plotted. Should searching aircraft fail to locate " forced-landed " aircraft, a messenger on camel or horse can usually be procured to take messages.

91. *Action when other aircraft are likely to be searching for forced landing.*—Every attempt must be made by pilots of lost " forced-landed " aircraft to attract the attention of searching aircraft. This is best done by :—

(i) Lighting smoke candle whenever other aircraft are heard.

(ii) Playing a mirror up and down when the sun is shining.

(iii) Two hours after sunset, a careful look-out will be made for signal lights fired by searching aircraft. If seen they will be answered by firing white signal cartridges.

(iv) Scrub will be collected and a large bonfire will be lit two hours before sunrise each morning until searching aircraft arrive.

(v) If no scrub is available, a petrol fire will be lit.

On no account must an occupant of a " forced-landed " aircraft wander away from it, in such a way as to lose sight of it. He will have little hope of being picked up.

92. *Action by searching aircraft.*—When it is presumed or known definitely that aircraft are lost, two or more search aircraft will go to the landing ground nearest the position where the aircraft were last heard of. This position will be the first base of operations, and one aircraft will always remain with the food, water, fuel and medical supplies, considered necessary by the despatching authority. Each aircraft will carry a supply of very lights. One hour after sunset a very light will be fired, and will be repeated twice at intervals of five minutes. During the whole of this period a strict lookout will be kept for answering very lights. If the answering very lights are seen, a compass bearing will be taken and the search carried out in that direction in the morning. From two hours before sunrise on each morning after the lost aircraft was last heard of, a strict lookout will be kept by all searching personnel. If a bonfire is seen, its bearing will be taken and the search for it continued during the hours of daylight. If no bonfire is seen, a lightly laden aircraft will, if circumstances permit, take off one hour before sunrise and look for fires. The pilot must, however, make careful arrangements to ensure that he does not himself become lost in the half-light.

93. Arrangements will be made to ensure that continuous W/T communication is maintained between this aircraft and the ground station at the point of departure or base. If, after an interval of 15 mins., no signal is received from the aircraft, a very light will be fired from the point of departure followed by further lights at intervals until daylight. Should the aeroplane ask by W/T for very lights one will be fired immediately in answer to the request. During daylight hours the searching aircraft will search along the route on as wide a front as possible without losing the track.

94. Finally, so much depends upon the circumstances in which the aircraft was lost, that the above orders may be found to be inapplicable in some cases. But whatever action is dictated by circumstances, it should be carried out in such a manner as to conform as far as possible with the foregoing instructions. Pilots who are lost will then know what action to expect by aircraft searching for them and will be able to adapt their own action to the particular circumstance in which they are situated.

PART VIII—REFUELLING BASES.

97. *Ziza.*—No stocks of fuel are maintained at Ziza. It should be borne in mind that Ziza is not an ordinary service aerodrome where all facilities may be expected, but is to be regarded primarily as a desert landing ground, and, from the equipment point of view, in no way different from any other landing ground between Ziza and Ramadi.

98. *Refuelling dump, landing ground "D."*—A 1,000-gallon tank, similar to that at landing ground "V" is installed at landing ground "D." The store is situated on a slight rise between the mud flat and the all-weather landing ground; the ground up to the tank has been cleared to enable aircraft to "taxi" up to it. Whenever fuel is taken from the tank, the signal announcing the departure of the aircraft is to state the amount of fuel left in the tank, in order that Headquarters, Royal Air Force, Amman, may be kept informed. Keys for the dump are kept by Headquarters, Royal Air Force, Amman, and are issued to each outgoing aircraft and collected from each incoming aircraft by the Duty Pilot, Hinaidi, or Amman, as the case may be.

99. *Rutbah.*—Fuel can be obtained from a 1,000-gallon tank which has been hired from Imperial Airways, situated on the landing ground in front of the Serai. This is replenished from four R.A.F. tanks containing 960 gallons in petrol tins. It is proposed to fit two further tanks each containing 1,000 gallons in the near future.

100. *Refuelling dump, landing ground "V."*—(i) A 700-gallon tank is installed at landing ground "V," and is situated 260 yards on a bearing of 40° from the centre of the circle. Aircraft can taxi up to it. A dip rod has been fitted to the tank and on every occasion that fuel is drawn from the tank, in order that it may be kept full at all times, the signal announcing the departure of the aircraft from landing ground "V" will give the reading of the dip rod.

FIG. 1.

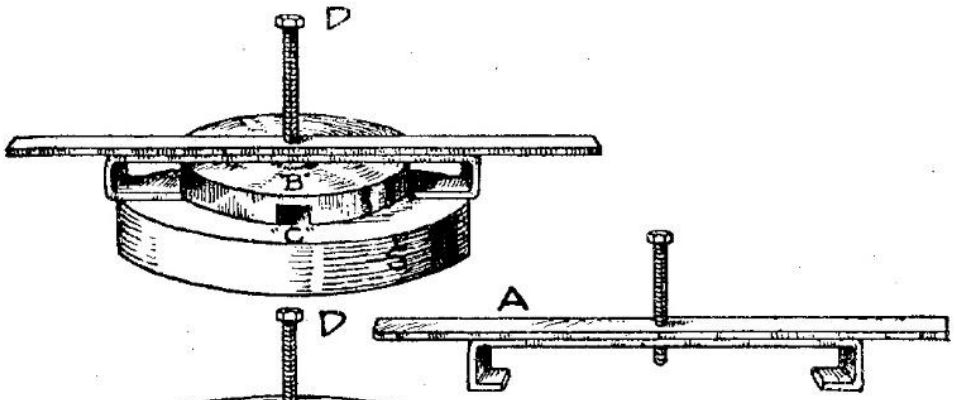


FIG. 2.

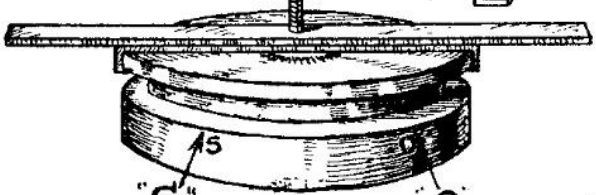
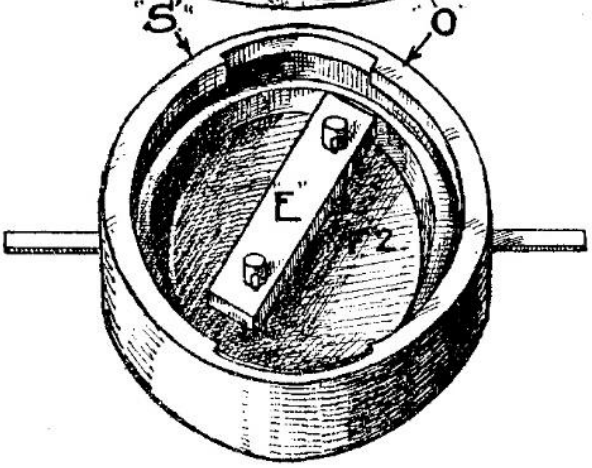


FIG. 3.



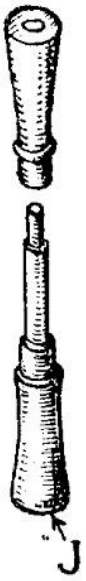
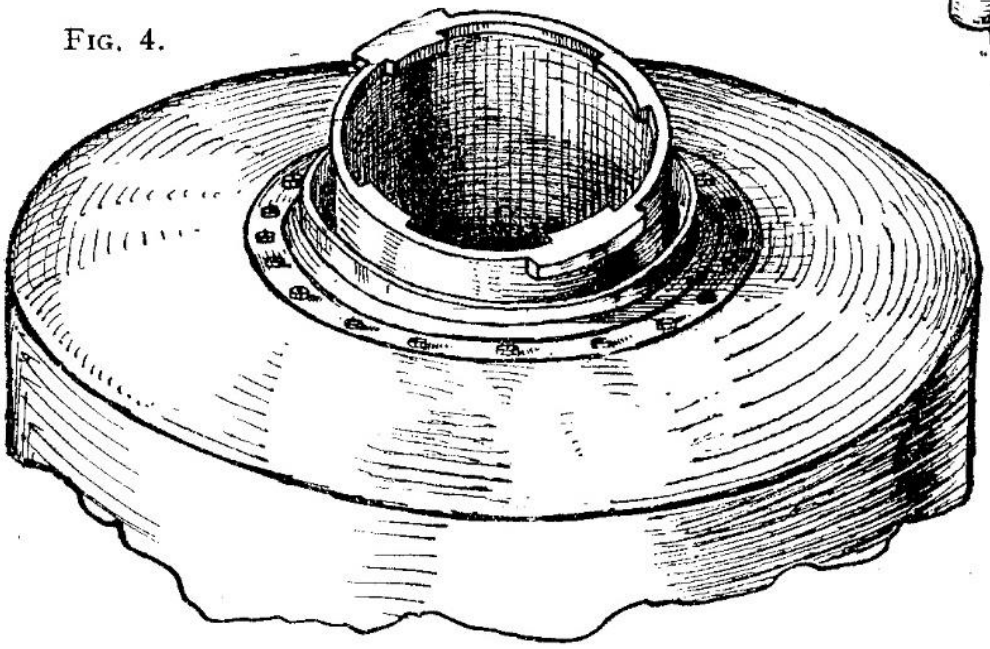


FIG. 4.



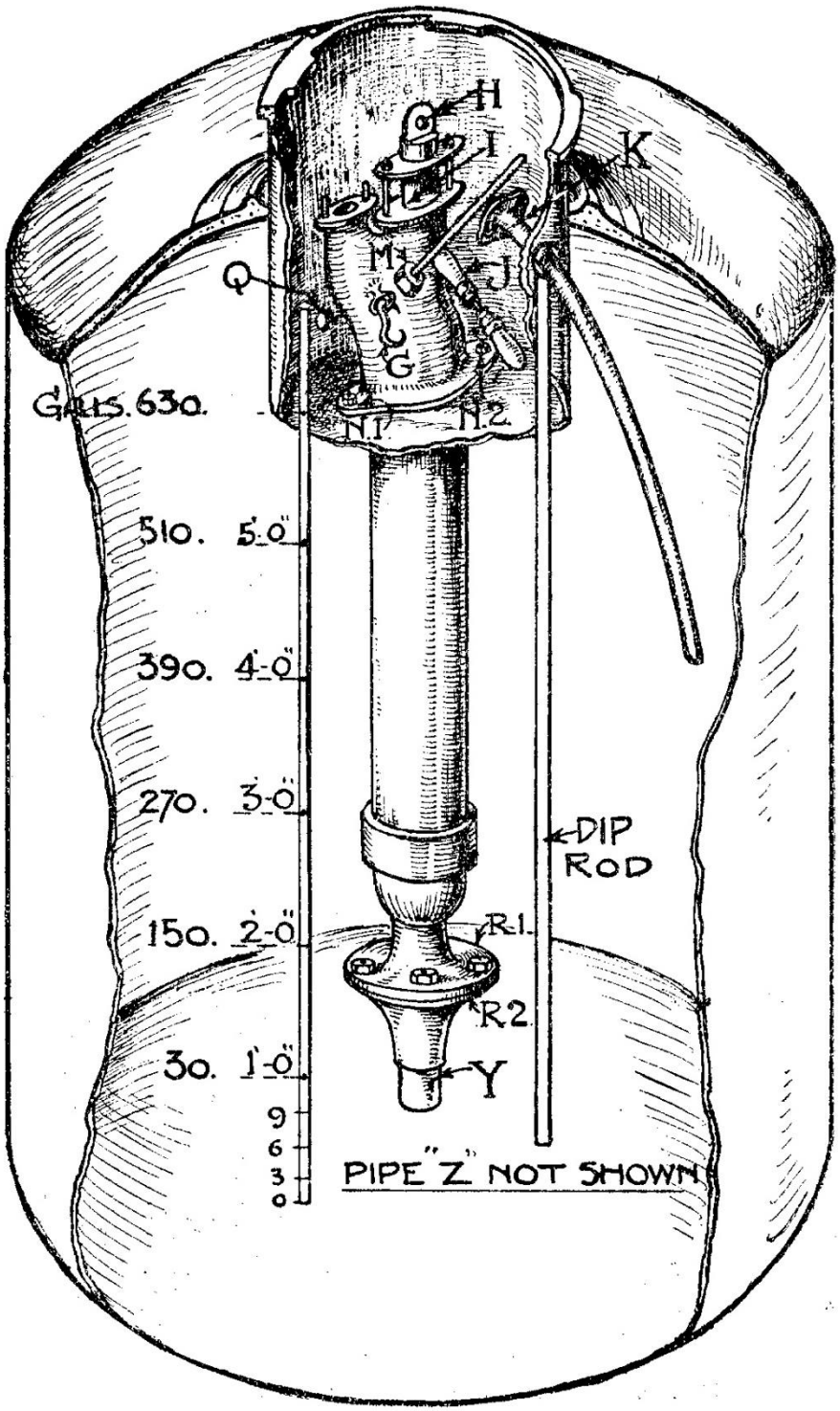


FIG. 5.

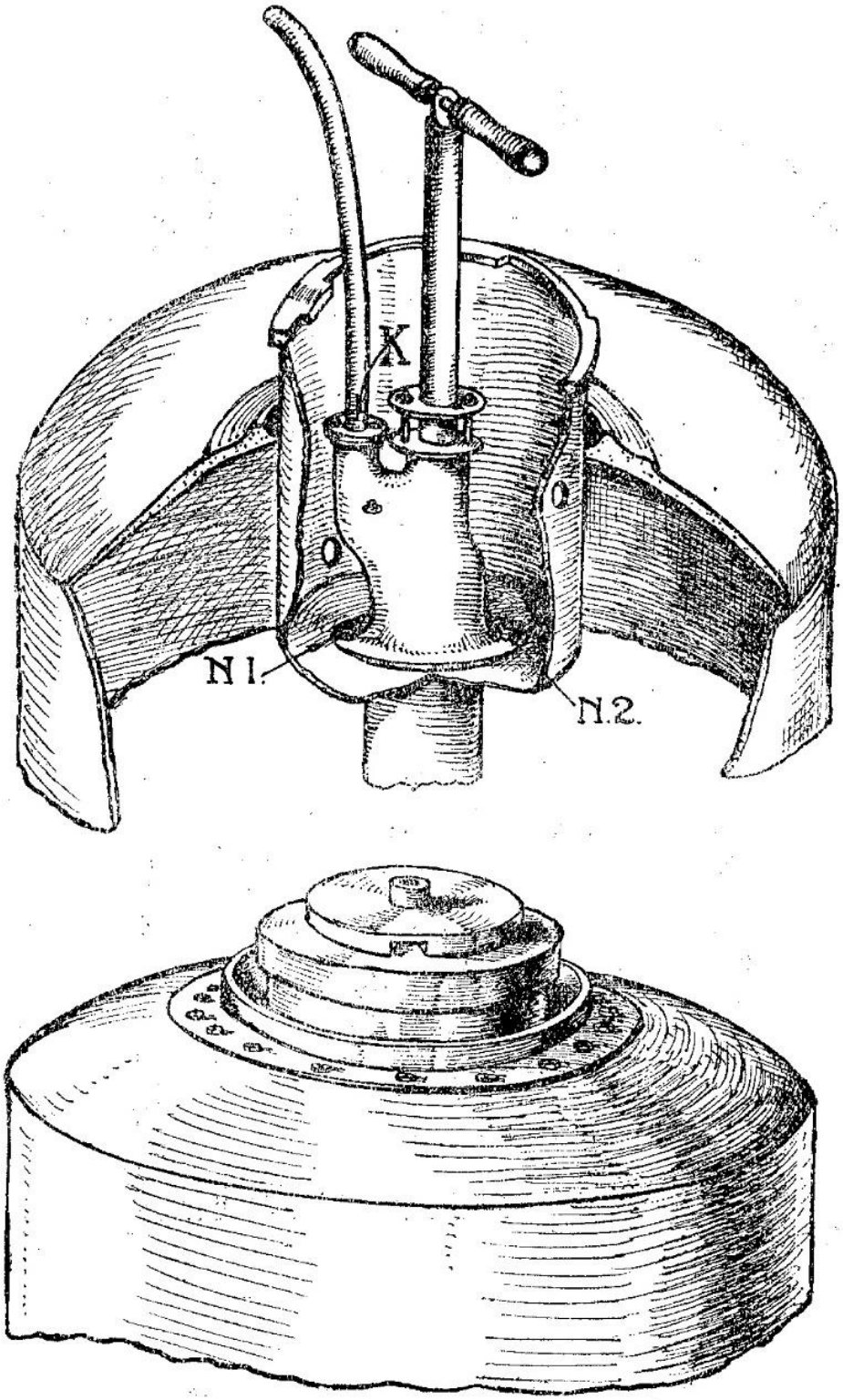


FIG. 6.—TANK AND PUMP WITH LID CLOSED.

(ii) *Keys.*—Keys for the tank are kept at Amman and Baghdad, and all pilots will be provided with a key by the Duty Pilot, Hinaidi or Amman. As a length of tubing with special fittings to enable filling to be accomplished rapidly is required, all pilots will ensure that this tubing is drawn at the same time as the key. These keys and length of tubing are to be handed to either the officer in charge of ground party, Ziza, Duty Pilot, Hinaidi, or Amman, on completion of the desert crossing.

101. *Ramadi.*—A store of petrol, benzol and oil is kept in the building close to the landing ground. The chowkidar on guard will obtain keys of petrol store from the police in the village. The stock is normally maintained at 1,000 gallons petrol and benzol.

102. *Instructions for opening tanks at landing grounds "D" and "V."*—(i) Take the special spanner marked "A" on the drawing and place it on the lid "B" as shown in fig. 1.

(ii) Turn the spanner round until it falls into slots "C" on the lid, as in fig. 2.

(iii) Screw down the bolt "D" through hole in the centre of the lid "B" with the aid of a standard $\frac{5}{8}$ in. spanner, until it bears on the plate "E" and compresses the springs "F.1" and "F.2" about $\frac{5}{8}$ in. (about six complete turns of the spanner). Don't screw too far or the spanner will bend.

(iv) Turn the lid "B" to the right with the aid of the spanner "A" until the arrow, marked "O" on the lid comes in line with the arrow on the body of the pump. Lift the lid out with the spanner "A" and let the spanner remain on the lid until the lid is replaced.

(v) Take the hook marked "G," pass it into the hole "H" on the piston rod "I" and pull up the rod one and a half feet above the body of the pump.

(vi) Take the handle marked "J" and fix it on the piston rod in place of the hook as shown in fig. 6.

(vii) Pull out the hose pipe marked " K " and fix it to flange " E " with the aid of the box spanner " M."

(viii) Screw length of $1\frac{1}{4}$ in. P.R. hose with brass connection (carried in aircraft) on to the end of " K " if desired.

(ix) Short strokes will be found effective. If the handle is pulled up too far, it may jam and require a blow to free it.

(x) Put all the parts back as they were found.

(xi) Replace lid " B " with arrow marked " O " in line with the arrow on the body of the pump. Turn the lid to the left until the arrow marked " B " comes in line with the arrow on the body of the pump.

(xii) Unscrew the bolt " D " until the spanner " A " becomes loose and comes out of the slots " C." Then turn the spanner to the position shown in fig. 1, and remove it. The lid is now closed and locked.

(xiii) Take spanner " A " and the standard $\frac{5}{8}$ in. spanner used for the bolt " D " away with you.

(xiv) To fill the tank, simply remove the lid and pour in petrol, which will pass through the hold " X." There is a gauze at " X," but the use of an additional strainer in a funnel is desirable.

(xv) If it is necessary to remove the pump from the tank for repairs of any kind, this can be done by unscrewing the nuts " N.1 " and " N.2 " with the aid of the spanner " M." The pump can then be lifted out of the tank by two men with a piece of rope or wire.

(xvi) At the lower end of the pump barrel, between the flanges marked " R.1 " and " R.2 " is placed a gauze filter to prevent any dirt getting into the pump. This should be cleaned out whenever the pump is found to work unsatisfactorily.

(xvii) If water accumulates in the tank, it may be removed by unscrewing pipe " Y " and fixing a longer pipe, then pumping until the water is reduced to the level

of the bottom of this long pipe and finally replacing pipe "Y." The longer pipe will be held by the unit responsible for filling the tank.

(xviii) When using the pump or filling the tank, care should be taken to prevent dust getting in, if it happens to be blowing about.

(xix) Petrol settling at the bottom of the body of the pump under the level of the hole "X" should be mopped up with clean waste or cloth.

(xx) Care must be taken when pumping petrol from pumps, not to pull the pump lever to the top of its stroke, as it is liable to jam in this position.

PART IX—VISUAL SIGNALS.

103. *Ground strip code for ground signalling to aircraft.*—

(i) I am O.K. Do not land but proceed..... K

(ii) Land and I will tell you what I want..... ⊣

(iii) Ground unfit to land on..... +

(iv) Wireless not ready—wait..... W
(the word "wait" added to F.T.M. signification.)

(v) Wait for half an hour. I will endeavour to find landing ground for you..... T

(vi) Try and find landing ground within 1 hour's walk, and walk over towards me..... ±

(vii) W/T unserviceable..... W

(viii) Proceed. Am communicating requirements by W/T to base..... Z

(ix) Medical assistance is required urgently.... A

(x) Pick up message..... M

(xi) Your message received..... F

(xii) We want water..... ⊘

(xiii) We want aviation fuel and oil..... P

104. *Table of signal pistol signals.*—The following signal pistol signals will be employed on the Cairo-Baghdad route only for signalling from the air to the ground, and between aircraft :—

(i) *Air to air.*

1 Red—" I am forced to land," or " I am about to land."

1 Green—Fired by leader " Am lost " " Take the lead."

1 White—" Am making for nearest landing ground with engine trouble."

2 Green—Fired by pilot *not* leading. " Follow me. Have seen track."

2 Red—Fired by W/T duty aircraft. " W/T failed. Stand by aircraft take over."

(ii) *Ground to air by day.*

Smoke fire, smoke candle or mirror to attract the attention of searching aircraft when seen or heard.

(iii) *Ground to air by night.*

Scrub fire or any coloured very light or rocket to attract attention of searching aircraft when seen or heard.

Signal cartridges or rockets to be fired at 30 minute intervals from two hours after sunset until two hours before sunrise.

(iv) *Air to ground by day and night.*

Shutting off engine fairly quickly twice in succession will mean " I have read and understand your signal."

(v) *Air to ground by night,* by searching aircraft.

One hour after sunset—Signal cartridge of any colour, repeated twice at intervals of five minutes.

(vi) *Night landing signals.*

See Flying Training Manual, Part II, 1927, Appendix I.

PART X—GENERAL NOTES AND PRECAUTIONS.

106. *Treatment of natives.*—Experience has proved that individuals or bodies of Arabs encountered on the desert between Amman and Baghdad generally display a friendly attitude, especially to British personnel.

107. This friendly attitude should be cultivated, and all chances of untoward incidents should be rigorously avoided. Pilots who are thrown in contact with Arabs should make every effort to converse with them in friendly fashion, even if conversation is of a most elementary kind. A cigarette, or some small present of food, is a conciliatory introduction, but the Arab likes you to share the present of food with him. No offer of food from Arabs should be refused, as such refusal is considered unmannerly.

108. If arms are carried, or are in evidence, they should never be flourished. The Arab is never averse to appropriating quietly any small article that pleases or amuses him, so no small articles that are of use or value should be left lying about. If a large body of Arabs insists on relieving you of arms or ammunition, the only course is to give them up with good grace.

109.—(i) *Clothing and bedding, summer* (*mid April to mid November*).—Light clothing, such as drill, and cellular or light woollen underwear, should be worn during the daytime.

(ii) For the head and back, a tropical sun helmet or topee, glare glasses and spine pad should be worn. If held up in the desert, the use of the sun helmet or topee should be rigorously adhered to. The cork aviation helmet is insufficient protection against the sun when on the ground.

(iii) Two blankets are allowed during the summer period. The best place to sleep is under the bottom plane or, in the case of large aircraft, in the fuselage.

(iv) Sufficient pairs of socks should be carried to enable a change to be effected at night, if held up during the crossing.

110. *Clothing and bedding, winter (mid November to mid April).*—(i) In addition to heavy woollen clothing, a leather coat, or " sidcot " suit, will be required.

(ii) During the months of December, January, February and March, some of the nights are intensely cold, and every available piece of covering will be brought into use. Any spare underclothing should be worn with the ordinary clothing.

(iii) Three blankets are allowed during this part of the year.

111. *Ablution.*—Ablution may not be possible between Amman and Baghdad if held up in the desert for a lengthy period. If so held up, it will be found that a brisk rub down with a dry towel (or shirt) at dawn will prove surprisingly refreshing.

112. *Water.*—(i) A water-bottle should be carried, containing unsweetened tea or coffee. Water-bottles should be emptied daily and dried before putting away.

(ii) Water-drinking should be cut down to a minimum during the daytime. If rationed, four pints a day should be allowed. Acid drops (not lemon) will be found useful as thirst quenchers.

(iii) Doubtful water, drawn under necessity, should be boiled and used for making tea.

113. *Food.*—The rations, as at present issued, should be fairly apportioned for the meals, and effort made to attain variety. Tinned foods should not be left in their containers after opening.

114. *First-aid* outfit.—A small first-aid outfit and a fracture splint are supplied to each mail aircraft. Instructions are provided with the outfit. Abrasions and cuts should always be painted with iodine and then covered with a dressing. Two tablets of aspirin taken with a little water will frequently effect a rapid cure of headache consequent on exposure to sun.

115. *Passengers.*—Passengers should be warned as regards clothing and protection from the sun. They might well carry some light reading matter. In order to overcome their liability to air-sickness, they should take Calomel, followed by a saline purge, 24 hours or so before departure.

116. *Barbed grass, flies, &c.*—A peculiar thorn, or rather thorny grass, is prevalent in the desert. Its barbed points are very penetrating and insidious in their effect. They gradually work through all clothing and pierce the skin When lying on the desert, a blanket or coat should first be spread. A small portion of mosquito netting is of value, as a face protection against flies which abound in the desert and make sleep during the hours of daylight impossible, unless protection against their bites is provided. Snakes have been seen in the desert, but it is believed that they are of the harmless variety.

117. *Fires.*—If fires are lighted on the desert, care should be taken that there is no danger of petrol tins bursting, or dry camel thorn igniting, and the fire being spread within reach of an aircraft.

118 *Radiators.*—Aircraft should always carry nests of tins sufficient to hold all radiator water. During the months referred to at para. 110, sub-para (ii) above, radiators should be filled with an appropriate solution of Ethylene Glycol or other approved anti-freezing mixture. When using this mixture, radiators need not be emptied at night.

PART XI—PARTICULARS OF LOG TO BE KEPT BY PILOTS AND SPECIMEN REPORT TO BE SUBMITTED ON COMPLETION OF FLIGHTS.

120. Cairo-Baghdad route pilots, on arriving at the terminal aerodromes, will make out and submit to the officer commanding the station a pro forma report as outlined below. During their passage they will keep such notes as are necessary to enable this form to be completed.

REPORT FORM.

Nature of Flight.....

Air Route.....To.....

Date of Departure.....

Date of Arrival.....

---

1. Type and No. of aircraft.....
2. Squadron No.....
3. Names of pilots.....
   .....
4. Names of crew.....
   .....
5. Names of passengers :
   R.A.F. .....
   .....
   Army.....
   Civilian.....
6. Times of departure and arrival, including intermediate landings and information as to cause.

   (NOTE.—All times are to be given in G.M.T.)

Place or landing ground.	Time and date of departure.		Place or landing ground.	Time and date of arrival.		Time taken travelling section of route.		Cause of stop.
	Time.	Date.		Time.	Date.	Hours.	Min.	

7. Total flying time.....Hours.....Minutes.

8. *Fuelling :*

Quantities in tanks on departure :
Benzol.....Petrol.....Oil.....

Refuelled at.....
Benzol.....Petrol.....Oil.....

Refuelled at.....
Benzol.....Petrol.....Oil.....

Refuelled at.....
Benzol.....Petrol.....Oil.....

9. Average fuel and oil consumption throughout the flight.....
.....

10. Engine trouble.....

11. W/T trouble.....

12. Aeroplane trouble.....

13. Load carried :.....
Passengers.....
Stores.....

14. Distinctness of track.....

15. General description of weather encountered.....

16. Location of Arab tribes, number of tents (approx.), &c.....
.....

17. Additional remarks and suggestions.....
.....

Date.....

Signed.....

PART XII—LIST OF USEFUL ARAB PHRASES PHONETICALLY SPELT.

Peace be on you	Salaam alaikum.
And on you peace (reply)..	Wa alaikum as-salaam.
Where have you come from	Min wen jet.
What is the name of this place.	Shisma hal makan.
I have come from Baghdad	Jet min Baghdad.
I am an Englishman ..	Ana Inglezi.
Will you have a cigarette ..	Tishrab sigarah.
Thank you	Mamnun.
I want to see your chief ..	Arid ashuf al Shaikh.
Where is the railway ..	Wen sikkat al hadid.
Where is there a telegraph office.	Wen aku telkhanah.
I want to send a telegram ..	Areed adugg tel.
I want a man to take a letter	Areed zilma yawaddi maktub.
To	Ila.
I want to go to	Areed aruh ila.
I want a horse	Areed husan.
I want a guide	Areed daleel.
I want a drink	Areed ashrab.
I want water	Areed mai.
I want food	Areed akl.
I am tired	Ana ta'aban.

I am ill	Ana wajan.
I am cold	Ana bardan.
I am wounded	Ana majruh.
Keep quiet	Og'ud raha.
Be careful	Dir balak.
Nobody should touch the aeroplane	Ma lazim ahad yelmis at-taiyarah.
I want a guard for the aeroplane.	Areed natoor ala at-taiyarah.
I will give you a reward ..	Anteek bakshish.
Hold this	Ilzam hadha.
Do like this	Sawwi hichi.
Go away	Imshi.
Come here	Taal hina.
In the morning	Es-subuh.
In the evening	El-masa.
At noon	Edh-dhuhr.
Very early	Min el-ghubshah.
Which road goes to ..	Yahu darb ila.
Which is the shortest way	Ya darb aqrab.
How many hours is it to ..	Kam saah ila.
Is there any drinking water on the road.	Aku mai lishshurb fi had-darb.
Good bye	Fi aman illah.

PART XIII—ROUTE REPORT INCLUDING ALTITUDES, DISTANCES AND BEARINGS OF LANDING GROUNDS.

—	Distance. Miles.	Bearing.		Remarks.
		Eastbound.	Westbound.	
Cairo-Baghdad.				
Heliopolis (50) Bilbeis ..	27	35°	215°	
Bilbeis (30) Tel-el-Kebir	17	50°	230°	
Tel-el-Kebir (30) Abu Sueir	19½	93°	273°	New landing ground at Tel-el-Kebir marked with a black circle. Pilots should avoid old ground marked with white circle.
Abu Sueir (30) Kantara	25	33°	213°	Suez Canal forms a prominent landmark.
Kantara (10) Romani ..	22	64°	244°	From Kantara a broad-scrub-covered plain with a gentle rise towards the east extends for about fifteen miles where the zone of shifting sand dunes is encountered. These dunes in places are 200 feet in height, and are composed of fine sand; they extend east for nine miles followed by five miles of marsh to Bir Katia. Romani is a very soft landing ground and should be avoided if possible.

(Figures in brackets indicate height above mean sea level.)

—	Distance. Miles.	Bearing.		Remarks.
		Eastbound.	Westbound.	
Cairo–Baghdad—cont.				It should be carefully examined for water in winter months. In winter months therefore a pilot should bear in mind that he will probably be unable to effect a safe landing between Kilo 143 and a point some ten miles north-east of Kantara.
Romani (10) Mosefig ..	31	87°	267°	East of Bir Katia, a region of sand dunes is again encountered ; it stretches to El Arish.
Mosefig (10) Kilo 143 ..	28½	82°	262°	Mosefig—31 miles east of Romani ; immediately north of the railway.
Kilo 143 (10) El Arish ..	9½	102°	282°	Large palm groves are situated on the north-west side of El Arish. Between El Arish and Rafa the country is undulating and composed of light sandy soil with scrub. North of the railway are sand dunes stretching to the sea. El Arish landing ground is five miles south of El Arish in wady El Arish. Circle is raised approximately 1½ feet and should be avoided.
El Arish (60) Rafa ..	28	66°	246°	Rafa. Care should be exercised in landing as there are small ridges on the landing ground.

Southern Route.				
Rafa (250) Beersheba ..	31	92°	272°	Country sandy and cultivated. Good country both sides of railway.
Beersheba (993) El Lisan	43	85°	265°	A conspicuous wadi joins these places; fairly good country is found up to seven miles east of Tel-el-Millar.
El Lisan (–1180) Ziza ..	40½	45°	225°	Landing ground at El Lisan marked with black circle. 1,100 feet below sea level. Bad country up to El Lisan. From El Lisan to Wadi Seil-el-Mojeb the country is bad. The wadi forms a conspicuous landmark and is approximately one mile wide. Between Wadi Seil-el-Mojeb and Ziza the country is fairly good.
Northern Route.				
Rafa (250) Jerusalem ..	66½	56½°	236½°	Landing ground at Kolundia, six miles north of Jerusalem on the Nablus Road. L-shaped ground, 2,000 feet above sea level, divided into two grounds by the Nablus Road. Ground on west side of road 485 × 200 yards mean. On east side 400 × 160 yards mean. Both grounds have white circles and boundary markings. Landings cannot be made across the road from one ground to the other.
Jerusalem—Amman ..	43¾	70°	250°	Landing ground at Jericho marked with black markings. The Jordan Valley near the Dead Sea although apparently good is unsuitable for forced landing (1,100 feet below sea level).

(Figures in brackets indicate height in feet above mean sea level.)

——	Distance. Miles.	Bearing.		Remarks.
		Eastbound.	Westbound.	
Northern Route—cont.				
Amman (2,700) " B " ..	33	117°	297°	Car track is visible nine miles west of Kasr Kharana. Landing ground at Amman situated 2½ miles east of Amman village and marked with a white circle—usual aerodrome facilities.
" B " (640) " C " ..	26	20 miles 86°; 6 miles, 0°.	6 miles 180°; 2 miles, 267°.	Car track visible until arrow is reached. A prominent landmark is a tree at Shagaret esh Shomerih, five miles west of point marked 475 on map, and two miles south of course.
" C " (Azrak 1,710) " D "	29	6 miles, 180°; 5 miles, 102°; 18 miles, 73°.	18 miles, 253°; 5 miles, 282°; 6 miles, 0°.	Small well-defined wadi south of car track runs from southern flat at " C " towards landing ground " D." Two mud flats at " D," both suitable for landing on in dry weather. Petrol dump on eastern edge of north-eastern flat.
" D " (1,840) " E " ..	14½	84°	264°	All-weather landing ground is at north end and just east of mud flat marked with a large circle enclosing letter " D." Both flats elongated in north-south direction, and shown up from east or west like two thin streaks of yellow. Several mud flats on north side of track; darkest in colour and

				closest to track is landing ground "E," marked with a circle and no letter. Eastern half of flat should be avoided; it is composed of rows of scrub banked up with sand.
"E" (1,950) "F" ..	17½	89°	269°	Just south of flat is a small line of hills running in a southerly direction. At southern end is track. All-weather landing ground at "E" is one mile west of hills and on south side of track; surface bad; dimensions small.
"F" (2,194) "G" ..	4½	40°	220°	Flat at "F" is kidney-shaped, pointing north-east and west, and shows up car track well; track otherwise indistinct.
"G" (2,210) "H" ..	12½	89°	269°	Landing ground "G" is a small flat 4½ miles north-east by east of landing ground "F." This is one of the earliest flats to become unserviceable.
"H" (2,050) "J" ..	15½	74°	254°	Landing ground "H" is located between two very large mud flats. All-weather landing ground at "H" is found on south-western side of mud flat marked with a circle enclosing letter "H." From "H" to a point seven miles east, the track winds a great deal and should be closely followed. Between this point and "J" the track straightens out and is easy to follow.
"J" (2,290) "K" ..	7	69°	249°	
"K" (2,405) "L" ..	13½	68°	248°	
"L" (2,730) "M" ..	15½	64°	244°	Landing ground "M" can be located by position of small flat to the west of it.

(Figures in brackets indicate height in feet above mean sea level.)

—	Distance. Miles.	Bearing.		Remarks.
		Eastbound.	Westbound.	
Northern Route—cont.				
" M " (2,720) " N " ..	15	66°	246°	
" N " (2,925) " O " ..	13	59°	239°	
" O " (2,880) " P " ..	15	50°	230°	
" P " (2,600) " R " ..	14	52°	232°	Track distinct. Approximately four miles north of track is a conspicuous and peculiar crater-like depression containing a mud flat within its circumference. It can be seen from a considerable distance.
" R " (2,600) " XI " ..	17	49°	229°	
" XI " (2,290) " X " ..	17	31°	211°	Track enters Wadi Hauran.
" X " ( ) " IX " ..	11½	60°	240°	
Rutbah	—	—	—	Fuel at Rutbah—1,000 gallons petrol.
" 8 " ( ) " VII " ..	25½	97°	277°	Between here and Ramadi the track is clear and easily followed.
" VII " (1,820) " VI " ..	20	70°	250°	
" VI " ( ) " V " ..	19	78°	258°	
" V " (1,590) " IV " ..	27	68°	248°	Fuel dump at landing ground " V."
" IV " (1,000) " III " ..	20	81°	261°	
" III " ( ) " II " ..	22	89°	269°	Wadi Muhammadi is crossed six miles west of landing ground " II."
" II " (620) " I " ..	27½	73°	253°	

"I" ( ) Ramadi ..	15½	83°	263°	Petrol and oil available at Ramadi. Two circuits round town to attract attention before landing.
Ramadi (170) Baghdad (Hinaidi).	67	96°	276°	Features shown on the map are liable to alteration at different seasons of the year. Lake Aqquar Quf does not now exist. Best country is north of Euphrates until opposite Felujah and thence direct to Hinaidi.

(Figures in brackets indicate height in feet above mean sea level.)

FIG.

CAIRO-BAGHDAD IR ROUTE.

TABLE OF AD ISTANCES IN MILES.

Via EERSHEBA.

	Heliopolis.	Tel el Kebir.	Abu Sueir.	Kantara.	Romani.	Mosefig.	El Arish.	Rafa.	Beersheba.	El Lisan.	Ziza.	B.	C.	D.	E.	F.	G.	H.	J.	K.	L.	M.	N.	O.	P.	R.	XI.	X.	IX.	8.	VII.	VI.	V.	IV.	III.	II.	I.	Ramadi.	Hinaidi.
Heliopolis ..																																							
Tel el Kebir ..	44																																						
Abu Sueir ..	63	19																																					
Kantara ..	88	44	25																																				
Romani ..	110	66	47	22																																			
Mosefig ..	139	95	76	51	29																																		
El Arish ..	179	135	116	91	69	40																																	
Rafa ..	207	163	144	119	97	68	28																																
Beersheba ..	238	194	175	150	128	99	59	31																															
El Lisan ..	281	237	218	193	171	142	102	74	43																														
Ziza	318	274	255	230	208	179	139	111	80	37																													
B	349	305	286	261	239	210	170	142	111	68	31																												
C	375	331	312	287	265	236	196	168	137	94	57	26																											
D	404	360	341	316	294	265	225	197	166	123	86	55	29																										
E	419	375	356	331	309	280	240	212	181	138	101	70	44	15																									
F	436	392	373	348	326	297	257	229	198	155	118	87	61	32	17																								
G	441	397	378	353	331	302	262	234	203	160	123	92	66	37	22	5																							
H	453	409	390	365	343	314	274	246	215	172	135	104	78	49	34	17	12																						
J	469	425	406	381	359	330	290	262	231	188	151	120	94	65	50	33	28	16																					
K	476	432	413	388	366	337	297	269	238	195	158	127	101	72	57	40	35	23	7																				
L	489	445	426	401	379	350	310	280	251	208	171	140	114	85	70	53	48	36	20	13																			
M	505	461	432	417	395	366	326	298	267	224	187	156	130	101	86	69	64	52	36	29	16																		
N	520	476	447	432	410	381	341	313	282	239	202	171	145	116	101	84	79	67	51	44	31	15																	
O	533	489	460	445	423	394	354	326	295	252	215	184	158	129	114	97	92	80	64	57	44	28	13																
P	548	504	475	460	438	409	369	341	310	267	230	199	173	144	129	112	107	95	79	72	59	43	28	15															
R	562	518	489	474	452	423	383	355	324	281	244	213	187	158	143	126	121	109	93	86	73	57	42	29	14														
XI	579	535	506	491	469	440	400	372	341	298	261	230	204	175	160	143	138	126	110	103	90	74	59	46	31	17													
X	596	552	523	508	486	457	417	389	358	315	278	247	221	192	177	160	155	143	127	120	107	91	76	63	48	34	17												
IX	607	563	534	519	497	468	428	400	369	326	289	258	232	203	188	171	166	154	138	131	118	102	87	74	59	45	28	11											
8	617	573	544	529	507	478	438	410	379	336	299	268	242	213	198	181	176	164	148	141	128	112	97	84	69	55	38	21	10										
VII	643	599	570	555	533	504	464	436	405	362	325	294	268	239	224	207	202	190	174	167	154	138	123	110	95	81	64	47	36	26									
VI	663	619	590	575	553	524	484	456	425	382	345	314	288	259	244	227	222	210	194	187	174	158	143	130	115	101	84	67	56	46	20								
V	682	638	609	594	572	543	503	475	444	401	364	333	307	278	253	246	241	229	213	206	193	177	162	149	134	120	103	86	75	65	39	19							
IV	709	665	636	621	599	570	530	502	371	428	391	360	334	305	290	273	268	256	240	233	220	204	189	176	161	147	130	113	102	92	66	46	27						
III	729	685	656	641	619	590	550	522	491	448	411	380	354	325	310	293	288	276	260	253	240	224	209	196	181	167	150	133	122	112	86	66	47	20					
II	751	707	678	663	641	612	572	544	513	470	433	402	376	347	332	315	310	298	282	275	262	246	231	218	203	189	172	155	144	134	108	88	69	42	22				
I	778	734	705	690	668	639	599	571	540	497	460	429	403	374	359	342	337	325	309	302	289	273	258	245	230	216	199	182	171	161	135	115	96	69	49	27			
Ramadi ..	794	750	721	706	684	655	615	587	556	513	476	445	419	390	375	358	353	341	325	318	305	289	274	261	246	232	215	198	187	177	151	131	112	85	65	43	16		
Hinaidi ..	861	817	788	773	751	722	682	654	623	580	543	512	486	457	442	425	420	408	392	385	372	356	341	328	313	299	282	265	254	244	218	198	179	152	132	110	83	67	

FIG.

CAIRO-BAGHDAD AIR ROUTE.

TABLE OF AIR DISTANCES IN MILES.

Via RAMLEH.

	Heliopolis.	Tel el Kebir.	Abu Sueir.	Kantara.	Romani.	Mosefig.	El Arish.	Rafa.	Ramleh.	Jerusalem.	Ziza.	B.	C.	D.	E.	F.	G.
Heliopolis ..																	
Tel el Kebir	44																
Abu Sueir ..	63	19															
Kantara ..	88	44	25														
Romani ..	110	66	47	22													
Mosefig ..	139	95	76	51	29												
El Arish ..	179	135	116	91	69	40											
Rafa	207	163	144	119	97	68	28										
Ramleh ..	266	222	203	178	156	127	87	59									
Jerusalem ..	288	244	225	200	178	149	109	81	22								
Ziza	331	287	268	243	221	192	152	124	65	43							
B	362	318	299	274	252	223	183	155	96	74	31						
C	388	344	325	300	278	249	209	181	122	100	57	26					
D	417	373	354	329	307	278	238	210	151	129	86	55	29				
E	432	388	369	344	322	293	253	225	166	144	101	70	44	15			
F	449	405	386	361	339	310	270	242	183	161	118	87	61	32	17		
G	454	410	391	366	344	315	275	247	188	166	123	92	66	37	22	5	
H	466	422	403	378	356	327	287	259	200	178	135	104	78	49	34	17	12
J	482	438	419	394	372	343	303	275	216	194	151	120	94	65	50	33	28
K	489	445	426	401	379	350	310	282	223	201	158	127	101	72	57	40	35
L	502	458	439	414	392	363	323	295	236	214	171	140	114	85	70	53	48
M	518	474	455	430	408	379	339	311	252	230	187	156	130	101	86	69	64
N	533	489	470	445	423	394	354	326	267	245	202	171	145	116	101	84	79
O	546	502	483	458	436	407	367	339	280	258	215	184	158	129	114	97	92
P	561	517	498	473	451	422	382	354	295	273	230	199	173	144	129	112	107
R	575	531	512	487	465	436	396	368	309	287	244	213	187	158	143	126	121
XI	592	548	529	504	482	453	413	385	326	304	261	230	204	175	160	143	138
X	609	565	546	521	499	470	430	402	343	321	278	247	221	192	177	160	155
IX	620	576	557	532	510	481	441	413	354	332	289	258	232	203	188	171	166
8	630	586	567	542	520	491	451	423	364	342	299	268	242	213	198	181	176
VII	656	612	593	568	546	517	477	449	390	368	325	294	268	239	224	207	202
VI	676	632	613	588	566	537	497	469	410	388	345	314	288	259	244	227	222
V	695	651	632	607	585	556	516	488	429	407	364	333	307	278	253	246	241
IV	722	678	659	634	612	583	543	515	456	434	391	360	334	305	290	273	268
III	742	698	679	654	632	603	563	535	476	454	411	380	354	325	310	293	288
II	764	716	701	676	654	625	585	557	498	476	433	402	376	347	332	315	310
I	791	747	728	703	681	652	612	584	525	503	460	429	403	374	359	342	337
Ramadi ..	807	763	744	719	697	668	628	600	541	519	476	445	419	390	375	358	353
Hinaidi ..	874	830	811	786	764	735	695	667	608	586	543	512	486	457	442	425	420

	H.	J.	K.	L.	M.	N.	O.	P.	R.	XI.	X.	IX.	8.	VII.	VI.	V.	IV.	III.	II.	I.	Ramadi.	Hinaidi.
Heliopolis ..																						
Tel el Kebir																						
Abu Sueir ..																						
Kantara ..																						
Romani ..																						
Mosefig ..																						
El Arish ..																						
Rafa																						
Ramleh ..																						
Jerusalem ..																						
Ziza																						
B																						
C																						
D																						
E																						
F																						
G																						
H																						
J	16																					
K	23	7																				
L	36	20	13																			
M	52	36	29	16																		
N	67	51	44	31	15																	
O	80	64	57	44	28	13																
P	95	79	72	59	43	28	15															
R	109	93	86	73	57	42	29	14														
XI	126	110	103	90	74	59	46	31	17													
X	143	127	120	107	91	76	63	48	34	17												
IX	154	138	131	118	102	87	74	59	45	28	11											
8	164	148	141	128	112	97	84	69	55	38	21	10										
VII	190	174	167	154	138	123	110	95	81	64	47	36	26									
VI	210	194	187	174	158	143	130	115	101	84	67	56	46	20								
V	229	213	206	193	177	162	149	134	120	103	86	75	65	39	19							
IV	256	240	233	220	204	189	176	161	147	130	113	102	92	66	46	27						
III	276	260	253	240	224	209	196	181	167	150	133	122	112	86	66	47	20					
II	298	282	275	262	246	231	218	203	189	172	155	144	134	108	88	69	42	22				
I	325	309	302	289	273	258	245	230	216	199	182	171	161	135	115	96	69	49	27			
Ramadi ..	341	325	318	305	289	274	261	246	232	215	198	187	177	151	131	112	85	65	43	16		
Hinaidi ..	408	392	385	372	356	341	328	313	299	282	265	254	244	218	198	179	152	132	110	83	67	

Distance in Miles.

	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
																		5
																		6
120	128																	7
105	112	128																8
93	100	107	113	120	127	133												9
84	90	96	102	108	114	120	126											10
76	82	87	93	98	104	109	115	120	125	131								11
70	75	80	85	90	95	100	105	110	115	120	125	130						12
65	69	74	78	83	92	97	102	106	111	115	120	125	129	135				13
60	64	69	73	77	81	86	90	94	99	103	107	111	116	120	124	129		14
56	60	64	68	72	76	80	84	88	92	96	100	104	108	112	116	120		15
53	56	60	64	68	71	75	79	83	86	90	94	98	101	105	109	112		16
49	53	56	60	64	67	70	74	78	81	85	88	91	95	99	102	106		17
	50	53	57	60	64	67	70	73	77	80	83	87	90	93	97	100		18
		51	54	57	60	63	66	69	73	76	79	82	85	88	92	95		19
20			51	54	57	60	63	66	69	72	75	78	81	84	87	90		20
	21			52	55	57	60	63	66	69	71	74	77	80	83	86		21
		22			52	55	57	60	63	65	68	71	74	76	79	82		22
			23			52	55	57	60	63	65	68	70	73	76	78		23
				24			53	55	58	60	63	65	68	70	72	75		24
					25			53	55	58	60	62	65	67	70	72		25
						26			53	55	58	60	62	65	67	69		26
							27			53	56	58	60	62	64	66		27
								28			54	56	58	60	62	64		28
									29			54	56	58	60	62		29
										30			54	56	58	60		30

Time in Minutes.

LE.

.H.

TE.

PART XV.

SECTIONAL MAPS

OF THE

CAIRO-BAGHDAD AIR-ROUTE

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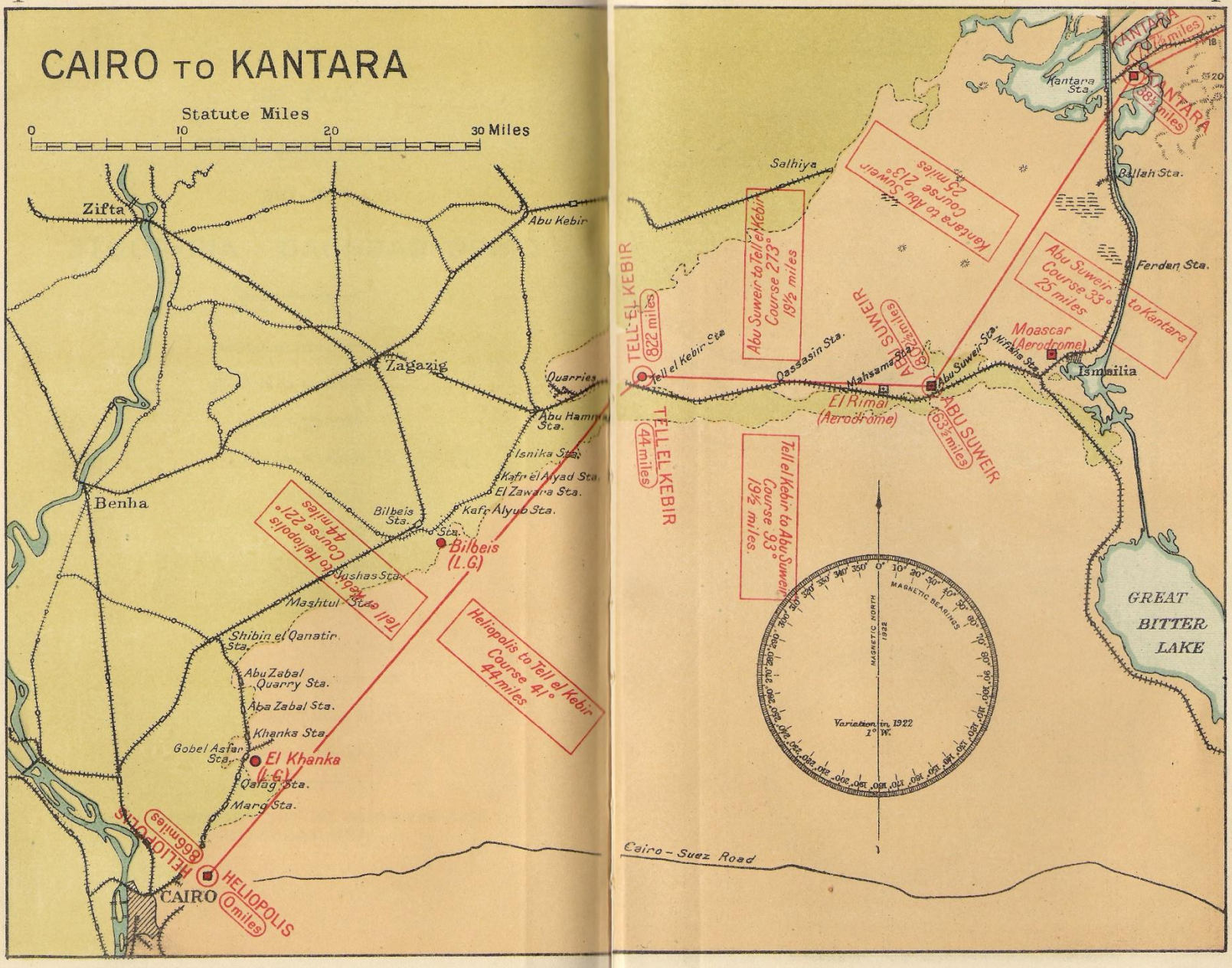
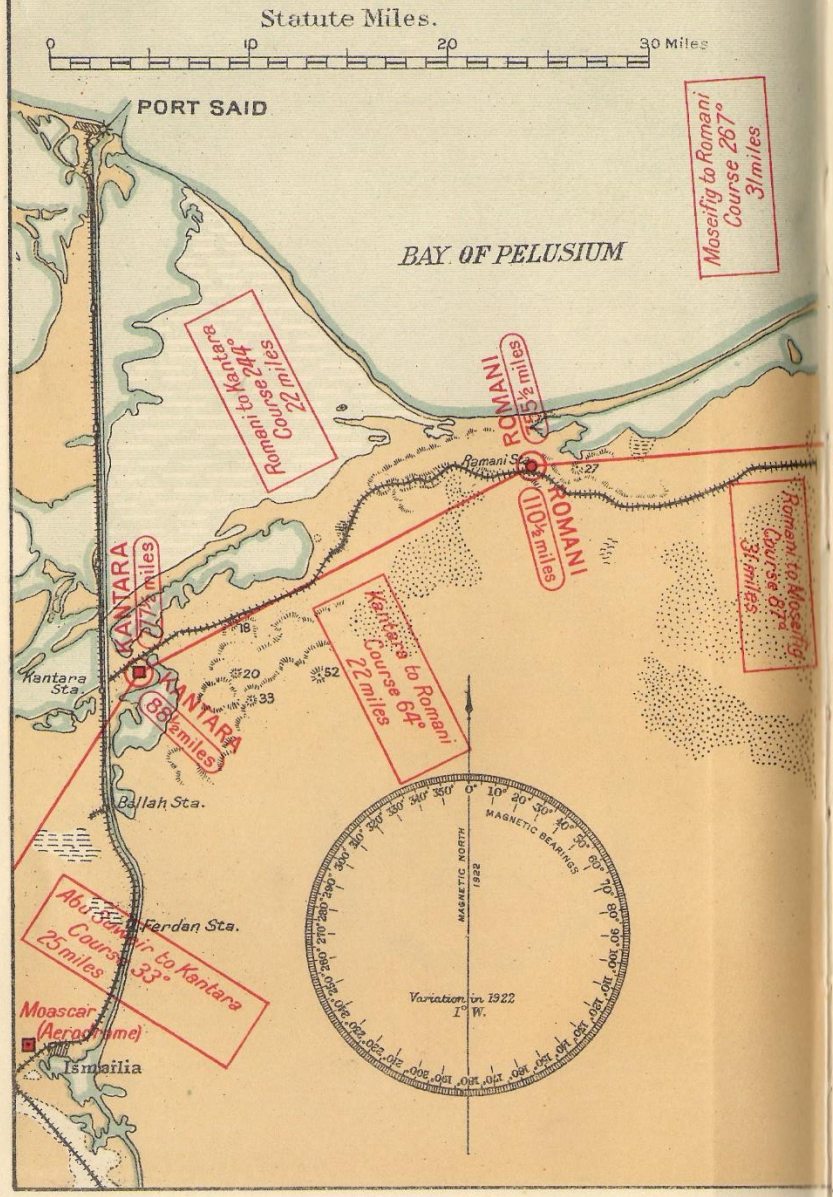
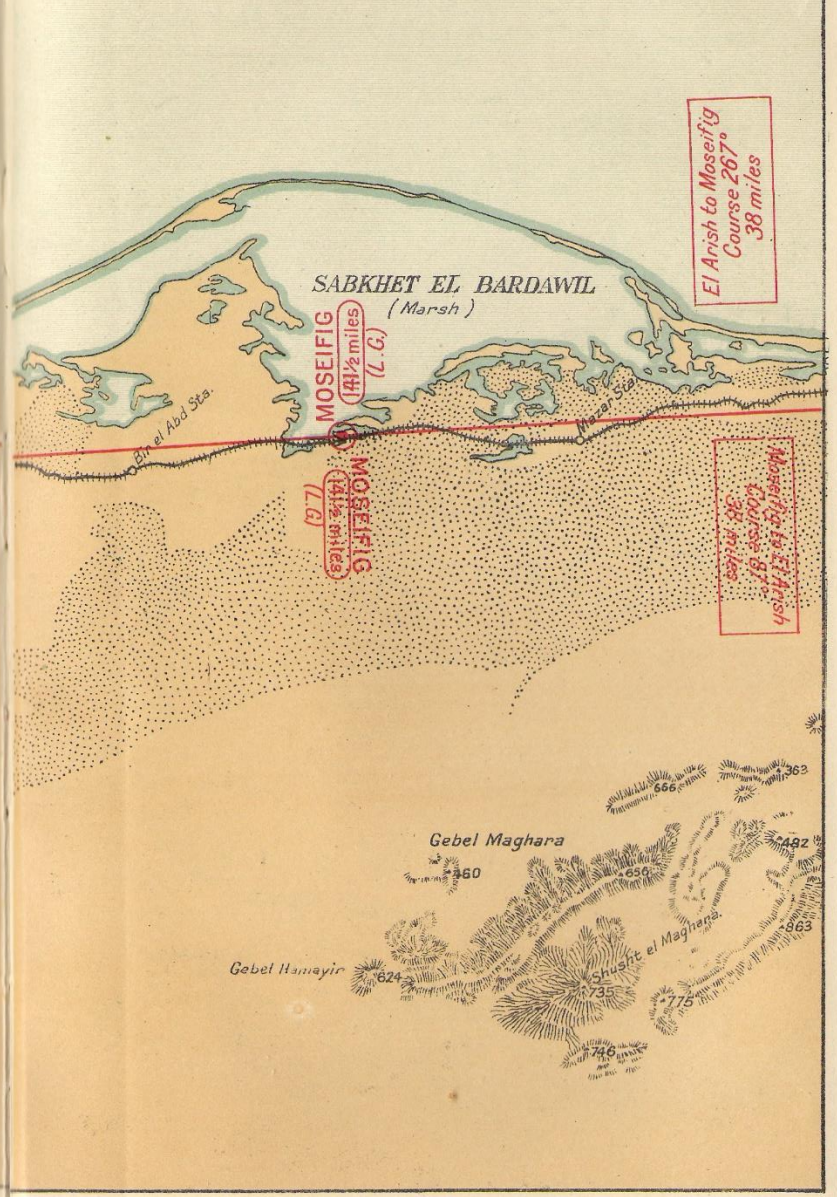
1. *Heliopolis to Kantara*
2. *Kantara to Moseifig*
3. *Moseifig to Rafa*
4. *Rafa to Jericho*
5. *Jericho to C*
6. *C to H*
7. *H to O*
8. *O to 8*
9. *8 to V*

CAIRO TO KANTARA

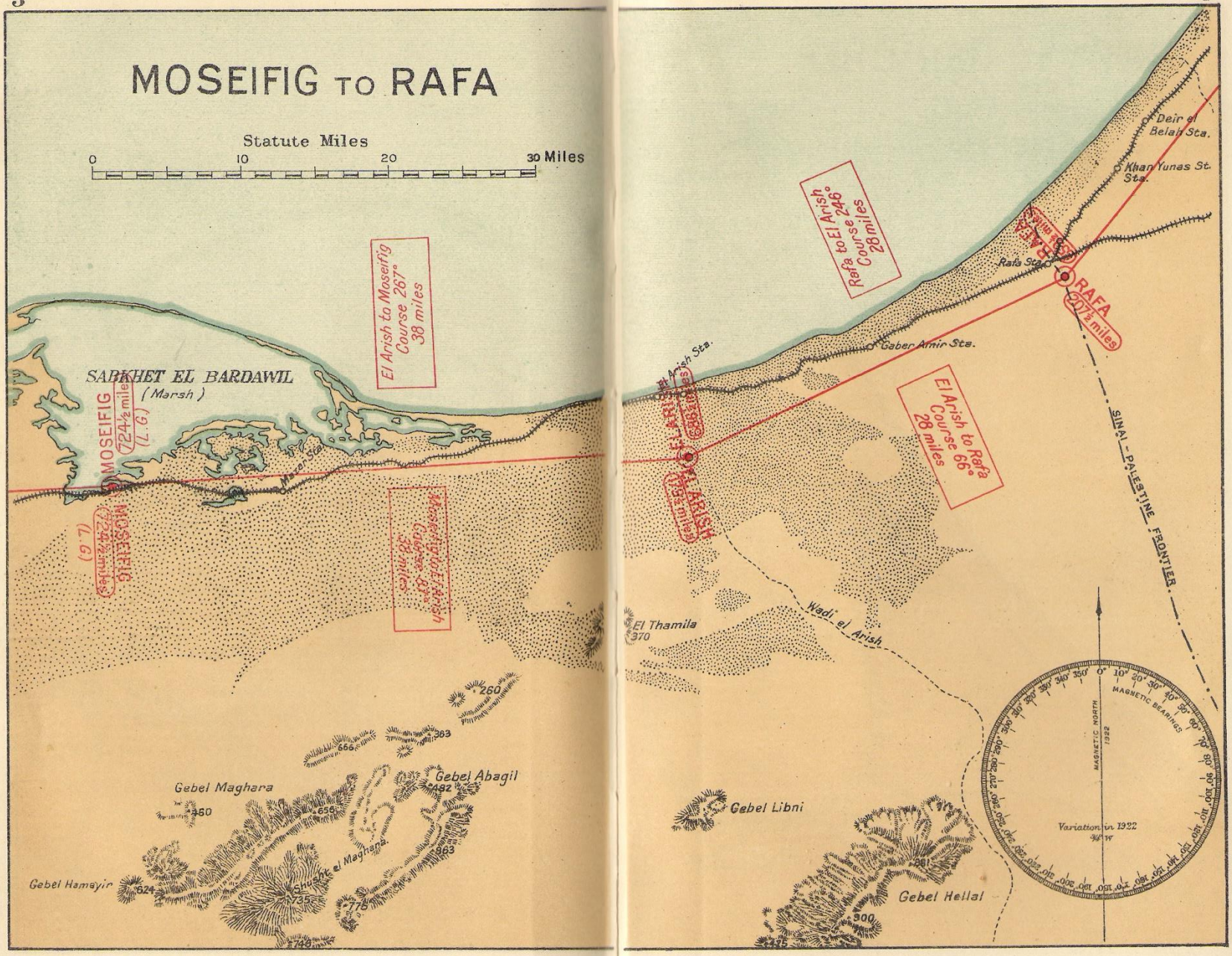


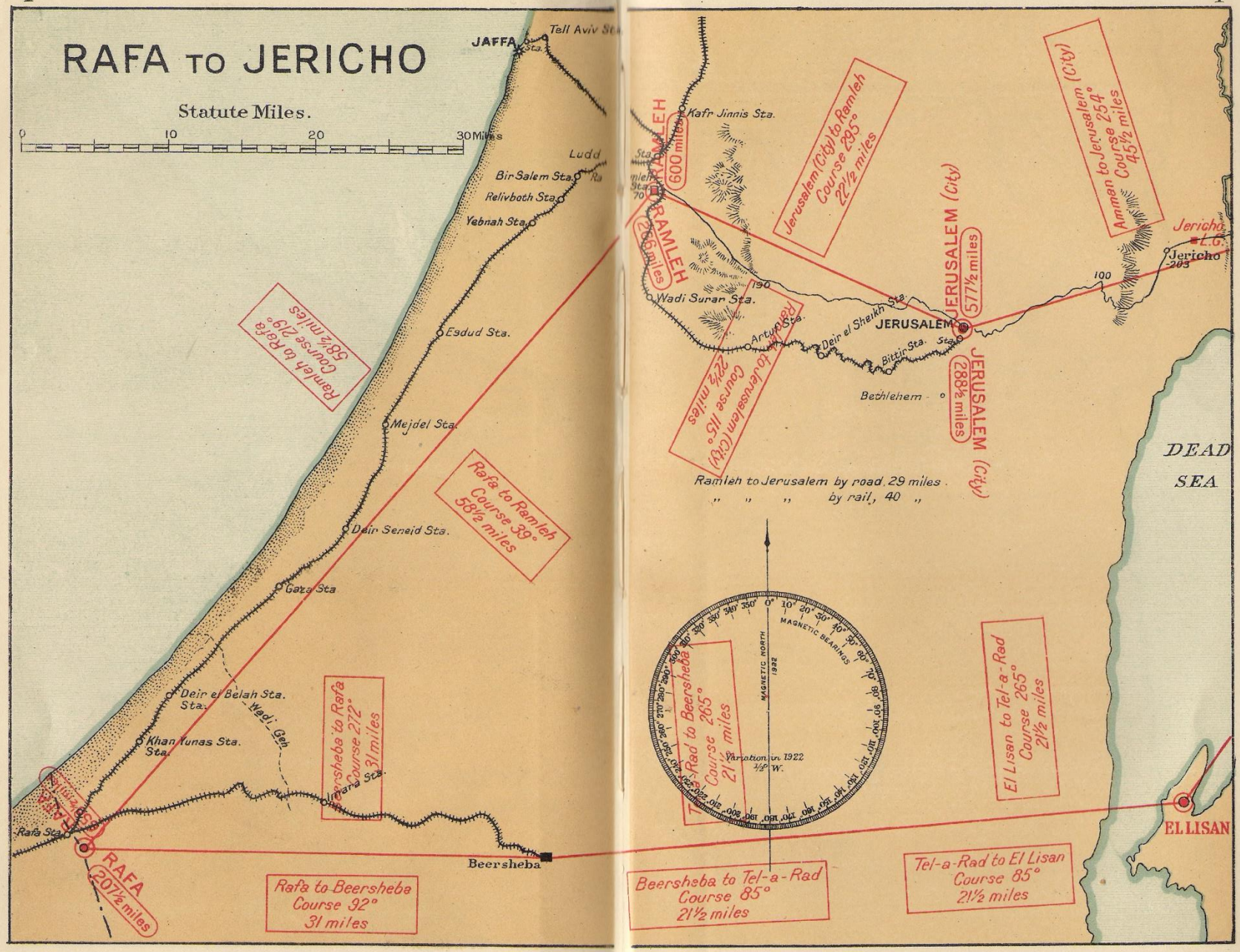
KANTARA TO MOSEIFIG





MOSEIFIG TO RAFA




RAFA TO JERICHO
Statute Miles.
0
10
20
30 Miles
JAFFA
Tell Aviv Sta.
Ludd
Bir Salem Sta.
Relivboth Sta.
Yebnah Sta.
Esdud Sta.
Mejdel Sta.
Deir Seneid Sta.
Gaza Sta.
Deir el Belah Sta.
Wadi Gaza
Khan Yunas Sta.
Rafa Sta.
RAFA
(207½ miles)
Beersheba
Rafa to Beersheba
Course 92°
31 miles
Beersheba to Rafa
Course 272°
31 miles
Ramleh to Rafa
Course 219°
58½ miles
Rafa to Ramleh
Course 39°
58½ miles
Kafr Jinnis Sta.
RAMLEH
(600 miles)
RAMLEH
(26 miles)
Wadi Surar Sta.
Artuf Sta.
Deir el Sheikh Sta.
Bittir Sta.
JERUSALEM
JERUSALEM (City)
(577½ miles)
JERUSALEM (City)
(288½ miles)
Bethlehem
Jerusalem (City) to Ramleh
Course 295°
22½ miles
Jerusalem (City) to Jericho
Course 115°
22½ miles
Amman to Jerusalem (City)
Course 254°
45½ miles
Jericho
Jericho
-205
190
100
Ramleh to Jerusalem by road, 29 miles
" " " by rail, 40 "
MAGNETIC NORTH
1922
MAGNETIC BEARINGS
Variation in 1922
½° W.
Tel-a-Rad to Beersheba
Course 265°
21½ miles
El Lisan to Tel-a-Rad
Course 265°
21½ miles
Beersheba to Tel-a-Rad
Course 85°
21½ miles
Tel-a-Rad to El Lisan
Course 85°
21½ miles
DEAD
SEA
EL LISAN

https

JERICHO TO C

Statute Miles

0 10 20 30 Miles

Wheat fields

Es Salt 765

987 Suweila

1025

AMMAN 592 miles

Sta.

Zerka Camp & L.G

Aerodrome 790

Amman (Town) 740

AMMAN 334 miles

258

River Jordan

Jericho L.G

Jericho -203

340 Bridge

Ziza to Jerusalem Course 275° 43 miles

Sahab

Ruin

Jerusalem to Amman by road 75 miles. Road winding and undulating

Sta.

ZIZA

Ziza Sta.

Ziza (Village)

Jerusalem (City) to Amman Course 74° 45½ miles

Jerusalem to Ziza Course 95° 43 miles

Jerusalem to Amman by road 75 miles. Road winding and undulating.

DEAD SEA

HEDJAZ RAILWAY

Sta.

Ziza to El Lisan Course 225° 40½ miles

El Lisan to Ziza Course 45° 40½ miles

EL LISAN

Kasr Hallabut

Kasr Hammam es Sara

Mud Flats

G. Minsaf el Gharbi 780

G. Minsaf el Shergi 750

Kurun el Gamus

C to Amman Course 280° 50½ miles

481½ miles

Kasr Azrak 560

C

Course 180° for 6 miles 267° " 20 " 26 miles

Gebel Zia Course 271° 31 miles

Gebel el Mughen

Amman to C Course 50½ miles

Cairn (Marma el Durmi

Flat Plain with small scrub

Wadi Gerab

Gravel

Kasr Amra

G. Awaind 545

Gravel

Arrow

Kasr Kharana 640

B

A. C. C. TRACK

Tree (Shagaret esh Shomerih)

Amman to C by car-track 71 miles. Going mostly good.

Ziza to B Course 91° 31 miles

Gebel Emdeiseiaat

B to C Course 86° for 20 miles 0° " 6 " 26 miles

Amari

To Kaf

Flat Plain

CHALK CLIFFS VERY DISTINCT

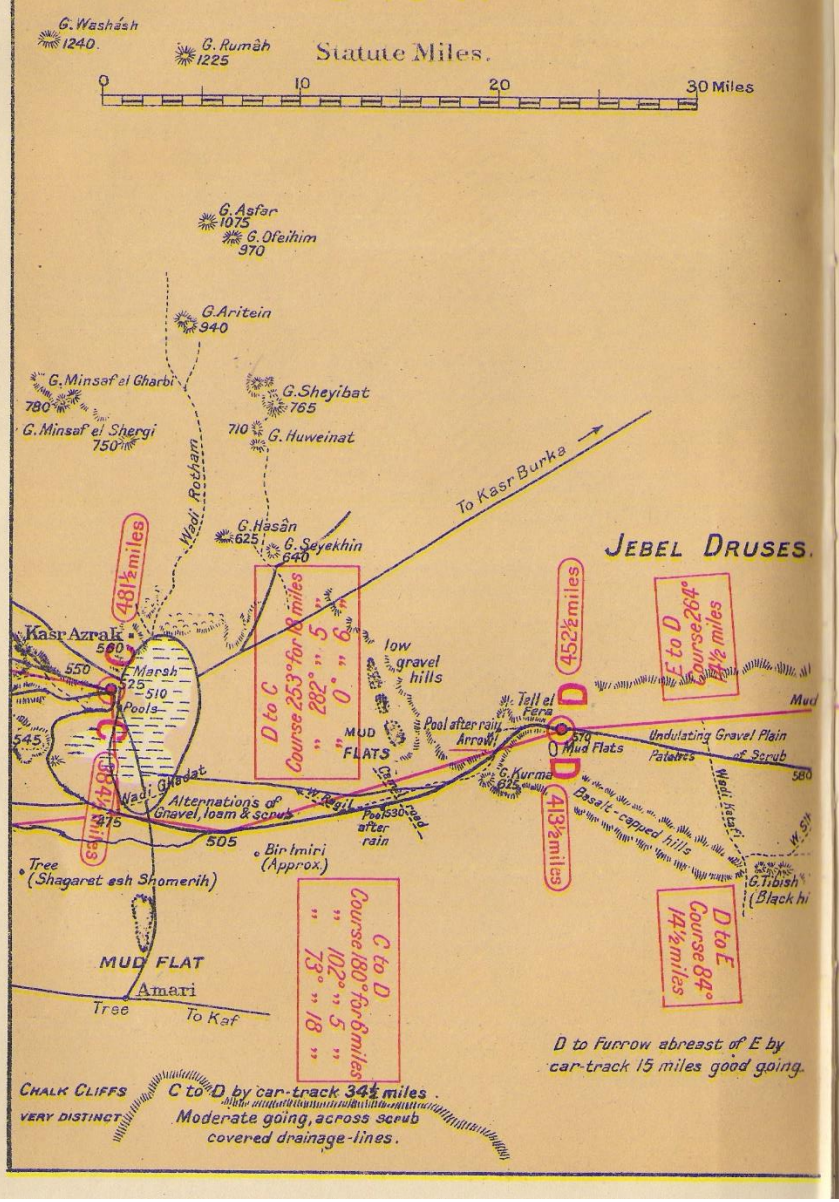
MAGNETIC BEARINGS

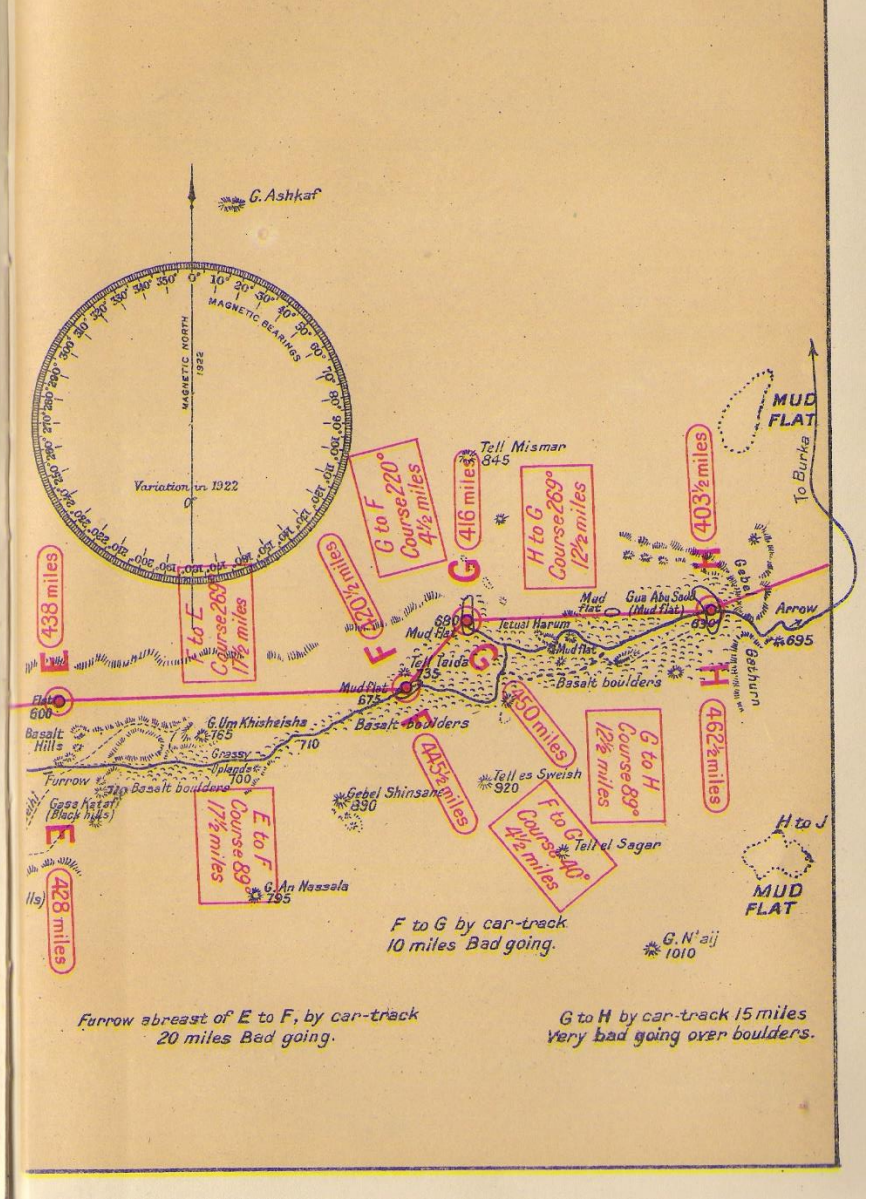
MAGNETIC NORTH 1922

Variation in 1922 ½° W.

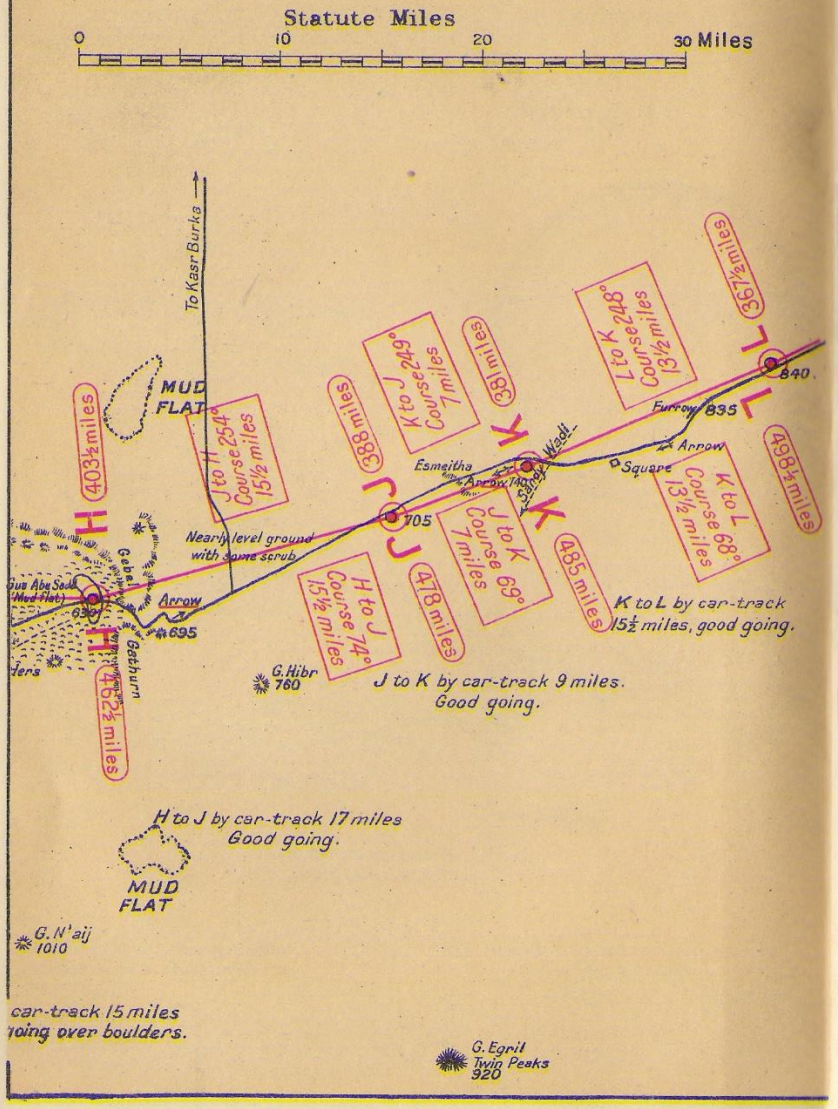
https:

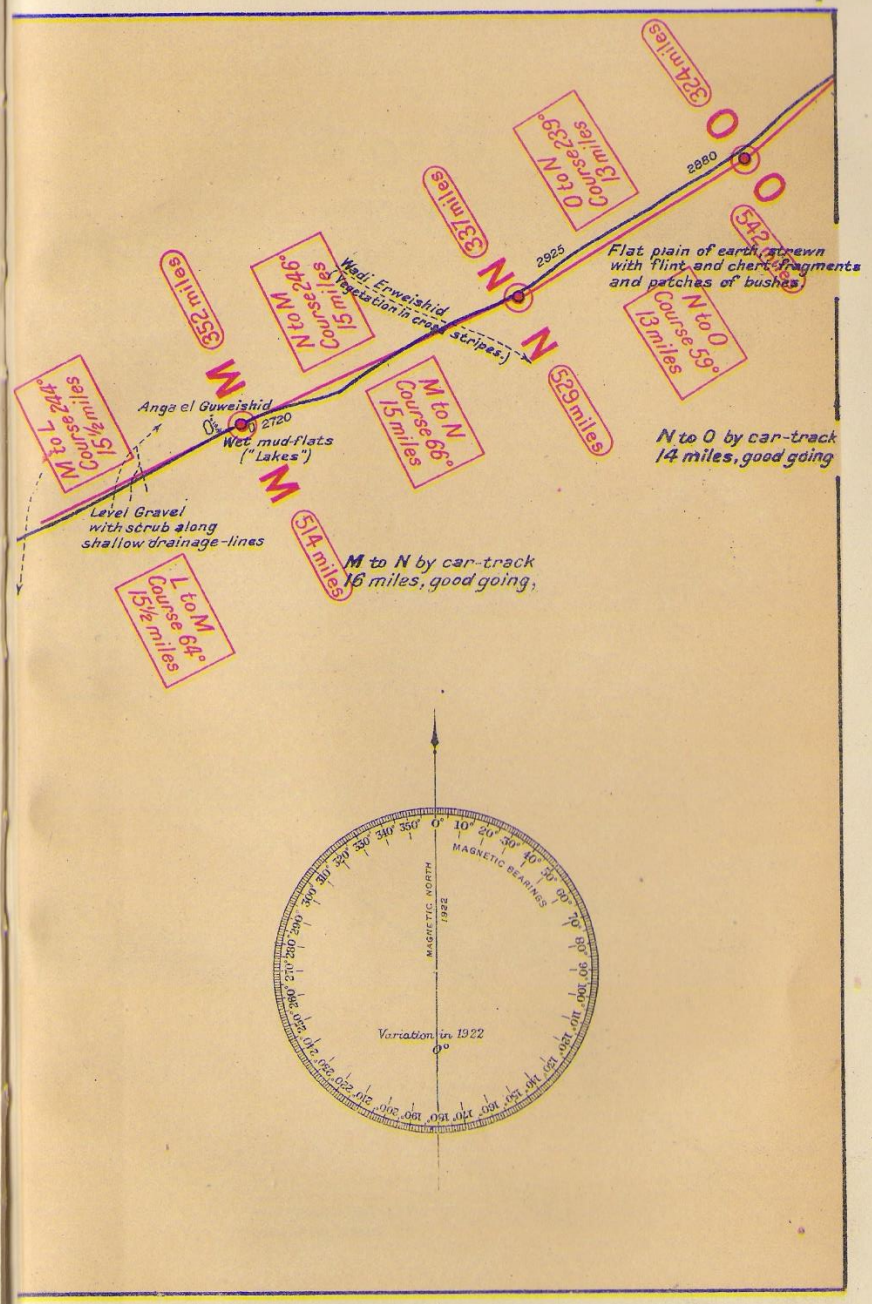
C TO H


Statute Miles.
0 10 20 30 Miles
G. Washásh 1240.
G. Rumâh 1225
G. Asfar 1075
G. Ofeihim 970
G. Aritein 940
G. Minsaf el Gharbi 780
G. Minsaf el Shergi 750
G. Sheyibat 765
G. Huweinat 710
Wadi Rotham
G. Hasân 625
G. Seyekhin 640
To Kasr Burka
JEBEL DRUSES.
Kasr Azrak 500
Marsh 525
510
Pools
550
545
low gravel hills
Pool after rain
Arrow
Tell el Fera
Mud Flats
MUD FLATS
Undulating Gravel Plain
Patches of Scrub
Mud
580
Wadi Ghadat
Alternations of Gravel, loam & scrub
Wadi Rajil
Pools formed after rain
G. Kurma 625
Basalt-capped hills
Wadi Ketaf
W. Sh
505
Bir Imiri (Approx.)
Tree (Shagarat esh Shomerih)
G. Tibish (Black hi
MUD FLAT
Amari
Tree
To Kaf
CHALK CLIFFS VERY DISTINCT
C to D by car-track 34½ miles
Moderate going, across scrub covered drainage-lines.
D to Furrow abreast of E by car-track 15 miles good going.
D to C Course 253° for 8 miles
282° " 5 "
0° " 6 "
C to D Course 180° for 6 miles
73° " 18 "
101° " 5 "
E to D Course 264° 14½ miles
D to E Course 84° 14½ miles
48½ miles
38½ miles
45½ miles
43½ miles


G. Ashkaf
MAGNETIC NORTH 1922
MAGNETIC BEARINGS
Variation in 1922
0°
Tell Mismar 845
MUD FLAT
To Burka
Mud Flat
Gua Abu Saud (Mud flat)
Arrow
Jetual Harum
Mud Flat
Tell Taida 655
Basalt boulders
Basalt Hills
G. Um Khisheisha 165
Grassy Uplands 100
Furrow
To Basalt boulders
Gasa Kataff (Black hills)
Gebel Shinsan 390
Tell es Sweish 920
Tell el Sagar
G. An Nassala 795
G. N'aij 1010
MUD FLAT
H to J
F to G by car-track 10 miles Bad going.
Furrow abreast of E to F, by car-track 20 miles Bad going.
G to H by car-track 15 miles Very bad going over boulders.
G to F Course 220° 4½ miles
H to G Course 289° 12½ miles
I to E Course 283° 17½ miles
E to F Course 89° 17½ miles
F to G Course 140° 4½ miles
G to H Course 89° 12½ miles
43½ miles
41½ miles
45½ miles
46½ miles
40½ miles
45½ miles
40½ miles
46½ miles
40½ miles
43½ miles

H TO O


Statute Miles
0
10
20
30 Miles
To Kasr Burke
MUD FLAT
H to J Course 254° 15½ miles
J to K Course 249° 7 miles
K to L Course 248° 13½ miles
L to M Course 244° 15½ miles
403½ miles
388 miles
381 miles
367½ miles
Furrow 835
840
Arrow
Square
Esmeitha
Arrow 140
Wadi
705
Nearly level ground with some scrub
Arrow
695
Gebel Gethurn
Gus Abu Saud (Mud Flat)
630
H to J Course 74° 15½ miles
J to K Course 69° 7 miles
K to L Course 68° 13½ miles
478 miles
485 miles
498½ miles
462½ miles
K to L by car-track 15½ miles, good going.
G. Hibr 760
J to K by car-track 9 miles. Good going.
H to J by car-track 17 miles Good going.
MUD FLAT
G. N'aij 1010
car-track 15 miles going over boulders.
G. Egril Twin Peaks 920


M to L Course 244° 15½ miles
352 miles
N to M Course 246° 15 miles
331 miles
O to N Course 239° 13 miles
324 miles
Anga el Guweishid
2720
Wet mud-flats ("Lakes")
Wadi Erweishid (Vegetation in cross stripes.)
2925
2880
Flat plain of earth strewn with flint and chert fragments and patches of bushes
M to N Course 66° 15 miles
529 miles
N to O Course 59° 13 miles
542
Level Gravel with scrub along shallow drainage-lines
514 miles
L to M Course 64° 15½ miles
M to N by car-track 16 miles, good going.
N to O by car-track 14 miles, good going
MAGNETIC NORTH 1922
MAGNETIC BEARINGS
Variation in 1922 0°

https

O TO 8

Statute Miles.

0 10 20 30 Miles

O to P Course 50° 15 miles

P to O Course 230° 15 miles

P to R Course 62° 14 miles

R to P Course 232° 14 miles

R to XI Course 49° 17 miles

XI to R Course 229° 17 miles

X to XI Course 217° 17 miles

IX to X Course 240° 11½ miles

8 to IX Course 287° 10 miles

IX to 8 Course 107° 10 miles

X to IX Course 60° 11½ miles

XI to X Course 31° 17 miles

542 miles

324 miles

309 miles

357 miles

571 miles

295 miles

585 miles

626½ miles

239½ miles

261 miles

Mud flat in Pan

Leachman Hill (Approx.)

Wadi Hawat

Wadi Haura

Wadi Abailie

Tell el Abailie

Wadi Haurah

Deep Wells on Wadi

Shallow Wells

El Mat Wells

Rutbah Wells

Telul esh Shawer

Fairly level

Twaidat el Chalet

Jid

Arrows

Bent Arrow

Level to undulating grou of limestones with sprink flints and chert on surfac with short herbage and s and occasional shallow drainage-lines

P to R by car-track 14½ miles, good going.

R to XI by car-track 17½ miles, good going.

XI to X by car-track 18½ miles, good going.

X to IX by car-track 18 miles, good going.

IX to 8 by car-track 9½ miles, going bumpy in places

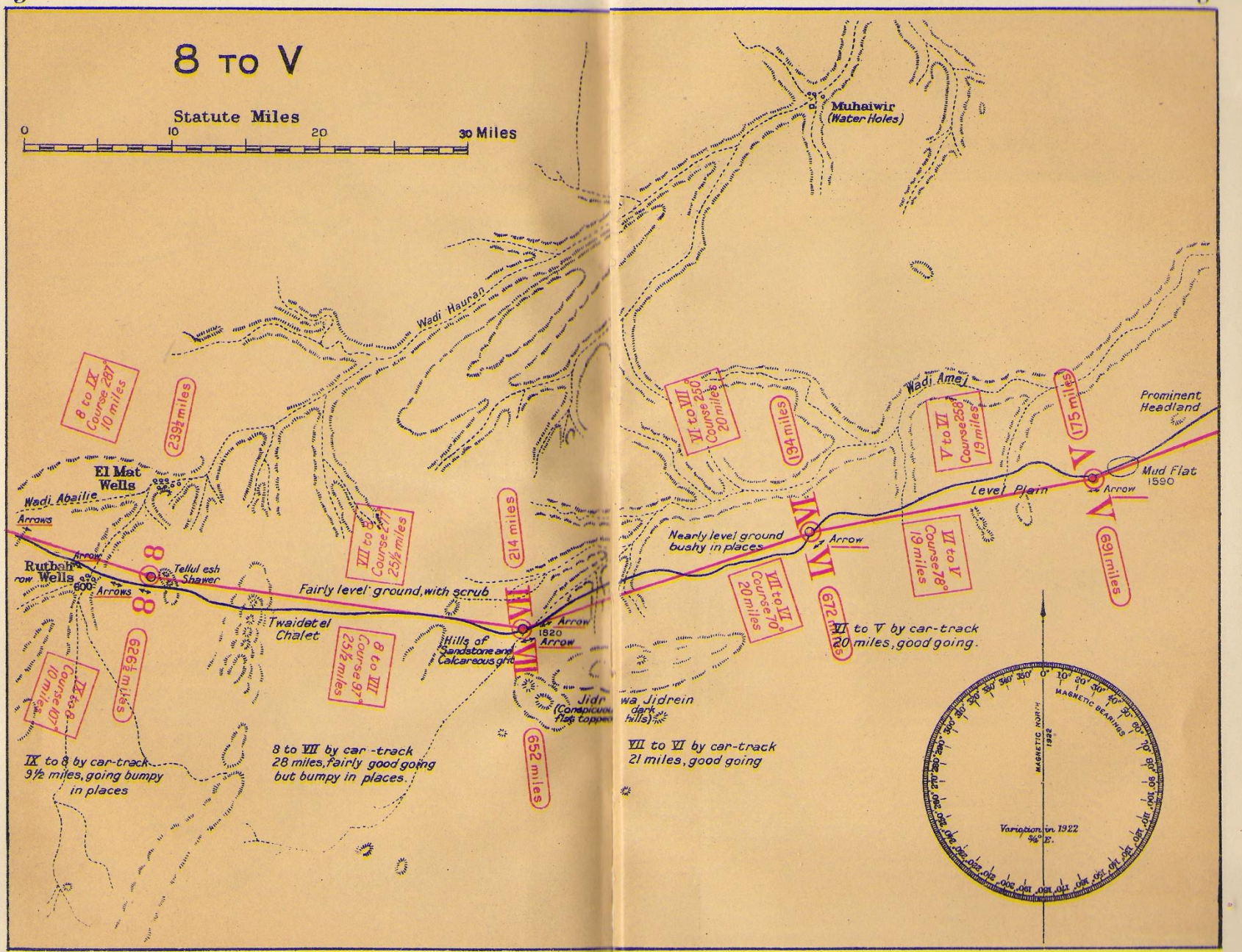
8 to XII by car-track 28 miles, fairly good going but bumpy in places.

MAGNETIC NORTH 1922

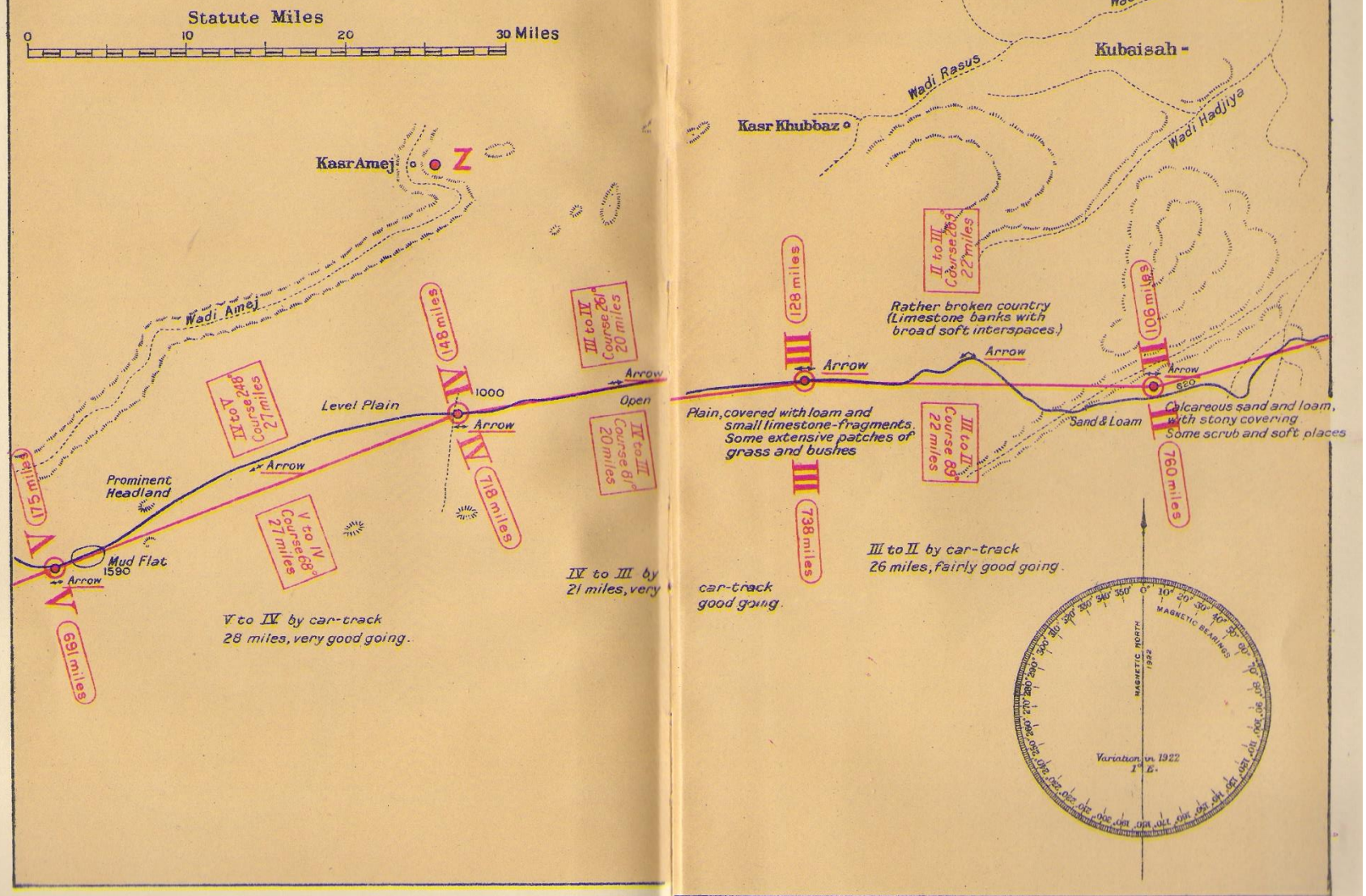
MAGNETIC BEARINGS

Variation in 1922 ½° E.

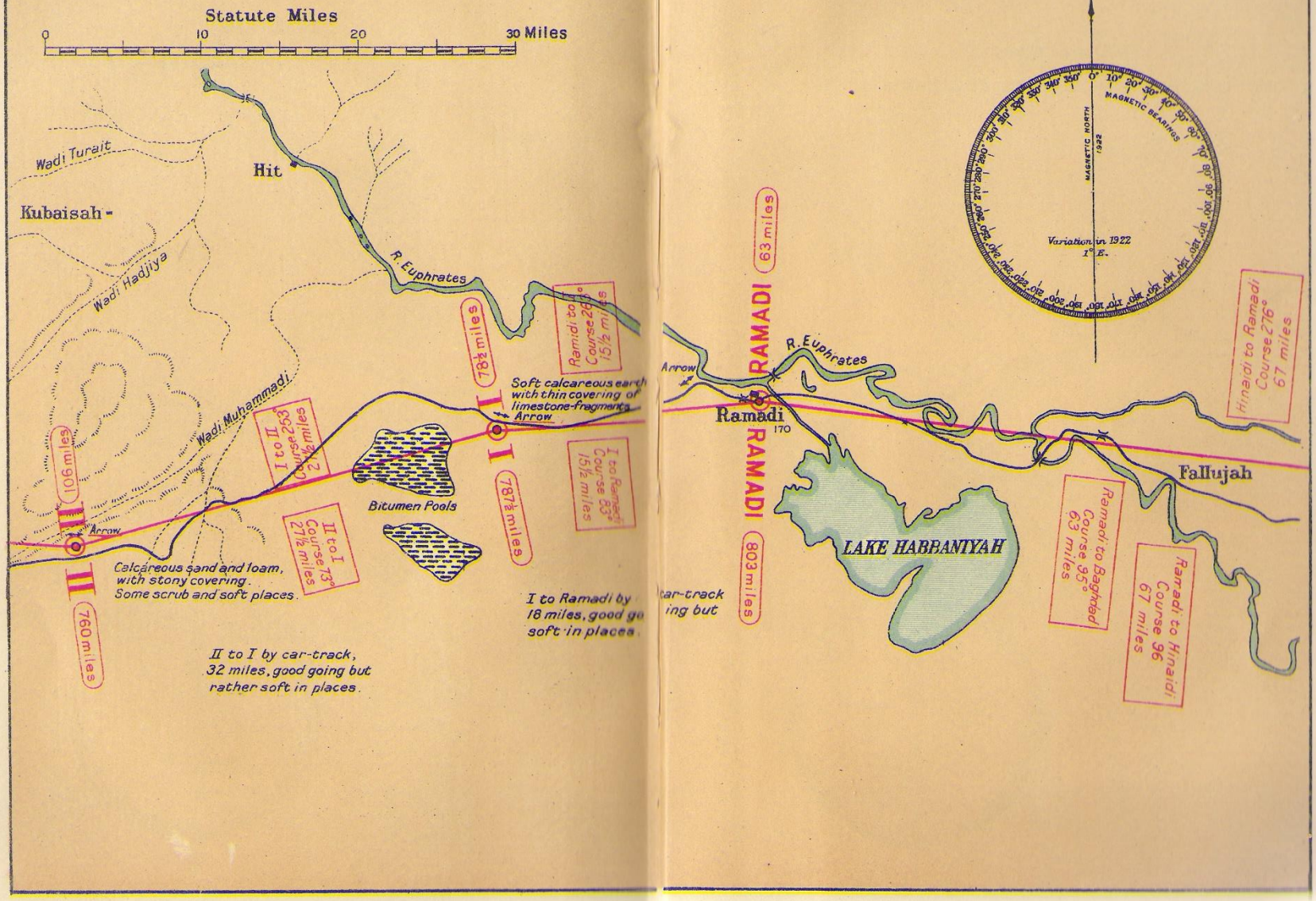
8 TO V


Statute Miles
0
10
20
30 Miles
Muhaiwir
(Water Holes)
Wadi Hauran
Wadi Amej
Prominent Headland
Mud Flat
1590
Level Plain
Arrow
8 to IX
Course 287°
10 miles
239½ miles
El Mat
Wells
Wadi Abailie
Arrows
Rutbah
Wells
600
Arrow
Arrows
Tellul esh
Shawer
Fairly level ground, with scrub
Twaidat el
Chalet
VII to 8
Course 277°
25½ miles
214 miles
8 to III
Course 87°
25½ miles
Hills of
Sandstone and
Calcareous grit
Arrow
1820
Arrow
Jidr
(Conspicuous
flat topped
dark
hills)
652 miles
626½ miles
IX to 8
Course 107°
10 miles
IX to 8 by car-track
9½ miles, going bumpy
in places
8 to VII by car-track
28 miles, fairly good going
but bumpy in places.
VII to VI by car-track
21 miles, good going
VI to VII
Course 250°
20 miles
194 miles
Nearly level ground
bushy in places
Arrow
VII to VI
Course 70°
20 miles
672 miles
VI to V
Course 78°
19 miles
V to VI
Course 258°
19 miles
175 miles
691 miles
VI to V by car-track
20 miles, good going.
MAGNETIC BEARINGS
MAGNETIC NORTH
1922
Variation in 1922
3½° E.

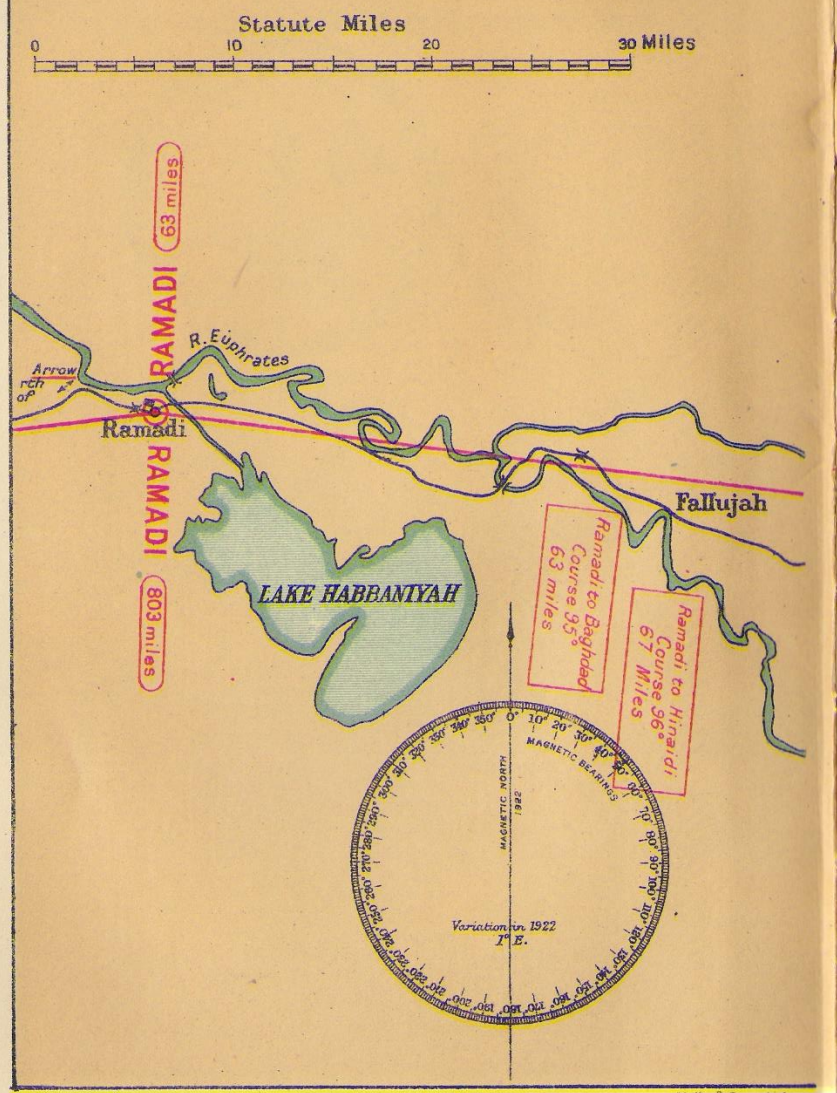
V TO II


Statute Miles
0
10
20
30 Miles
Kasr Amej
Z
Wadi Amej
Level Plain
Prominent Headland
Mud Flat
1590
Arrow
1000
Open
V
(175 miles)
(169 miles)
IV
(148 miles)
(718 miles)
III
(128 miles)
(738 miles)
II
(106 miles)
(760 miles)
IV to V Course 248° 27 miles
V to IV Course 68° 27 miles
III to IV Course 261° 20 miles
IV to III Course 81° 20 miles
V to IV by car-track
28 miles, very good going.
IV to III by
21 miles, very
car-track
good going.
Kasr Khubbaz
Wadi Rasus
Wadi Turait
Kubaisah
Wadi Hadjiya
II to III Course 289° 22 miles
Rather broken country
(Limestone banks with
broad soft interspaces.)
Plain, covered with loam and
small limestone-fragments.
Some extensive patches of
grass and bushes
III to II Course 89° 22 miles
Sand & Loam
Calcareous sand and loam,
with stony covering
Some scrub and soft places
III to II by car-track
26 miles, fairly good going.
MAGNETIC BEARINGS
MAGNETIC NORTH 1922
Variation in 1922
1° E.

II TO FALLUJAH



RAMADI TO BAGHDAD



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